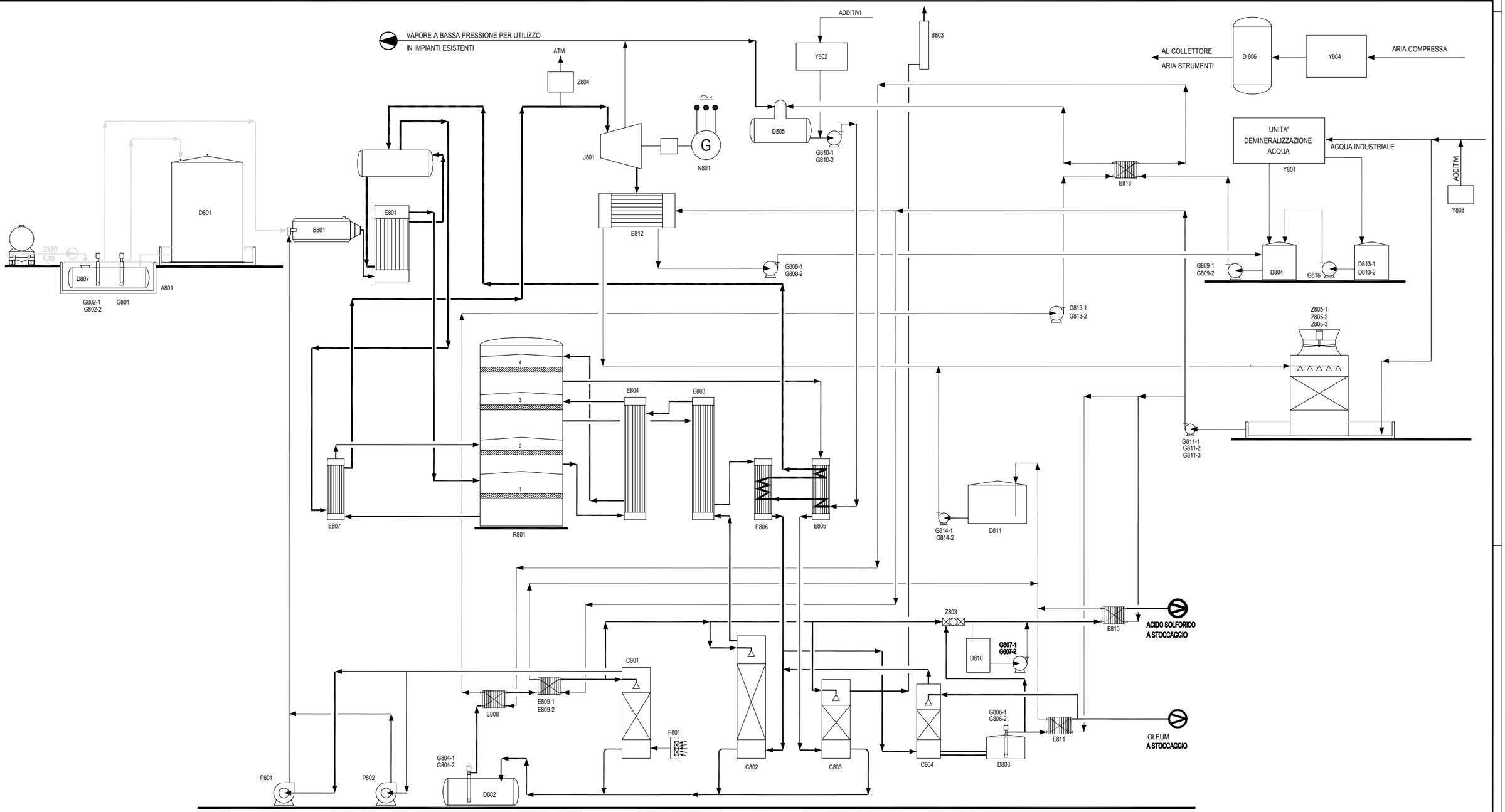


LEGENDA

SIGLA	DESCRIZIONE	N° PEZZI	SIGLA	DESCRIZIONE	N° PEZZI	SIGLA	DESCRIZIONE	N° PEZZI
A801	VASCA ZOLFO	1	E808	SCAMBIATORE A PIASTRE ACIDO SOLFORICO	1	P802	VENTILATORE DI FLUSSAGGIO	1
B801	FORNO ZOLFO	1	E809	SCAMBIATORE A PIASTRE ACIDO SOLFORICO	2	R801	CONVERTITORE SO2/SO3	1
B803	CAMINO	1	E810	SCAMBIATORE A PIASTRE ACIDO SOLFORICO	1	Y801	UNITA' DI DEMINERALIZZAZIONE ACQUA	1
C801	TORRE ESSICCAMENTO ARIA	1	E811	SCAMBIATORE A PIASTRE OLEUM	1	Y802	UNITA' DI ALIMENTAZIONE ADDITIVI ACQUA ALIMENTO CALDAIA	1
C802	COLONNA DI ASSORBIMENTO INTERMEDIO	1	E812	CONDENSATORE DI VAPORE	1	Y803	UNITA' DI ALIMENTAZIONE ADDITIVI ACQUA DI RAFFREDDAMENTO	1
C803	COLONNA DI ASSORBIMENTO FINALE	1	E813	SCAMBIATORE A PIASTRE ACQUA DEMINERALIZZATA	1	Y804	UNITA' DI ESSICAMENTO ARIA STRUMENTI	1
C804	COLONNA DI ASSORBIMENTO OLEUM	1	F801	FILTRO ARIA	1	Z803	MISCELATORE ACIDO/OLEUM	1
D801	SERBATOIO DI STOCCAGGIO ZOLFO	1	G801	POMPA TRASFERIMENTO ZOLFO	1	Z804	SILENZIATORE PER VAPORE	1
D802	SERBATOIO INTERMEDIO ACIDO SOLFORICO	1	G802	POMPA ALIMENTAZIONE ZOLFO	2	Z805	TORRI DI RAFFREDDAMENTO ACQUA	3
D803	SERBATOIO CIRCOLAZIONE OLEUM	1	G804	POMPA CIRCOLAZIONE ACIDO SOLFORICO	2	D813	SERBATOIO DI ACCUMULO ACQUA DEMINERALIZZATA	2
D804	SERBATOIO DI STOCCAGGIO ACQUA DEMINERALIZZATA	1	G806	POMPA CIRCOLAZIONE OLEUM	2	G816	POMPA DI TRASFERIMENTO ACQUA DEMINERALIZZATA A D804	1
D805	DEGASATORE CONDENSATO	1	G807	POMPA BOOSTER ACIDO SOLFORICO	2			
D806	SEPARATORE POLMONE ARIA STRUMENTI	1	G808	POMPA RILANCIO CONDENSA TURBOGENERATORE	2			
D807	SERBATOIO RICEVIMENTO ZOLFO	1	G809	POMPA ALIMENTAZIONE ACQUA DEMINERALIZZATA	2			
D811	SERBATOIO RACCOLTA ACQUA DI RAFFREDDAMENTO	1	G810	POMPA ALIMENTO ACQUA CALDAIA	2			
E801	CALDAIA DI RECUPERO	1	G811	POMPA CIRCOLAZIONE ACQUA DI RAFFREDDAMENTO	3			
E803	SCAMBIATORE FREDDO INTERSTADIO	1	G813	POMPA CIRCOLAZIONE ACQUA DEMINERALIZZATA	2			
E804	SCAMBIATORE CALDO INTERSTADIO	1	G814	POMPA RILANCIO ACQUA DI RAFFREDDAMENTO	2			
E805	ECONOMIZZATORE 4A/4C	1	J801	TURBINA A VAPORE	1			
E806	ECONOMIZZATORE 3B	1	N801	ALTERNATORE	1			
E807	SURRISCALDATORE VAPORE 1A	1	P801	COMPRESSORE PRINCIPALE ARIA DI PROCESSO	1			

ZOLFO FUSO
GAS
ACIDO SOLFORICO
CAMINO
ACQUA DEMINERALIZZATA
ACQUA INDUSTRIALE
ADDITIVI CHIMICI
VAPORE BASSA PRESSIONE
VAPORE ALTA PRESSIONE
CONDENSA
OLEUM
ARIA

Revisione	Data	Motivo della Revisione	Geom. G. Enlu	Dott.Ing. G. Enlu	Dott.Ing. M. Lavanga
00	02.08.2004	Emissione	Disegnato	Verificato RT	Approvato DS

FLUORSID S.p.A.
Area industriale di Cagliari,
2ª strada Macchiareddu
09032 Assemini (CA)

Titolo:

IMPIANTO ACIDO SOLFORICO

Disegno n°: FLG_COES_PL05

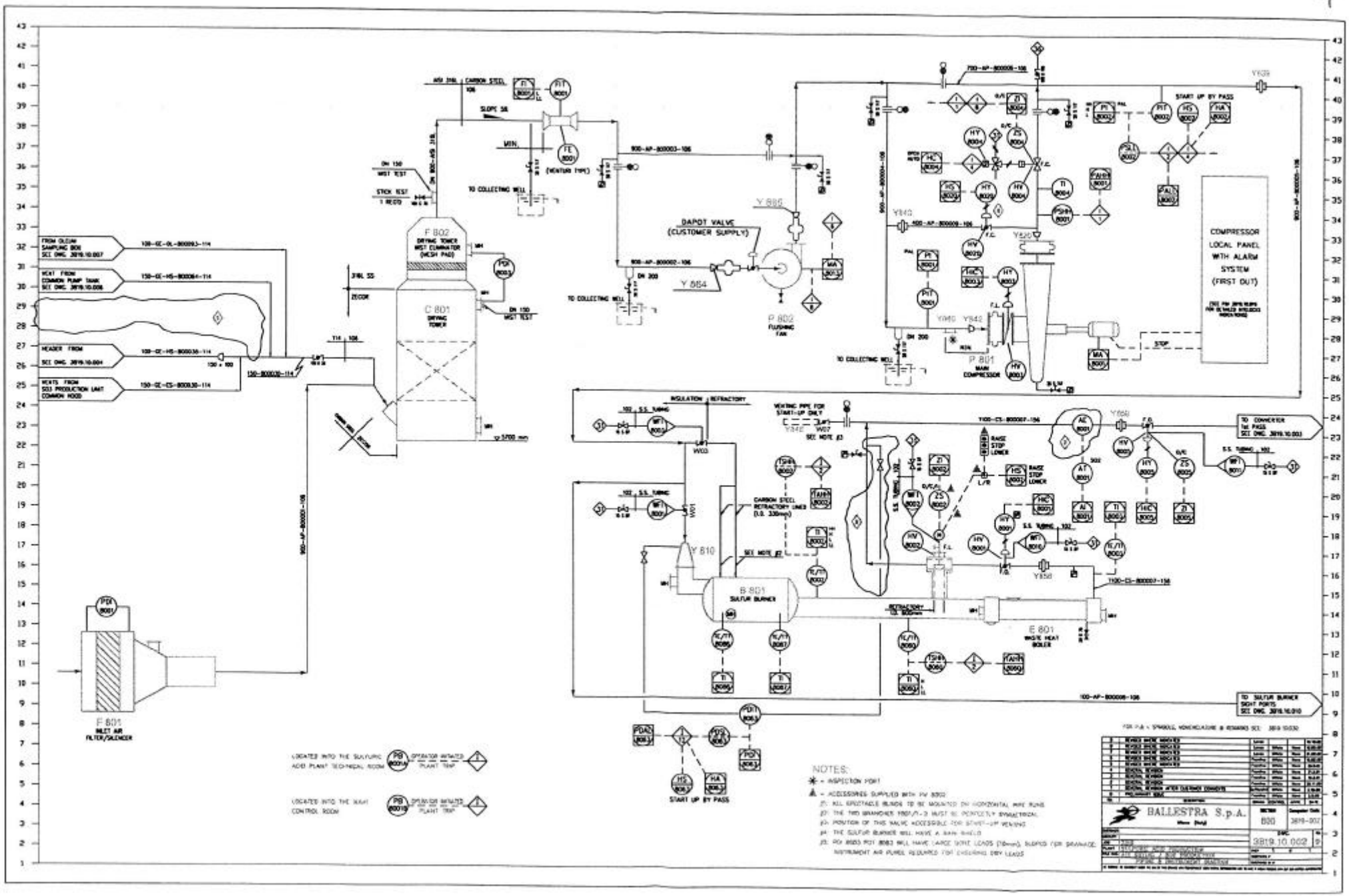
Scala: 1:1000

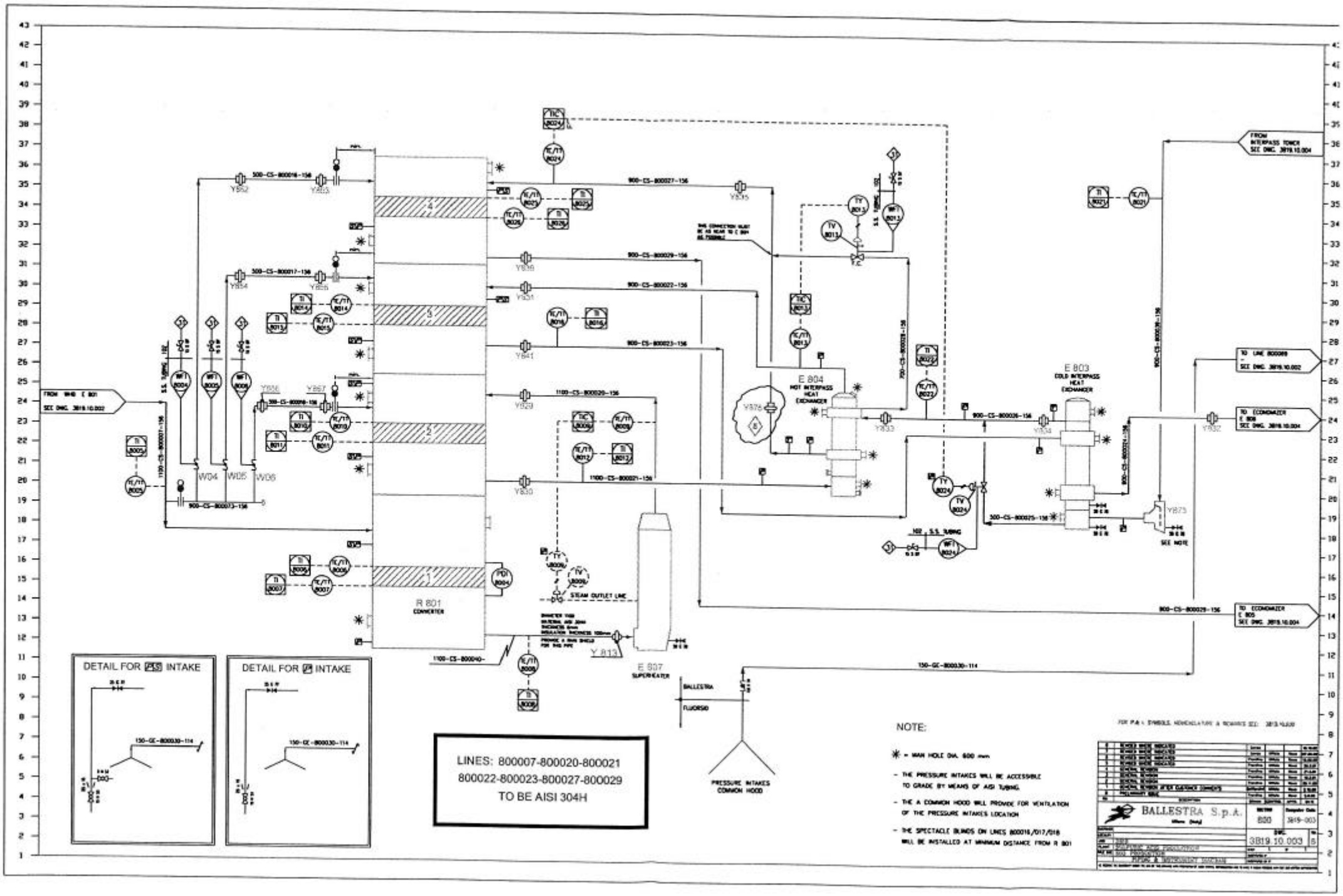
Tavola: 1/1

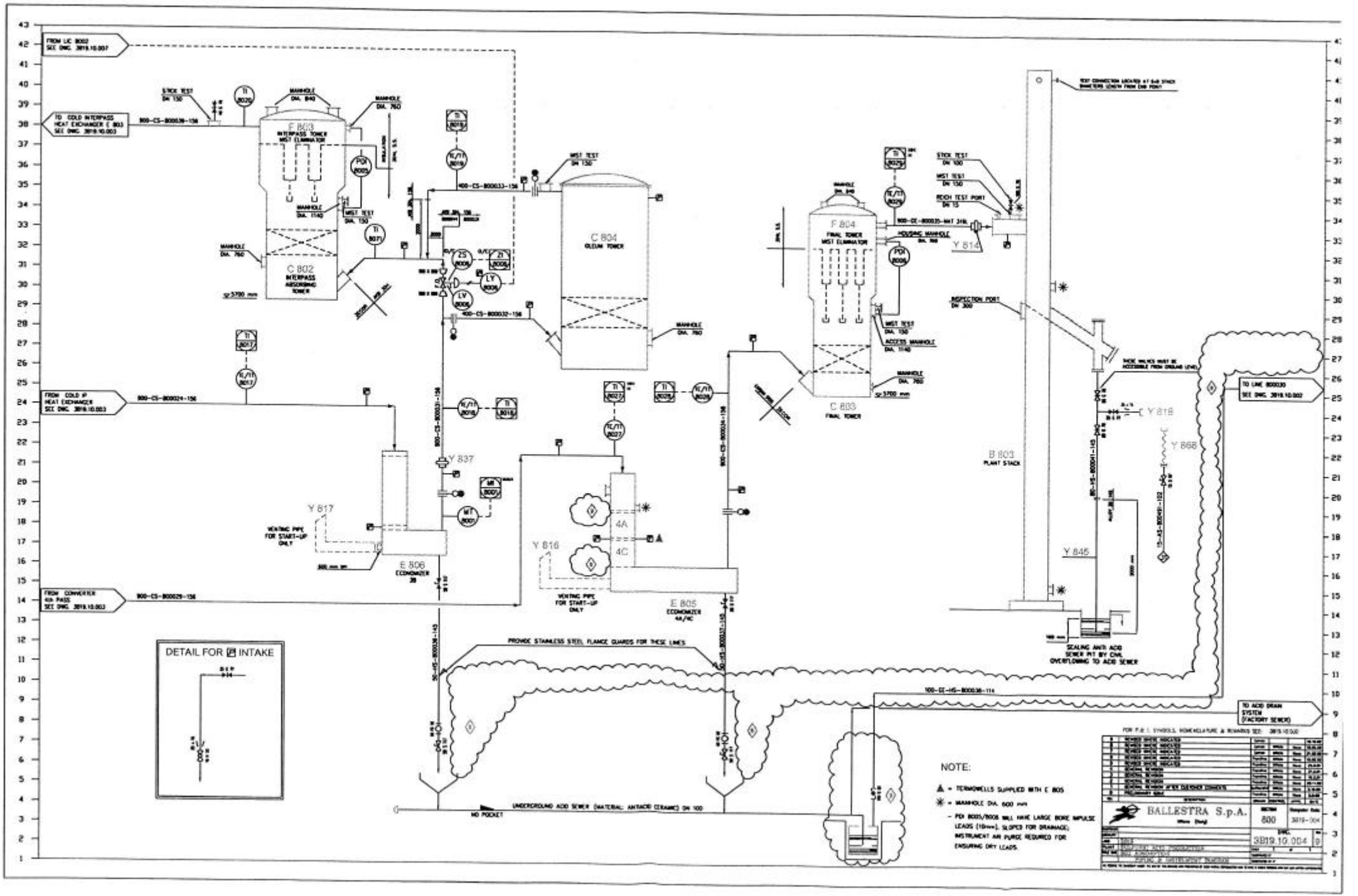
Oggetto:

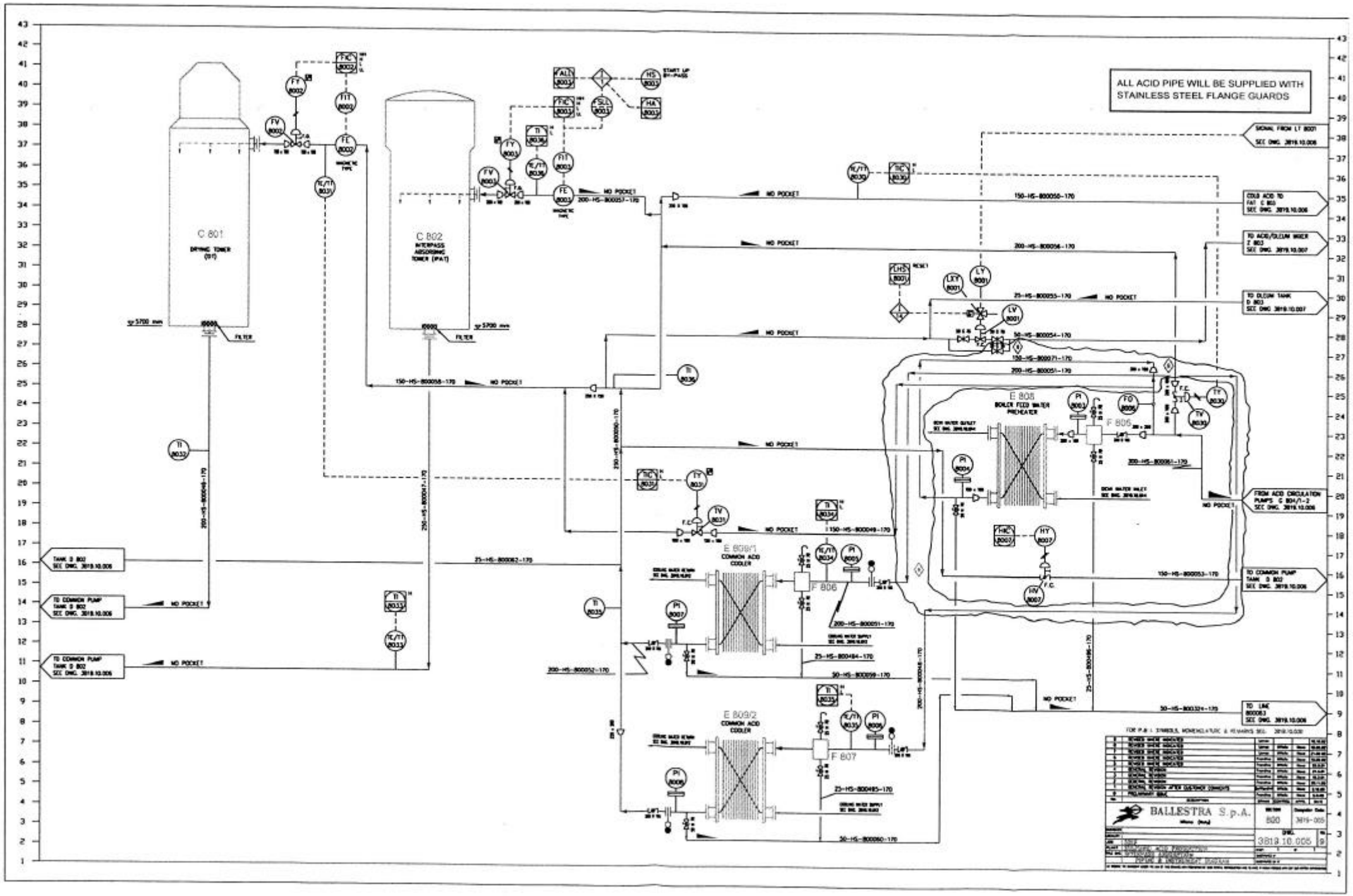
FLOW - SHEET

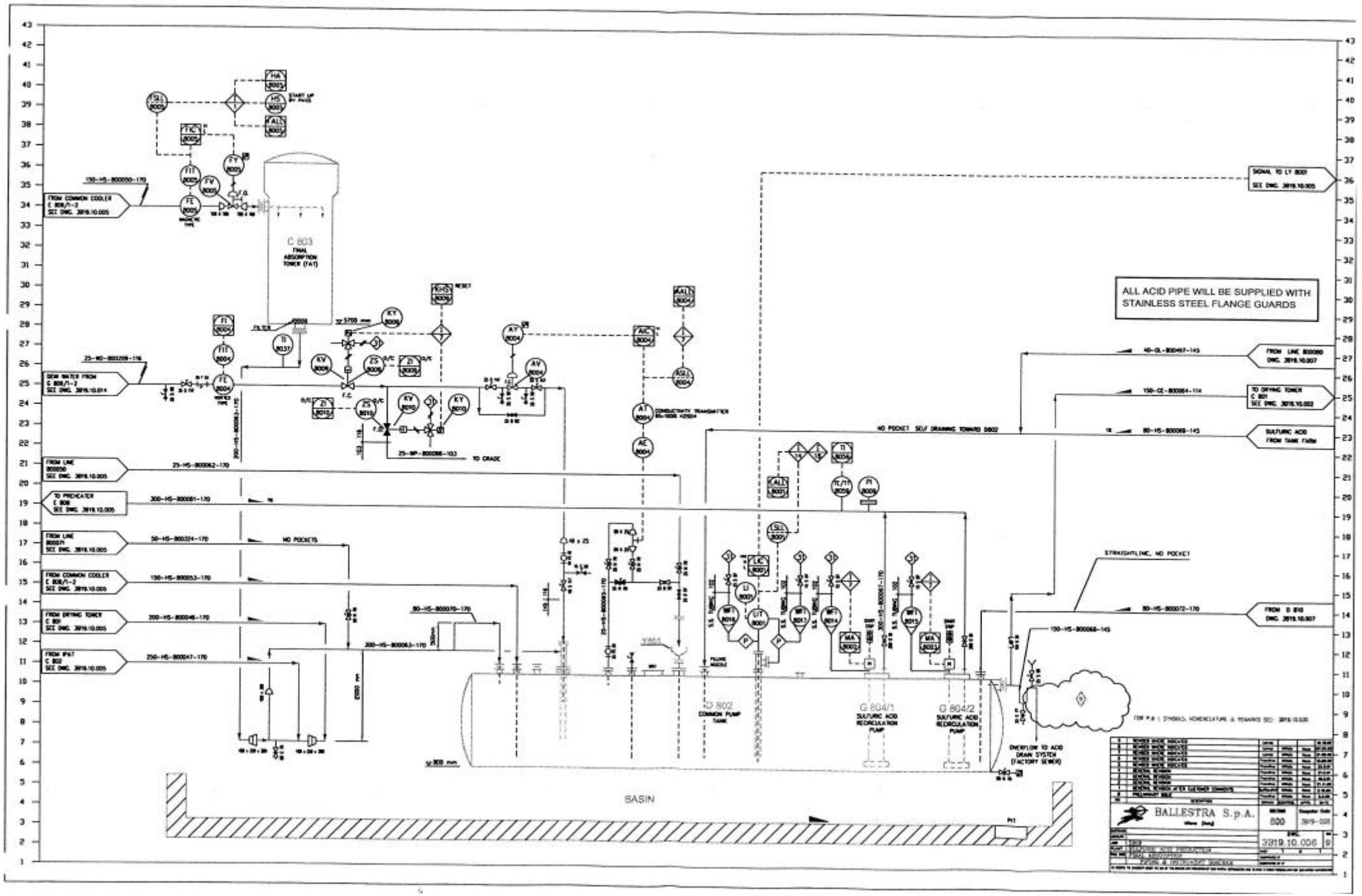
Nome del file: FLG_COES_PL05_Rev00

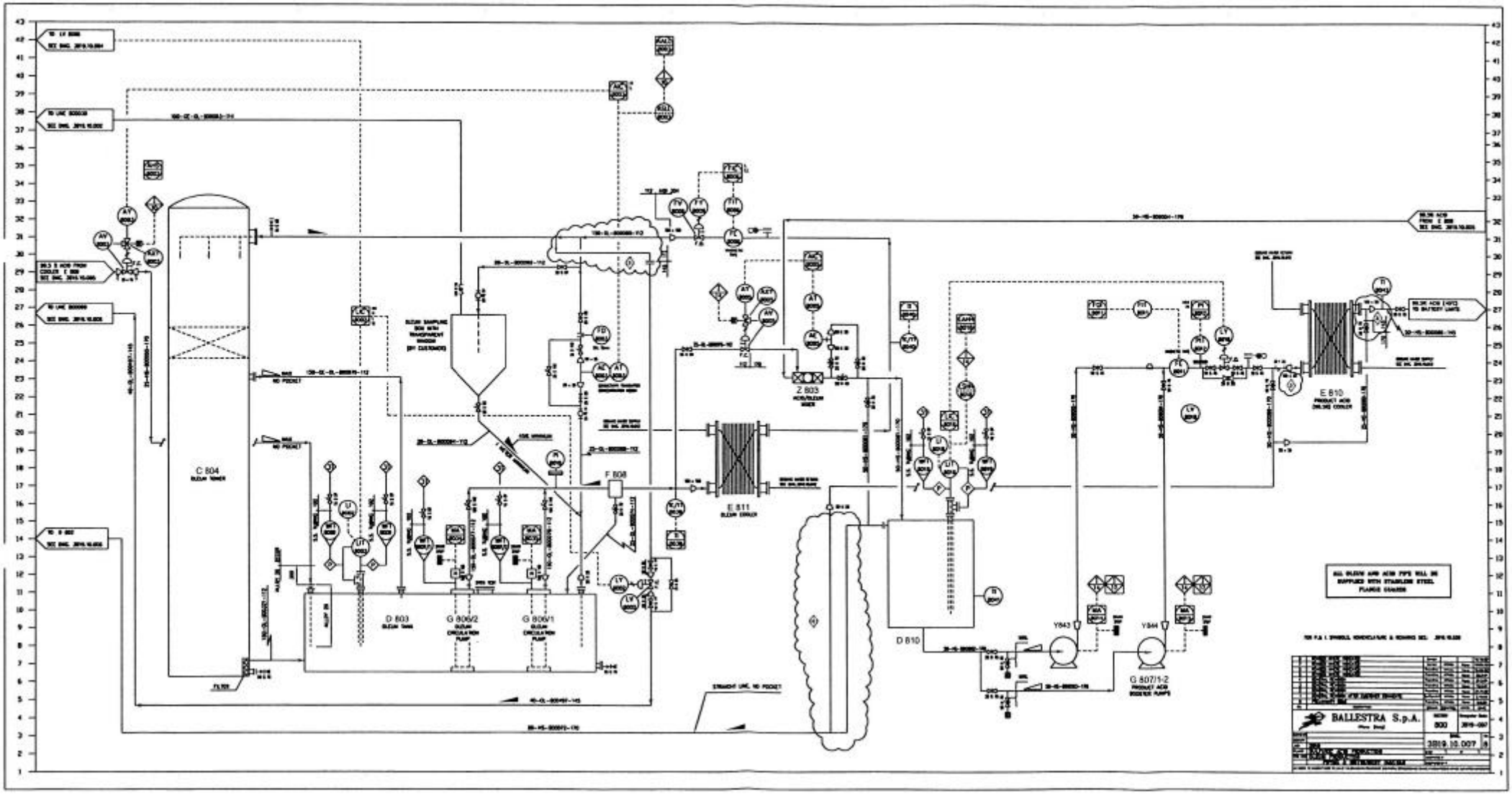

F 802
DRYING TOWER MIST ELIMINATOR (MESH PAD)
C 801
DRYING TOWER
DAPOT VALVE (CUSTOMER SUPPLY)
P 802
FLUSHING FAN
P 801
MAIN COMPRESSOR
COMPRESSOR LOCAL PANEL WITH ALARM SYSTEM (FIRST OUT)
START UP BY PASS
F 801
INLET AIR FILTER/SILENCER
B 801
SULFUR BURNER
E 801
WASTE HEAT BOILER
Y 810
Y 864
Y 865
INSULATION REFRACTORY
CARBON STEEL REFRACTORY LINED (I.D. 330mm)
TO COLLECTING WELL
TO CONVERTER 1st PASS SEE DWG. 3819.10.003
TO SULFUR BURNER SIGHT PORTS SEE DWG. 3819.10.010
FROM OLEUM SAMPLING BOX SEE DWG. 3819.10.007
HEAT FROM COMMON PUMP TANK SEE DWG. 3819.10.006
HEADER FROM SEE DWG. 3819.10.004
HEATS FROM SO3 PRODUCTION UNIT COMMON HOOD
LOCATED INTO THE SULFURIC ACID PLANT TECHNICAL ROOM
LOCATED INTO THE MAIN CONTROL ROOM
OPERATOR INITIATED PLANT TRIP
NOTES:
* = INSPECTION PORT
▲ = ACCESSORIES SUPPLIED WITH FV 8002
(1): ALL EASTABLE BLINDS TO BE MOUNTED ON HORIZONTAL PIPE RUNS
(2): THE TWO BRANCHES 100-P1-3 MUST BE PERFECTLY SYMMETRICAL
(3): POSITION OF THIS VALVE ACCESSIBLE FOR START-UP VENTING
(4): THE SULFUR BURNER WILL HAVE A BAFFLE SHIELD
(5): PDI 8003 PDT 8003 WILL HAVE LARGE VENT LOADS (38mm), SUPPLY FOR DRAINAGE INSTRUMENT AIR PURGE REQUIRED FOR ENSURING DRY LEADS
BALLESTRA S.p.A.
Milano (Italy)
820
3819-002
3819.10.002
9

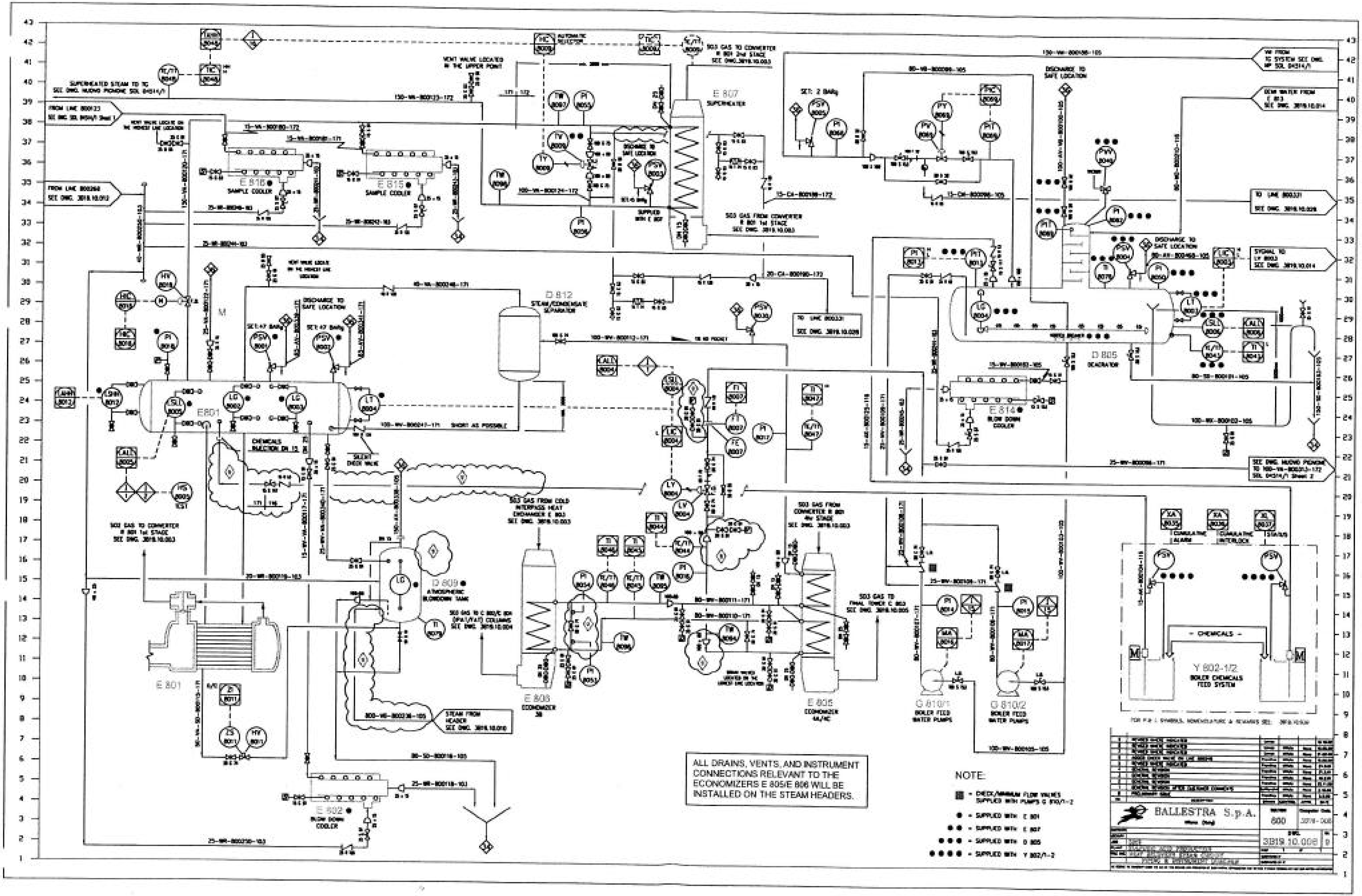

R 801
CONVERTER
E 804
HOT INTERPASS HEAT EXCHANGER
E 803
COLD INTERPASS HEAT EXCHANGER
E 807
SUPERHEATER
STEAM OUTLET LINE
DETAIL FOR PSS INTAKE
DETAIL FOR PI INTAKE
150-GC-800030-114
LINES: 800007-800020-800021
800022-800023-800027-800029
TO BE AISI 304H
PRESSURE INTAKES
COMMON HOOD
NOTE:
* = MAN HOLE DIA. 600 mm
- THE PRESSURE INTAKES WILL BE ACCESSIBLE TO GRADE BY MEANS OF AISI Tubing
- THE A COMMON HOOD WILL PROVIDE FOR VENTILATION OF THE PRESSURE INTAKES LOCATION
- THE SPECTACLE BLINDS ON LINES 800016/017/018 WILL BE INSTALLED AT MINIMUM DISTANCE FROM R 801
BALLESTRA S.p.A.
3819.10.003


F 803
INTERPASS TOWER
MIST ELIMINATOR
C 802
INTERPASS ABSORBING TOWER
C 804
OLEUM TOWER
F 804
FINAL TOWER
MIST ELIMINATOR
C 803
FINAL TOWER
B 803
PLANT STACK
E 806
ECONOMIZER 3B
E 805
ECONOMIZER 4A/4C
Y 814
Y 818
Y 868
Y 845
Y 837
Y 817
Y 816
4A
4C
FROM LIC 8002
SEE DWG. 3B19.10.007
TO COLD INTERPASS HEAT EXCHANGER E 803
SEE DWG. 3B19.10.003
FROM COLD IP HEAT EXCHANGER
SEE DWG. 3B19.10.003
FROM CONVERTER 4th PASS
SEE DWG. 3B19.10.003
TO LINE 800030
SEE DWG. 3B19.10.002
TO ACID DRAIN SYSTEM (FACTORY SEWER)
800-CS-800036-156
400-CS-800033-156
400-CS-800032-156
800-CS-800024-156
800-CS-800029-156
800-CS-800031-156
800-CS-800034-156
50-HS-800036-145
50-HS-800037-145
100-GI-HS-800038-114
15-AS-800049-102
MIST TEST DN 150
STACK TEST DN 150
MIST TEST DN 100
REICH TEST PORT DN 15
INSPECTION PORT DN 300
ACCESS MANHOLE DIA. 1140
HOUSING MANHOLE DIA. 900
MANHOLE DIA. 760
MANHOLE DIA. 840
MANHOLE DIA. 1140
VENTING PIPE FOR START-UP ONLY
PROVIDE STAINLESS STEEL FLANGE GUARDS FOR THESE LINES
UNDERGROUND ACID SEWER (MATERIAL: ANTIACID CERAMIC) DN 100
NO POCKET
SEALING ANTI ACID SEWER PIT BY CIVIL OVERFLOWING TO ACID SEWER
THICK VALVES MUST BE ACCESSIBLE FROM GROUND LEVEL
DETAIL FOR INTAKE
NOTE:
= THERMOWELLS SUPPLIED WITH E 805
= MANHOLE DIA. 600 mm
- PDI 8005/8008 WILL HAVE LARGE BORE IMPULSE LEADS (18mm), SLOPED FOR DRAINAGE. INSTRUMENT AIR PURGE REQUIRED FOR ENSURING DRY LEADS.
BALLESTRA S.p.A.
800
3B19.10.004
9

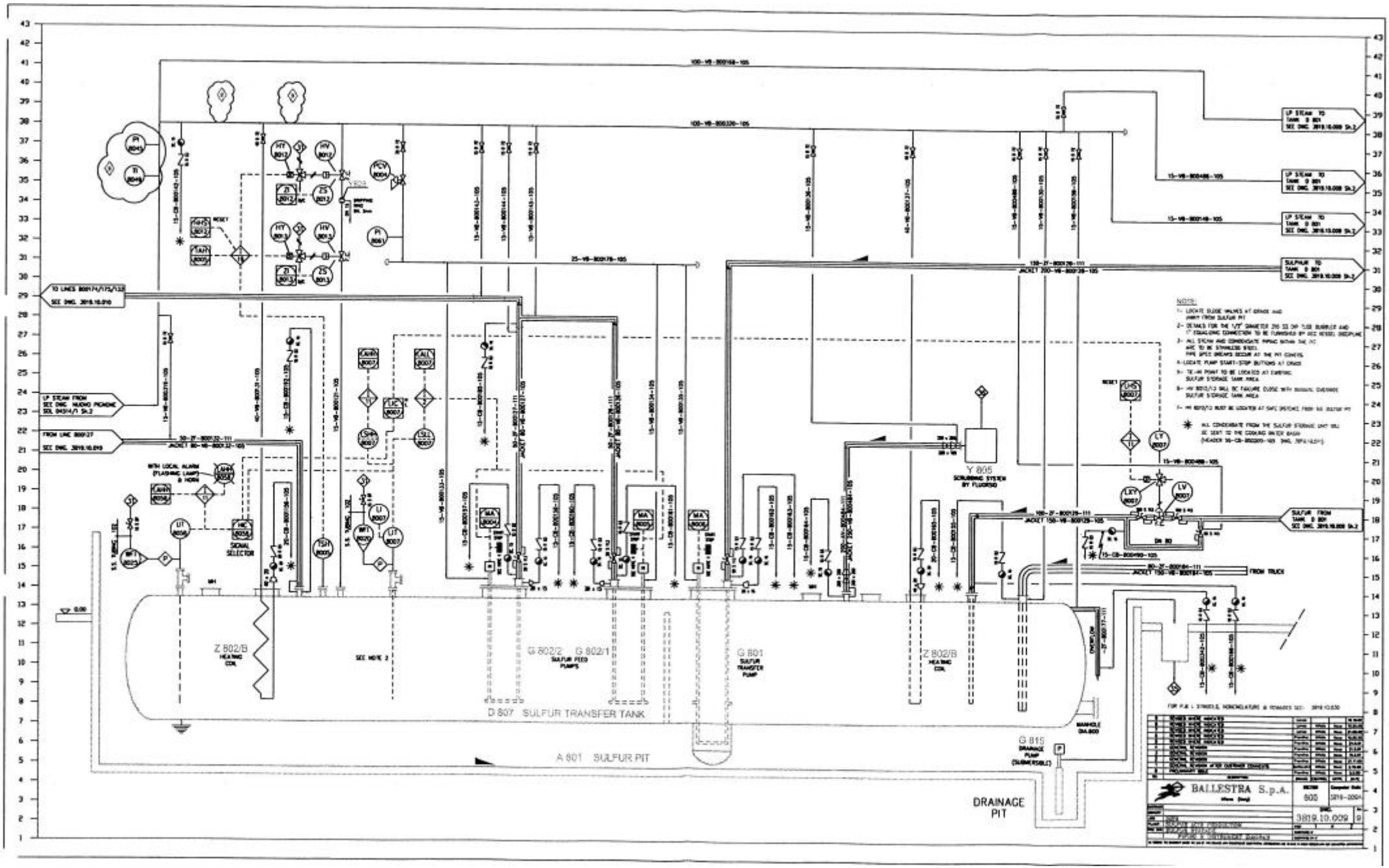

ALL ACID PIPE WILL BE SUPPLIED WITH STAINLESS STEEL FLANGE GUARDS
C 801
DRYING TOWER (DT)
C 802
INTERPASS ABSORBING TOWER (IPAT)
E 805
BOILER FEED WATER PREHEATER
E 809/1
COMMON ACID COOLER
E 809/2
COMMON ACID COOLER
F 805
F 806
F 807
NO POCKET
FILTER
TO COMMON PUMP TANK D 802
SEE DWG. 3819.10.006
FROM ACID CIRCULATION PUMPS G 804/1-2
SEE DWG. 3819.10.006
TO LINE 800063
SEE DWG. 3819.10.006
BALLESTRA S.p.A.
3819.10.005

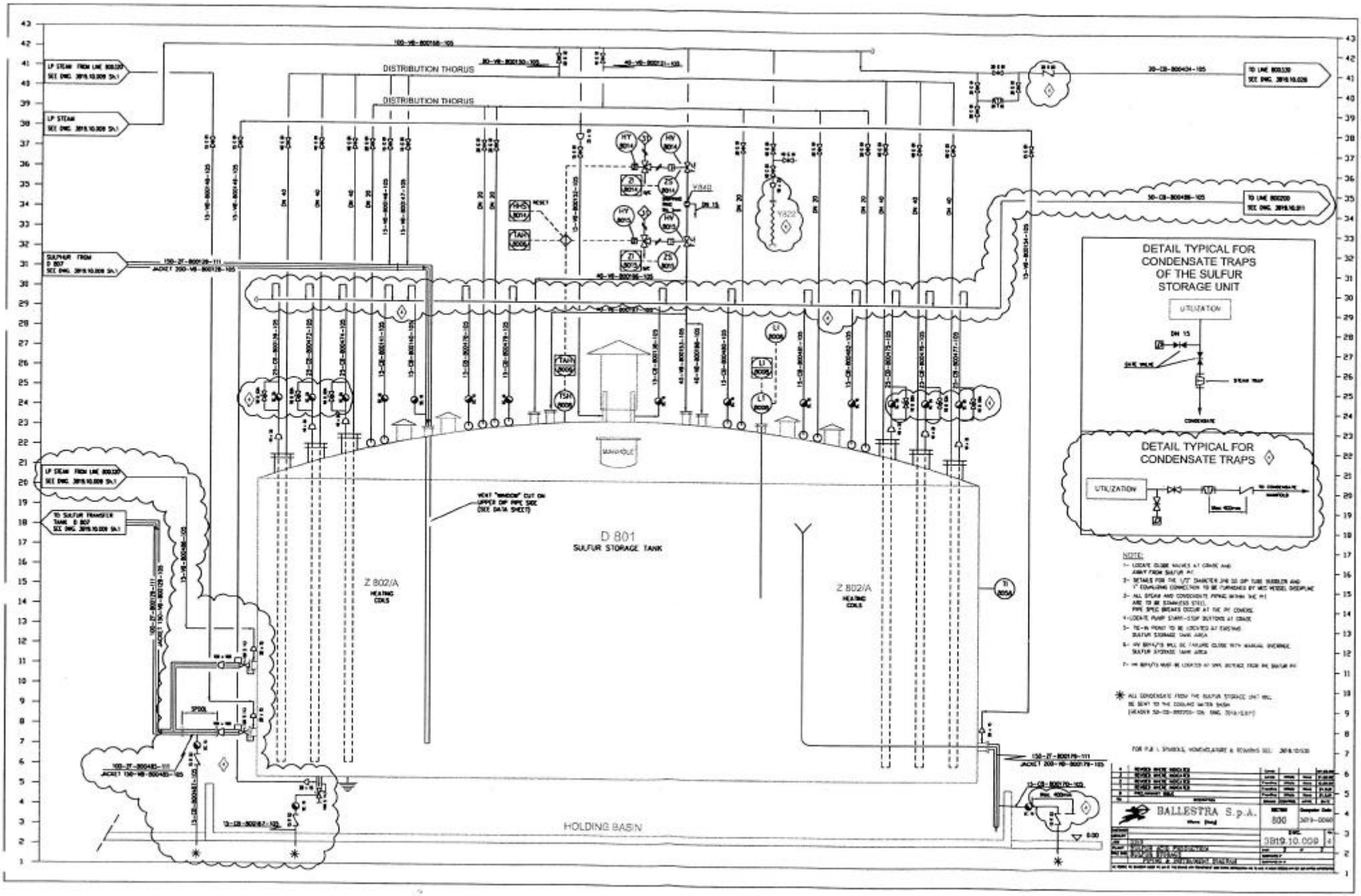

ALL ACID PIPE WILL BE SUPPLIED WITH STAINLESS STEEL FLANGE GUARDS
C 803
FINAL ABSORPTION TOWER (FAT)
D 802
COMMON PUMP TANK
G 804/1
SULFURIC ACID RECIRCULATION PUMP
G 804/2
SULFURIC ACID RECIRCULATION PUMP
BASIN
BALLESTRA S.p.A.
3819.10.006

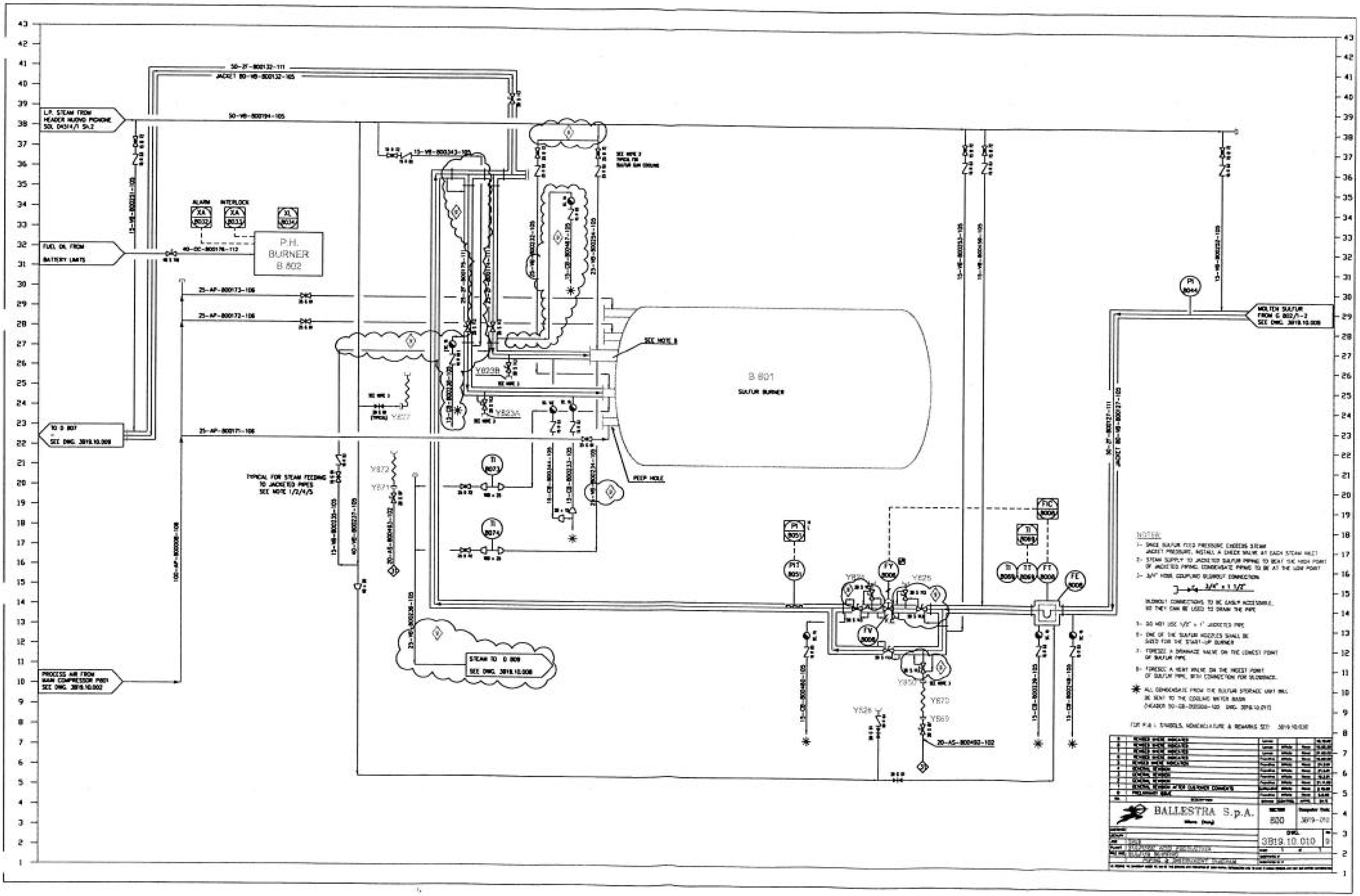

C 804
D 803
G 806/2
G 806/1
F 808
E 811
Z 803
D 810
Y943
Y944
G 807/1-2
E 810
BALLESTRA S.p.A.
3819.10.007



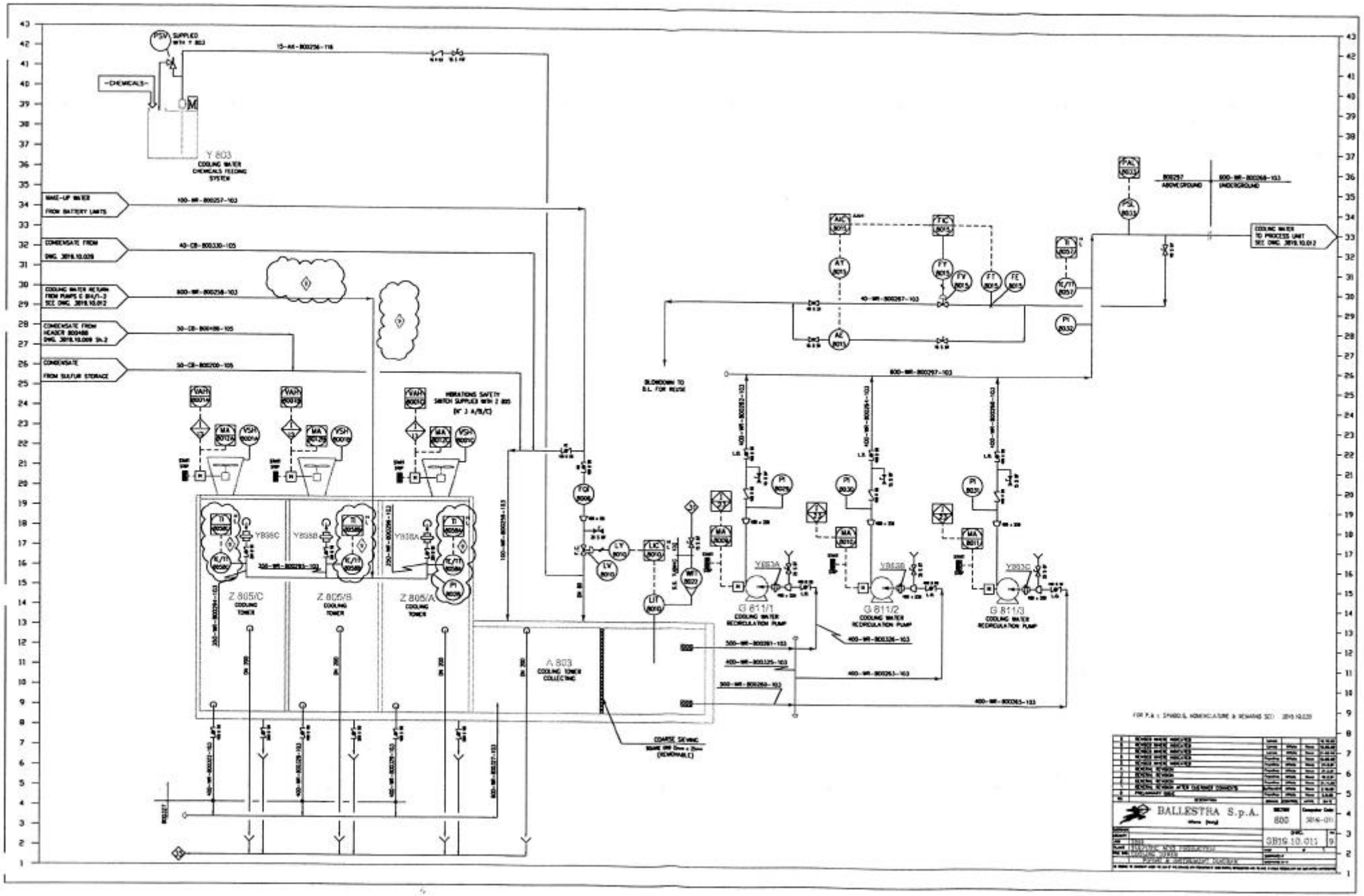
E 801
E 807
SUPERHEATER
D 812
STEAM/CONDENSATE SEPARATOR
D 805
DEAERATOR
E 814
BLOW DOWN COOLER
E 816
SAMPLE COOLER
E 815
SAMPLE COOLER
D 809
ATMOSPHERIC BLOWDOWN TANK
E 806
ECONOMIZER
E 805
ECONOMIZER
E 802
BLOW DOWN COOLER
G 810/1
BOILER FEED WATER PUMPS
G 810/2
BOILER FEED WATER PUMPS
Y 802-1/2
BOILER CHEMICALS FEED SYSTEM
CHEMICALS
ALL DRAINS, VENTS, AND INSTRUMENT CONNECTIONS RELEVANT TO THE ECONOMIZERS E 805/E 806 WILL BE INSTALLED ON THE STEAM HEADERS.
NOTE:
= SUPPLIED WITH E 801
= SUPPLIED WITH E 807
= SUPPLIED WITH D 805
= SUPPLIED WITH Y 802/1-2
BALLESTRA S.p.A.
800
3B19.10.008

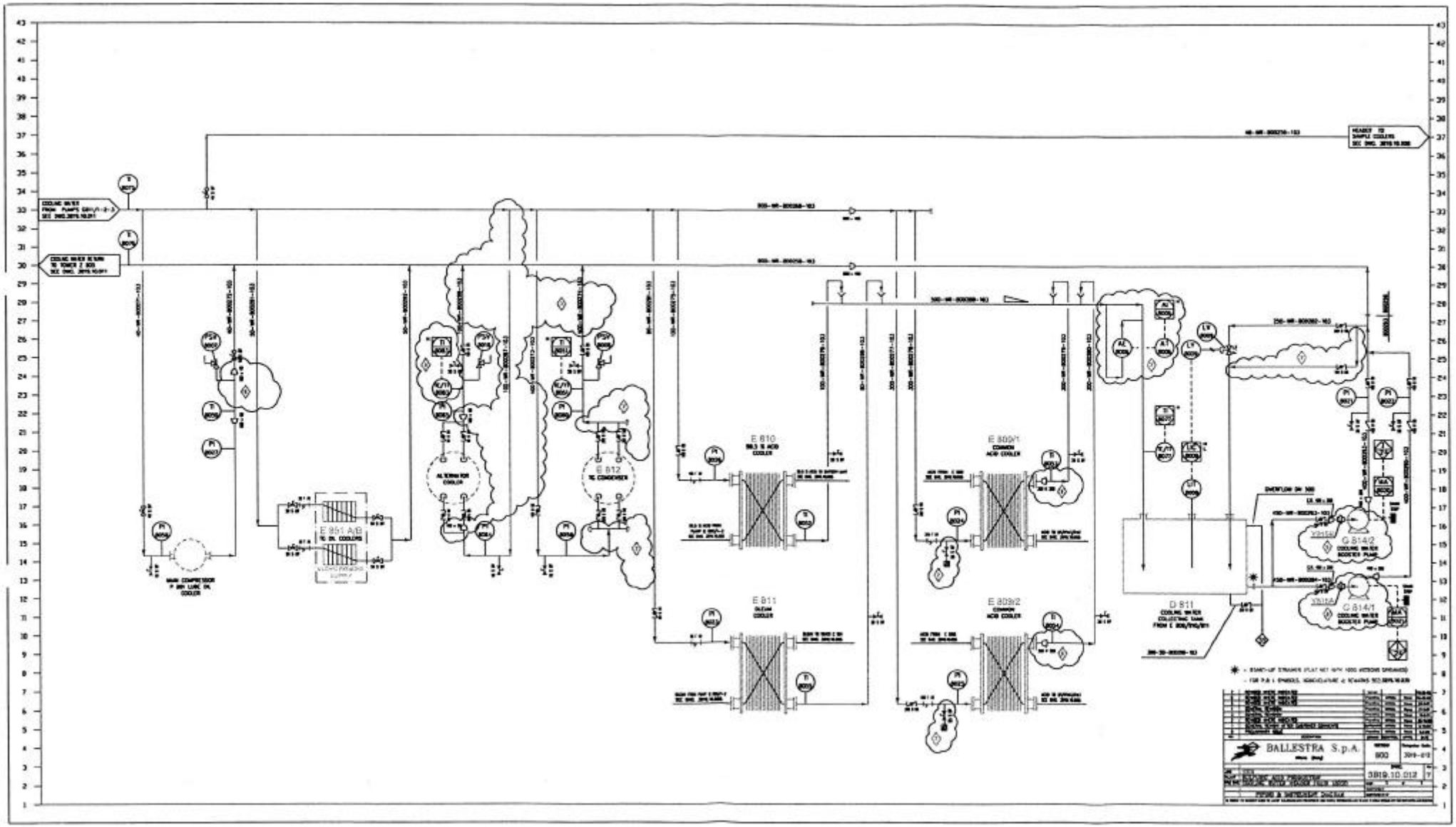

D 807 SULFUR TRANSFER TANK
A 801 SULFUR PIT
DRAINAGE PIT
G 802/2 G 802/1
SULFUR FEED PUMPS
G 801
SULFUR TRANSFER PUMP
G 815
DRAINAGE PUMP (SUBMERSIBLE)
Z 802/B
HEATING COIL
Z 802/B
HEATING COIL
Y 805
SCRUBBING SYSTEM BY FLUORSO
SIGNAL SELECTOR
FROM TRUCK
SULFUR FROM TANK D 801
SULPHUR TO TANK D 801
LP STEAM TO TANK D 801
LP STEAM FROM
NOTES:
BALLESTRA S.p.A.
3819.10.009

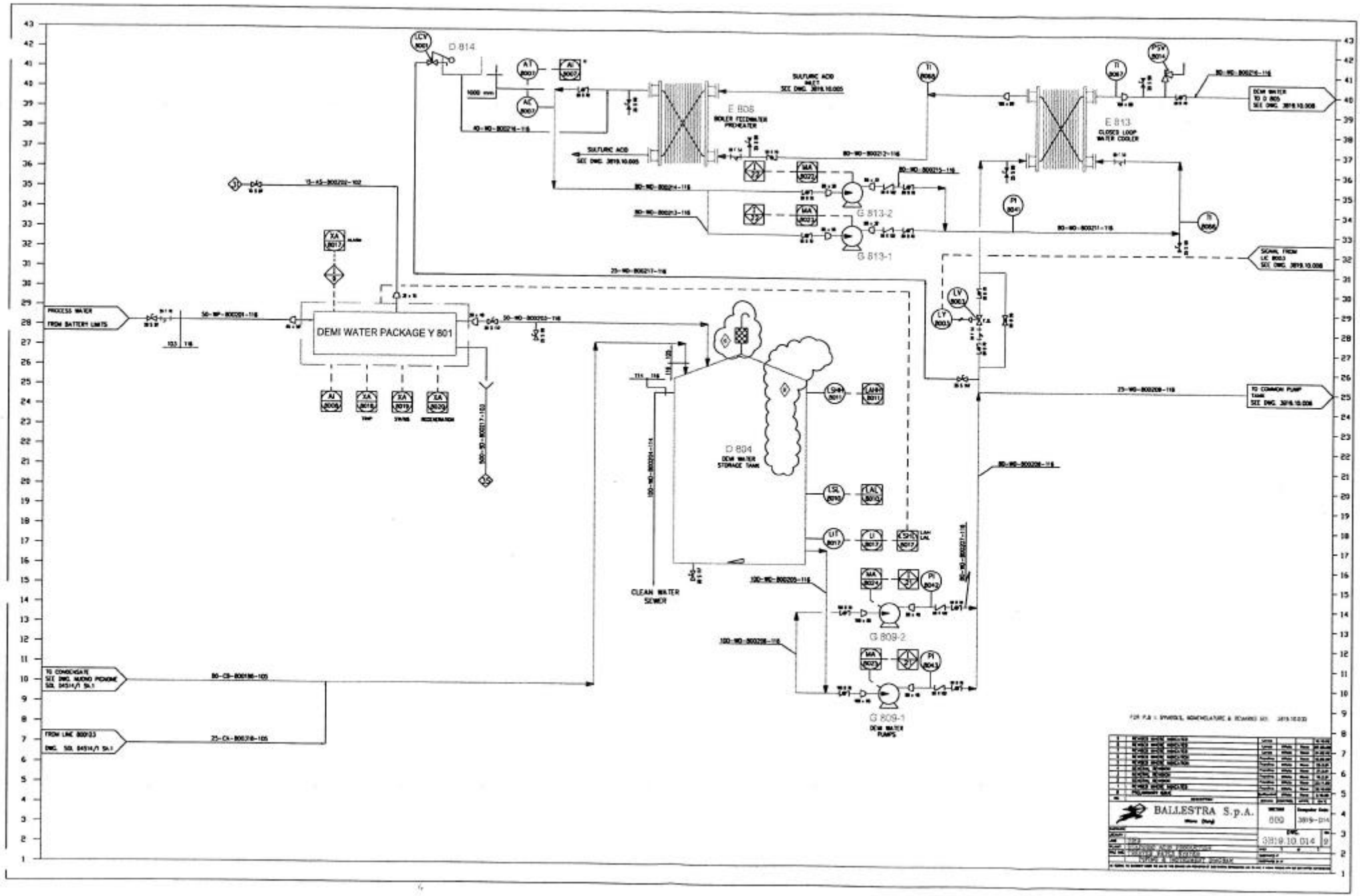

DISTRIBUTION THORUS
DISTRIBUTION THORUS
LP STEAM FROM LINE 800320
SEE DWG. 3819.10.009 Sh.1
LP STEAM
SEE DWG. 3819.10.009 Sh.1
SULPHUR FROM
D 807
SEE DWG. 3819.10.009 Sh.1
LP STEAM FROM LINE 800320
SEE DWG. 3819.10.009 Sh.1
TO SULFUR TRANSFER
TANK D 807
SEE DWG. 3819.10.009 Sh.1
TO LINE 800330
SEE DWG. 3819.10.026
TO LINE 800200
SEE DWG. 3819.10.011
D 801
SULFUR STORAGE TANK
Z 802/A
HEATING
COILS
Z 802/A
HEATING
COILS
MANHOLE
HOLDING BASIN
DETAIL TYPICAL FOR
CONDENSATE TRAPS
OF THE SULFUR
STORAGE UNIT
UTILIZATION
DN 15
STEAM TRAP
CONDENSATE
DETAIL TYPICAL FOR
CONDENSATE TRAPS
UTILIZATION
NOTE:
BALLESTRA S.p.A.
3819.10.009

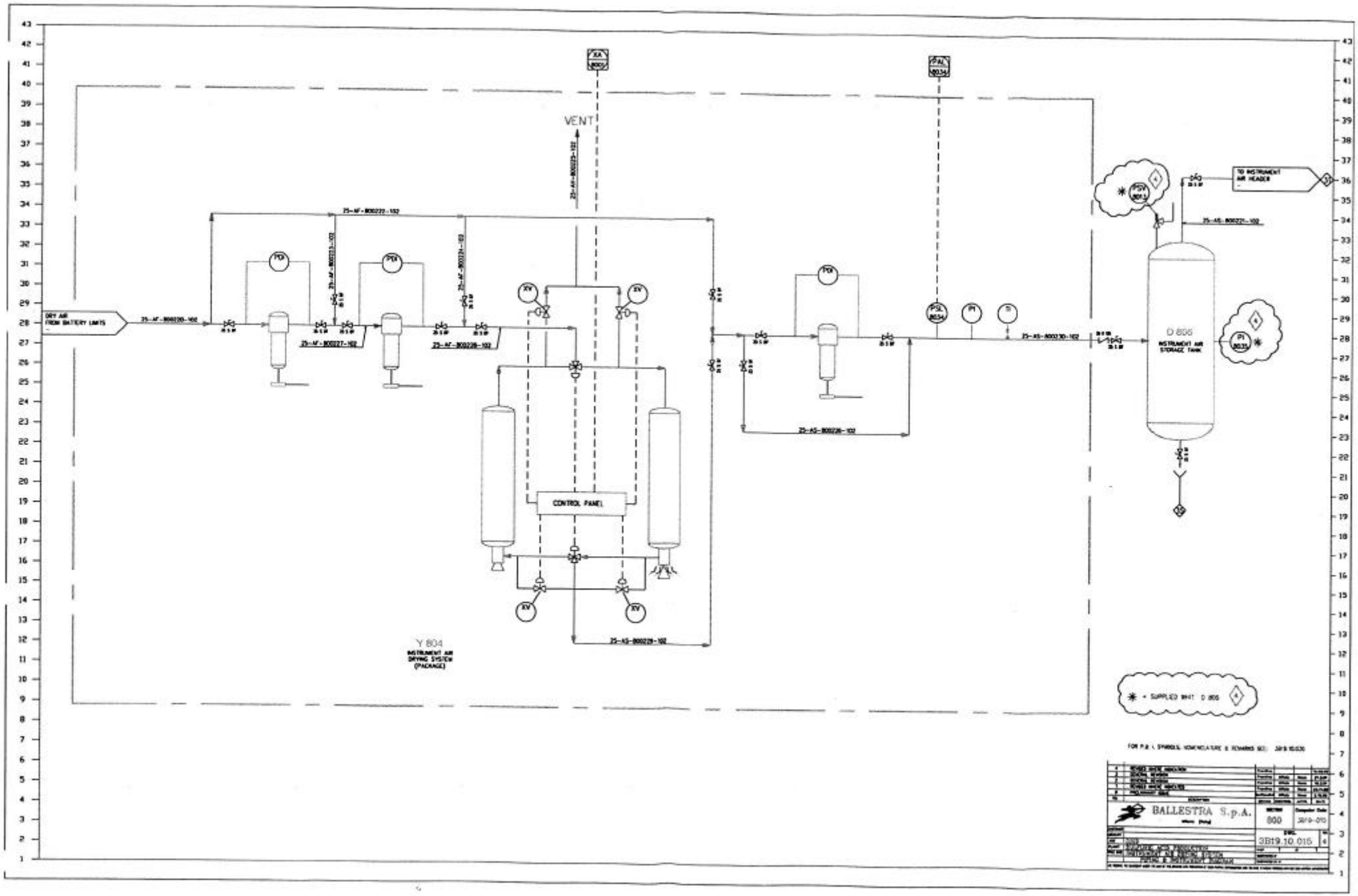


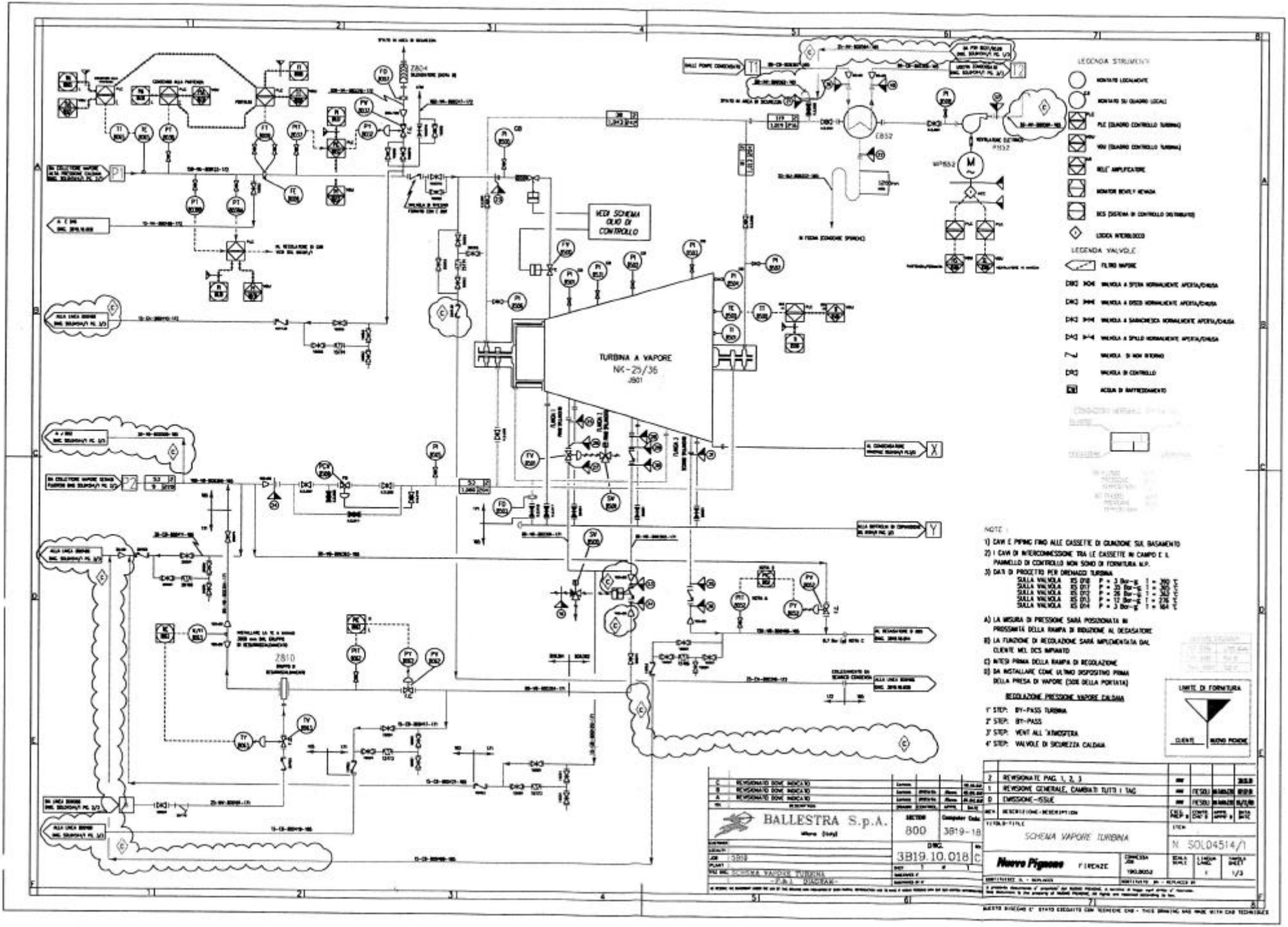
L.P. STEAM FROM HEADER NUOVO PIGNONE SEE DWG.
FUEL OIL FROM BATTERY LIMITS
ALARM
INTERLOCK
P.H. BURNER B 802
TO D 807 SEE DWG. 3B19.10.009
PROCESS AIR FROM MAIN COMPRESSOR P801 SEE DWG. 3B19.10.002
TYPICAL FOR STEAM FEEDING TO JACKETED PIPES SEE NOTE 1/2/4/5
STEAM TO D 809 SEE DWG. 3B19.10.008
SEE NOTE 6
PEEP HOLE
B 801
SULFUR BURNER
MOLTEN SULFUR FROM G 802/1-2 SEE DWG. 3B19.10.009
Y823B
Y823A
Y872
Y871
Y826
Y825
Y870
Y869
NOTES:
1- SINCE SULFUR FEED PRESSURE EXCEEDS STEAM JACKET PRESSURE, INSTALL A CHECK VALVE AT EACH STEAM INLET
2- STEAM SUPPLY TO JACKETED SULFUR PIPING TO BE AT THE HIGH POINT OF JACKETED PIPING. CONDENSATE PIPING TO BE AT THE LOW POINT
3- 3/4" HOSE COUPLING BLOWOUT CONNECTION.
BLOWOUT CONNECTIONS TO BE EASILY ACCESSIBLE, SO THEY CAN BE USED TO DRAIN THE PIPE
4- DO NOT USE 1/2" x 1" JACKETED PIPE
5- ONE OF THE SULFUR NOZZLES SHALL BE USED FOR THE START-UP BURNER
7- FORESEE A DRAINAGE VALVE ON THE LOWEST POINT OF SULFUR PIPE.
8- FORESEE A VENT VALVE ON THE HIGHEST POINT OF SULFUR PIPE, WITH CONNECTION FOR BLOWBACK.
ALL CONDENSATE FROM THE SULFUR STORAGE UNIT WILL BE SENT TO THE COOLING WATER BASIN
BALLESTRA S.p.A.
800
3B19.10.010
PIPING & INSTRUMENT DIAGRAM

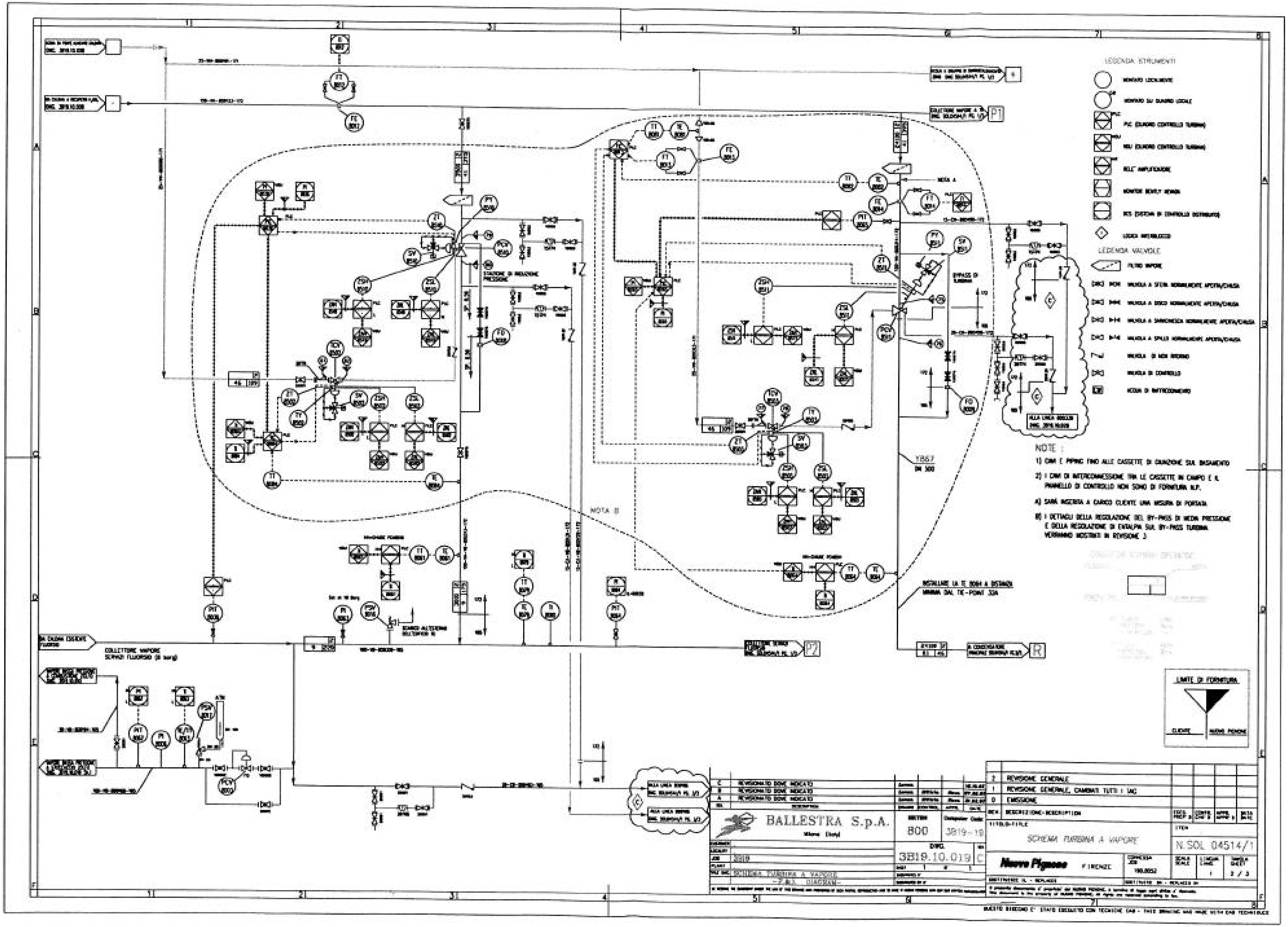

Y 803
COOLING WATER CHEMICALS FEEDING SYSTEM
MAKE-UP WATER FROM BATTERY LIMITS
CONDENSATE FROM DWG. 3B19.10.029
COOLING WATER RETURN FROM PUMPS G 811/1-3 SEE DWG. 3B19.10.012
CONDENSATE FROM HEADER 800488 DWG. 3B19.10.009 Sh.2
CONDENSATE FROM SULFUR STORAGE
VIBRATIONS SAFETY SWITCH SUPPLIES WITH Z 805 (N° 1 A/B/C)
BLOWDOWN TO B.L. FOR REUSE
Z 805/C COOLING TOWER
Z 805/B COOLING TOWER
Z 805/A COOLING TOWER
A 803 COOLING TOWER COLLECTING
G 811/1 COOLING WATER RECIRCULATION PUMP
G 811/2 COOLING WATER RECIRCULATION PUMP
G 811/3 COOLING WATER RECIRCULATION PUMP
COOLING WATER TO PROCESS UNIT SEE DWG. 3B19.10.012
800257 ABOVEGROUND
800-WR-800268-103 UNDERGROUND
BALLESTRA S.p.A.
800
3B19.10.011
9


E 851 A/B
E 810
E 812
E 811
E 809/1
E 809/2
D 811
G 814/2
G 814/1
BALLESTRA S.p.A.
3819.10.012

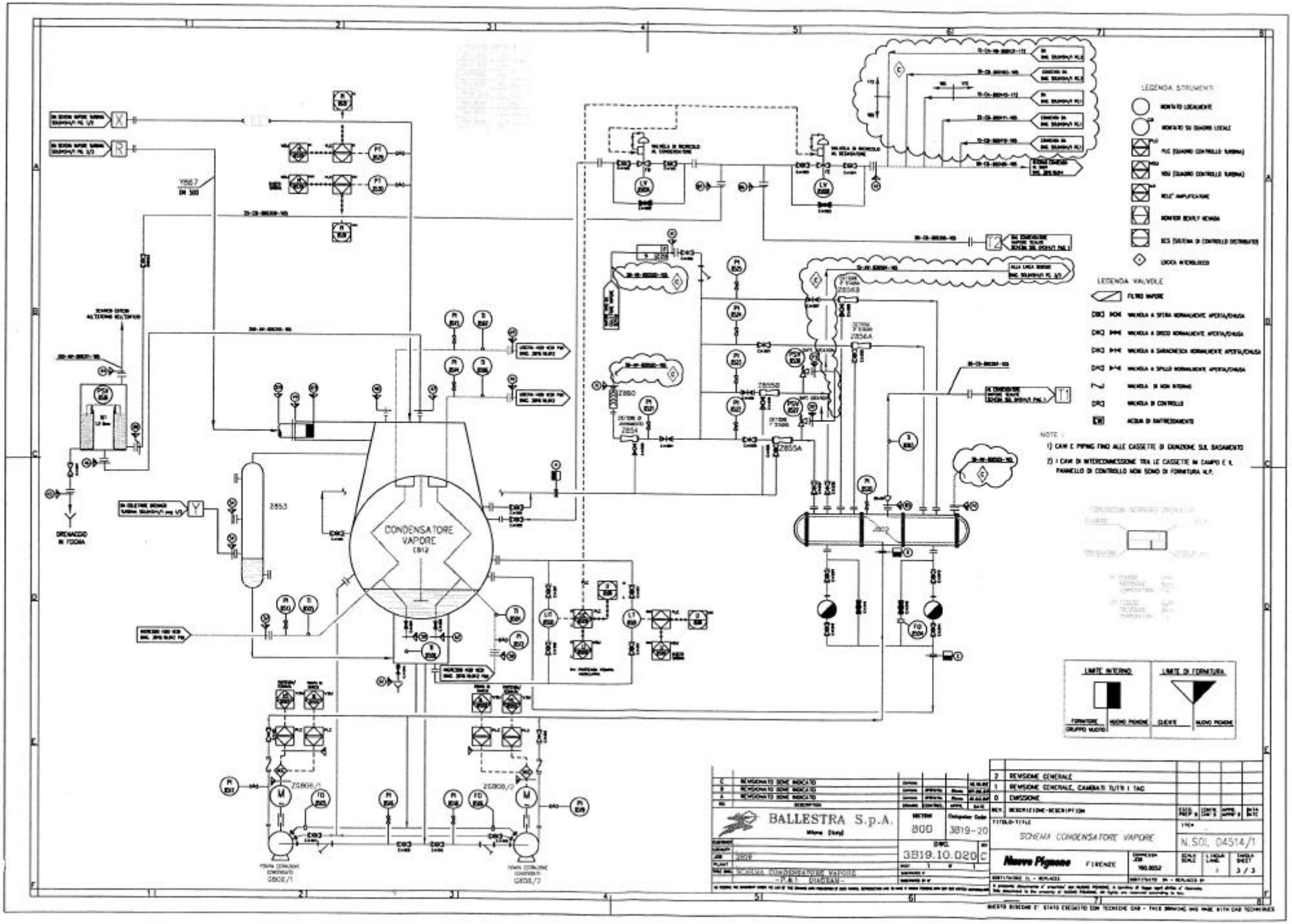

D 814
E 805
BOILER FEEDWATER PREHEATER
E 813
CLOSED LOOP WATER COOLER
G 813-2
G 813-1
DEMI WATER PACKAGE Y 801
PROCESS WATER FROM BATTERY LIMITS
D 804
DEM WATER STORAGE TANK
CLEAN WATER SEWER
G 809-2
G 809-1
DEM WATER PUMPS
TO CONDENSATE
FROM LINE 800123
BALLESTRA S.p.A.
3819.10.014


VENT
DRY AIR FROM BATTERY LIMITS
CONTROL PANEL
Y 804
INSTRUMENT AIR DRYING SYSTEM (PACKAGE)
D 806
INSTRUMENT AIR STORAGE TANK
TO INSTRUMENT AIR HEADER
* = SUPPLIED BY D 806
BALLESTRA S.p.A.
3B19.10 015


TURBINA A VAPORE
NK-25/35
J501
VEDI SCHEMA OLIO DI CONTROLLO
Z804
Z810
E852
LEGENDA STRUMENTI
LEGENDA VALVOLE
NOTE :
1) CAVI E PIPING FINO ALLE CASSETTE DI GIUNZIONE SUL BASAMENTO
2) I CAVI DI INTERCONNESSIONE TRA LE CASSETTE IN CAMPO E IL PANNELLO DI CONTROLLO NON SONO DI FORNITURA N.P.
3) DATI DI PROGETTO PER DRENAGGIO TURBINA
A) LA MISURA DI PRESSIONE SARA POSIZIONATA IN PROSSIMITA DELLA RAMPA DI RIDUZIONE AL DEGASATORE
B) LA FUNZIONE DI REGOLAZIONE SARA IMPLEMENTATA DAL CLIENTE NEL DCS IMPIANTO
C) INTESI PRIMA DELLA RAMPA DI REGOLAZIONE
D) DA INSTALLARE COME ULTIMO DISPOSITIVO PRIMA DELLA PRESA DI VAPORE (SIDE DELLA PORTATA)
REGOLAZIONE PRESSIONE VAPORE CALDAIA
1° STEP: BY-PASS TURBINA
2° STEP: BY-PASS
3° STEP: VENT ALL 'ATMOSFERA
4° STEP: VALVOLE DI SICUREZZA CALDAIA
LIMITE DI FORNITURA
CLIENTE
NUOVO PIGNONE
BALLESTRA S.p.A.
SECTOR 800
3B19.10.018
SCHEMA VAPORE TURBINA
Nuovo Pignone
FIRENZE
N. SOL04514/1
1/3



LEGENDA STRUMENTI
LEGENDA VALVOLE
NOTE :
1) CAVI E PIPING FINO ALLE CASSETTE DI GIUNZIONE SUL BASAMENTO
2) I CAVI DI INTERCONNESSIONE TRA LE CASSETTE IN CAMPO E IL PANNELLO DI CONTROLLO NON SONO DI FORNITURA N.P.
A) SARÀ INSERITA A CARICO CLIENTE UNA MISURA DI PORTATA
B) I DETTAGLI DELLA REGOLAZIONE DEL BY-PASS DI MEDIA PRESSIONE E DELLA REGOLAZIONE DI ENTALPIA SUL BY-PASS TURBINA VERRANNO MOSTRATI IN REVISIONE 3
NOTA B
COLLETTORE VAPORE SERVIZI FLUORSID (8 barg)
STAZIONE DI RIDUZIONE PRESSIONE
BY-PASS DI TURBINA
LIMITE DI FORNITURA
CLIENTE
NUOVO PIGNONE
REVISIONATO DOVE INDICATO
BALLESTRA S.p.A.
800
3B19-19
3B19.10.019
SCHEMA TURBINA A VAPORE
-P.&I. DIAGRAM-
2 REVISIONE GENERALE
1 REVISIONE GENERALE, CAMBIATI TUTTI I TAG
0 EMISSIONE
SCHEMA TURBINA A VAPORE
N.SOL 04514/1
Nuovo Pignone
FIRENZE
3 / 3


CONDENSATORE VAPORE
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LEGENDA VALVOLE
NOTE :
1) CAVI E PIPING FINO ALLE CASSETTE DI GIUNZIONE SUL BASAMENTO
2) I CAVI DI INTERCONNESSIONE TRA LE CASSETTE IN CAMPO E IL PANNELLO DI CONTROLLO NON SONO DI FORNITURA N.P.
LIMITE INTERNO
LIMITE DI FORNITURA
BALLESTRA S.p.A.
Milano (Italy)
SCHEMA CONDENSATORE VAPORE
-P & I DIAGRAM-
SCHEMA CONDENSATORE VAPORE
N.SOL. 04514/1
Nuovo Pignone
FIRENZE
3819.10.020 C
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SCALA 1:1
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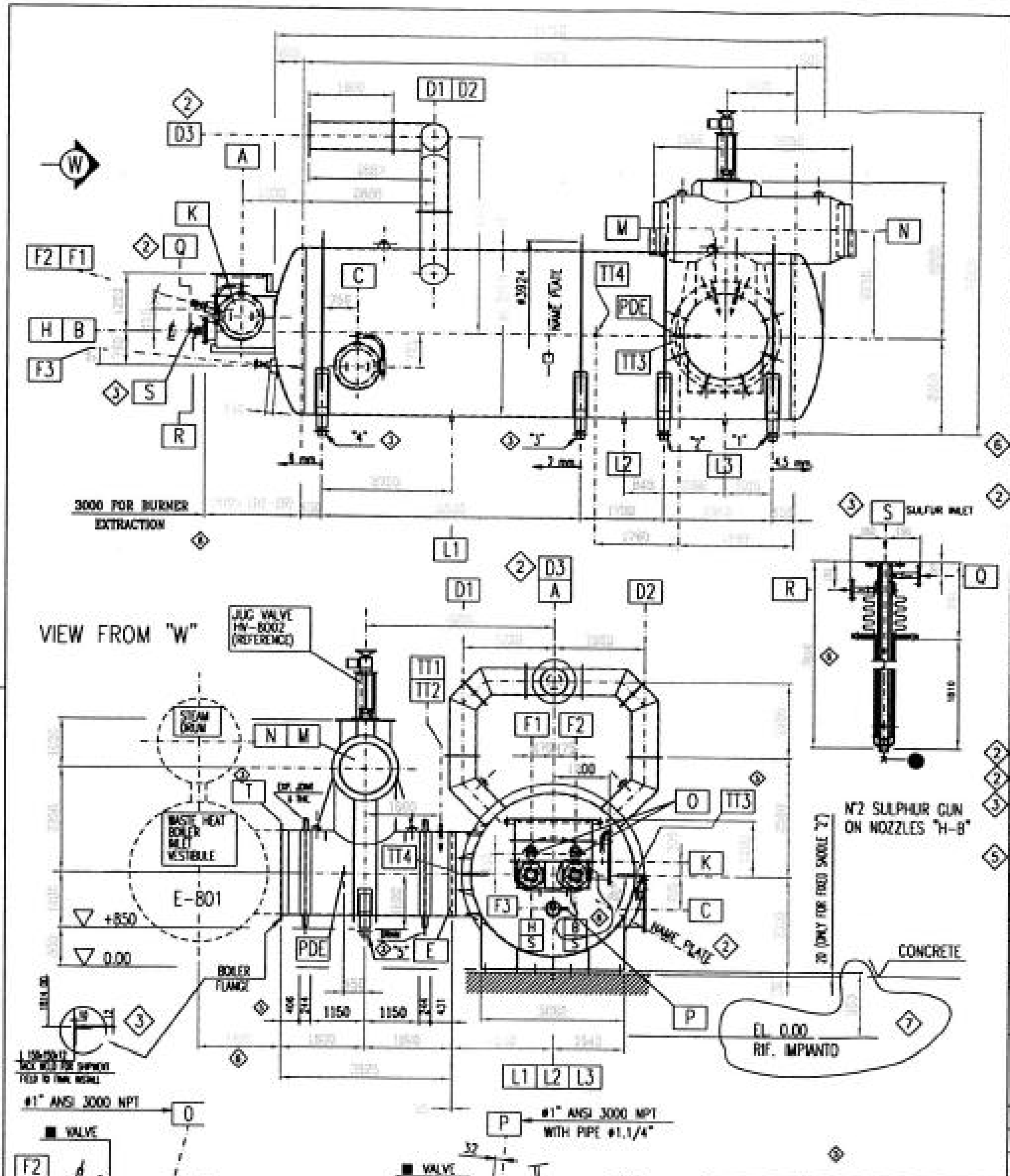


	CARICHI ALLA BASE DEI SOSTEGNI / LOADS AT SUPPORT BASE Q Kg	T Kg	M Kg m
A VUOTO / ERECTION	31500	950	1800
IN ESERCIZIO / OPERATING	71500	950	1800
VENTO / WIND	D.M. LL.PP. 16/01/96 e Circ. Min. LL.PP. 4/07/96		
VELOCITA' DEL VENTO / WIND SPEED	28 m/s		

BALLESTRA S.p.A MILANO (ITALIA)

CUSTOMER: FLUORSID - ASSEMINI (CAGLIARI) | DWG. 3B19 . 35 . 007
PLANT: SULFURIC ACID PRODUC. | JOB 3B19 | FLOW SHEET 3B19 . 10 . 010
ITEM B801 | N°REQUIRED 1 | **SULFUR BURNER** | SHEET 1 OF 3

Rev.	Date	Drawn	Checked	Apprd.	Description
0	02-01-01	EDI	G.B.	M.M.	1st ISSUE
1	14-02-01	EDI	G.B.	M.M.	2nd ISSUE
2	28-06-01	EDI	G.B.	M.M.	ISSUED FOR CONSTRUCTION ◇2
3	13-09-01	ERRECI	G.R.	M.M.	REVISED WHERE INDICATED ◇3
4	17-10-01	ERRECI	G.R.	M.M.	REVISED WHERE INDICATED ◇4
5	20-11-01	ERRECI	G.R.	M.M.	REVISED WHERE INDICATED ◇5
6	03-12-01	ERRECI	G.R.	M.M.	REVISED WHERE INDICATED ◇6
7	31-01-02	ERRECI	G.R.		AGGIUNTO QUOTA 0,00 RIF. IMPIANTO ◇7

NOZZLES

POS.	SIZE	FLG.TYPE/FACING/RATING	N°	SERVICE	THK.	NOZZLES PROJECT.
A	1070 x 1140	SEE DWG.	1	AIR INLET	12	.
◇6 B	150/350	PN16 UNI2278	1	SULFUR INLET	11.13	.
C	760 I.D.	SEE DWG.	1	ACCESS OPENING	12	.
◇2 D1/3	560 I.D.	SEE DWG.	3	SECONDARY AIR INLET	12	.
E	1790 I.D.	SPLICE BAND	1	GAS OUTLET	12	.
F1/3	4"	ANSI B2.1	3	PEEP HOLE	8.56	.
H	150/350	PN16 UNI2278	1	START-UP GUN/ SULFUR INLET	11.13	.
K	760 I.D.	SEE DWG.	1	ACCESS OPENING	12	.
L1/3	3/4"	ANSI 3000# WITH PLUG	3	BRICK VENT	/	.
M	1118 O.D.	SPLICE BAND	1	CS INLET	10	.
N	1118 O.D.	SPLICE BAND	1	CS OUTLET	10	.
O	1"	NPT-ANSI 3000#	2	AIR INLET	/	.
P	1"	NPT-ANSI 3000#	1	AIR INLET	4.85	.
◇2 Q	15	PN16 UNI2278/29	2	VB INLET	2.77	.
◇2 R	15	PN16 UNI2278/29	2	CS OUTLET	2.77	.
◇3 S	40	PN16 UNI6093/29	2	SULFUR INLET	-	.
PDE	1 1/2"	NPT-ANSI 3000#	1	PRESSURE CONN.	5.54	.
◇5 TT	1 1/2"	NPT-ANSI 3000#	4	TEMPERATURE CONN.	5.54	.
NAME PLATE POSITION						.

DESIGN DATA	SHELL	JACKET	COIL
OPERATING PRESSURE barg	/	.	.
DESIGN PRESSURE barg	0.49	.	.
HYDROSTATIC TEST PRESSURE barg	.	.	.
PNEUMATIC TEST PRESSURE barg	.	.	.
OPERA. TEMP. INTERNAL/SKIN °C	1184/60		.
DESIGN TEMPERATURE SHELL °C	400	.	.
FLUID/SPECIFIC WEIGHT Kg/dm3	.	.	.
HEAT EXCHANGE SURFACE m2	.	.	.
HEAT TREATMENT	.	.	.
INSPECTION AND TESTING ◇2	SEE SPEC. 512-171		
JOINT EFFICIENCY	0.7	.	.
CORROSION ALLOWANCE mm	3 C.S. 1.5 S.S.	.	.
GEOMETRIC CAPACITY litri	.	.	.
INSPECTION INSTITUTE	CUSTOMER / BALLESTRA		
CODE	ASME VIII div.1 / MEC std		

WEIGHTS

EMPTY ◇5 29500 Kg | OPERATING SEE TAB Kg
REFRACTORY LINING 40000 Kg | CONNECTING PIPE 2000 Kg

MATERIALS	
PLATE, SHEET	ASTM A 516-55
BARS, STRIP, FLATS	ASTM A 516-55
STRUCTURAL SHAPES	ASTM A 516-55
PIPE	ASTM A 312 TP 310 ASTM A 106 B
FORGINGS	ASTM A 182 - 310 ASTM A 105
BOLTS	ASTM A 193 B7
NUTS	ASTM A 194 2H
GASKET	VERMICULITA COATED

STD. DETAILS	ENCLOSED DWG. ◇2
CONSTR. DWG. SULFUR BURNER	3B19.30.007 FG1÷FG4 LAST REV
CONSTR. DWG SULPHUR GUN	3B19.30.007 FG5 LAST REV
CONSTR. DWG CONNECTING PIPE	3B19.30.007 FG6 LAST REV
NAME PLATE	3B19.30.100
NAME PLATE HOLDER	3B19.30.101

FOR FOUNDATION PLATE TYPE "1"÷"5" ◇3 SEE SHEET 3

FOR REFRACTORY LINING SEE SHEET 2

MATERIAL REQUISITION : 3B19.100.003 REV.1

INSULATION : NO

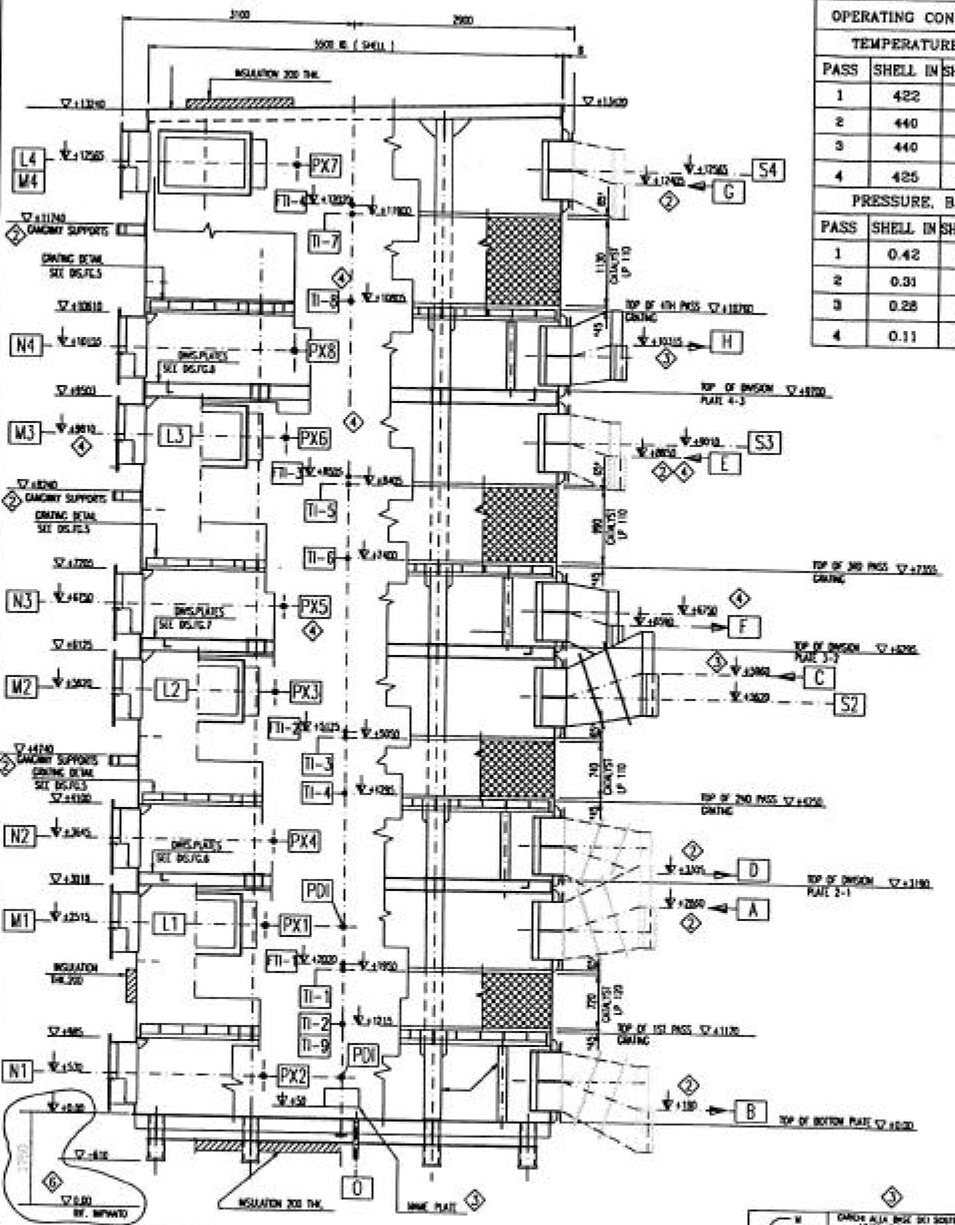
NOTE : INTERNAL LINING REF. MEC 531-120/121/122

● NOZZLE Mod. 1/2" BA-3095S25-13W "SPRAYING SYSTEM" (Orifice size 15/64" - Deliver 26.3 Lpm at 5.5 bar) ◇6

■ CLAMP GATE VALVES "CRANE" CLASS 125 - N.P.S.488

Comp. Code 3B19B801_FG1_REV7 | Scale : 1:100

7



- SFERE CERAMICHE FORNITE DA "FLUORSID"
- CERAMIC BALLS SUPPLY BY "FLUORSID" 1250 Kg/m3
- CATALIZZATORE LP110 & LP120 FORNITO DA "MONSANTO"
- CATALYST LP110 & LP120 SUPPLY BY "MONSANTO" 522 Kg/m3
- TRA LE SFERE CERAMICHE E IL CATALIZZATORE PREVEDERE RETI DI SEPARAZIONE
- BETWEEN CERAMIC BALLS AND CATALYST TO PROVIDE SEPARATING SCREENS

FOR CATALYST AND CERAMIC BALLS LOADING SEE SPEC. 3819.99.001 REV. 1

CARICHI ALLA BASE DEI SOSTEGNI / LOADS AT SUPPORT BASE

	D Kg	T Kg	M Kg m	W Kg	
A VUOTO ERECTION	56000	7700	51700	4800	3250
IN ESERCIZIO OPERATING	125000	7700	51700	14000	3750
VENTO WIND	D.M. LL.PP. 16/01/96 + Circ. Min. LL.PP. 4/07/96				
VELOCITA' DEL VENTO WIND SPEED	25 m/s				

OPERATING CONDITION

TEMPERATURE °C		
PASS	SHELL IN	SHELL OUT
1	422	621
2	440	519
3	440	465
4	425	444

PRESSURE, Barg		
PASS	SHELL IN	SHELL OUT
1	0.42	0.33
2	0.31	0.3
3	0.28	0.26
4	0.11	0.09

BALLESTRA S.p.A MILANO (ITALIA)

CUSTOMER FLUORSID - ASSEMINI (CAGLIARI) — DWG. 3B19 . 35 . 008
PLANT SULFURIC ACID PRODUCTION — JOB 3819 — FLOW SHEET 3819 . 10 . 003
ITEM R801 — N°REQUIRED 1 — CONVERTER — SHEET 1 OF 3

Rev.	Date	Drawn	Checked	Appd.	Description
0	02-01-01	EDI	G.B.	M.M.	1st ISSUE
1	28-02-01	EDI	G.B.	M.M.	GENERAL REVISION
2	10-05-01	EDI	G.B.	M.M.	DEFINED ORIENTATION AND MODIFIED WHERE MARK ⟨2⟩
3	27-06-01	EDI	G.B.	M.M.	ISSUED FOR CONSTRUCTION AND " TI - FTI" ELEVATIONS MODIFIED ⟨3⟩
4	07-08-01	EDI	G.B.	M.M.	REVISED WHERE SHOWN WITH ⟨4⟩
5	08-11-01	ERRECI	G.R.	M.M.	REVISED WHERE SHOWN WITH ⟨5⟩
6	31-01-02	ERRECI	G.R.		AGGIUNTO QUOTA 0,00 RIF. IMPIANTO ⟨6⟩

NOZZLES

POS.	SIZE	FLG/NPT/FACING/RATING	N°	SERVICE	THK.	NOZZLES ORIENT.
A	1118 OD	SPLICE BAND	1	1ST PASS INLET	12	SEE SHEET 2
B	1118 OD	SPLICE BAND	1	1ST PASS OUTLET	12	
C	1118 OD	SPLICE BAND	1	2ND PASS INLET	12	
D	1118 OD	SPLICE BAND	1	2ND PASS OUTLET	12	
E	914.4 OD	SPLICE BAND	1	3RD PASS INLET	12	
F	914.4 OD	SPLICE BAND	1	3RD PASS OUTLET	12	
G	914.4 OD	SPLICE BAND	1	4TH PASS INLET	12	
H	914.4 OD	SPLICE BAND	1	4TH PASS OUTLET	12	
L	1320 WDG. 610 HIGH	WELDED COVER PLATE	4	CATALYST LOADING	12	
M	760 I.D.	WELDED COVER PLATE	4	ACCESS MANWAY	10	
N	760 I.D.	WELDED COVER PLATE	4	ACCESS MANWAY	10	
■ O	1.1/2"	NPT ANSI3000	1	DRAIN	5.54	
PX	1"	NPT ANSI3000	8	PRESSURE CONN.	5.08	
S2	508 OD	SPLICE BAND	1	2ND PASS PREHEAT	6	
S3	508 OD	SPLICE BAND	1	3RD PASS PREHEAT	6	
S4	508 OD	SPLICE BAND	1	4TH PASS PREHEAT	6	
TI	1.1/2"	NPT ANSI3000	9	TEMPERATURE CONN.	5.54	
■ FTI	1.1/2"	NPT ANSI3000	4	FUTURE TEMP. CONN.	5.54	
PDI	1"	NPT ANSI3000	2	PRESSURE CONN.	5.08	

NAME PLATE POSITION

DESIGN DATA

		SHELL
OPERATING PRESSURE	Barg	SEE TABLE
DESIGN PRESSURE	Barg	0.49
HYDROSTATIC TEST PRESSURE	Barg	-
PNEUMATIC TEST PRESSURE	Barg	-
OPERATING TEMPERATURE	°C	SEE TABLE
DESIGN TEMPERATURE	°C	650
FLUID/SPECIFIC WEIGHT	Kg/dm3	GAS
HEAT EXCHANGE SURFACE	m2	-
HEAT TREATMENT		SCREENS ONLY
INSPECTION AND TESTING ⟨2⟩		SEE SPEC. 512-175
JOINT EFFICIENCY		0.7
CORROSION ALLOWANCE	mm	1
GEOMETRIC CAPACITY	dm3	335000
INSPECTION INSTITUTE		CUSTOMER / BALLESTRA
CODE		ASME VIII div.1/ MEC STD

⟨3⟩ WEIGHTS

EMPTY	⟨4⟩ 55565 Kg	OPERATING	SEE TABLE Kg
INSULATION	7000 Kg	PLTF (DEAD+LIVE)	4000 Kg
PACKING	44400 Kg		
CERAMIC BALLS	13080 Kg		

MATERIALS

PLATE	ASTM A 240-304
BARS, FLATS	ASTM A 479-304
PIPE	ASTM A 312 TP.304
SCREENS	SS 304/SS 321

MATERIAL REQUISITION : 3B19.100.004 REV.1

⟨5⟩ FOR DETTAGLIO "PASTRE PER SCHERMI RADIAZIONI" VEDI DIS. N. 3819.30.018 / FOR DETAIL "STAMPS FOR PIPE NOISE" SEE DWG. N. 3819.30.019

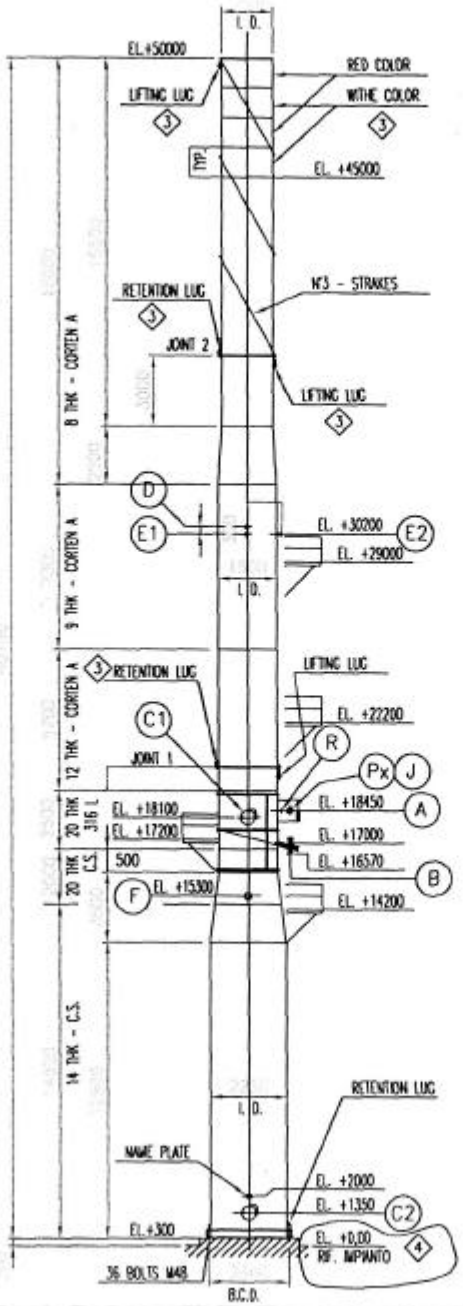
INSULATION : 200 mm.
1x100 m2 298 - 1x100 m2 311

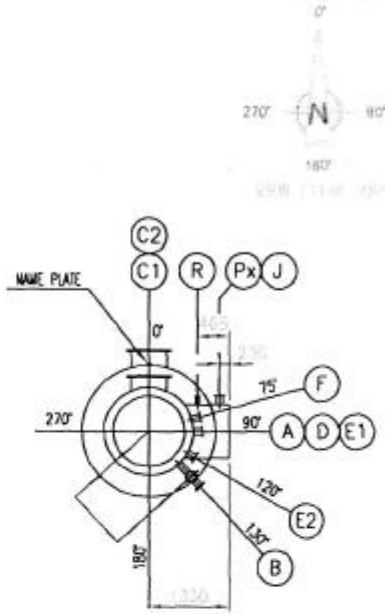
NOTE :

■ WITH PLUG

STD. DETAILS	ENCLOSED DWG.
WORKING DWG.	3B19.30.008 sh.1of12 Rev.4
WORKING DWG.	3B19.30.008 sh.2of12 Rev.5
WORKING DWG.	3B19.30.008 sh.3of12 Rev.3
WORKING DWG.	3B19.30.008 sh.4of12 Rev.3
WORKING DWG.	3B19.30.008 sh.5of12 Rev.3
WORKING DWG.	3B19.30.008 sh.6of12 Rev.2
WORKING DWG.	3B19.30.008 sh.7of12 Rev.2
WORKING DWG.	3B19.30.008 sh.8of12 Rev.3
WORKING DWG.	3B19.30.008 sh.9of12 Rev.3
WORKING DWG.	3B19.30.008 sh.10of12 Rev.4
WORKING DWG.	3B19.30.008 sh.11of12 Rev.3
WORKING DWG.	3B19.30.008 sh.12of12 Rev.3
WORKING DWG.	3B19.30.018 sh. 1of 1 Rev.0
NAME PLATE	3B19.30.100 Rev.0
NAME PLATE HOLDER	3B19.30.101 Rev.0

Comp. Code 3819R801_FG1_REV6 — Scale : /





NOZZLES ORIENTATION

M / Q / T	CARICHI ALLA BASE DEI SOSTEGNI *LOADS AT SUPPORT BASE*			
	Q Kg	T Kg	M Kg m	W each support Kg
A VUOTO *ERECTION*	29000	18000	465000	---
IN ESERCIZIO *OPERATING*	39000	18000	465000	---

VENTO WIND: D.M. LLPP. 16/01/96 e Circ. Min. LLPP. 4/07/96

VELOCITA' DEL VENTO WIND SPEED: 28 m/s

BALLESTRA S.p.A. MILANO (ITALIA)

CUSTOMER: FLUORSID - ASSEMINI (CAGLIARI) | DWG. 3819 . 35 . 013

PLANT: SULFURIC ACID PRODUCTION | JOB 3819 | FLOW SHEET 3819 . 10 . 004

ITEM B-803 | N°REQUIRED 1 | PLANT STACK | SHEET 1 OF 3

Rev.	Date	Drawn	Checked	Apprd.	Description
0	5/02/01	ERED	R.G.	M.M.	PRELIMINARY ISSUE FOR COMMENTS
1	20/03/01	ERED	R.G.	M.M.	PRELIMINARY ISSUE FOR COMMENTS
2	29/06/01	ERED	R.G.	M.M.	ISSUE FOR CONSTRUCTION
3	5/08/01	ERED	R.G.	M.M.	ADDED LIFTING LUG/RETENTION LUG ON II° AND III° MODULE
4	31/01/02	ERED	R.G.		ACCIUNTO QUOTA 0,00 RIF. IMPIANTO
5					
6					

NOZZLES

POS.	SIZE	RATING	N°	SERVICE	THK. NOZZLES
A	DN900	PIPE S.B.	1	GAS INLET	10 mm
B	DN150	PN16-UNI2278	1	DRAIN	SCH. 40
C1	DN500	PN6-UNI6088	1	MANWAY	10 mm
C2	DN500	PN6-UNI2276	1	MANWAY	10 mm
D	DN 50	PN16-UNI2278	1	ANALYZER ELEMENT	SCH. 80
E1	DN100	PN16-UNI2278	1	SAMPLE PORT	SCH. 80
E2	DN100	PN16-UNI2278	1	SAMPLE PORT	SCH. 80
F	DN300	PN16-UNI2278	1	INSPECTION PORT	SCH. 40
Px	1"	NPT-3000#	1	PRESSURE CONNECTION	SCH. 80
J	DN50/100	PN16-UNI2278	1	STICK & MIST TEST	SCH. 40
R	1/2"	NPT-3000#	1	REICH TEST PORT	SCH. 80

DESIGN DATA		SHELL	COIL
OPERATING PRESSURE	Bar (g)	ATM	
DESIGN PRESSURE	Bar (g)	ATM	
HYDROSTATIC TEST PRESSURE	Bar (g)		
PNEUMATIC TEST PRESSURE	Bar (g)		
OPERATING TEMPERATURE	°C	82	
DESIGN TEMPERATURE	°C	110	
FLUID/SPECIFIC WEIGHT	Kg/m³	1	
TYPE OF FLUID		(EXHAUST GAS (AIR 408 ppm SO2))	
HEAT TREATMENT		NONE	
X-RAY TEST		SPOT	
PENETRATING LIQUIDS TEST		SPEC. 512-171	
JOINT EFFICIENCY		0.7	
CORROSION ALLOWANCE	mm	1- CORTEN A	
GEOMETRIC CAPACITY	m³	-	
INSPECTION INSTITUTE		CUSTOMER / BALLESTRA	
CODE		ASME VIII DIV.1 / ITALIAN LAWS	

WEIGHTS

EMPTY 29000 Kg | OPERATING SEE TABLE Kg

WITH INSULATION - Kg | PLTF (DEAD+LIVE) 4000 Kg

MATERIALS	
SHELL-NOZZLE A	AISI 316 L
NOZZLES B-C1	AISI 316 L
SHELL	CORTEN-A
HEAD	AISI 316 L
BASE STACK	ASTM A 36
STIFFENERS	ASTM A 36
STRAKES	ASTM A 36
FLANGES	ASTM A 105
NOZZLES	ASTM A 538
GASKETS	GARLOCK GYLON
STUD BOLTS	ASTM A 307 B

INSULATION : NO

WEIGHTS OF COMPONENT	Kg
PLATFORMS "800SSB"	1910

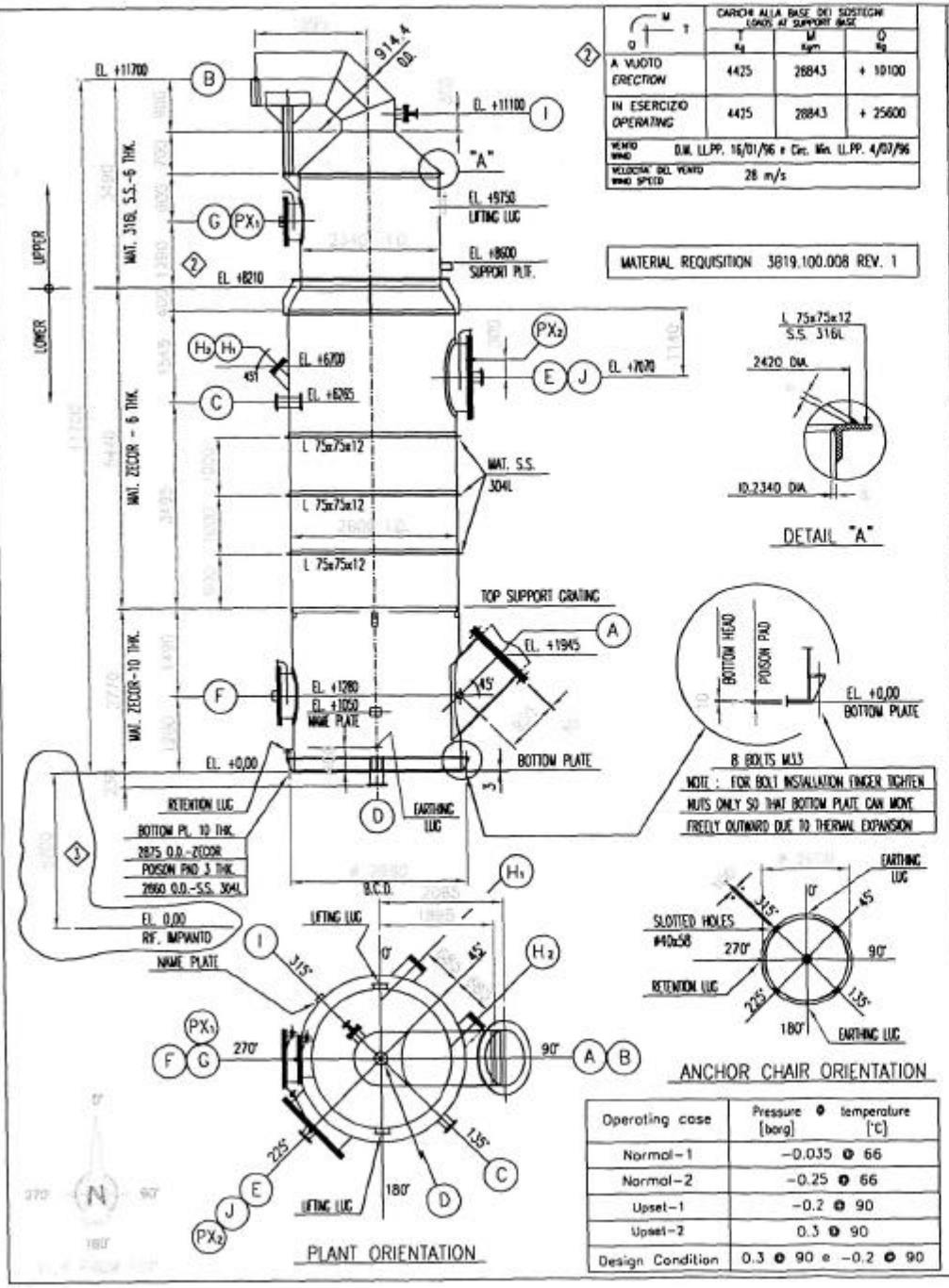
MATERIAL REQUISITION	
3819.100.007 REV1	-

STD. DETAILS	ENCLOSED DWG.
CONSTRUCTIVE DWG.	3819.30.013 fg.1-2-3
NAME PLATE	3819.30.100
NAME PLATE SUPPORT	3819.30.101

NOTE : GASKET 3 mm THK.(BLUE OR FAWN)
FLANGE FACE: PHONOGRAPHIC FINISH 125-250 RMS
FOR GENERAL NOTES SEE CONSTRUCTION DWG.

* WITH HEXAGONAL HEAD PLUG

M.E.C. NO. 511-150 | Comp. Code 3819B803_FG1_REV4 | Scale 1:50



	CARICHI ALLA BASE DEI SOSTEGNI LOADS AT SUPPORT BASE		
	T kg	M kgm	Q kg
A VUOTO ERECTION	4425	28843	+ 10100
IN ESERCIZIO OPERATING	4425	28843	+ 25600
VENTO WIND	D.M. LL.PP. 16/01/96 e Circ. Min. LL.PP. 4/07/96		
VELOCITÀ DEL VENTO WIND SPEED	28 m/s		

MATERIAL REQUISITION 3819.100.008 REV. 1

Operating case	Pressure ● temperature [barg] [°C]
Normal-1	−0.035 ● 66
Normal-2	−0.25 ● 66
Upset-1	−0.2 ● 90
Upset-2	0.3 ● 90
Design Condition	0.3 ● 90 e −0.2 ● 90

BALLESTRA S.p.A. MILANO (ITALIA)

CUSTOMER FLUORSID – ASSEMINI (CAGLIARI) | DWG. 3819 . 35 . 015

PLANT SULFURIC ACID PRODUCTION | JOB 3819 | FLOW SHEET 3819 . 10 . 002

ITEM C-801 | N°REQUIRED 1 | DRYING TOWER | SHEET 1 OF 6

Rev.	Date	Drawn	Checked	Appr'd.	Description
0	26/05/01	EARED	R.C.	M.M.	PRELIMINARY ISSUE FOR COMMENTS
1	27/07/01	EARED	R.C.	M.M.	ISSUE FOR CONSTRUCTION
2	31/12/01	EARED	R.C.	M.M.	GENERAL REVISION
3	31/01/02	EARED	R.C.		AGGIUNTO QUOTA 0,00 RIF. IMPIANTO
4					

NOZZLES SCHEDULE

POS.	N°	PROJECT	SERVICE	SIZE	NOZZLE NECK THK.	NOZZLE NECK MAT.L	FLANGE RATING	FLANGE THK.	FLANGE FACE	FLANGE MAT.L	NOTE
A	1	SEE DWG.	GAS INLET	O.D. 914.4	10 mm	ZECOR ◇2	PL.-SEE DTL.	32	PLANE	304 L	NOTE 5
B	1	1895	GAS OUTLET	O.D. 914.4	6 mm	316 L	-	-	-	-	PIPE S.B.
C	1	1630	ACID INLET	DN 150	5 mm	ZECOR	PN16-UNI6090	-	LAP JT	304 L	
D	1	SEE DWG.	ACID OUTLET	DN 200	5 mm	ZECOR	PN10-UNI6089	-	LAP JT	304 L	
E	1	1630	TROUGH ACCESS	I.D. 1140	6 mm	ZECOR	PL.-SEE DTL.	32	LAP JT	304 L	W/DAVIT
F	1	1630	SHELL MANWAY	I.D. 760	10 mm	ZECOR ◇2	PL.-SEE DTL.	25	LAP JT	304 L	W/DAVIT & DAVIT
G	1	1400	HOUSING MANWAY	O.D. 610	6 mm	316 L	PL.-SEE DTL.	25	LAP JT	304 L	W/DAVIT
J	1	1860	MIST TEST	DN 150	5 mm	ZECOR	PN16-UNI6090	--	LAP JT	304 L	W/BLIND FLG.
H	2	SEE DWG.	SIGHTGLASS	O.D. 340	6 mm	ZECOR	DN 200 SIGHTGLASS		PN10-DIN 28120		NOTE 3
I	1	700	STICKTEST	DN 50	80S	316 L	PN16-UNI2278	--	PLANE	316 L	
Px	2	-	PRESSURE CONNECTION	DN 25	-	316 L	CPLG.-3000#				W/PLUG

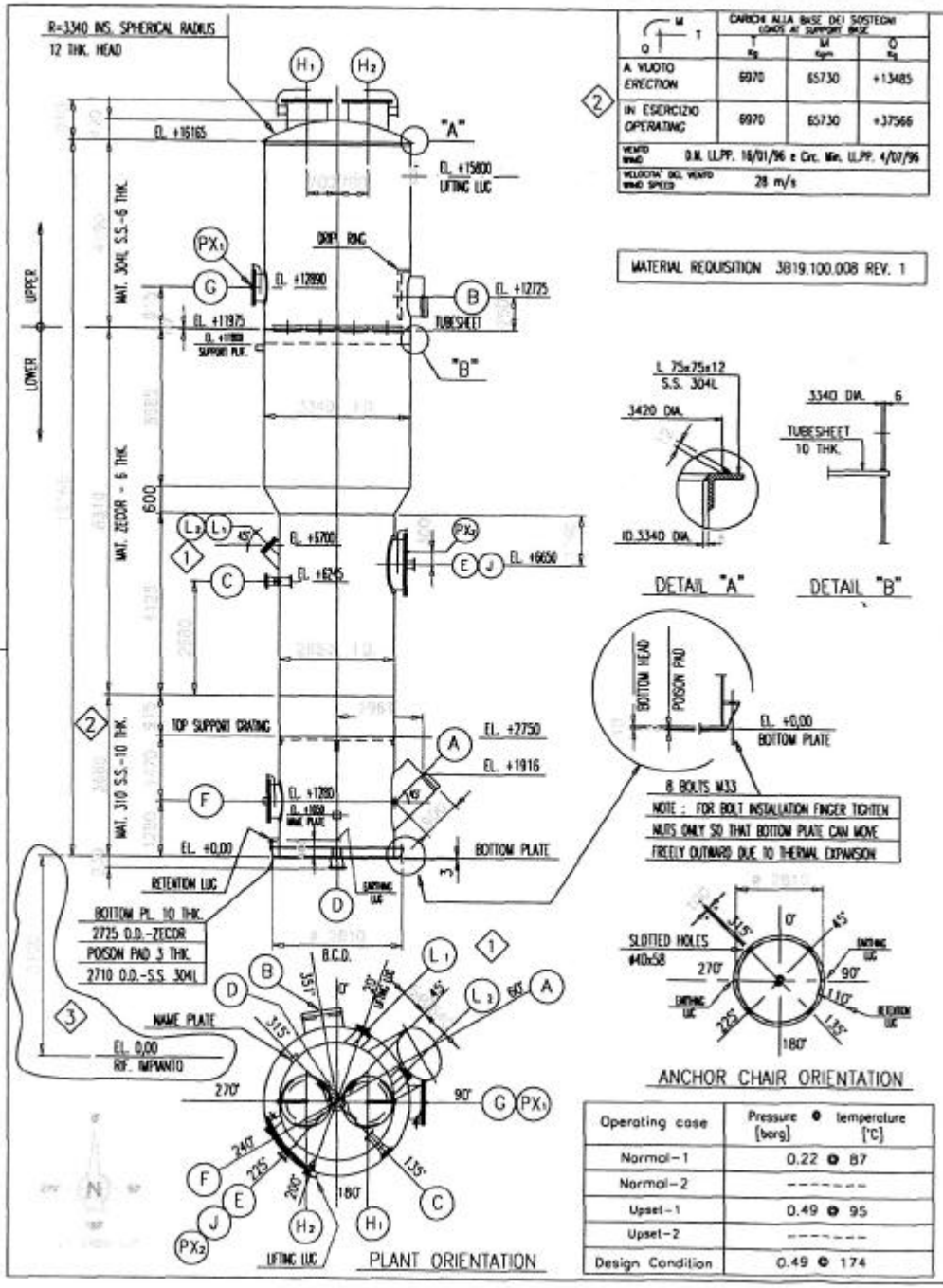
MATERIALS			DESIGN DATA		SHELL	CONE
LOWER SECTION:	SHELL	ZECOR ALLOY	DESIGN TEMPERATURE °C		90 ◇2	
	CONICAL TRANSITION	ZECOR ALLOY	DESIGN PRESSURE Bar (g)		SEE TABLE	
	BOTTOM PLATE	ZECOR ALLOY	TYPE OF FLUID		GAS	
	PACKING SUPPORT	ZECOR ALLOY	HEAT TREATMENT		NONE	
	EXT. STIFFENERS	ASTM A 240 304L	X-RAY TEST		100%-10%	
	NOZZLE FLANGES	ASTM A 240 304L	SPECIFICATION FOR ZECOR MAT.		SPEC. 412-2702	
	NOZZLES PIPE	SEE NOZZLE SCHEDULE	JOINT EFFICIENCY		-	
	GASKETS	GARLOCK GYLON	CORROSION ALLOWANCE	ZECOR mm	1	
	BOLTS AND NUTS EXT.	ASTM A 193 B8-A 194 8		316L S.S. mm	1.5	
UPPER SECTION:	SHELL	ASTM A 240 316L		ALLOY 20 mm	- ◇2	
	CONICAL TRANSITION	ASTM A 240 316L	GEOMETRIC CAPACITY m3		61.2	
	MESH PAD SUPPORT	ASTM A 240 316L				
	EXT. STIFFENERS	ASTM A 240 316L	INSPECTION INSTITUTE		COSTUMER / BALLESTRA S.p.A.	
	NOZZLE FLANGES	ASTM A 240 316L	CODE		ASME VIII div.1 / MEC std	
	NOZZLES PIPE	ASTM A 240 316L	WEIGHTS			
	GASKETS	GARLOCK GYLON	EMPTY	10030 Kg	OPERATING	24550 Kg
	BOLTS AND NUTS EXT.	ASTM A 193 B8-A 194 8	GRATING	490 Kg	HOLD-UP LIQ.	3000 Kg
	LIFTING LUG	ASTM A 240 316L	PACKING	8870 Kg	TROUGH DRY	890 Kg
	ELBOW	ASTM A 240 316L	MESH PAD	240 Kg	TROUGH FLOODED	1920 Kg

INSULATION : NO

NOTE : 1) GASKET 3 mm THK.(BLUE OR FAWN)
2) FLANGE FACE: PHONOGRAPHIC FINISH 125-250 AARH
3) SIGHTGLASS COMPLETED WITH "LUMICLAS" LUMINAIRE TYPE USL-06/75 (24V-10OW)
4) FOR GENERAL NOTES SEE CONSTRUCTION DWG.
5) COMPLETE WITH BOLTS AND COUNTERFLANGE

M.E.C. NO. 511-301 | CONSTRUCTION DWG. NO. 3819.30.015 | Comp. Code 3819C8012_FG1_REV3 | Scale 1:75

9B



	CARICHI ALLA BASE DEI SOSTEGNI LOADS AT SUPPORT BASE		
	T kg	U kgm	Q kg
A VUOTO ERECTION	6970	65730	+13485
IN ESERCIZIO OPERATING	6970	65730	+37566
VENTO WIND	D.M. LL.PP. 16/01/96 e Circ. Min. LL.PP. 4/07/96		
VELOCITA' DEL VENTO WIND SPEED	28 m/s		

MATERIAL REQUISITION 3819.100.008 REV. 1

Operating case	Pressure ● temperature [barg] [°C]
Normal-1	0.22 ● 87
Normal-2	--------
Upset-1	0.49 ● 95
Upset-2	--------
Design Condition	0.49 ● 174

BALLESTRA S.p.A. MILANO (ITALIA)

CUSTOMER FLUORSID - ASSEMINI (CAGLIARI) | DWG. 3819 . 35 . 016

PLANT SULFURIC ACID PRODUCTION | JOB 3819 | FLOW SHEET 3819 . 10 . 004

ITEM C-802 N°REQUIRED 1 | INTERPASS ABSORBING TOWER | SHEET 1 OF 6

Rev.	Date	Drawn	Checked	Apprd.	Description
0	26/05/01	ERRED	R.G.	M.M.	PRELIMINARY ISSUE FOR COMMENTS
1	27/07/01	ERRED	R.G.	M.M.	ISSUE FOR CONSTRUCTION
2	31/12/01	ERRED	R.G.	M.M.	GENERAL REVISION
3	31/01/02	ERRED	R.G.		ACCIUNTO QUOTA 0,00 RIF. IMPIANTO
4					

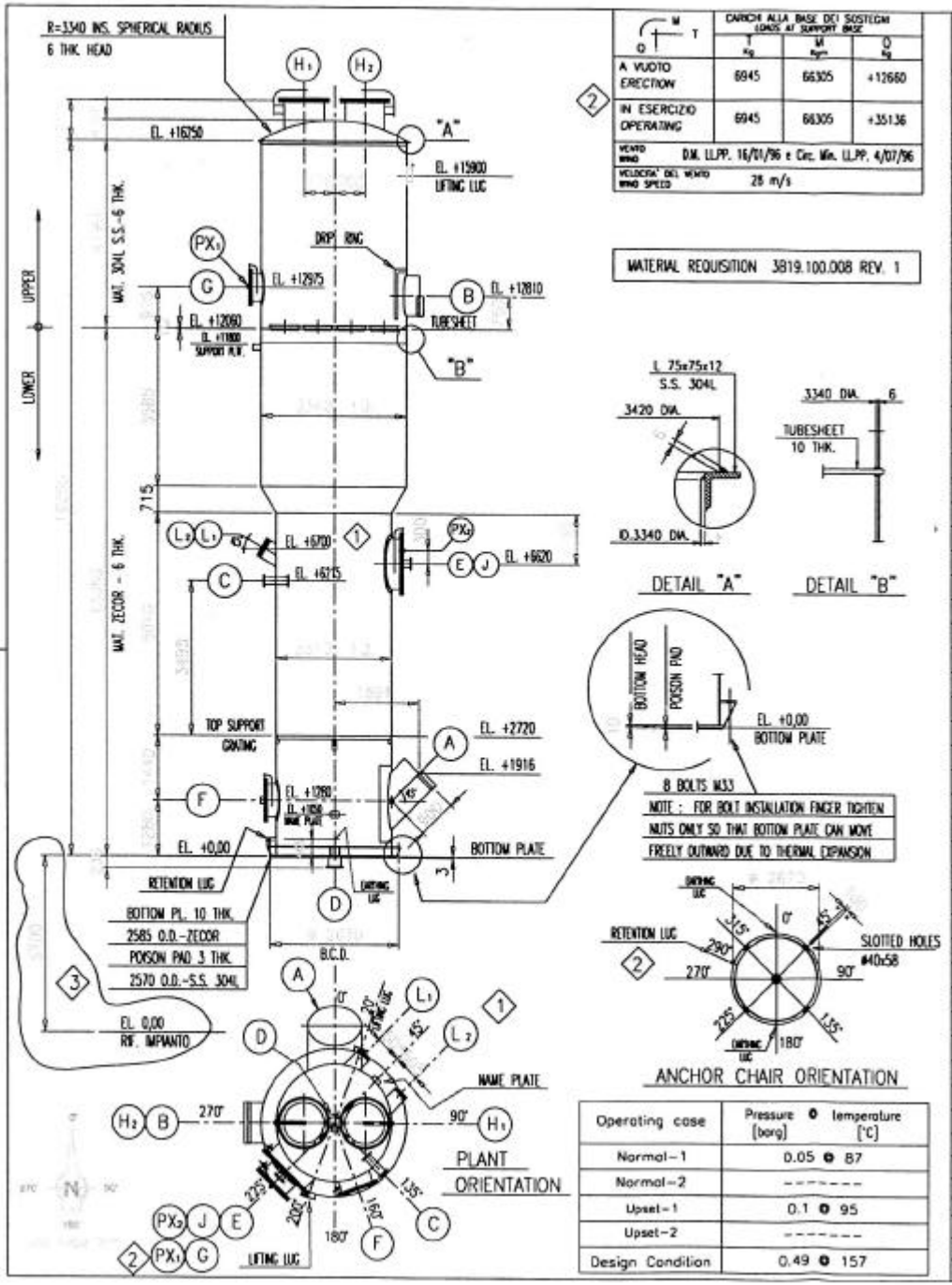
NOZZLES SCHEDULE

POS.	N°	PROJECT	SERVICE	SIZE	NOZZLE NECK THK.	NOZZLE NECK MAT.L	FLANGE RATING	FLANGE THK.	FLANGE FACE	FLANGE MAT.L	NOTE
A	1	SEE DWG.	GAS INLET	O.D. 914.4	10 mm	◇ 310	-	-	-	-	PIPE S.B.
B	1	1970	GAS OUTLET	O.D. 914.4	6 mm	304 L	-	-	-	-	PIPE S.B.
C	1	1555	ACID INLET	DN 200	5 mm	ZECOR	PN10-UNI6089	-	LAP JT	304 L	
D	1	SEE DWG.	ACID OUTLET	DN 250	5 mm	ZECOR	PN10-UNI6089	-	LAP JT	304 L	
E	1	1555	TROUGH ACCESS	I.D. 1140	6 mm	ZECOR	PL.-SEE DTL.	32	LAP JT	304 L	W/DAVIT
F	1	1555	SHELL MANWAY	I.D. 760	10 mm	◇ 310	PL.-SEE DTL.	25	LAP JT	304 L	W/DAVIT
G	1	1900	HOUSING MANWAY	I.D. 610	6 mm	304 L	PL.-SEE DTL.	25	LAP JT	304 L	W/DAVIT
J	1	1785	MIST TEST	DN 150	5 mm	ZECOR	PN16-UNI6090	--	LAP JT	304 L	W/BLIND FLG.
H	2	SEE DWG.	ROOF MANWAY	O.D. 915	6 mm	304 L	PL.-SEE DTL.	32	LAP JT	304 L	W/DAVIT
L	2	-	SIGHTGLASS	O.D. 340	6 mm	ZECOR	DN 200 SIGHTCLASS		PN10-DIN 28120		NOTE 3
Px	2	-	PRESSURE CONNECTION	DN 25	-	316 L	CPLG.-3000/				W/PLUG

MATERIALS			DESIGN DATA		SHELL	CONN.
LOWER SECTION:	SHELL	ASTM A 240 310	DESIGN TEMPERATURE	°C	174	
	CONICAL TRANSITION	ZECOR ALLOY	DESIGN PRESSURE	Barg	0.49 ◇	
	BOTTOM PLATE	ZECOR ALLOY	TYPE OF FLUID		GAS	
	PACKING SUPPORT	ASTM A 240 310	HEAT TREATMENT		NONE	
	EXT. STIFFENERS	ASTM A 240 304L	X-RAY TEST		100%-10%	
	NOZZLE FLANGES	ASTM A 240 304L	SPECIFICATION FOR ZECOR MAT.		SPEC. 412-2702	
	NOZZLES PIPE	SEE NOZZLES SCHEDULE	JOINT EFFICIENCY		-	
	GASKETS	GARLOCK GYLON	CORROSION ALLOWANCE	ZECOR mm	1	
	BOLTS AND NUTS EXT.	ASTM A 193 B8-A 194 8		304L/316L S.S. mm	1.5	
UPPER SECTION:	SHELL	ASTM A 240 304L		310 S.S. mm	3	
	HEAD	ASTM A 240 304L	GEOMETRIC CAPACITY	m3	117	
	TUBESHEET/STIFF.	ASTM A 240 304L				
	EXT. STIFFENERS	ASTM A 240 304L	INSPECTION INSTITUTE		COSTUMER / BALLESTRA S.p.A.	
	NOZZLE FLANGES	ASTM A 240 304L	CODE		ASME VIII div.1 / MEC std	
	NOZZLES PIPE	ASTM A 240 304L	WEIGHTS			
	GASKETS	GARLOCK GYLON	EMPTY	15310 Kg	OPERATING	31200 Kg
	BOLTS AND NUTS EXT.	ASTM A 193 B8-A 194 8	GRATING	733 Kg	HOLD-UP LIQ.	3000 Kg
	LIFTING LUG	ASTM A 240 304L	PACKING	7960 Kg	TROUGH DRY	855 Kg
			MIST ELIMIN. DRY	2121 Kg	TROUGH FLOODED	1808 Kg
			MIST ELIMIN. WET	3118 Kg		
INSULATION :	NO					

NOTE : 1) GASKET 3 mm THK.(BLUE OR FAWN)
2) FLANGE FACE: PHONOGRAPHIC FINISH 125-250 AARH
3) SIGHTGLASS COMPLETED WITH "LUMIGLAS" LUMINAIRE TYPE USL-06/75 (24V-100W)
4) FOR GENERAL NOTES SEE CONSTRUCTION DWG.

M.E.C. NO. 511-303 | CONSTRUCTION DWG. NO. 3819.30.016 | Comp. Code 3819C802Z_FG1_REV3 | Scale 1:100



CARICHI ALLA BASE DEI SOSTEGNI LOADS AT SUPPORT BASE	T kg	M kgm	Q kg
A VUOTO ERECTION	6945	66305	±12660
IN ESERCIZIO OPERATING	6945	66305	±35136

VENTO WIND: D.M. LL.PP. 16/01/96 e Circ. Min. LL.PP. 4/07/96
VELOCITA' DEL VENTO WIND SPEED: 28 m/s

MATERIAL REQUISITION 3819.100.008 REV. 1

Operating case	Pressure (barg)	Temperature (°C)
Normal-1	0.05	87
Normal-2	--------	
Upset-1	0.1	95
Upset-2	--------	
Design Condition	0.49	157

BALLESTRA S.p.A
MILANO (ITALIA)

CUSTOMER FLUORSID- ASSEMINI (CAGLIARI) | DWG. 3819 . 35 . 017
PLANT SULFURIC ACID PRODUCTION | JOB 3819 | FLOW SHEET 3819 . 10 . 006
ITEM C-803 | N°REQUIRED 1 | FINAL ABSORBING TOWER | SHEET 1 OF 6

Rev.	Date	Drawn	Checked	Apprd.	Description
0	26/05/97	ERRED	R.G.	M.M.	PRELIMINARY ISSUE FOR COMMENTS
1	27/07/97	ERRED	R.G.	M.M.	ISSUE FOR CONSTRUCTION
2	31/12/97	ERRED	R.G.	M.M.	GENERAL REVISION
3	31/01/98	ERRED	R.G.		ACCIUNTO QUOTA 0,00 RIF. IMPIANTO
4					

NOZZLES SCHEDULE

POS.	N°	PROJECT	SERVICE	SIZE	NOZZLE NECK THK.	NOZZLE NECK MAT.L	FLANGE RATING	FLANGE THK.	FLANGE FACE	FLANGE MAT.L	NOTE
A	1	SEE DWG.	GAS INLET	O.D. 914.4	10 mm	◇ 310	-	-	-	-	PIPE S.B.
B	1	1970	GAS OUTLET	O.D. 914.4	6 mm	304 L	-	-	-	-	PIPE S.B.
C	1	1485	ACID INLET	DN 150	5 mm	ZECOR	PN16-UNI6090	-	LAP JT	304 L	
D	1	SEE DWG.	ACID OUTLET	DN 200	5 mm	ZECOR	PN10-UNI6089	-	LAP JT	304 L	
E	1	1485	TROUGH ACCESS	I.D. 1140	6 mm	ZECOR	PL.-SEE DTL.	32	LAP JT	304 L	W/DAVIT
F	1	1485	SHELL MANWAY	I.D. 760	10 mm	◇ 310	PL.-SEE DTL.	25	LAP JT	304 L	W/DAVIT
G	1	1900	HOUSING MANWAY	I.D. 760	6 mm	304 L	PL.-SEE DTL.	25	LAP JT	304 L	W/DAVIT
J	1	1715	MIST TEST	DN 150	5 mm	ZECOR	PN16-UNI6090	--	LAP JT	304 L	W/BLIND FLG.
H	2	SEE DWG.	ROOF MANWAY	O.D. 915	6 mm	304 L	PL.-SEE DTL.	32	LAP JT	304 L	W/DAVIT
L	2	-	SIGHTGLASS	O.D. 340	6 mm	ZECOR	DN 200 SIGHTGLASS	PN10-DIN 28120			NOTE 3
Px	2	-	PRESSURE CONNECTION	DN 25	-	316 L	CPLG.-3000#				W/PLUG

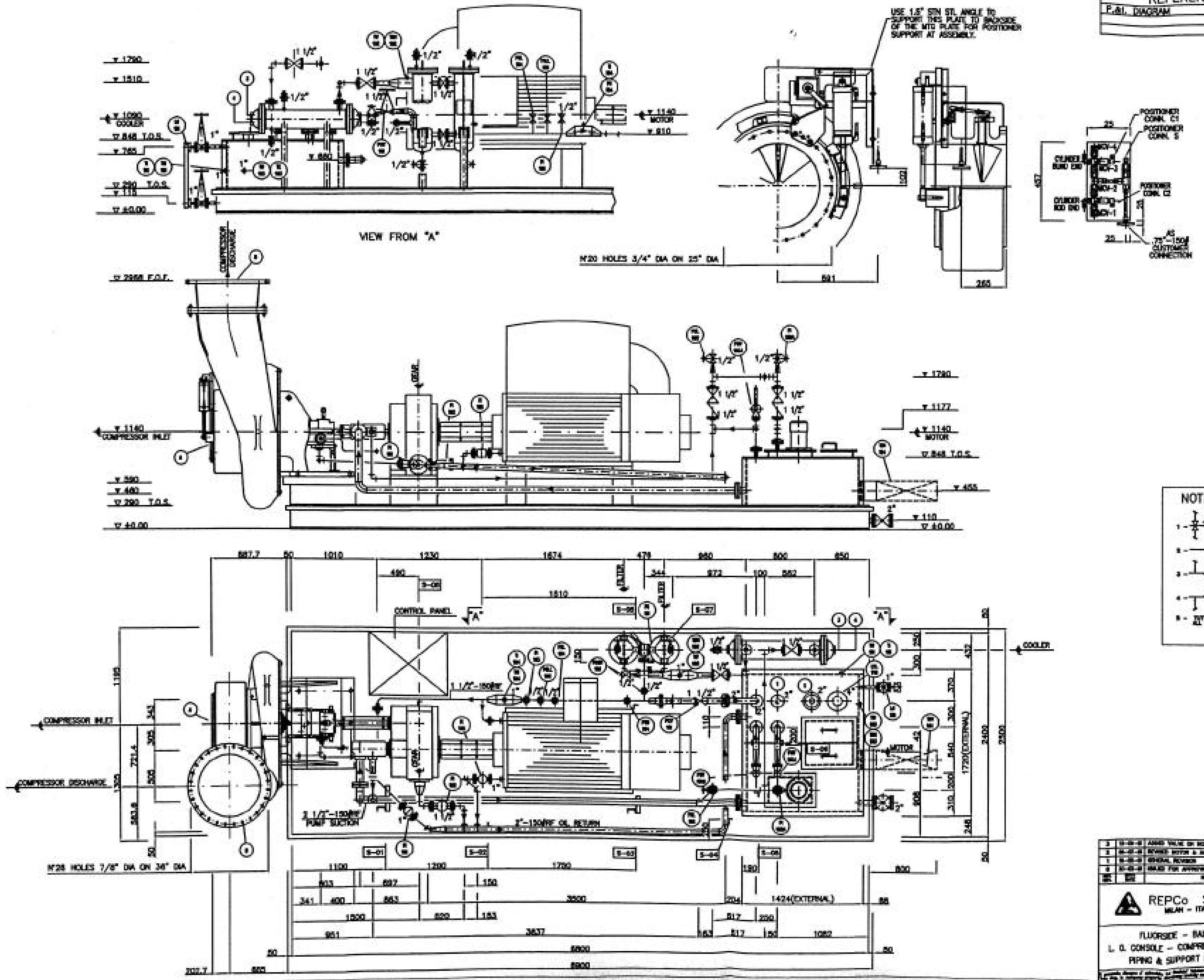
MATERIALS			DESIGN DATA		SHELL	COIL
LOWER SECTION:	SHELL	ZECOR ALLOY	DESIGN TEMPERATURE °C		157	
	CONICAL TRANSITION	ZECOR ALLOY	DESIGN PRESSURE Bar (g)		0.49 ◇	
	BOTTOM PLATE	ZECOR ALLOY	TYPE OF FLUID		GAS	
	PACKING SUPPORT	ZECOR ALLOY	HEAT TREATMENT		NONE	
	EXT. STIFFENERS	ASTM A 240 304L	X-RAY TEST		100%-10%	
	NOZZLE FLANGES	ASTM A 240 304L	SPECIFICATION FOR ZECOR MAT.		SPEC. 412-2702	
	NOZZLES PIPE	SEE NOZZLES SCHEDULE	JOINT EFFICIENCY		-	
	GASKETS	GARLOCK GYLON	CORROSION ALLOWANCE	ZECOR mm	1	
	BOLTS AND NUTS EXT.	ASTM A 193 B8-A 194 8		304L/316L S.S. mm	1.5	
UPPER SECTION:	SHELL	ASTM A 240 304L		310 S.S. mm	3	
	HEAD	ASTM A 240 304L	GEOMETRIC CAPACITY m3		112	
	TUBESHEET/STIFF.	ASTM A 240 304L				
	EXT. STIFFENERS	ASTM A 240 304L	INSPECTION INSTITUTE		COSTUMER / BALLESTRA S.p.A.	
	NOZZLE FLANGES	ASTM A 240 304L	CODE		ASME VIII div.1 / MEC std	
	NOZZLES PIPE	ASTM A 240 304L	WEIGHTS			
	GASKETS	GARLOCK GYLON	EMPTY	13030 Kg	OPERATING	27436 Kg
	BOLTS AND NUTS EXT.	ASTM A 193 B8-A 194 8	GRATING	320 Kg	HOLD-UP LIQ.	3000 Kg
	LIFTING LUG	ASTM A 240 304L	PACKING	7150 Kg	TROUGHS DRY	793 Kg
			MIST ELIMIN. DRY	1735 Kg	TROUGHS FLOODED	1705 Kg
			MIST ELIMIN. WET	2551 Kg		

INSULATION : NO

NOTE : 1) GASKET 3 mm THK.(BLUE OR FAWN)
2) FLANGE FACE: PHONOGRAPHIC FINISH 125-250 AARH
3) SIGHTGLASS COMPLETED WITH "LUMIGLAS" LUMINAIRE TYPE USL-06/75 (24V-10DW)
4) FOR GENERAL NOTES SEE CONSTRUCTION DWG.

M.E.C. NO. 511-305 | CONSTRUCTION DWG. NO. 3819.30.017 | Comp. Code 3819CB03Z_FG1_REV3 | Scale 1:100

10



REFERENCE DRAWINGS	DWG N°
P.&I. DIAGRAM	00317-CD-PI-001

NOZZLE	DN	RATING
A	20"	25#FF
B	20"	25#FF

CONNECTION LEGEND			
TERMINAL POINT N°	ND	SERVICE	TYPE
1	2"	VENT	150#
2	2"	FILL OPENING	150#
3	1 1/2"	WATER INLET	150#
4	1 1/2"	WATER OUTLET	150#

NOTE GENERALI – GENERAL NOTES

1. [illegible]
2. [illegible]
3. [illegible]
4. [illegible]
5. [illegible]

JOB: 3819
ITEM P-801

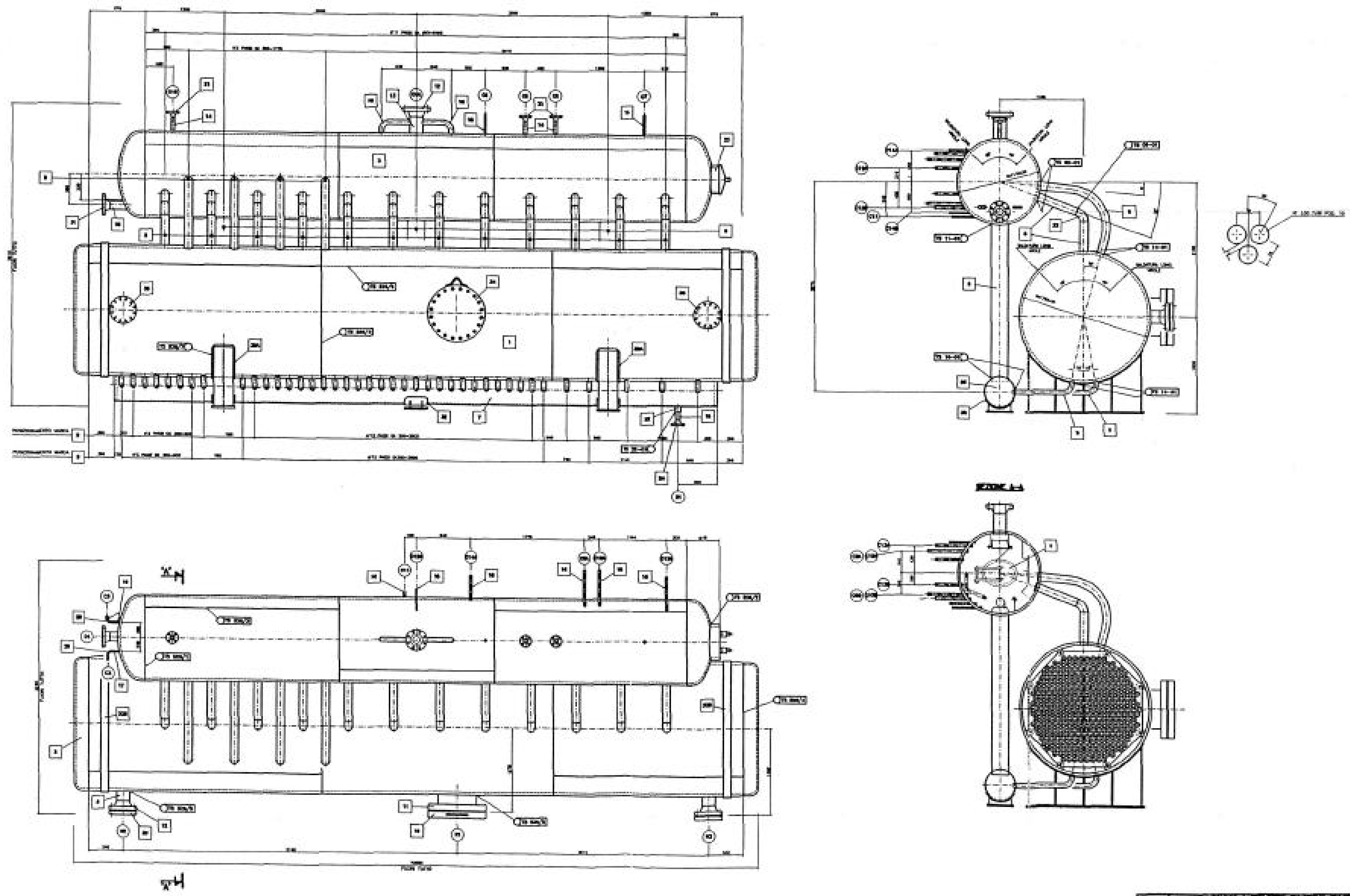
REV.	DATE	DESCRIPTION			
3	[illegible]	ADDED VALVE ON NOZZLE "B"			PT
2	[illegible]	REVISED MOTOR & ADDED SUPPORTS LOCATION			PT
1	[illegible]	GENERAL REVISION			PT
0	[illegible]	ISSUED FOR APPROVAL			PT

REPCo S.p.A.
MILAN – ITALY

FLUORSIDE – BALLESTRA
L. O. CONSOLE – COMPRESSOR PACKAGE
PIPING & SUPPORT LAY-OUT

1 / 1

DIS. N. /DWG N.
00317-CD-ME-101



TITOLO: CALDAIA A RECUPERO SU FORNO ZOLFO

RUTHS SpA GENOVA

FIG. 1

Genuine

BRINK®

Mist Eliminators

for

Sulfuric

Acid

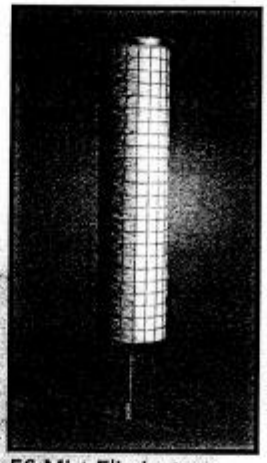
Plants

OVER 75 YEARS IN H_2SO_4

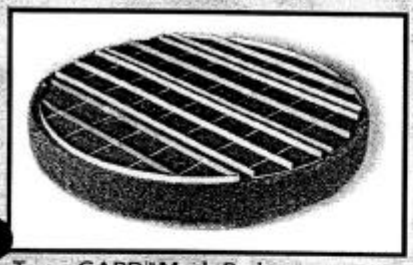
12

Featuring

- Brink® Fiber Bed Mist Eliminators
  - High Efficiency - HE Desig
  - Energy Saver - ES Design
  - Field Pack - FP Design
  - Cost Saver - CS Design
  - Co-Knit - CK Design
- TowerGARD™ Mesh Pads
  - BrinkMesh Design with SX® or LEWMET® wire
  - Patented HI-FLO™ Design
- Oleum Vent Package



ES Mist Eliminator



TowerGARD™ Mesh Pad

CS Mist Eliminator

ENVIRO-CHEM SYSTEMS

a Monsanto Company

Recovering the Future™

Why Brink?

- Over 75 years experience in sulfuric acid plant technology
- Broadest selection of mist elimination designs and products
- Invented fiber bed technology
- Patented designs for sulfuric acid plant products
- Exclusive supplier of SX® and LEWMET® wire mesh pads
- Best technical support in the industry
- Worldwide manufacturing and availability

Monsanto Brink Mist Eliminators
Quality • Service • Technology

Monsanto developed the fiber bed mist eliminator in 1960. We continue to be the leader in improved products which utilize the latest technology. Monsanto Enviro-Chem welcomes the opportunity to investigate and recommend solutions to any air pollution problem. Systems are in operation throughout the world which incorporate Brink technology to meet a variety of diverse needs. Brink Mist Eliminator products offer longer service life resulting in lower plant maintenance and operating costs.

Formation of Acid Mists

Larger acid mist particles are created in sulfuric acid drying and absorbing towers as a result of the splash and shear of liquid acid in the distributor and over the packing. These particles are entrained in the upward gas flow. More difficult to collect small acid particles are formed by the reaction of sulfur trioxide with any water vapor present and by the condensation of acid from the gaseous or vapor phase. These acid particles can corrode blowers, ductwork and heat exchangers, damage catalyst and cause atmospheric pollution.

Collection of Acid Mists

A fiber bed mist eliminator for sulfuric acid service is a thick filter consisting of acid resistant glass fibers packed in a supporting cage. Gases containing the mist particles are directed horizontally through the fiber beds. Particles contact and collect on individual fibers of the bed and then coalesce to form liquid films and droplets which are moved through the bed by the gas flow. The collected liquid then drains off the downstream face of the bed by gravity.

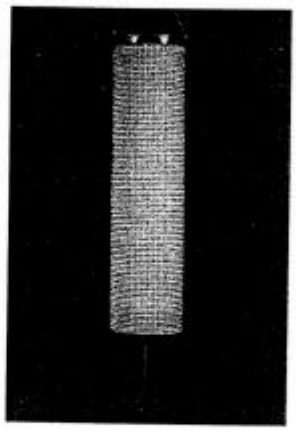
The Brink HE (High Efficiency), ES (Energy Saver) and FP (Field Pack) styles achieve very high collection efficiencies on submicron particles by using impaction, interception and Brownian diffusion capture mechanisms. Extremely fine particles have random (Brownian) movement caused by collisions with gas molecules. The HE, ES, and FP styles use small fibers, thick beds and long residence times to enable fine mist particles to collect on fibers by their random movement.

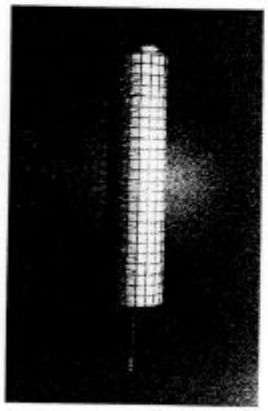
The Brink CS (Cost Saver), CK (Co-Knit), HV (High Velocity), and HP (High Performance) styles utilize only impaction and provide high efficiency collection on all but the smallest particles.

Brownian & Diffusion Fiber Bed Products

HE (High Efficiency)

The original Brink design consists of fibers which are packed between two concentric cylindrical screens.





ES (Energy Saver)

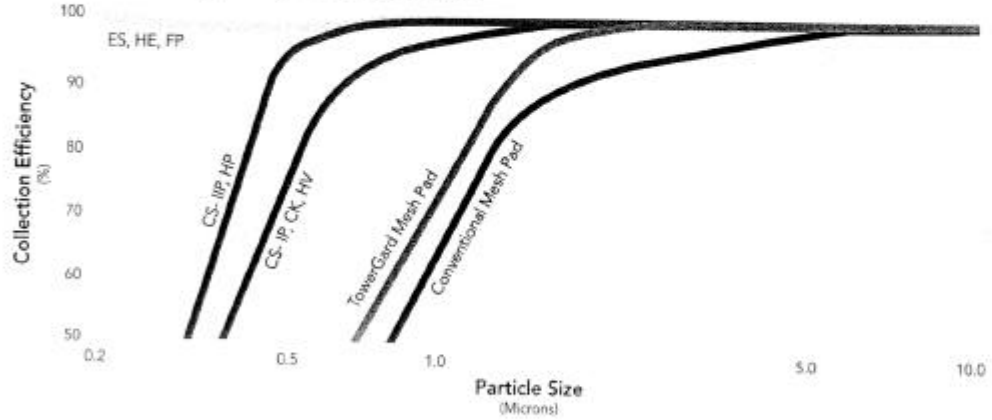
This product consists of a special wound fiber bed, computer controlled quality, and a bicomponent drainage or reentrainment control layer of coarse fiber downstream of the finer collecting fiber. Liquid that would reentrain from the fine fiber bed is drained in the reentrainment control layer. The **ES** element has become the product of preference in absorption tower service.

FP (Field Pack)

A special field replaceable non-woven sleeve design is available that allows the customer to replace the fiber packing on site. The **FP** offers comparable performance to the **HE** or **ES** style.

Mist Elimination

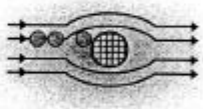
Collection Efficiency vs. Particle Size



Particles are collected in three different ways:

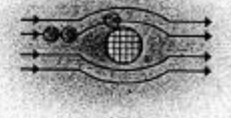
INERTIAL IMPACTION

Particles larger than three microns are collected when their momentum prevents them from following gas streamlines around fibers. They leave the streamline, strike a fiber and are collected by the fiber.



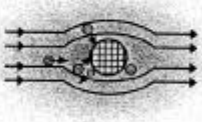
DIRECT INTERCEPTION

Between 1.0 and 3.0 micron size particles tend to follow the gas streamlines as they flow relatively close to fibers. A 1.0 micron particle, for example, passing within 0.5 micron of a fiber will be collected by the fiber.



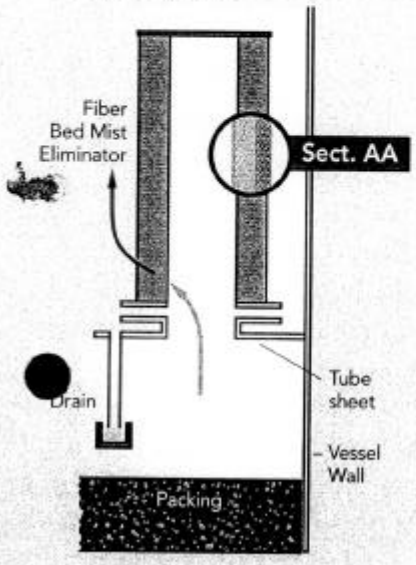
BROWNIAN DIFFUSION

Extremely fine particles have random side-to-side movement caused by collisions with gas molecules. A 0.1 micron particle will have about 10 times the Brownian movement or random motion of a 1.0 micron particle, greatly increasing the probability of collision with a fiber.

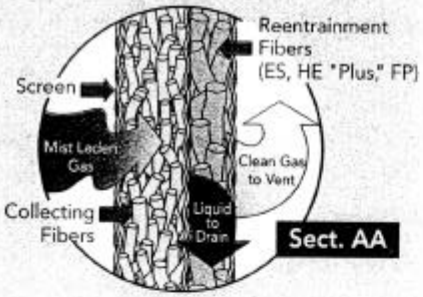


Genuine Brink® Products

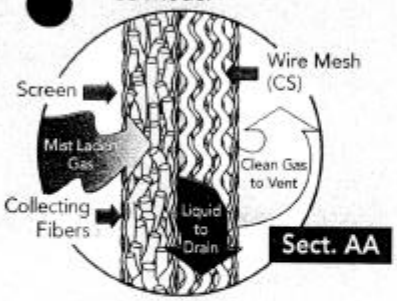
Bi-Component
Bed Products:



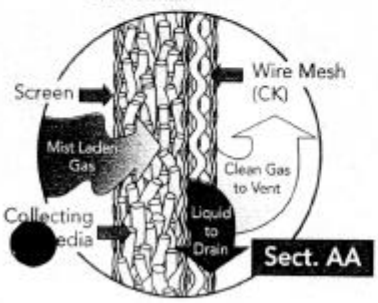
• ES, FP, HE "Plus" Models



• CS Model



• CK Model



Impaction Fiber Bed Products

CS (Cost Saver)
Packed with a glass fiber mat collecting layer and a metal alloy mesh reentrainment control layer on the downstream side (outside). One advantage of **CS** products is their ease of maintenance and removal compared to conventional mesh pads.

CS-IP
Used in the drying towers of sulfur burning and spent acid plants where the outer metal mesh layer is typically alloy 20. **CS-IP** elements in the drying tower usually need to be washed about once per year due to buildup of sulfates in the fiber. While this maintenance results in plant downtime, removing the acid mist and solids with the **CS** helps protect downstream equipment such as a suction blower and the first pass catalyst.

CS-IIP
Used in low velocity absorption towers of any sulfuric acid plant where the quantity of sub-micron mist formed is reduced, and where the gas volume does not fluctuate below 80% of design. Like the **CS-IP**, the **CS-IIP** uses a glass mat to collect the particles and includes an alloy mesh reentrainment layer. For interpass and final tower service, this metal mesh layer is usually 310 SS. In situations where the loading is expected to be high (greater than 50 mg/ACF), a special metal impaction separator screen can be provided as part of the element. This separator collects the larger particles and reduces the effective load to the fiber bed portion of the element.

CK (Co-Knit)
A new innovation to increase the operating time between washings of drying tower elements and extend the plant operating time between turnarounds. **Co-knit** uses alloy 20 wire mesh with acid resistant glass fiber knitted into the mesh, creating a more open packing structure. A metal alloy mesh reentrainment control layer is included on the downstream side (outside).

HV (High Velocity)
Flat panel design is used in many older plants.

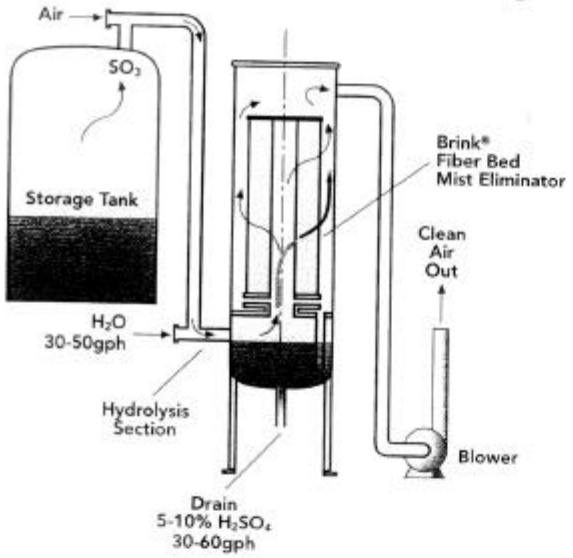
HP (High Performance)
Bulk packed cylindrical design is used in many older plants.

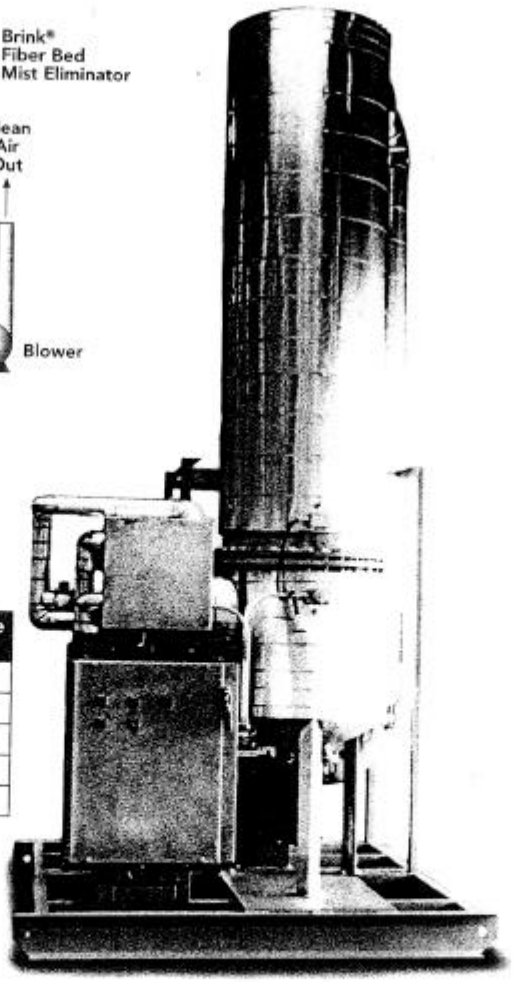
Oleum Vent Package

Enviro-Chem offers fully engineered package system for controlling SO_3/H_2SO_4 emissions from oleum storage tanks, tank trucks, railcars, and loading stations. These units are available in flows from 100 to 1,500 cfm. The units hydrolyze SO_3 vapor into sulfuric acid mist and use a high efficiency Brink Mist Eliminator to remove the mist. Typically, customers with a storage tank vent problem will require a 100 cfm package. If there are multiple vent problems, such as several storage tanks at high rates, a 200, 500, or larger cfm package will be required.

Where an oleum loading or unloading dock is involved, the package size is governed by the hood design, but a typical package would require a 200 or 500 cfm oleum vent package.

A typical flow diagram for the Oleum Vent Package.





PACKAGE CAPACITIES

Model	Max. Gas Flow (cfm)	Max. SO_3 Rate (lbs./hr.)
OVS 100	100	11
OVS 200	200	22
OVS 500	500	54
OVS 1000	1,000	108
OVS 1500	1,500	162

BENEFITS

- Control of SO_3/H_2SO_4 emissions from loading/unloading stations
- Converts SO_3 vapor into sulfuric acid for ease of removal
- Available in sizes from 100 to 1,500 cfm

FEATURES

- Utilizes high efficiency Monsanto Brink Mist Eliminator
- Hydrolysis section to mix water with SO_3/air mixture
- Heat tracing and insulation for outdoor installation
- A suction side blower to draw in process gas and dilution air

Genuine Brink® Products

BENEFITS

- SX® and LEWMET® increase service life 3 to 5 times vs. alloy 20
- Increases service life of ductwork, blowers and catalyst
- Guards against unexpected temperature upsets or surges

FEATURES

- Uses multi-layer BrinkMesh in SX, LEWMET, alloy 20, 316L SS and co-knit for all services
- Exclusively incorporates the best materials available: LEWMET for 93% sulfuric acid and SX for 98% sulfuric acid
- Co-knit glass or Teflon® fibers provide increased efficiency and reduced pressure drop without sacrificing capacity

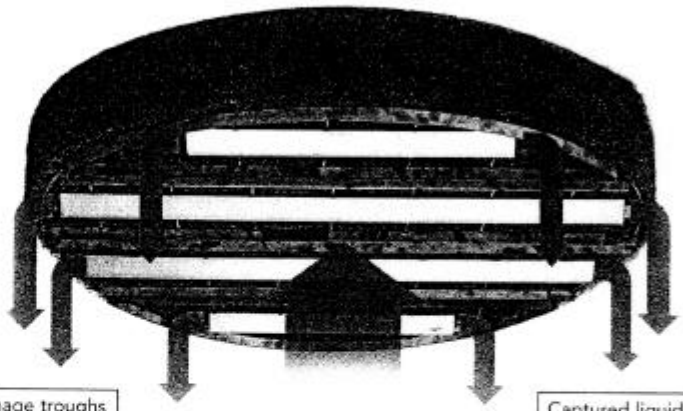
Mesh Pad Impaction Products

High Performance: TowerGARD™

Captures, collects and returns acid mist to the tower with 99.9% collection efficiency on particles greater than 2.0 microns with 2 inch w.c. pressure drop. TowerGARD systems made with co-knit glass or Teflon® fibers are capable of 50% turndown due to increased targets for slower/ smaller droplets.

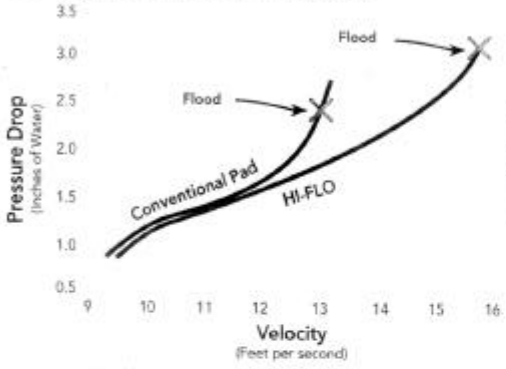
Higher Performance: HI-FLO™

Patented design which safely increases capacity by 25% and can handle up to 300% increased liquid load versus a conventional pad.



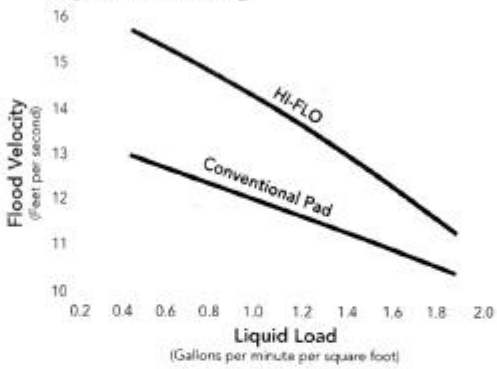
Open ended metal troughs are placed at the bottom of the pad. Within the pad, gas flow patterns are induced by the Von Karman Roll-Vortex effect and push liquid out of the pad to protected regions directly above each trough, discharging collected liquid near the vessel walls.

Figure 1: Increased Velocity



Liquid load: 0.432 gallons per minute per square foot.

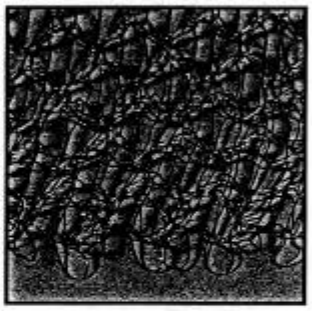
Figure 2: Loading



Both plots: 0.011-inch wire knitted at 8 lbs/ft³, 4 inches thick, air and water at ambient conditions.

BRINKMESH

- Crimped wire BrinkMesh



- Co-knit wire/fiberglass Brinkmesh

One layer shown for clarity.

Corrosion Resistant Materials

Sulfuric acid plant drying or absorbing tower mesh pads utilizing stainless steel or alloy 20 materials, require replacement every one to three years as a result of corrosion. Resultant sulfate build-up reduces collection efficiency and increases pressure drop. Plant upsets can overheat Teflon® mesh pads and cause them to melt. Brink TowerGARD™ mesh pads are available exclusively with the best corrosion-resistant materials currently available: LEWMET® for 92 - 96% sulfuric acid and SX® stainless steel for 98% sulfuric acid.

Compared to alloy 20 and 316L stainless steel, corrosion rates are dramatically reduced for LEWMET and SX within normal operating temperatures for drying towers (50° - 80°C) and 92 - 98% sulfuric acid (*see Figures 3 and 4*). LEWMET and SX have much greater corrosion resistance and withstand temporary plant temperature excursions better than either alloy 20 or 316L stainless steel.

*Figure 3: 93% H_2SO_4 Corrosion Rate**

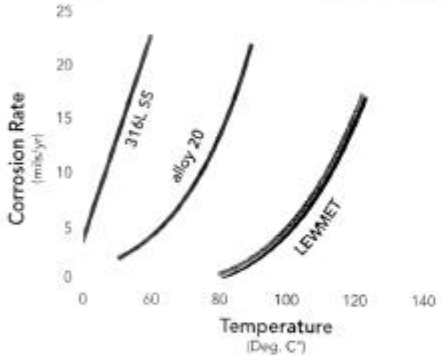
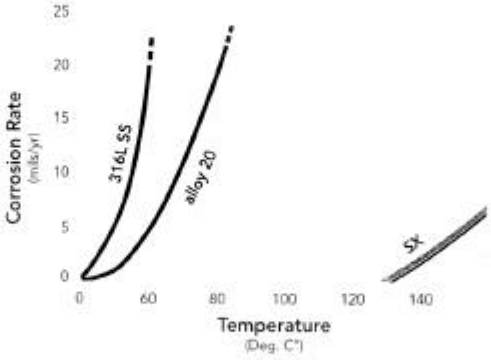


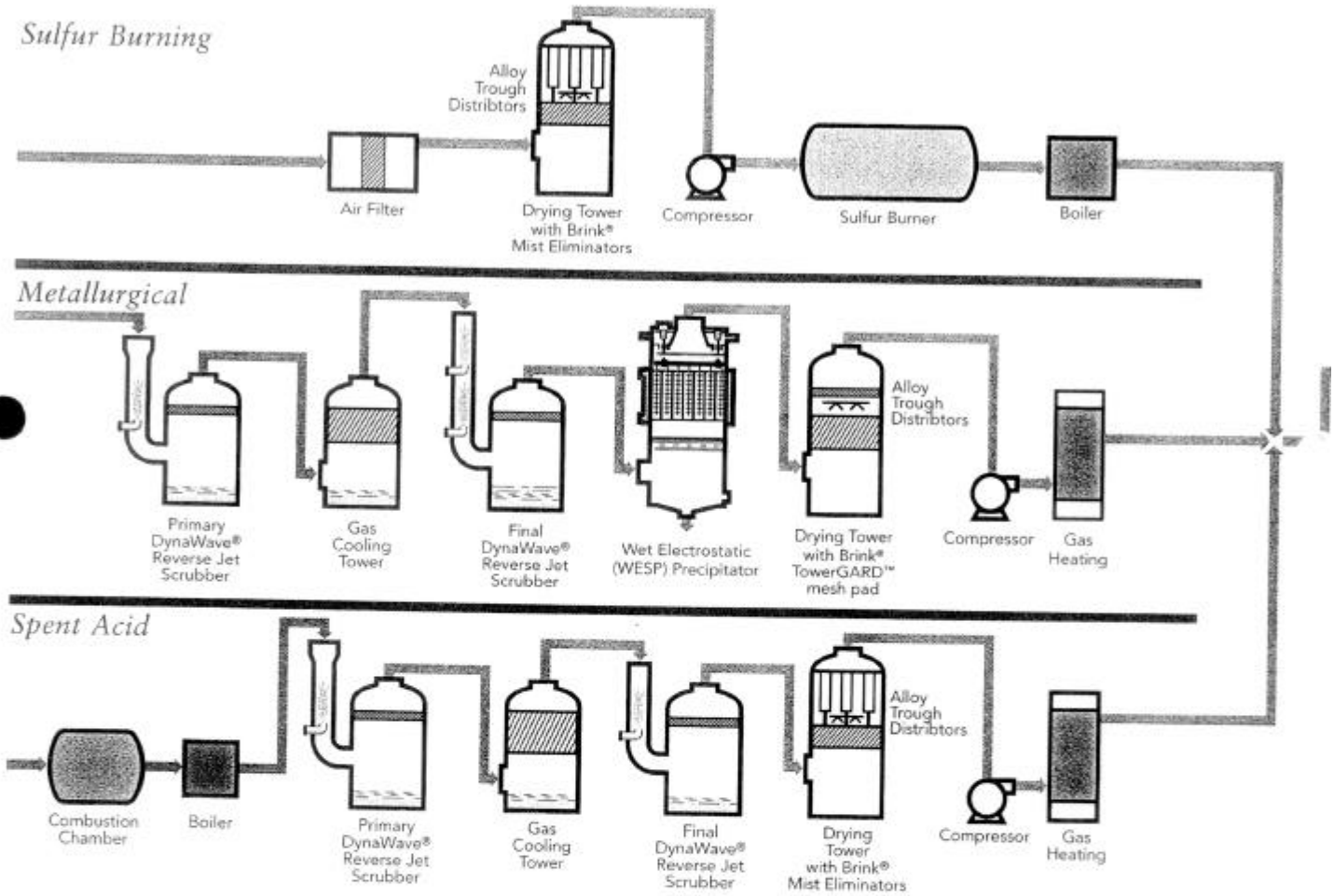
*Figure 4: 98% H_2SO_4 Corrosion Rate**



*Data supplied by Chas. S. Lewis & Co., and Sandvik, Inc.

Genuine Brink® Products

Typical H_2SO_4 Plant Process Flow Diagrams



Sulfur Burning

Ambient air is drawn through a high efficiency drying tower by the main compressor to remove moisture. A Brink Mist Eliminator provides efficient acid mist removal, which is critical for protection of the main compressor. The compressed dry gas enters the sulfur burner where molten sulfur is burned in the presence of the dry air to produce high sulfur dioxide (SO_2) gas strength. The hot SO_2 combustion gas is then cooled in a steam boiler to the proper temperature for introduction to the converter system.

Metallurgical

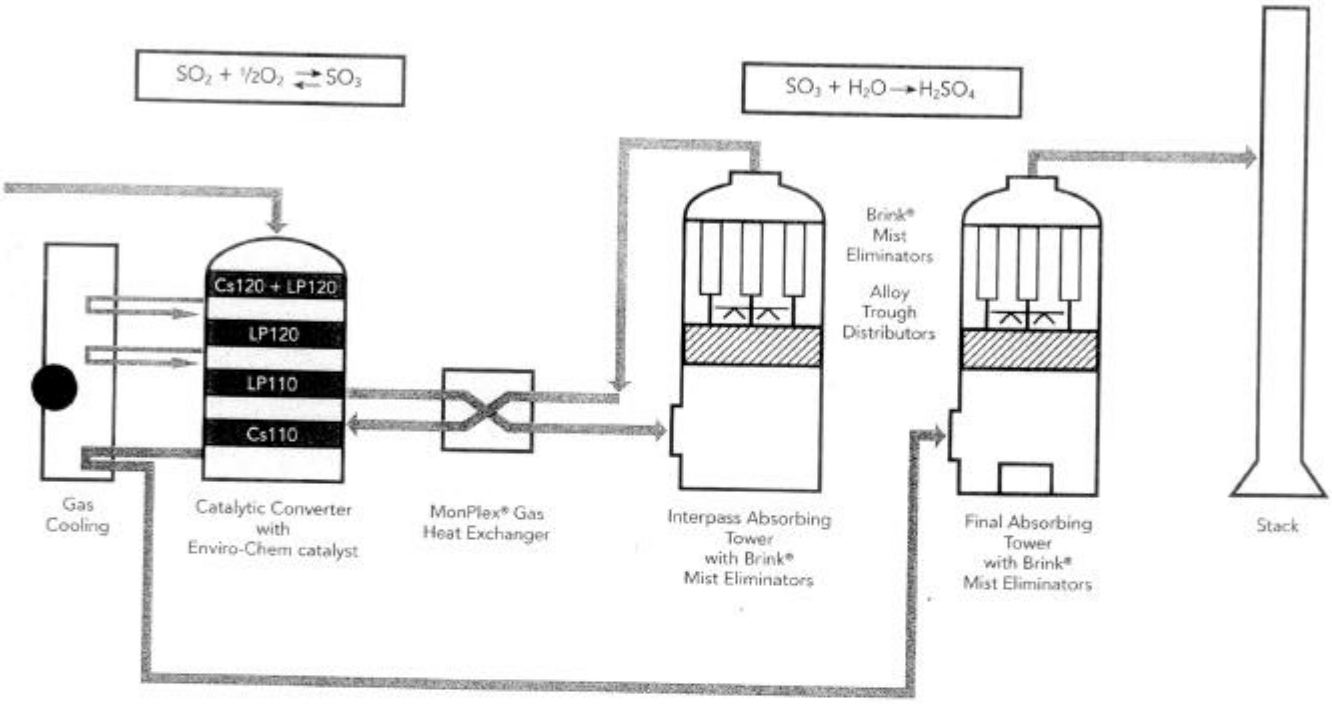
Off gas from essentially any continuous or semi-continuous process that contains SO_2 gas is pulled through the primary DynaWave® Reverse Jet Scrubber where it is cleaned and cooled to its adiabatic saturation temperature by recirculating weak acid. Next, the gas is cooled in the gas cooling tower, to a point where the moisture level is reduced to the amount required in the product acid. Next, depending on the level of impurities in the feed gas, a final DynaWave Reverse Jet Scrubber may be used. The final stage of gas cleaning is the Wet Electrostatic Precipitator (WESP) which removes both liquid and solid particulate matter to prevent corrosion and fouling in the acid plant. The gas is then pulled through the high efficiency drying tower where the remaining water vapor is removed. A Brink Mist Eliminator provides efficient acid mist removal for the protection of the main compressor. The dry, clean gas is then compressed and introduced to the converter system.

Spent Acid Regeneration

Spent acid and/or hydrogen sulfide are burned at elevated temperatures to provide SO_2 gas. In the case of spent acid, fuel is burned along with the spent acid in the combustion chamber to achieve the required decomposition temperature. The wet SO_2 combustion gas is then cooled in a steam boiler to recover energy prior to entering the primary DynaWave Reverse Jet Scrubber. From the scrubber on, the process equipment arrangement will have some variation depending on the amount of insolubles generated in the combustion chamber.

SO_3 Absorption

After passing through the first three layers of Monsanto Enviro-Chem LP and Cesium catalyst, SO_3 rich gas is cooled and absorbed with



98% sulfuric acid (H_2SO_4) in the interpass absorption tower. The lean SO_2 gas flows through a Brink Mist Eliminator to remove fine mist particles, thereby protecting downstream equipment. The clean gas is then reheated and enters the converter to complete the conversion of SO_2 to SO_3. The SO_3 formed is absorbed in 98% H_2SO_4 in the final absorbing tower. Brink Mist Eliminators are installed in the final tower to insure the stack gas will meet environmental regulations on acid mist.

Applications for Brink Mist Eliminators in H_2SO_4 Plants

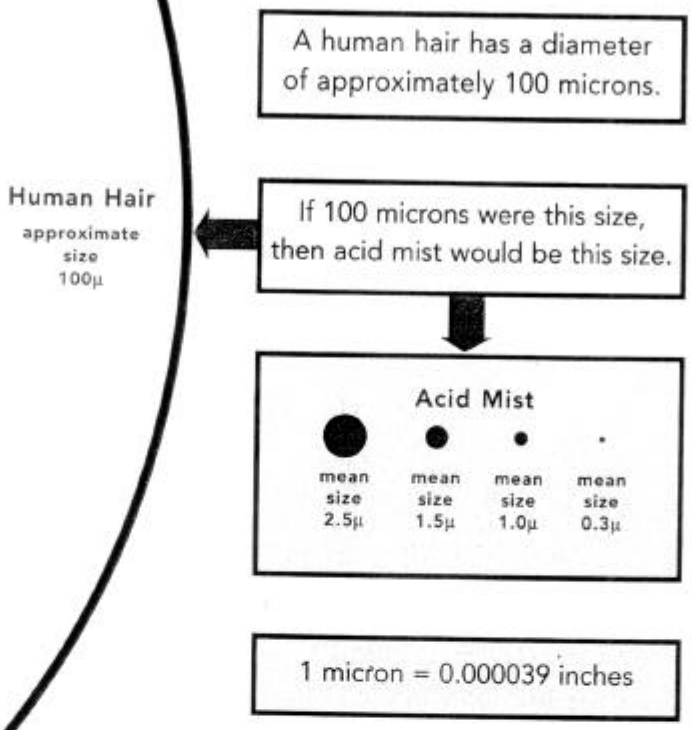
In the drying tower, combustion air for a sulfur burning plant or the acid gas feed in a metallurgical or spent acid plant is dried with sulfuric acid. The concentration and temperature of the circulating acid will affect the amount of small acid mist formation. The higher concentration and temperature common to modern sulfur burning plants increases the amount of small acid mist particles formed, thus requiring better mist collection equipment. In the drying tower of spent acid and metallurgical plants, there is more potential for solids in the gases, and, as a result, co-knit mesh pads or fiber bed mist eliminators are normally used.

Mist in the primary absorption tower is a combination of larger, mechanically generated particles and smaller particles formed from the condensation reaction in the bottom of the tower. If the plant also produces oleum, the overall mist loading will be approximately the same, but the size of the particles formed from condensation will be smaller. This is also the case with Heat Recovery towers.

The mist in the secondary or final absorber is formed in the same way as the mist in the primary absorber, but the quantity of small mist from condensation will be less. High efficiency Brownian diffusion type Brink fiber bed mist eliminators are normally specified for absorbing tower applications.

In plants with ammonia tailgas scrubbers, large amounts of submicron ammonium sulfate/sulfite salts are formed by chemical reaction with sulfur dioxide. Also plants with caustic scrubbers have weak acid mist created from residual SO_3 gas. High efficiency Brownian diffusion type Brink fiber bed mist eliminators are necessary for these applications.

How small is the mist found in sulfuric acid plant towers?



Standard Drying Tower
Acid mist mean size 2.5 micron

Standard Interpass Tower
Acid mist mean size 1.5 micron

Interpass Tower with Oleum Production
Acid mist mean size is 0.3 micron

Interpass Tower with Heat Recovery
Acid mist mean size is 1.0 micron

Final Tower
Acid mist mean size is 1.5 micron

Ammonia Scrubber
Acid mist mean size is 0.3 micron

Mist Eliminator Selection Guide

		FIBER BED PRODUCTS							MESH PADS	
		ES	HE	FP	CS-IP/CK	CS-IIP	HP	HV	TowerGARD™	HI-FLO™
Drying Tower	Sulfur Burning				P		O	O	O	O
	Spent Acid		P		O		O	O	O	O
	Metallurgical				O*				P	O
Interpass Tower	No Oleum	P	O	O		O	O	O		
	With Oleum	P	O	O						
HRS (Heat Recovery Tower)		P	O	O						
Final Tower	Stringent Regulations	P	O	O						
	Operating Rate Varies	P	O	O						
	Standard Design	O	O	O		P	O	O	O	O
Ammonia Scrub		P	O							
Oleum Storage and Loading			P							

P = Preferred O = Option

* *Only CK (Co-knit) design is recommended.*

Monsanto Enviro-Chem Systems

World's Leading Source for Sulfuric Acid Technologies

Enviro-Chem Systems has a long and successful history in providing the latest technology to the sulfuric acid industry. Enviro-Chem is known around the world as the premier designer and constructor of sulfuric acid plants. Along with process engineering, Enviro-Chem provides a broad range of innovative and high quality products for sulfuric acid plants, including Brink® Mist Eliminators, catalyst, acid coolers, alloy products, heat exchangers, and DynaWave® scrubbers.

INNOVATIVE PROCESS TECHNOLOGIES

- Acid plants to 4,500 ton/day capacity
- Patented Heat Recovery Systems (HRS)
- Monarch Systems for maximum energy recovery
- MaC-100™ Catalytic Carbon Systems for stack emission reduction
- DynaWave® Wet Scrubber Systems for particulate removal, acid gas absorption and hot gas quenching
- ClausMaster™ Tail Gas Systems for improved sulfur recovery
- Cogeneration for the production of energy from waste streams

HIGH PERFORMANCE PRODUCTS

- Brink® Fiber Bed Mist Eliminators
- Exclusive supplier of SX® and LEWMET® TowerGARD™ Mesh Pads
- Alloy piping systems, distributors and vessels for greater corrosion resistance
- Acid Coolers and MonPlex™ Gas Heat Exchangers
- LP and CS Catalyst
- High efficiency absorbers

WORLDWIDE PLANT SERVICES

- Operator training
- PeGASyS - Portable Gas Analysis System
- Control system configuration
- Ongoing technical support

Global Offices

Asia
Hong Kong
852-2831-9121 phone
852-2834-0571 fax

Europe
Brussels, Belgium
32-2-776-4111 phone
32-2-776-4040 fax

South America
São Paulo, Brasil
55-11-817-6233 phone
55-11-211-9922 fax

See our home page at http://www.enviro-chem.com

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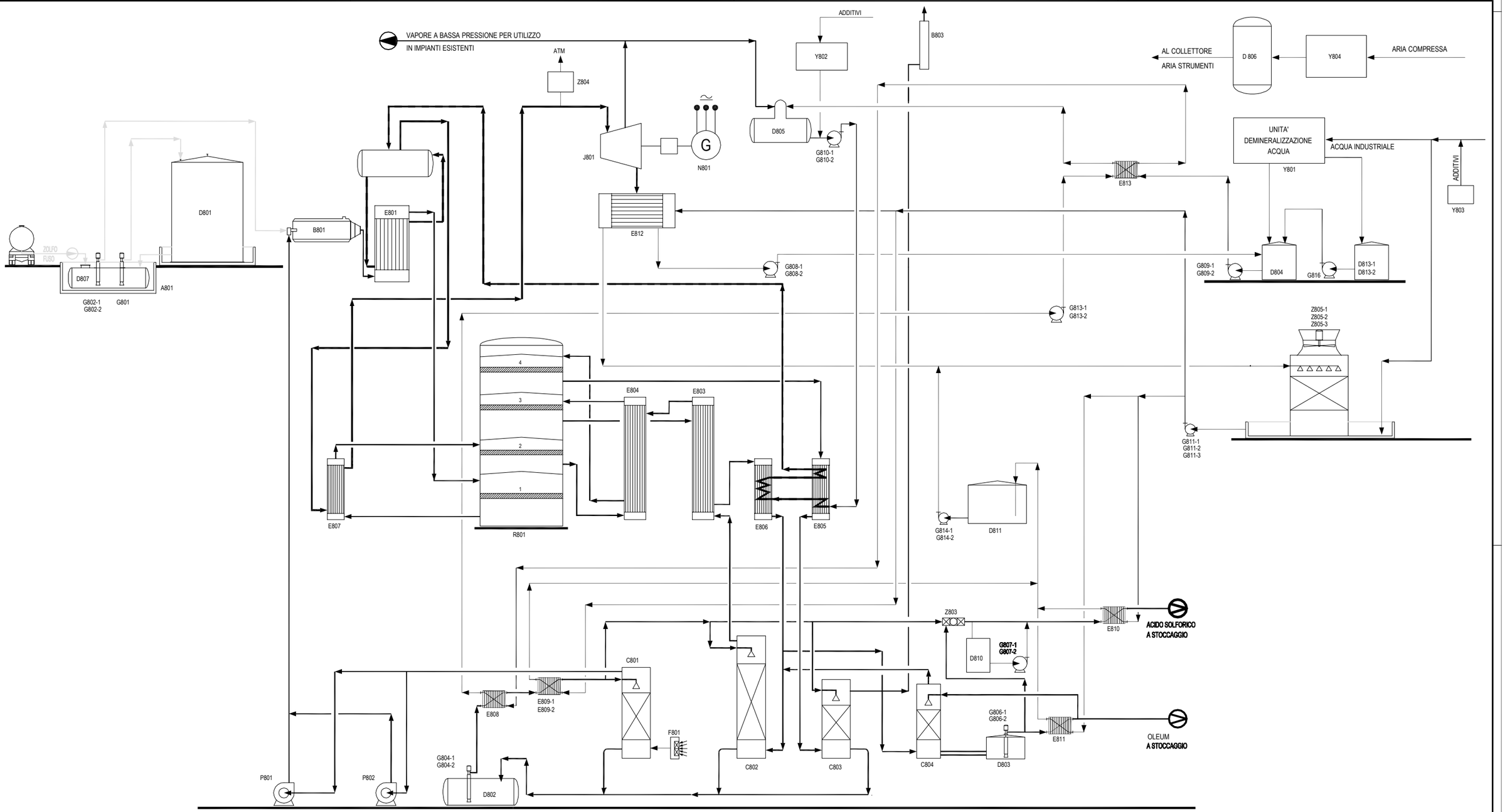


LEGENDA

SIGLA	DESCRIZIONE	N° PEZZI	SIGLA	DESCRIZIONE	N° PEZZI	SIGLA	DESCRIZIONE	N° PEZZI
A801	VASCA ZOLFO	1	E808	SCAMBIATORE A PIASTRE ACIDO SOLFORICO	1	P802	VENTILATORE DI FLUSSAGGIO	1
B801	FORNO ZOLFO	1	E809	SCAMBIATORE A PIASTRE ACIDO SOLFORICO	2	R801	CONVERTITORE SO2/SO3	1
B803	CAMINO	1	E810	SCAMBIATORE A PIASTRE ACIDO SOLFORICO	1	Y801	UNITA' DI DEMINERALIZZAZIONE ACQUA	1
C801	TORRE ESSICCAMENTO ARIA	1	E811	SCAMBIATORE A PIASTRE OLEUM	1	Y802	UNITA' DI ALIMENTAZIONE ADDITIVI ACQUA ALIMENTO CALDAIA	1
C802	COLONNA DI ASSORBIMENTO INTERMEDIO	1	E812	CONDENSATORE DI VAPORE	1	Y803	UNITA' DI ALIMENTAZIONE ADDITIVI ACQUA DI RAFFREDDAMENTO	1
C803	COLONNA DI ASSORBIMENTO FINALE	1	E813	SCAMBIATORE A PIASTRE ACQUA DEMINERALIZZATA	1	Y804	UNITA' DI ESSICAMENTO ARIA STRUMENTI	1
C804	COLONNA DI ASSORBIMENTO OLEUM	1	F801	FILTRO ARIA	1	Z803	MISCELATORE ACIDO/OLEUM	1
D801	SERBATOIO DI STOCCAGGIO ZOLFO	1	G801	POMPA TRASFERIMENTO ZOLFO	1	Z804	SILENZIATORE PER VAPORE	1
D802	SERBATOIO INTERMEDIO ACIDO SOLFORICO	1	G802	POMPA ALIMENTAZIONE ZOLFO	2	Z805	TORRI DI RAFFREDDAMENTO ACQUA	3
D803	SERBATOIO CIRCOLAZIONE OLEUM	1	G804	POMPA CIRCOLAZIONE ACIDO SOLFORICO	2	D813	SERBATOIO DI ACCUMULO ACQUA DEMINERALIZZATA	2
D804	SERBATOIO DI STOCCAGGIO ACQUA DEMINERALIZZATA	1	G806	POMPA CIRCOLAZIONE OLEUM	2	G816	POMPA DI TRASFERIMENTO ACQUA DEMINERALIZZATA A D804	1
D805	DEGASATORE CONDENSATO	1	G807	POMPA BOOSTER ACIDO SOLFORICO	2			
D806	SEPARATORE POLMONE ARIA STRUMENTI	1	G808	POMPA RILANCIO CONDENSA TURBOGENERATORE	2			
D807	SERBATOIO RICEVIMENTO ZOLFO	1	G809	POMPA ALIMENTAZIONE ACQUA DEMINERALIZZATA	2			
D811	SERBATOIO RACCOLTA ACQUA DI RAFFREDDAMENTO	1	G810	POMPA ALIMENTO ACQUA CALDAIA	2			
E801	CALDAIA DI RECUPERO	1	G811	POMPA CIRCOLAZIONE ACQUA DI RAFFREDDAMENTO	3			
E803	SCAMBIATORE FREDDO INTERSTADIO	1	G813	POMPA CIRCOLAZIONE ACQUA DEMINERALIZZATA	2			
E804	SCAMBIATORE CALDO INTERSTADIO	1	G814	POMPA RILANCIO ACQUA DI RAFFREDDAMENTO	2			
E805	ECONOMIZZATORE 4A/4C	1	J801	TURBINA A VAPORE	1			
E806	ECONOMIZZATORE 3B	1	N801	ALTERNATORE	1			
E807	SURRISCALDATORE VAPORE 1A	1	P801	COMPRESSORE PRINCIPALE ARIA DI PROCESSO	1			

ZOLFO FUSO
GAS
ACIDO SOLFORICO
CAMINO
ACQUA DEMINERALIZZATA
ACQUA INDUSTRIALE
ADDITIVI CHIMICI
VAPORE BASSA PRESSIONE
VAPORE ALTA PRESSIONE
CONDENSA
OLEUM
ARIA

Revisione	Data	Motivo della Revisione	Geom. G. Enlu	Dott.Ing. G. Enlu	Dott.Ing. M. Lavanga
00	02.08.2004	Emissione	Disegnato	Verificato RT	Approvato DS

FLUORSID S.p.A.
Area industriale di Cagliari,
2ª strada Macchiareddu
09032 Assemini (CA)

Titolo:

IMPIANTO ACIDO SOLFORICO

Disegno n°: FLG_COES_PL05

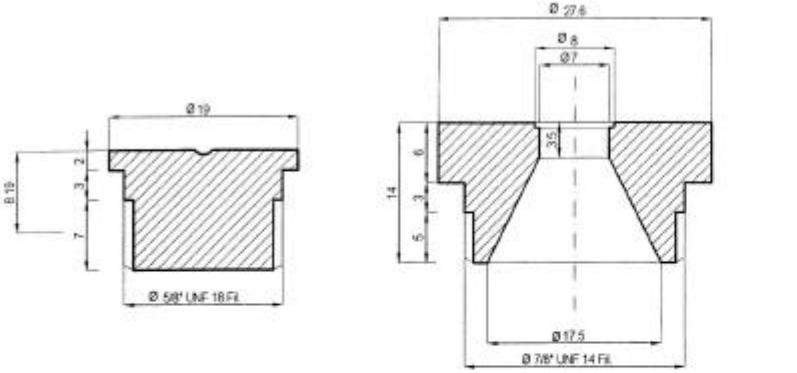
Scala: 1:1000

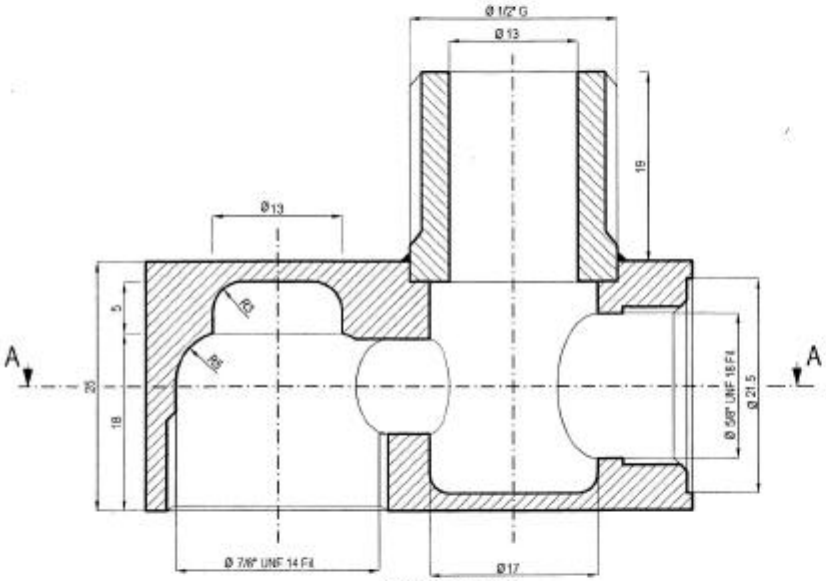
Tavola: 1/1

Oggetto:

FLOW - SHEET

Nome del file: FLG_COES_PL05_Rev00





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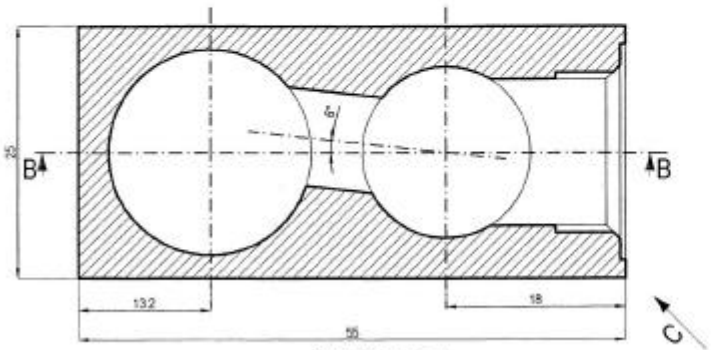

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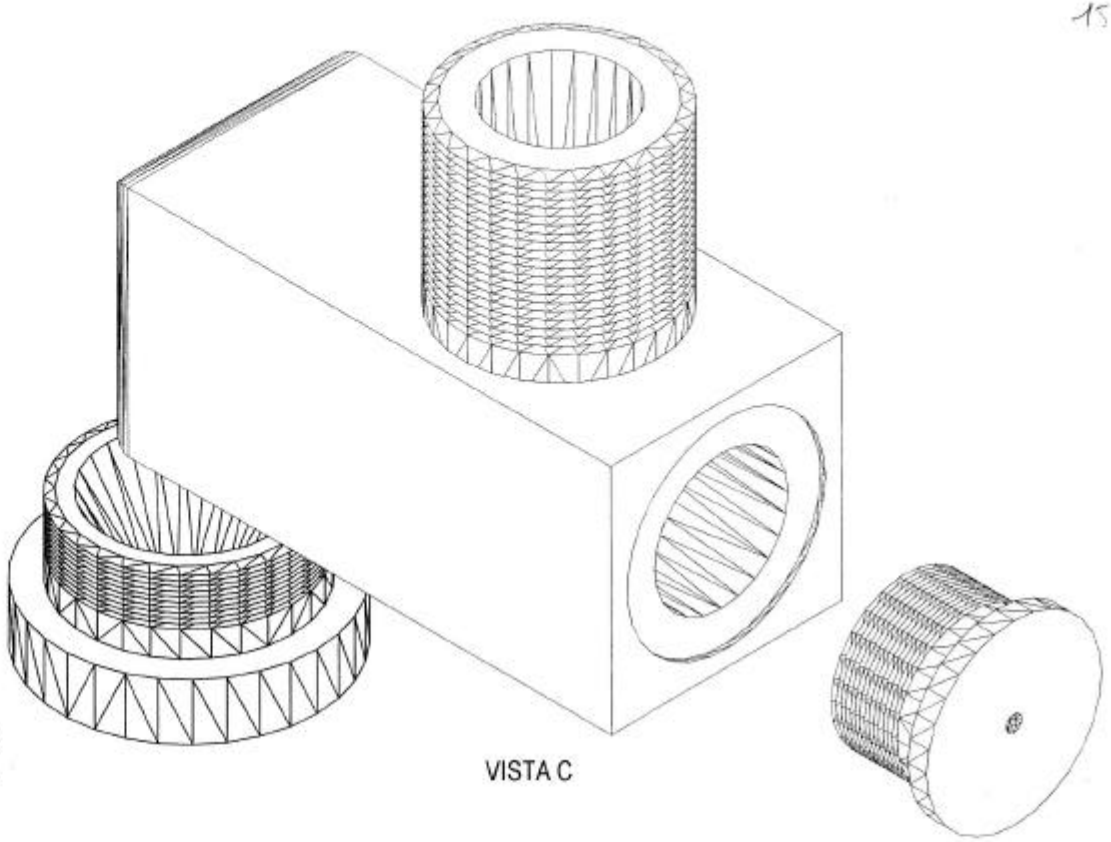

VISTA C

Revisione	Data	Motivo della Revisione	Disegnato	Verificato RT	Approvato DS
00	04.05.2004	Emissione	Geom. G. Erriu	Dott.Ing. G. Erriu	Dott.Ing. M. Lavanga

FLUORSID S.p.A.
Area industriale di Cagliari,
2ª strada Macchiareddu
09032 Assemini (CA)

NUOVI UGELLI FORNO ZOLFO

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Scala: ----

Tavola: 1/1

Oggetto: DISEGNO COSTRUTTIVO

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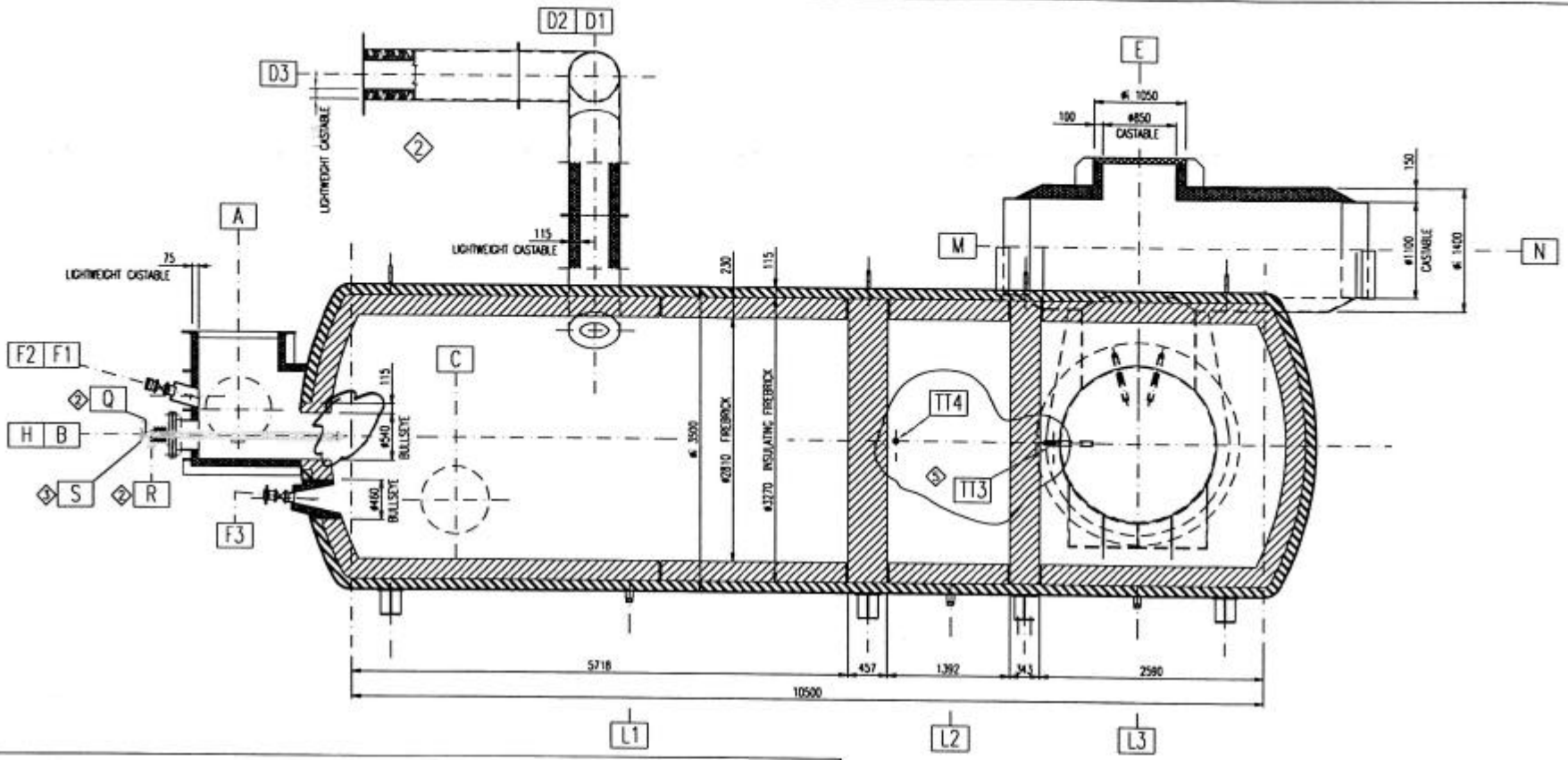

CASTABLE ANCHORS DETAIL
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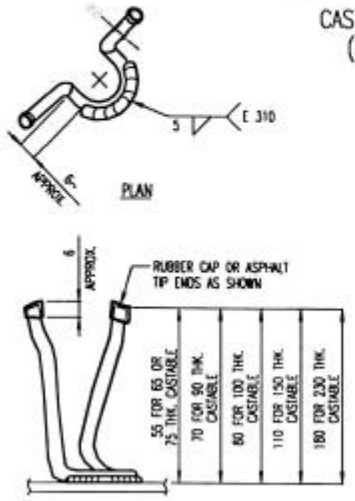
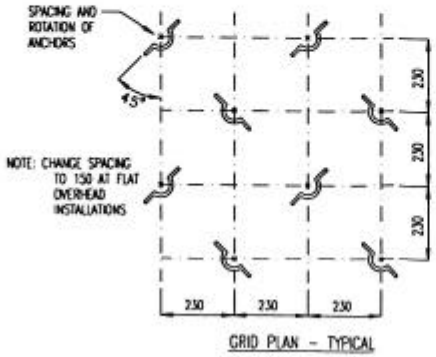




④ FOR REFRACTORING LINING SEE DWG. "UNISTARA" N° 010829-001

REV.	DESCRIZIONE - Description	DIS.-Drawn	Checked	APPR.	DATE
5	REVISED WHERE INDICATED ⑤	ERRECI	G.R.		20-11-01
4	REVISED WHERE INDICATED ④	ERRECI	G.R.	M.M.	17-10-01
3	REVISED WHERE INDICATED ③	ERRECI	G.R.	M.M.	13-09-01
2	ISSUED FOR CONSTRUCTION ②	E.D.I.	G.B.	M.M.	28-06-01
1	2nd ISSUE	E.D.I.	G.B.	M.M.	14-02-01
0	1st ISSUE	E.D.I.	G.B.	M.M.	02-01-01

BALLESTRA S.p.A
MILANO (ITALIA)

SCALA Scale 1:50

Comp.Code 3B19B801_FG2_REV5

CLIENTE Customer	FLUORSID - ASSEMINI (CAGLIARI)
PROGETTO Project	SULFURIC ACID PRODUCTION
IMPIANTO Plant	UNIT
TITOLO DIS. Title dwg.	SULFUR BURNER B 801

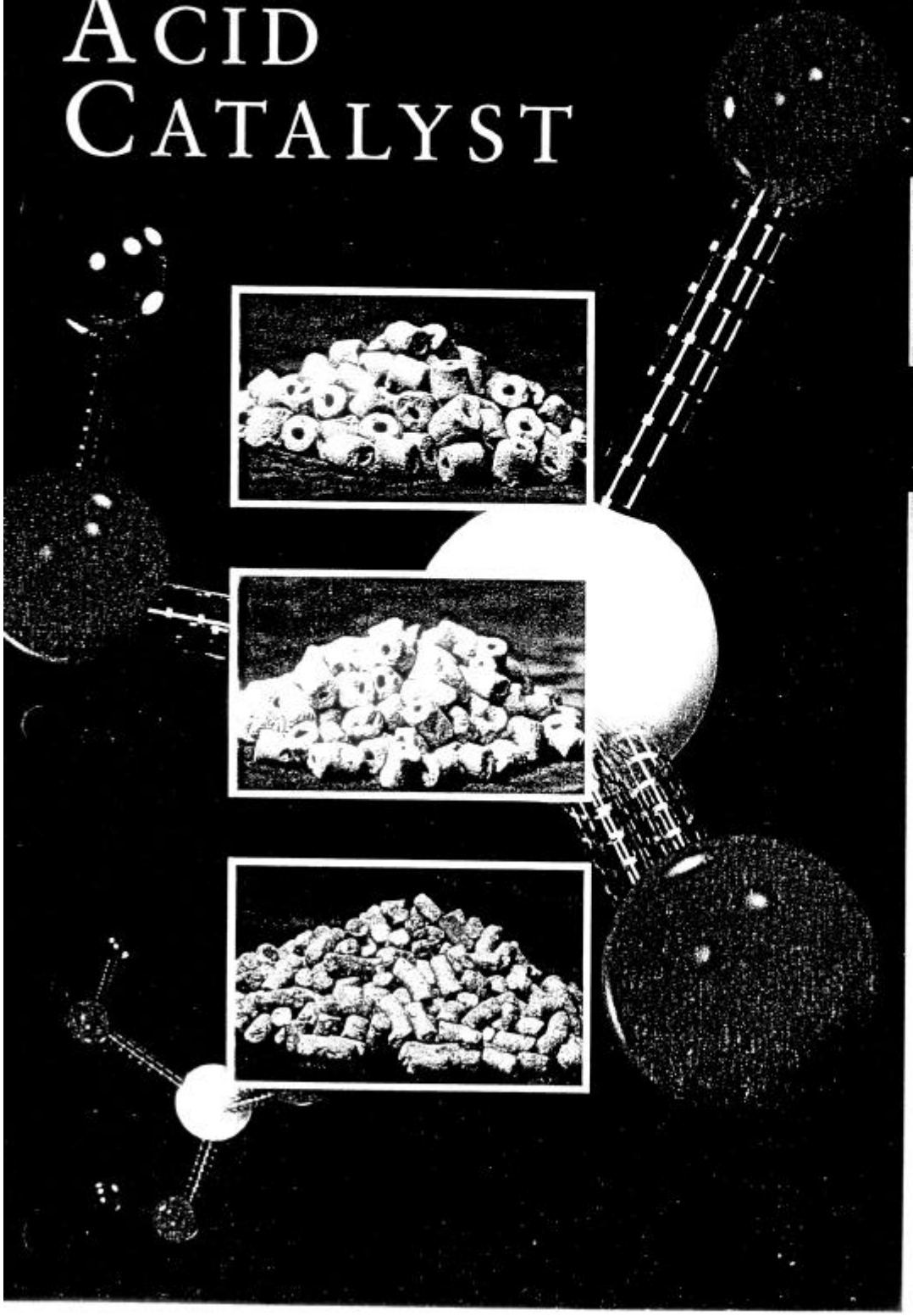
DIS. 3B19.35.007

FOGLIO Sheet 2 di 3

RIFERIMENTO D.S.: Reference to d.s.:

RICAVATO DA: Obtained from:

High Performance Sulfuric Acid Catalyst



Ring Catalyst

- LP-120
- LP-110
- LP-220
- TD-750

Cesium-Promoted Catalyst

- Cs-120
- Cs-110
- Cs-210

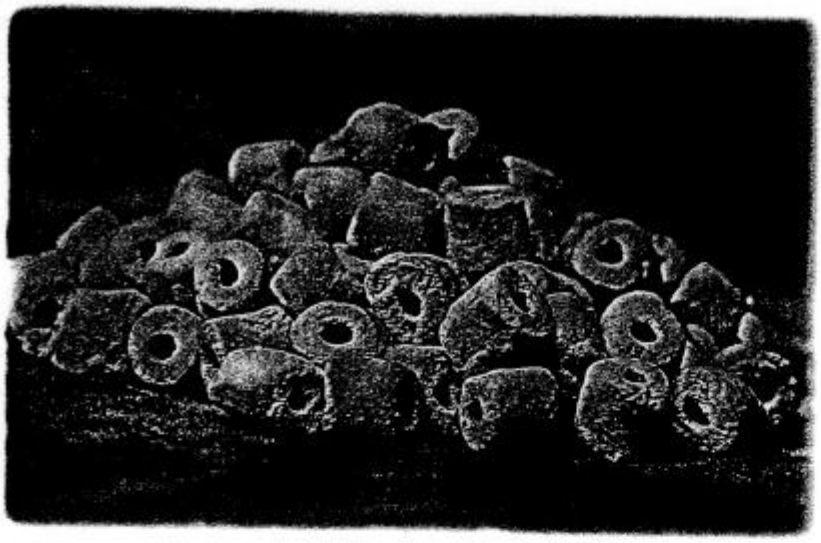
Pellet Catalyst

- Type 210
- Type 11

ENVIRO-CHEM SYSTEMS

a Monsanto Company

Recovering the Future™



"With Enviro-Chem ring catalyst we were able to nearly double the time between plant turnarounds."

BENEFITS

- Increased capacity
- Excellent durability
- Low pressure drop
- High activity
- Long-term activity retention
- Longer production campaigns

Enviro-Chem Systems offers a catalyst for every sulfuric acid application. Our LP series ring catalysts provide the high activity, low pressure drop characteristics desired by most producers. Enviro-Chem's catalyst specialists will specify the proper catalyst type for any converter design.

LP-120

Longer Production Campaigns

LP-120 users have experienced extended production campaigns (some exceeding 24 months), maintaining emission standards without losing capacity. The 1/2" (12.5mm) diameter ring provides a high void area permitting low pressure drop and a more uniform dust distribution in the bed resulting in lower fouling rates.

Excellent Durability

Enviro-Chem's LP-120 ring catalyst has outstanding resistance to breakage and screening losses. Testimonials from world-wide customers and vacuum screening companies show this conclusively. Recent reports indicate that vacuum screening losses for LP-120 have ranged between 5% and 12%.

Designed for Upper Bed Conditions

Enviro-Chem's LP-120 ring catalyst has been specially formulated for the harsh conditions encounterd in the first two catalyst beds. This thermally stable catalyst provides high activity, excellent dust handling capabilities, and low pressure drop.

Ring Catalyst

"Catalyst and equipment upgrading was successful in increasing plant feed rate and production."

BENEFITS

- Optimized lower bed activity
- Improved conversion
- Increased capacity
- Low pressure drop

LP-110

Balanced Properties

LP-110, for use in the lower passes of a converter, is formulated to provide high activity for extended periods of operation. Some LP-110 installed in 1980 is still performing at design conversion efficiencies. In fact, LP-110 can be expected to operate for 10 - 15 years and longer under typical plant conditions.

Durability

LP-110 has shown excellent durability and low losses when screened using correct procedures. Since it is used in the later passes, LP-110 requires infrequent screening. Typical screening losses are less than 10%.

Optimum pressure drop

LP-110's size and geometry allow for the pressure-drop benefits of ring catalyst while assuring high activity levels.

Highly Active Catalyst

Enviro-Chem Systems' LP-110 ring catalyst achieves greater conversion performance than most other catalysts available. LP-110 is specially formulated for service in the lower passes where low temperatures, high SO_3 and low O_2 conditions exist. It also has superior properties under low SO_2, low O_2 conditions after interpass absorption.

Enviro-Chem Systems is a fully integrated provider of sulfuric acid technology and equipment. With a highly experienced staff of process engineers, design engineers, product specialists, and technical service personnel, Enviro-Chem is the world's leading engineering firm in sulfuric acid technology. Beyond producing high-quality catalyst, Enviro-Chem products include Brink® Mist Eliminators, Acid Coolers, Alloy Trough Distributors, Tower and Piping Systems, Heat Recovery Systems, DynaWave® Wet Scrubbers, plus a variety of other products related to the sulfuric acid industry.

Monsanto Enviro-Chem Systems

World's Leading Source for Sulfuric Acid Technologies

INNOVATIVE PROCESS TECHNOLOGIES

- Acid plants to 4,500 ton/day capacity
- Patented Heat Recovery Systems (HRS)
- Monarch Systems for maximum energy recovery
- MaC-100™ Catalytic Carbon Systems for stack emission reduction
- DynaWave® Wet Scrubber Systems for particulate removal, acid gas absorption and hot gas quenching
- ClausMaster™ Tail Gas Systems for improved sulfur recovery
- Cogeneration for the production of energy from waste streams

HIGH PERFORMANCE PRODUCTS

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- Acid Coolers and MonPlex™ Gas Heat Exchangers
- LP and Cs Catalyst
- High efficiency absorbers

WORLDWIDE PLANT SERVICES

- Operator training
- *PeGASyS* - Portable Gas Analysis System
- Control system configuration
- Ongoing technical support

Global Offices

Asia
Hong Kong
852-2831-9121 phone
852-2907-0033 fax

Europe
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32-2-776-4057 fax

South America
São Paulo, Brasil
55-11-5503-2600 phone
55-11-5508-6799 fax

See our new website at http://www.enviro-chem.com

ENVIRO-CHEM SYSTEMS

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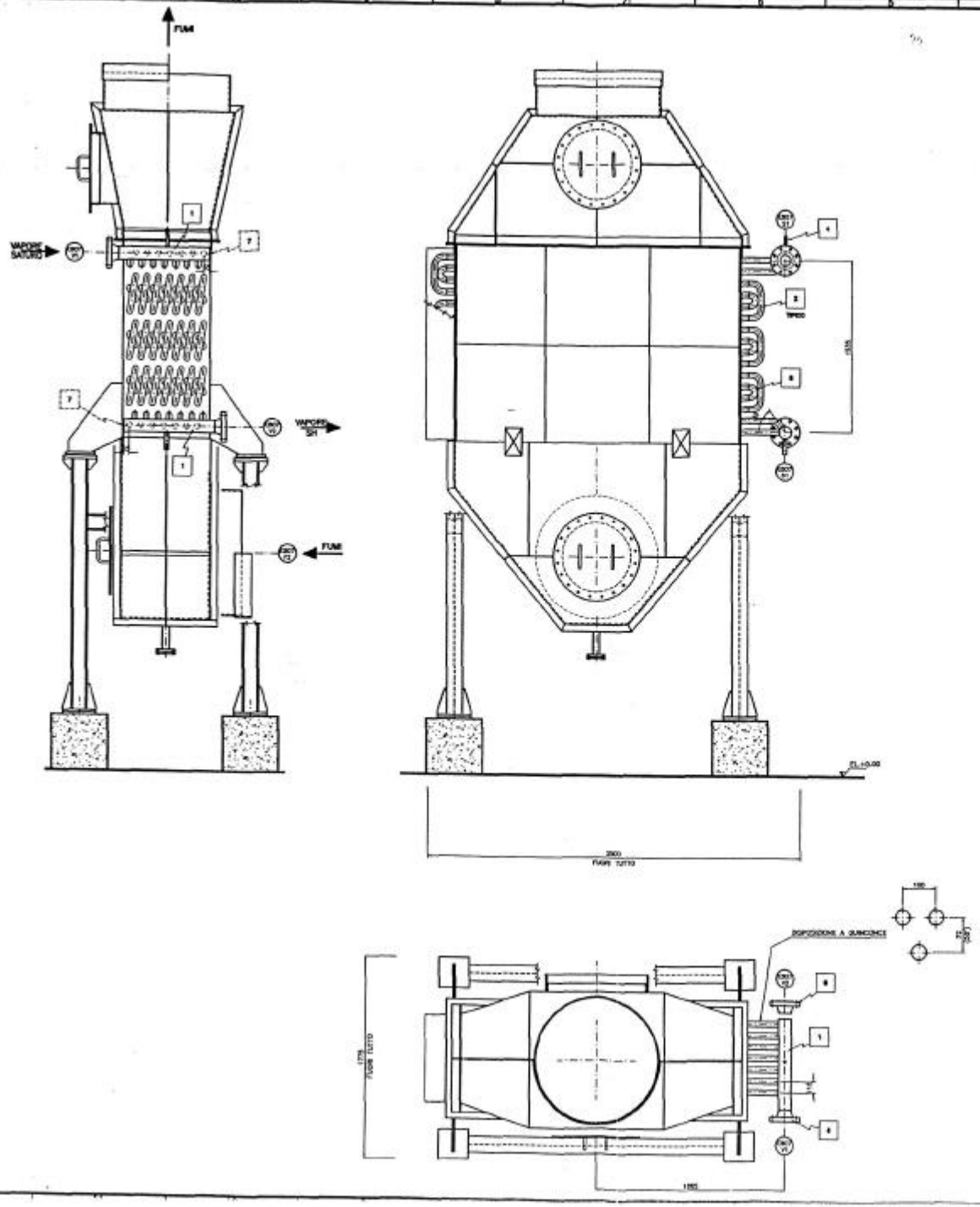

TITOLO	CALDAIA A RECUPERO SU FORNO 2DLF0		
	SPECIAL		
	SURRISCALDATORE E 807	CLIENTE : BALLESTRA FLUORSID ASSEMINI (CA)	

RUTHS SpA GENOVA

FIG. 3