Advances in wood treating infrastructure

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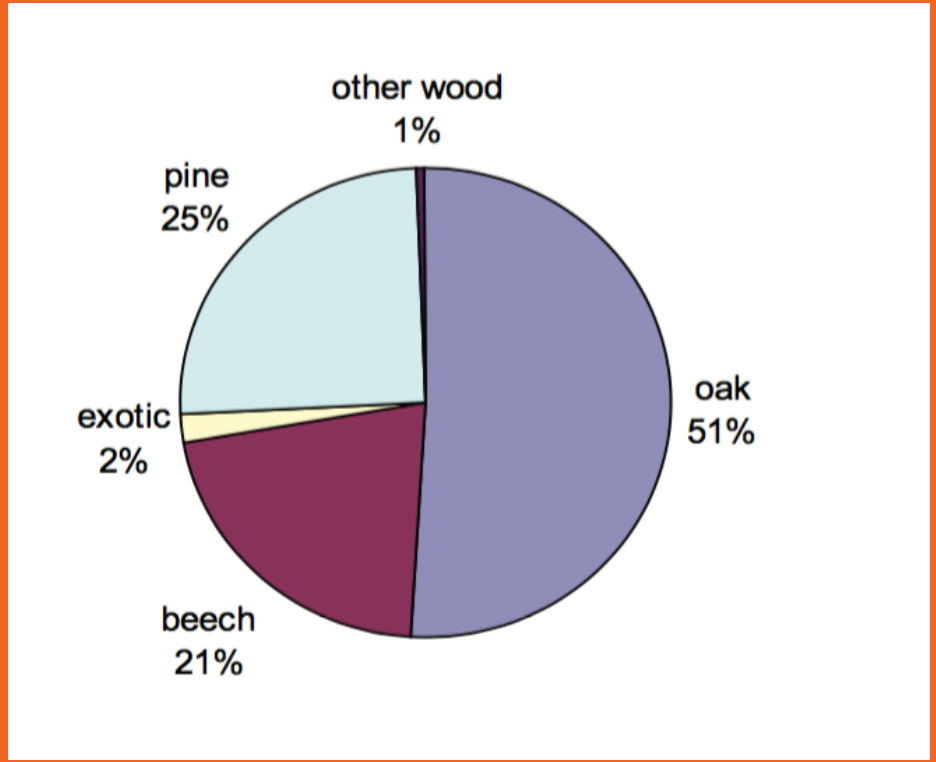
Agenda

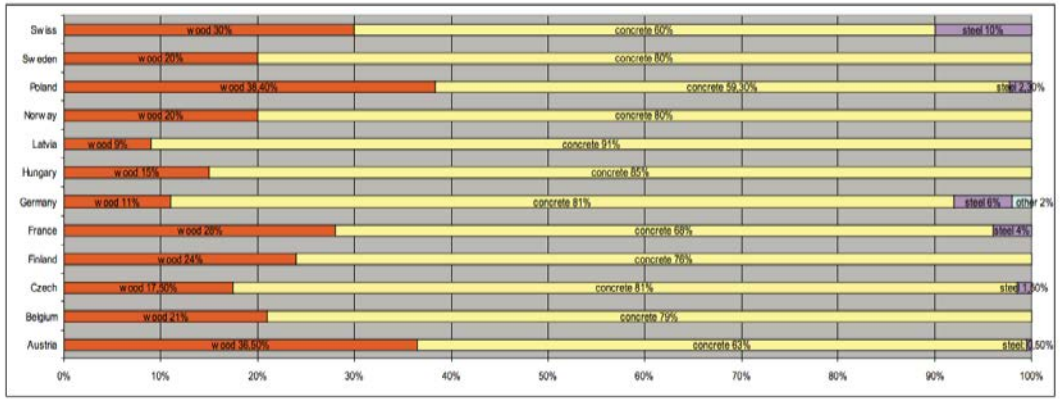
- Wooden sleepers/ties in Europe - historically and present
- Regularity issues in Europe
- Challenges for the creosote manufacturers in Europe
- Improvements in plant design 1978-
- Wrap-up
- Q&A

Wooden ties - historically and present

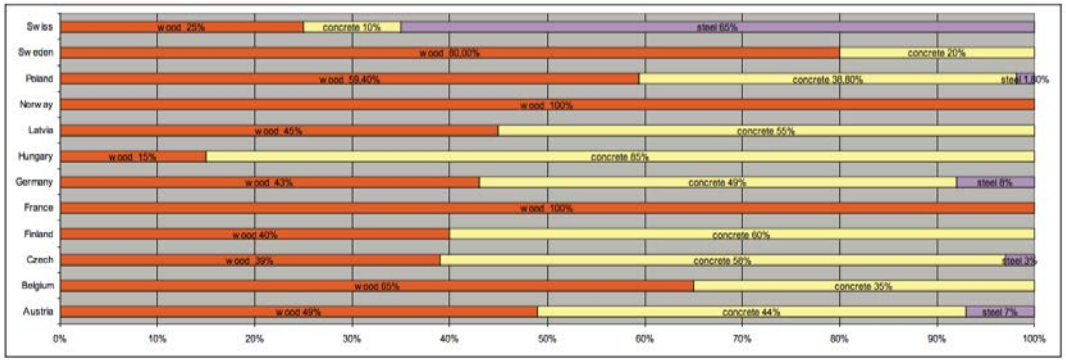
- Creosote treatment 1836 - 1976 - 2018 (?)
- Wood species (2013) - oak 50%, pine 25%, beech 21%, other (azobé) 3%. Bethell and Rüping processes.
- concrete ties on increase since 1955
- Wooden ties 10%, concrete 90%
- much more passenger line use (up to 200 miles/hour) than freight use
- larger percentage of wooden ties in secondary lines, switch tracks and industrial lines


other wood
1%
pine
25%
exotic
2%
beech
21%
oak
51%

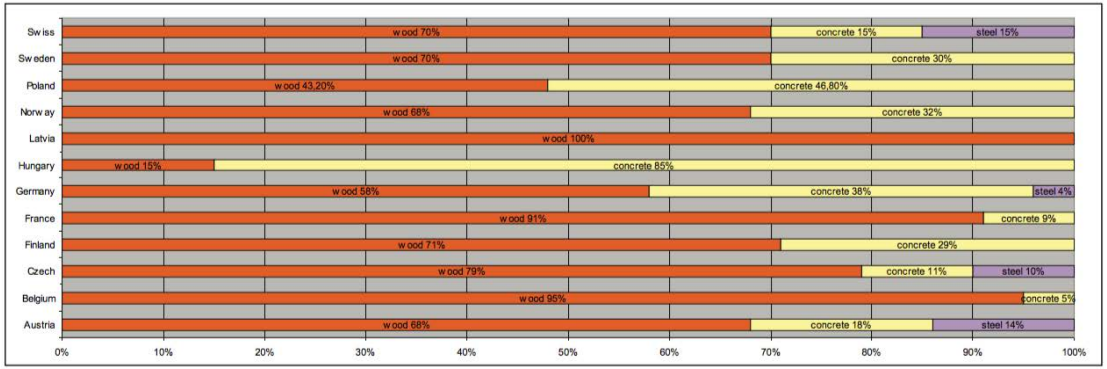
Main tracks

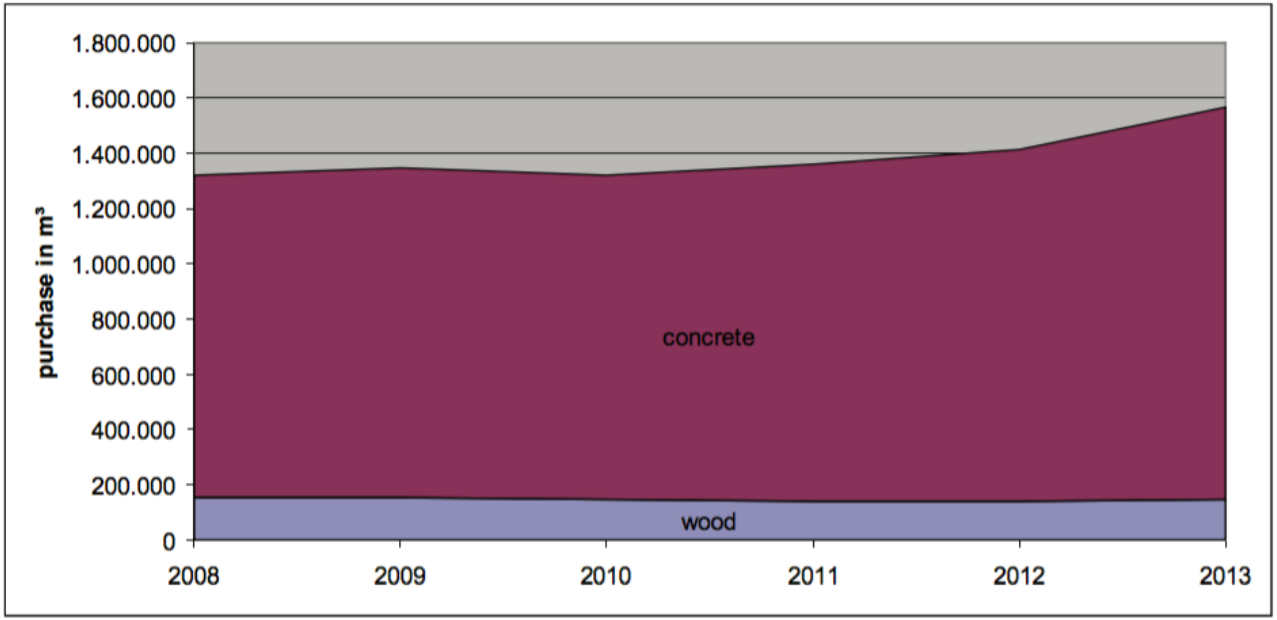


Side tracks



Switches


Swiss
wood 70%
concrete 15%
steel 15%
Sweden
wood 70%
concrete 30%
Poland
wood 43,20%
concrete 46,80%
Norway
wood 68%
concrete 32%
Latvia
wood 100%
Hungary
wood 15%
concrete 85%
Germany
wood 58%
concrete 38%
steel 4%
France
wood 91%
concrete 9%
Finland
wood 71%
concrete 29%
Czech
wood 79%
concrete 11%
steel 10%
Belgium
wood 95%
concrete 5%
Austria
wood 68%
concrete 18%
steel 14%
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%


1.800.000
1.600.000
1.400.000
1.200.000
1.000.000
800.000
600.000
400.000
200.000
0
purchase in m³
concrete
wood
2008
2009
2010
2011
2012
2013

Regulatory development

European

- Directive 76/769/EEC - max 50 ppm benzo-a-pyrene
- Biocide directive 98/8/EC
- Directive 2001/90/EC - max 5 ppm benzo-a-pyrene
- Directive 2011/71/EU - suggested ban from 2018

National

- environmental protection at treatment sites
- OSHA
- disposal

Plant design changes

- elimination of waste water (from vacuum pumps) by biofilters or by sealing with diesel fuel at over 212 F (1981)
- elimination of vapours containing creosote from the plant itself by incineration of all vapours at min. 1500 F integrated in plant design (boiler system)
- waste from the plant limited to very small amounts from in-line strainers with easy disposal

Plant design changes due to creosote formulation

- crystallization temperature increased from 77 F for WEI type B creosote to 150 F for WEI type C creosote in all parts of the treating plant
- odour less/free and VOC free creosotes (Gxs) with min. temperature of 150 F in all parts of the treating plant

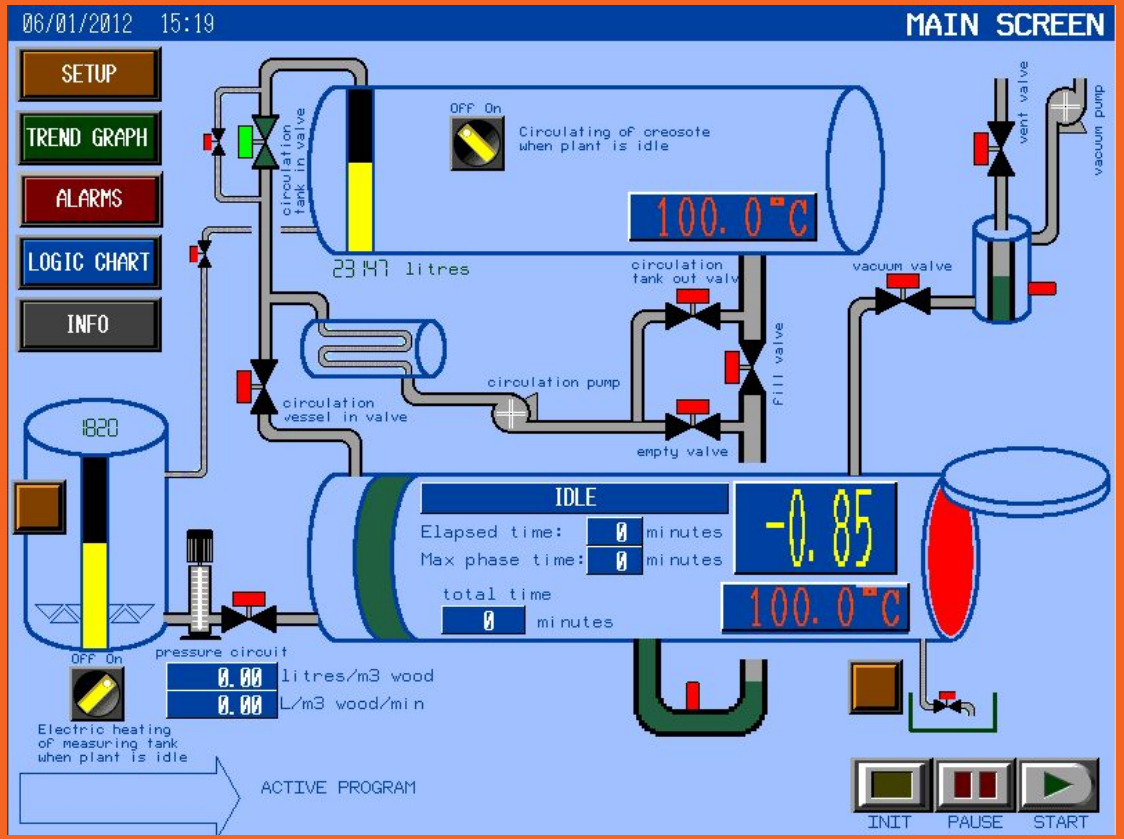
Process design changes

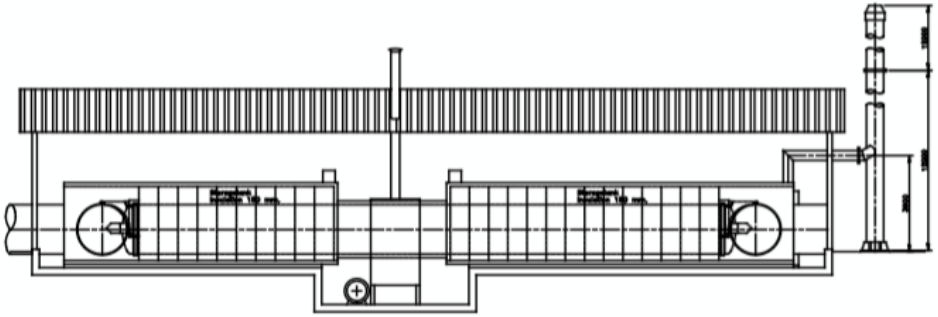
- Increase working temperature from a range 122 - 185 F to a range 225 - 248 F = improved dryness (improvement for plant workers and line workers) (easier retention control)
- abolishing heating coils in the bottom of autoclaves and pre-heaters to circulation of creosote through heat exchangers and through the length of the autoclaves for increased uniform temperature and treating result
- enclosing the autoclave inside the pre-heater for improved heat transfer and pre-drying

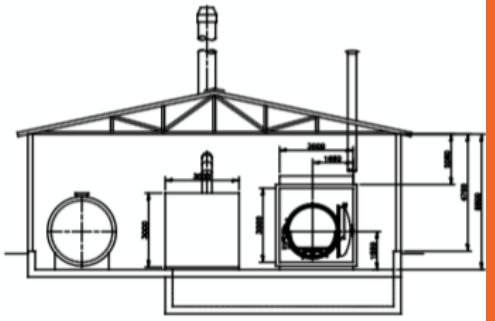
Process design changes

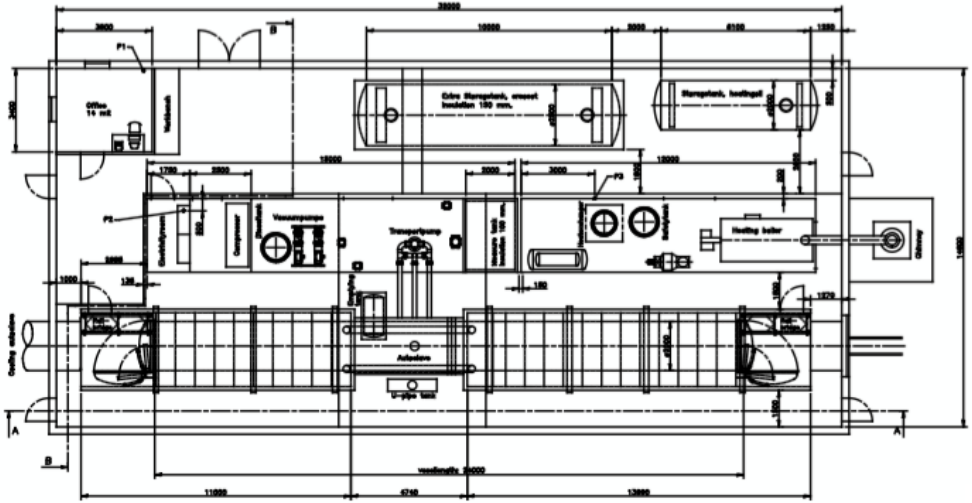
- different target retention in the length of poles (8 lbs/cfb butt end - 4 lbs/cfb air portion of pole)
- CCA or Cu-organics in air portion of the poles and creosote in butt end in the poles in ground contact.


0 825 825


06/01/2012 15:19
MAIN SCREEN
SETUP
TREND GRAPH
ALARMS
LOGIC CHART
INFO
circulation tank in valve
OFF On
Circulating of creosote when plant is idle
100.0°C
23147 litres
vent valve
vacuum pump
circulation tank out valv
vacuum valve
fill valve
circulation pump
circulation vessel in valve
empty valve
1820
IDLE
Elapsed time: 0 minutes
Max phase time: 0 minutes
-0.85
total time
0 minutes
100.0°C
OFF On
pressure circuit
0.00 litres/m3 wood
0.00 L/m3 wood/min
Electric heating of measuring tank when plant is idle
ACTIVE PROGRAM
INIT
PAUSE
START



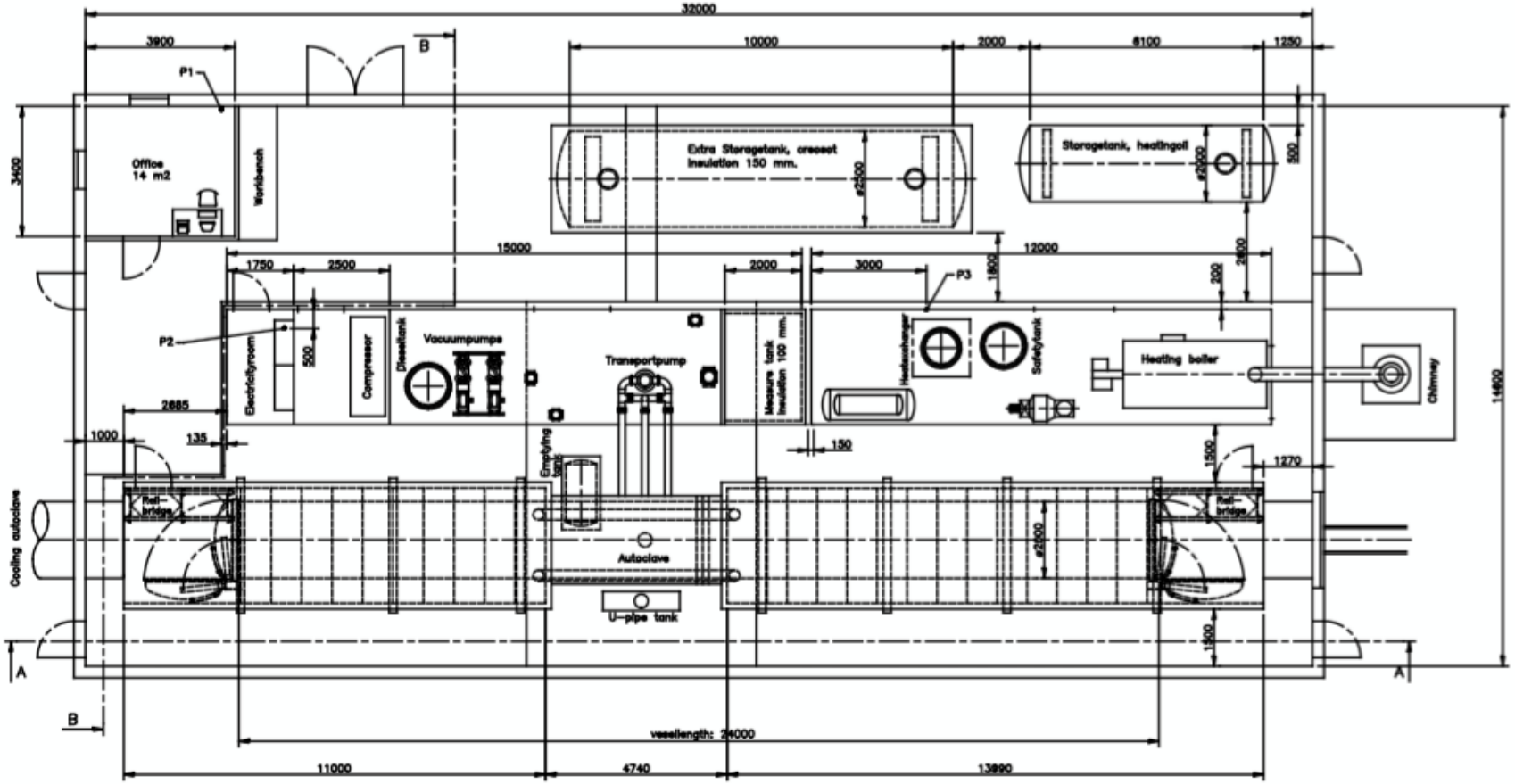


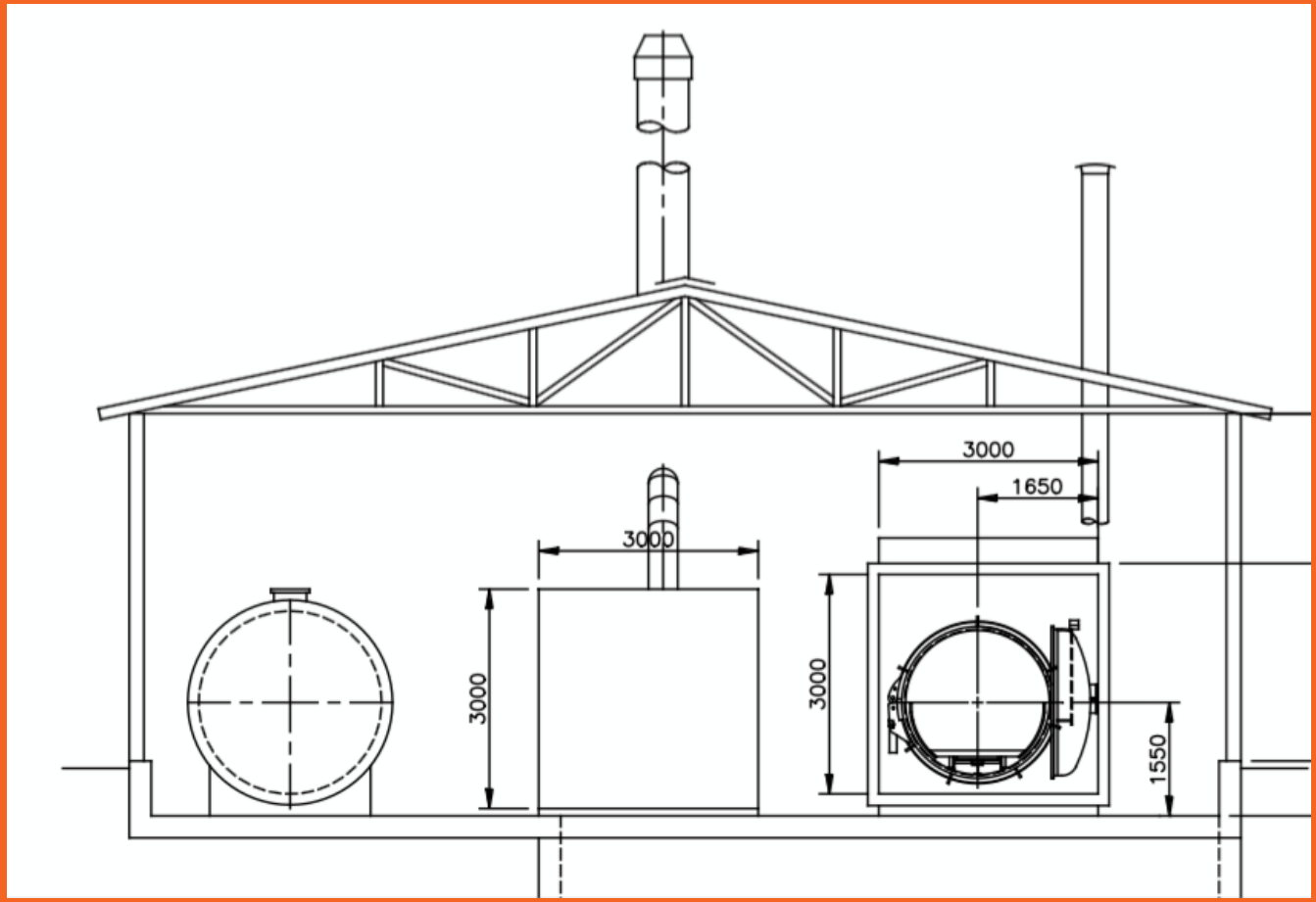


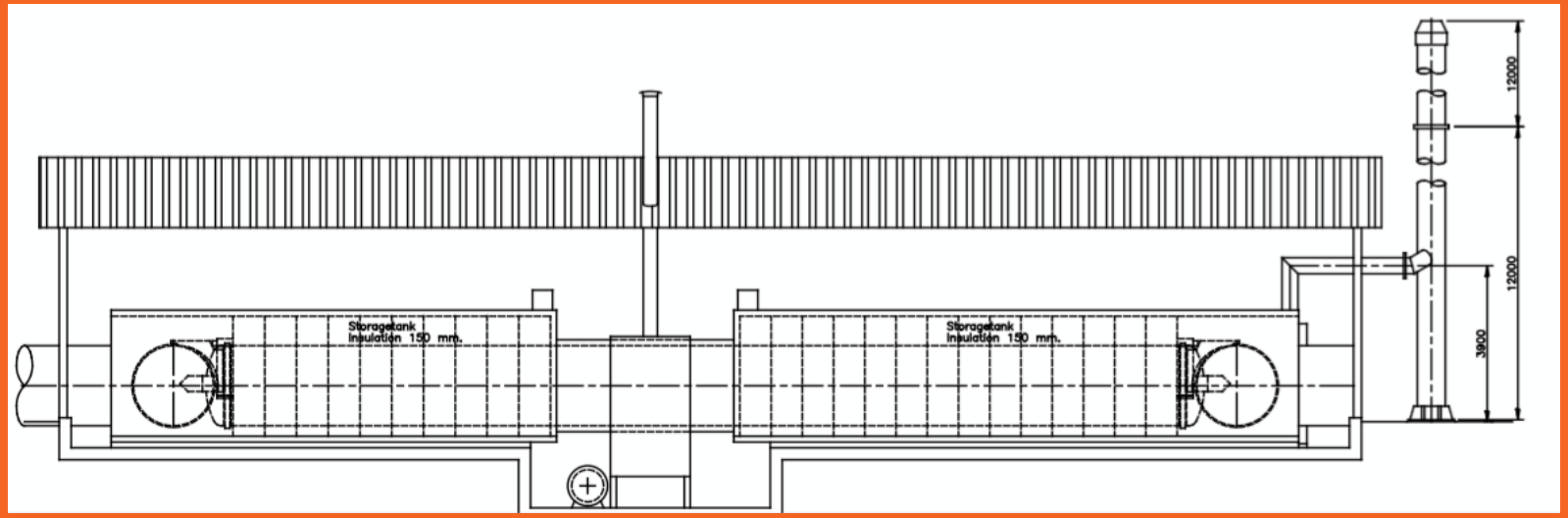
F1: Telephone-connection, in office

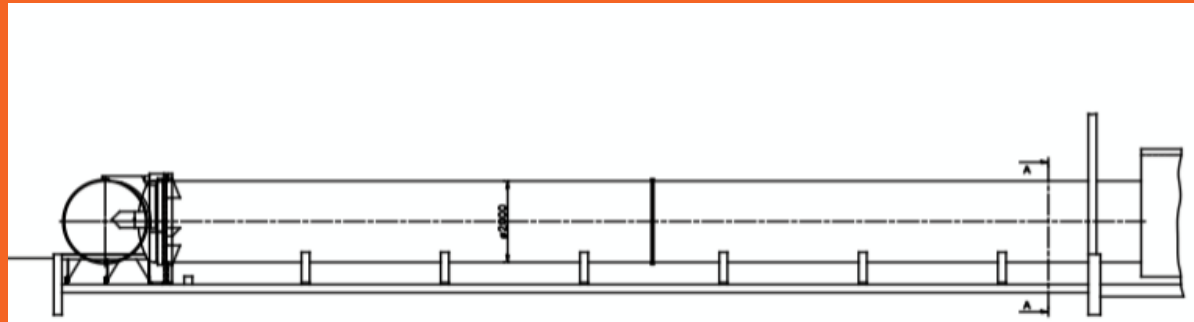
F2: Electric-connection, earth cabel, 220 AC or 3x400 Volt, 50 Hz.
4 x 4 mm² + separate earth in min. 10 mm.

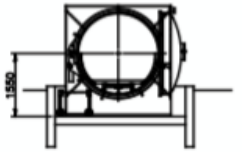
F3: Water-connection, 2inch, (1" Pipe-threads), min. pressure 1 bar

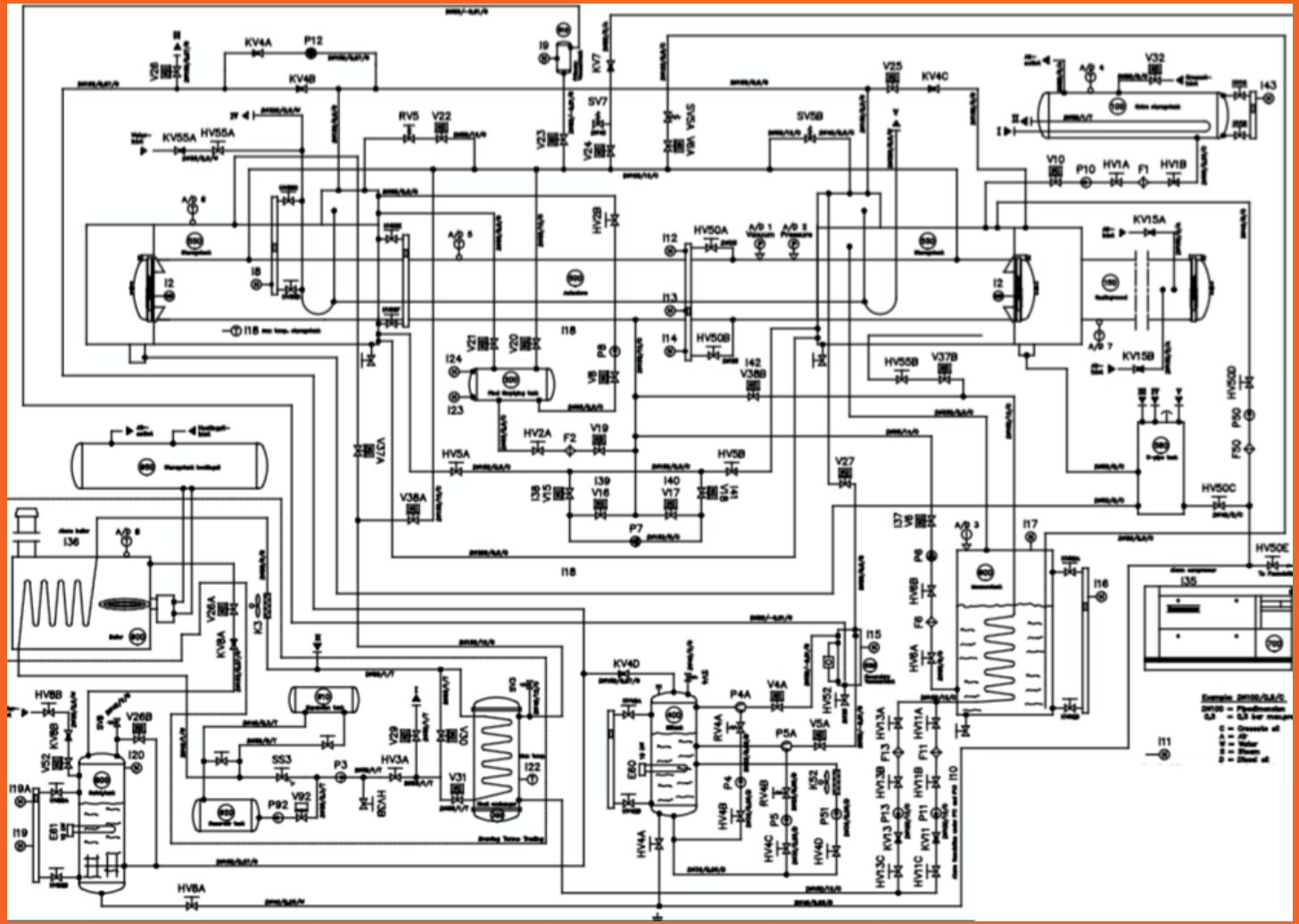

32000
3900
10000
2000
6100
1250
P1
B
Office
14 m2
Workbench
3400
Extra Storagetank, creoset
insulation 150 mm.
ø2500
Storagetank, heatingoil
ø2000
500
15000
12000
1750
2500
2000
3000
P3
1800
2400
200
P2
Electrictyroom
500
Compressor
Dieseltank
Vacuumpumps
Transportpump
Measure tank
insulation 100 mm.
Heatexchanger
Safetytank
Heating boiler
Chimney
14600
2685
1000
135
150
1500
1270
Emptying
tank
Rail-
bridge
Cooling autoclave
Autoclave
ø2500
U-pipe tank
1500
A
B
vesellength: 24000
11000
4740
13890

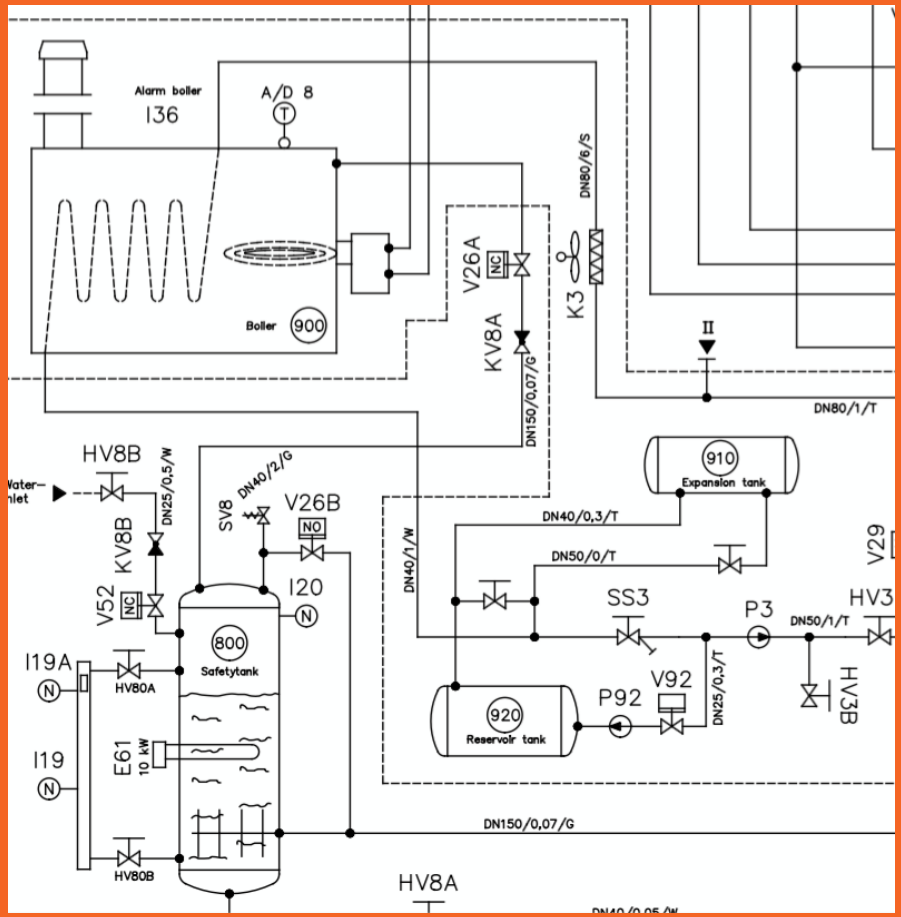

3000
1650
3000
3000
3000
1550

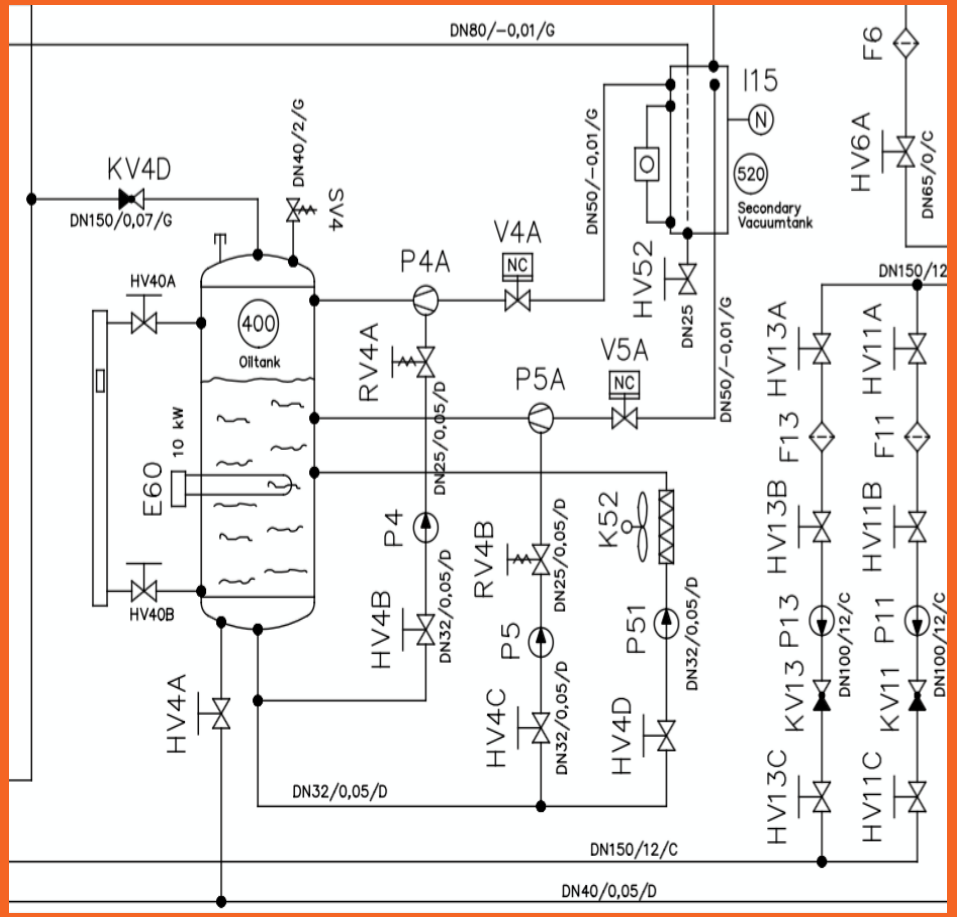

Storagetank
insulation 150 mm.
Storagetank
insulation 150 mm.
12000
12000
3900


2200


1550


KV4A
P12
KV4B
V28
KV55A
HV55A
RV5
V22
V23
KV7
SV7
V24
V25
KV4C
SV5B
V32
I43
V10
P10
HV1A
F1
HV1B
KV15A
KV15B
HV50D
P50
F50
HV50C
HV50E
I35
I16
I17
HV50A
HV50B
V37B
HV55B
V38B
I42
I12
I13
I14
I18
I24
I23
V21
V20
P8
HV2A
F2
V19
HV5A
HV5B
V37A
V38A
V27
I39
I40
V16
V17
P7
I36
V26A
KV8A
K3
HV8B
V26B
I20
I19A
I19
EB1
HV8A
S53
P3
HV3A
V29
V30
V31
I22
P92
V32
KV4D
P4A
V4A
I15
RV4A
P5A
V5A
HV52
K52
P51
RV4B
P4
P5
HV4B
HV4A
HV4C
HV4D
HV13A
HV13B
HV13C
HV11A
HV11B
HV11C
P13
P11
I10
I11
HV8B
F8
HV8A


Alarm boiler
I36
A/D 8
Boiler
900
DN80/6/S
V26A
NC
K3
KV8A
DN150/0,07/G
II
DN80/1/T
HV8B
DN25/0,5/W
SV8
DN40/2/G
V26B
NO
910
Expansion tank
DN40/0,3/T
DN50/0/T
V29
DN40/1/W
V52
KV8B
I20
SS3
P3
DN50/1/T
HV3
800
Safetytank
I19A
HV80A
E61
10 kW
I19
HV80B
920
Reservoir tank
P92
V92
DN25/0,3/T
HV3B
DN150/0,07/G
HV8A


DN80/–0,01/G
KV4D
DN150/0,07/G
DN40/2/G
SV4
I15
520
Secondary Vacuumtank
F6
HV6A
DN65/0/C
DN50/–0,01/G
HV52
DN25
V4A
NC
P4A
HV40A
400
Oiltank
RV4A
DN25/0,05/D
P5A
V5A
NC
DN50/–0,01/G
DN150/12
HV13A
HV11A
F13
F11
HV13B
HV11B
E60
10 kW
P4
HV40B
HV4B
DN32/0,05/D
RV4B
DN25/0,05/D
K52
P5
P51
DN32/0,05/D
HV4A
HV4C
DN32/0,05/D
HV4D
DN32/0,05/D
DN100/12/C
HV13C
HV11C
KV13
KV11
P13
P11
DN150/12/C
DN40/0,05/D

Advances

- emission and waste water free treatment plants available
- increased process temperature with more dry and easy to handle ties
- better retention control
- more uniform temperature in process with more uniform treatment result
- targeted retention possible for poles
- some pre-drying and less energy waste through autoclave placed inside pre-heater
- compact treatment plants easy to install and move

Thank you for your attention!

Q&A