


 insertec Furnaces & Refractories	AUTOMATION AND CONTROL DEPARTMENT	 ALINVEST Bridiöné, a.s.
	FUNCTIONAL INTERFACES BETWEEN EQUIPMENT	


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	OBJECT				
	Basic process description				
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2. OBJECT

The main objective of this document is to basically explain the interfaces between the proposed equipment must have.

This document, developed for ALINVEST, is part of the basic engineering works that INSERTEC is developing.

Thus, the main aspects to be commented are:

- Main equipment enumeration and descriptions.
- Minimum interfaces between them.

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3. MAIN EQUIPMENT DESCRIPTION

3.1 Basic process description

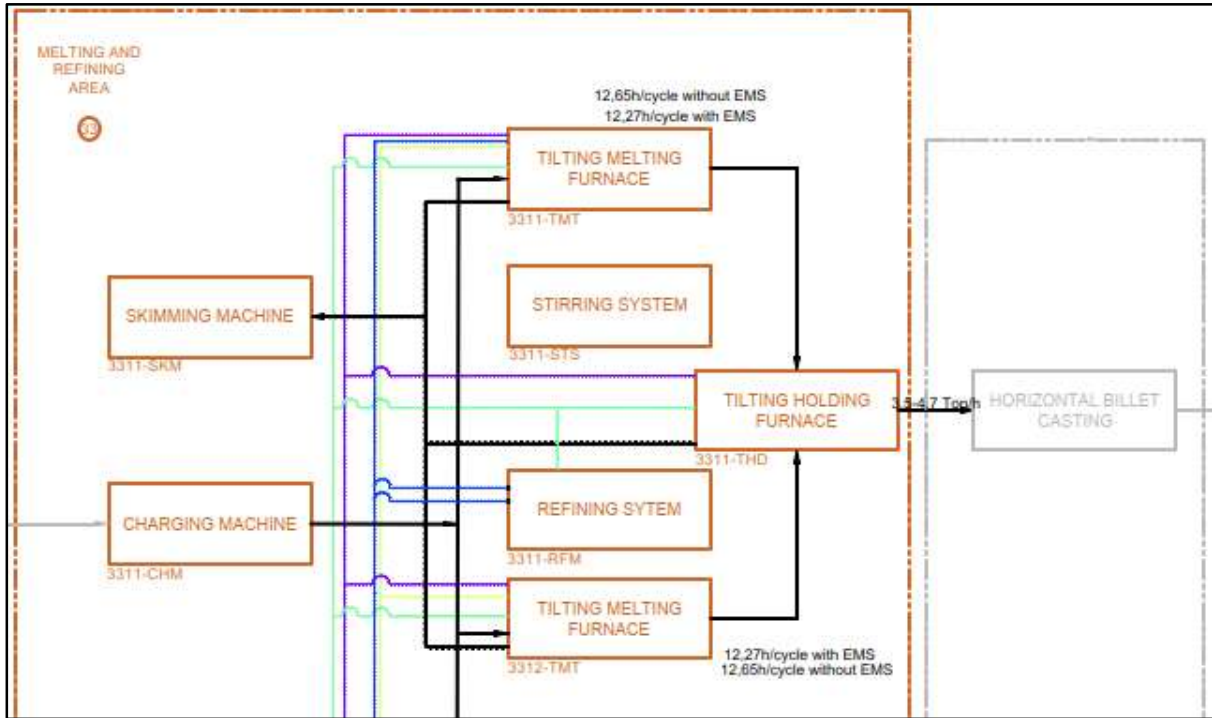



Figure 1. Basic process description & equipment forging line.

 Furnaces & Refractories	MAIN EQUIPMENT DESCRIPTION			
	Basic process description			
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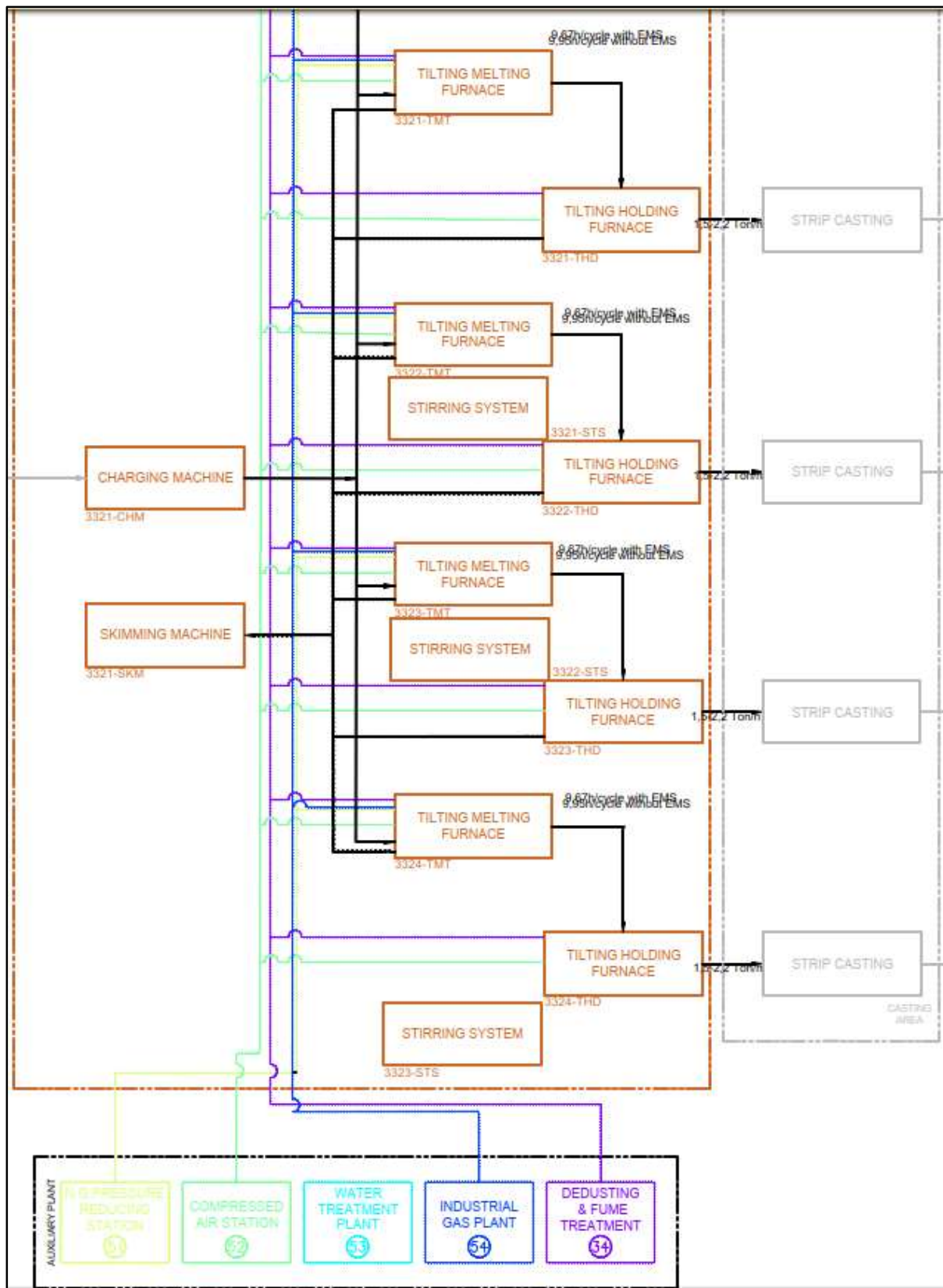




Figure 2. Basic process description & equipment strapping lines.

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3.2 Equipment list

Equipment List			
Item Nbr	Equipment Code	Description	Remarks
1	3311-TMT	Tiltable Melter Furnace	Forging area Line #01 Equipment #01
2	3312-TMT	Tiltable Melter Furnace	Forging area Line #01 Equipment #02
3	3311-THD	Tiltable Holding Furnace	Forging area Line #01 Equipment #01
4	5511-GEN	Hydraulic System	Hydraulic System Line#01 Equipment#01
5	3311-SFS	Salt Feeding System	Forging area Line #01 Equipment #01
6	3311-CHM	Charging Machine	Forging area Line #01 Equipment #01
7	3311-SKM	Skimming Machine	Forging area Line #01 Equipment #01
8	3311-HGS	Homogenizing System	Forging area Line #01 Equipment #01
9	3411-FTS	Fumes Treatment System	Fume Treatment Plant Line #01 Equipment #01
10	3311-BCM	Billet Caster Machine	Forging area Line #01 Equipment #01
11	3321-DCM	DC Caster Machine	Stripping area Line #02 Equipment #01
12	3322-DCM	DC Caster Machine	Stripping area Line #02 Equipment #02
13	3323-DCM	DC Caster Machine	Stripping area Line #02 Equipment #03
14	3324-DCM	DC Caster Machine	Stripping area Line #02 Equipment #04
15	3321-TMT	Tiltable Melter Furnace	Stripping area Line #02 Equipment #01
16	3321-THD	Tiltable Holding Furnace	Stripping area Line #02 Equipment #01
17	5521-GEN	Hydraulic System	Hydraulic System Line#01 Equipment#01
18	3321-SFS	Salt Feeding System	Stripping area Line #02 Equipment #01
19	3321-CHM	Charging Machine	Stripping area Line #02 Equipment #01
20	3321-SKM	Skimming Machine	Stripping area Line #02 Equipment #01
21	3321-HGS	Homogenizing System	Stripping area Line #02 Equipment #01
22	3322-TMT	Tiltable Melter Furnace	Stripping area Line #02 Equipment #02
23	3322-THD	Tiltable Holding Furnace	Stripping area Line #02 Equipment #02
24	5522-GEN	Hydraulic System	Hydraulic System Line#01 Equipment#02
25	3322-SFS	Salt Feeding System	Stripping area Line #02 Equipment #02
26	3322-HGS	Homogenizing System	Stripping area Line #02 Equipment #02
27	3323-TMT	Tiltable Melter Furnace	Stripping area Line #02 Equipment #03
28	3323-THD	Tiltable Holding Furnace	Stripping area Line #02 Equipment #03
29	5523-GEN	Hydraulic System	Hydraulic System Line#01 Equipment#03
30	3323-SFS	Salt Feeding System	Stripping area Line #02 Equipment #03
31	3323-HGS	Homogenizing System	Stripping area Line #02 Equipment #03
32	3324-TMT	Tiltable Melter Furnace	Stripping area Line #02 Equipment #04
33	3324-THD	Tiltable Holding Furnace	Stripping area Line #02 Equipment #04
34	5524-GEN	Hydraulic System	Hydraulic System Line#01 Equipment#04
35	3324-SFS	Salt Feeding System	Stripping area Line #02 Equipment #04
36	0600-GEN	Main Automation Server	Plant Automation Level I/II General

Table 1. Equipment list.

	MAIN EQUIPMENT DESCRIPTION			
	Basic network topology			
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3.3 Basic network topology

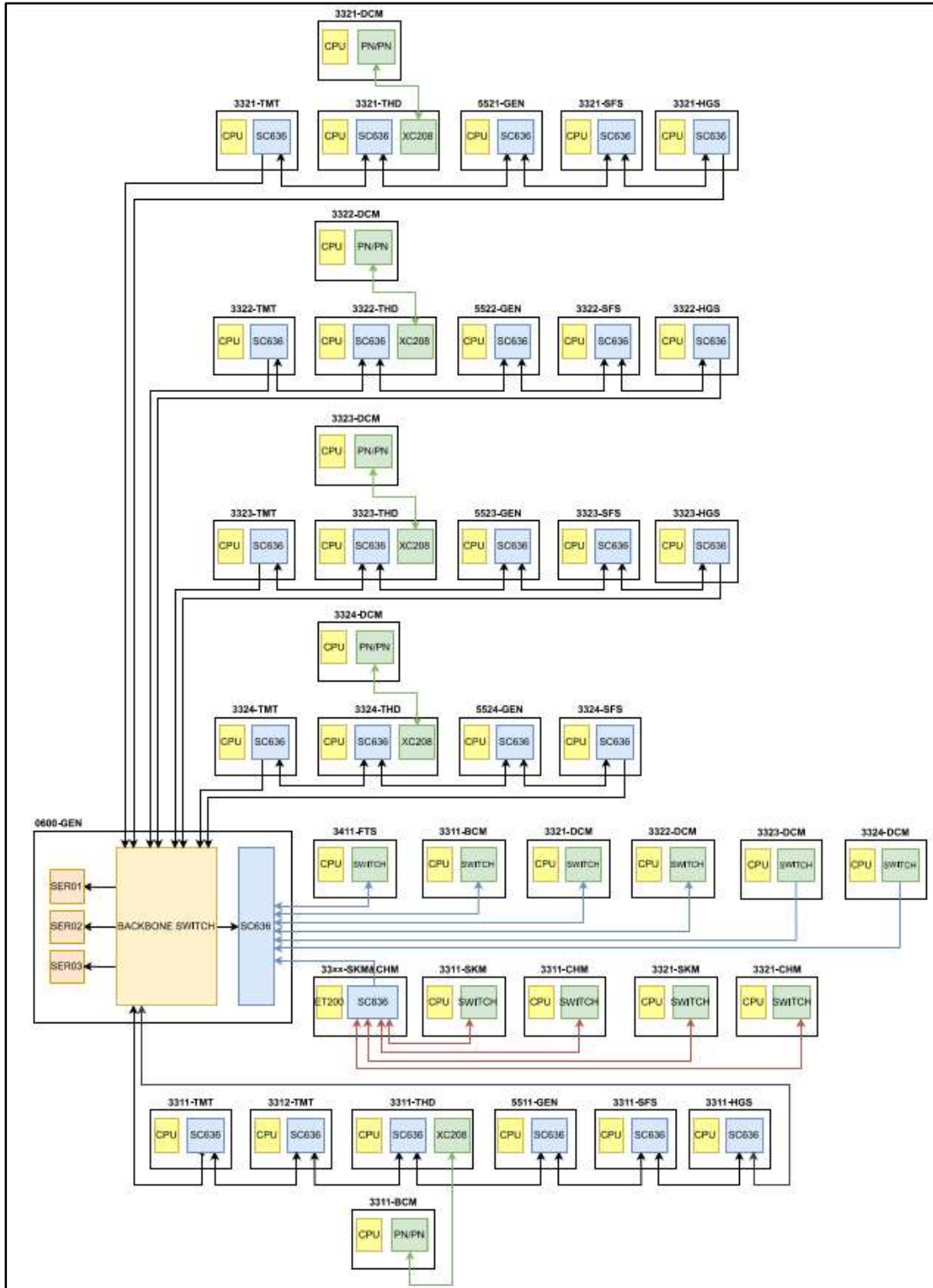



Figure 3. Communication basic network topology.

All the communications inside INSERTEC equipment will be managed under S7 communications. For more information, see 2558-0000-GEN-E-DWG-BNCD Basic Control System Configuration.dwg

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4. FORGING AREA

4.1 TILTING MELTER << >> FUMES TREATMENT SYSTEM

4.1.1 331x-TMT >> 3411-FTS

Signal Nbr.	Signal description	Data Type	Comment	Remarks
1	Emergency Stop	Bool		
2	Life Bit	Bool		
3	Main door open request	Bool		
4	Main door hood damper opened	Bool		
5	Main door loosened	Bool	Max. aspiration request	
6	Main door opened	Bool	Min. aspiration request	
7	Main door closed	Bool		
8	Chimney valve closed	Bool		
9	Melting chamber exhaust gases temperature	Real	Chimney + Main door hoods	

Table 2. TMT >> FTS communication interface.

4.1.2 3411-FTS >> 331x-TMT


Signal Nbr.	Signal description	Data Type	Comment	Remarks
1	Emergency Stop	Bool		
2	Life Bit	Bool		
3	System ready	Bool		
4	Main door open permission	Bool		

Table 3. FTS >> TMT communication interface.

4.1.3 Door opening sequence description

The furnace melter will perform a sequence for opening the main door, during which it will be necessary to prepare and exchange a series of signals with the FTS to ensure proper evacuation of any fumes that may accumulate in the main door hood.

- 1- **Ready from FTS.** The FTS sends a ready signal according to the availability (concurrency, equipment status) of the system.
- 2- **Main door opening request.** A request will be sent to the FTS from the TMT; the request can be activated from the door local control box manually or from the skimming (SKM) / charging machine (CHM) remotely.
- 3- **Adjusting conditions in the TMT.**
 - a. Burners at minimum power (Low fire mode)
 - b. Open chimney valve and pressure damper actuators 15 seconds
 - c. Close chimney valve and pressure damper actuators
 - d. Open (maximum) main door hood damper
- 4- **Open permission.**
 - a. Door open permission signal from FTS
 - b. Minimum pressure switch OK signal
- 5- **Loosen main door** and rise 15 cm (ZAM207).

	FORGING AREA			
	TILTING MELTER << >> FUMES TREATMENT SYSTEM			
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- 6- **Wait “t” time.** Remain for 10 seconds, blocking the rise, until is ensured that the maximum amount of fumes is drawn through the door hood.
- 7- **Open main door completely.** The interlock is unlocked to fully open the door.
- 8- **Reduce the suction valve position to the suction position with the door open.** This position will be assumed as soon as the door is not closed.
- 9- Close and tighten the main door on demand of local or remote operations
- 10- **Resuming TMT conditions**
 - a. Open chimney valve
 - b. Resume regulation with pressure dampers
 - c. Combustion on regulation
 - d. Release main door hood damper to control the temperature TIC902 (air dilution) of the melting chamber exhaust fumes (350°C)

Note: During the step number 4, the system will wait a defined “permission time” to receive the permission signal (from FTS) and condition (pressure switch) to open the door. In case the time is completed without receiving the opening permit, the system will go directly to step 10 of the sequence.

4.1.4 TIC902 description

Melting chamber exhaust fumes control loop uses the hood exhaust fumes temperature (PV: TI902) and closes a control with the motorized valve (OP: MOV902). The position of the valve is modulated automatically to maintain the exhaust fumes temperature at the selected control setpoint (350°C), using the air from the main door hood to dilute the exhaust fumes from the furnace chimney.

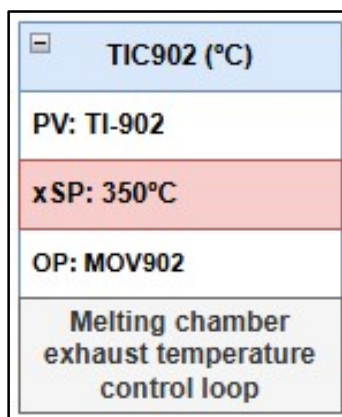



Figure 4. TIC902 Melting chamber exhaust fumes temperature control loop

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4.2 TILTING HOLDER << >> FUMES TREATMENT SYSTEM

4.2.1 3311-THD >> 3411-FTS

Signal Nbr.	Signal description	Data Type	Comment	Remarks
1	Emergency Stop	Bool		
2	Life Bit	Bool		
3	Main door open request	Bool		
4	Main door hood damper opened	Bool		
6	Main door opened	Bool		
7	Main door closed	Bool		

Table 4. THD >> FTS communication interface.

4.2.2 3411-FTS >> 3311-THD


Signal Nbr.	Signal description	Data Type	Comment	Remarks
1	Emergency Stop	Bool		
2	Life Bit	Bool		
3	System ready	Bool		
4	Main door open permission	Bool		

Table 5. FTS >> THD communication interface.


4.2.3 Door opening sequence description

The holding melter will perform a sequence for opening the main door, during which it will be necessary to prepare and exchange a series of signals with the FTS to ensure proper evacuation of any fumes that may accumulate in the main door hood.

- 1- **Ready from FTS.** The FTS sends a ready signal according to the availability (concurrency, equipment status) of the system.
- 2- **Main door opening request.** A request will be sent to the FTS from the TMT; the request can be activated from the door local control box manually or from the skimming (SKM) / charging machine (CHM) remotely.
- 3- **Adjusting conditions in the THD:**
 - a. Heating system at minimum power
 - b. Open door hood damper
- 4- **Open permission:**
 - a. Door open permission signal from FTS
 - b. Minimum pressure switch OK signal
- 5- **Open main door.**
- 6- **Close the main door** on demand of local or remote operations
- 7- **Resuming THD conditions**
 - a. Close hood damper
 - b. Heating system on regulation

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	TILTING HOLDER << >> FUMES TREATMENT SYSTEM				
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Note: During the step number 4, the system will wait a defined “permission time” to receive the permission signal (from FTS) and condition (pressure switch) to open the door. In case the time is completed without receiving the opening permit, the system will go directly to step 7 of the sequence.

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5. STRIPPING AREA

5.1 TILTING MELTER << >> FUMES TREATMENT SYSTEM

5.1.1 332x-TMT >> 3411-FTS

Signal Nbr.	Signal description	Data Type	Comment	Remarks
1	Emergency Stop	Bool		
2	Life Bit	Bool		
3	Main door open request	Bool		
4	Main door hood damper opened	Bool		
5	Main door loosened	Bool	Max. aspiration request	
6	Main door opened	Bool	Min. aspiration request	
7	Main door closed	Bool		
8	Chimney valve closed	Bool		
9	Melting chamber exhaust gases temperature	Real	Chimney + Main door hoods	

Table 6. TMT >> FTS communication interface

5.1.2 3411-FTS >> 332x-TMT


Signal Nbr.	Signal description	Data Type	Comment	Remarks
1	Emergency Stop	Bool		
2	Life Bit	Bool		
3	System ready	Bool		
4	Main door open permission	Bool		

Table 7. FTS >> TMT communication interface

5.1.3 Door opening sequence description

The furnace melter will perform a sequence for opening the main door, during which it will be necessary to prepare and exchange a series of signals with the FTS to ensure proper evacuation of any fumes that may accumulate in the main door hood.

- 1- **Ready from FTS.** The FTS sends a ready signal according to the availability (concurrency, equipment status) of the system.
- 2- **Main door opening request.** A request will be sent to the FTS from the TMT; the request can be activated from the door local control box manually or from the skimming (SKM) / charging machine (CHM) remotely.
- 3- **Adjusting conditions in the TMT.**
 - a. Burners at minimum power
 - b. Close chimney damper
 - c. Open (maximum) main door hood damper
- 4- **Open permission.**
 - a. Door open permission signal from FTS
 - b. Minimum pressure switch OK signal
- 5- **Loosen main door.**

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- 6- **Wait “t” time.** Remain for a few seconds, blocking the rise, until is ensured that the maximum amount of fumes is drawn through the door.
- 7- **Open main door completely.** The interlock is unlocked to fully open the door.
- 8- **Reduce the suction valve position to the suction position with the door open.** This position will be assumed as soon as the door is not closed.
- 9- Close and tighten the main door on demand of local or remote operations
- 10- **Resuming TMT conditions**
 - a. Open Chimney damper
 - b. Combustion on regulation
 - c. Release main door hood damper to control the temperature TIC902 (air dilution) of the melting chamber exhaust fumes (350°C)

Note: During the step number 4, the system will wait a defined “permission time” to receive the permission signal (from FTS) and condition (pressure switch) to open the door. In case the time is completed without receiving the opening permit, the system will go directly to step 10 of the sequence.

5.1.4 TIC902 description

Melting chamber exhaust fumes control loop uses the hood exhaust fumes temperature (TI902.PV) and closes a control with the motorized valve (MOV902.OP). The position of the valve is modulated automatically to maintain the exhaust fumes temperature at the selected control setpoint (350°C), using the air from the main door hood to dilute the exhaust fumes from the furnace chimney.

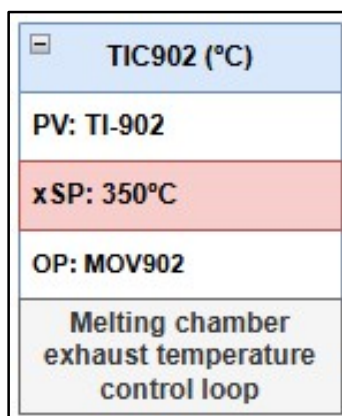



Figure 5. TIC902 Melting chamber exhaust fumes temperature control loop

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5.2 TILTING HOLDER << >> FUMES TREATMENT SYSTEM

5.2.1 332x-THD >> 3411-FTS

Signal Nbr.	Signal description	Data Type	Comment	Remarks
1	Emergency Stop	Bool		
2	Life Bit	Bool		
3	Main door open request	Bool		
4	Main door hood damper opened	Bool		
6	Main door opened	Bool		
7	Main door closed	Bool		

Table 8. THD >> FTS communication interface

5.2.2 3411-FTS >> 332x-THD


Signal Nbr.	Signal description	Data Type	Comment	Remarks
1	Emergency Stop	Bool		
2	Life Bit	Bool		
3	System ready	Bool		
4	Main door open permission	Bool		

Table 9. FTS >> THD communication interface.


5.2.3 Door opening sequence description

The holding melter will perform a sequence for opening the main door, during which it will be necessary to prepare and exchange a series of signals with the FTS to ensure proper evacuation of any fumes that may accumulate in the main door hood.

- 8- **Ready from FTS.** The FTS sends a ready signal according to the availability (concurrency, equipment status) of the system.
- 9- **Main door opening request.** A request will be sent to the FTS from the TMT; the request can be activated from the door local control box manually or from the skimming (SKM) / charging machine (CHM) remotely.
- 10- **Adjusting conditions in the THD:**
 - a. Heating system at minimum power
 - b. Open door hood damper
- 11- **Open permission:**
 - a. Door open permission signal from FTS
 - b. Minimum pressure switch OK signal
- 12- **Open main door.**
- 13- **Close the main door** on demand of local or remote operations
- 14- **Resuming THD conditions**
 - a. Close hood damper
 - b. Heating system on regulation


	STRIPPING AREA				
	TILTING HOLDER << >> FUMES TREATMENT SYSTEM				
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Note: During the step number 4, the system will wait a defined “permission time” to receive the permission signal (from FTS) and condition (pressure switch) to open the door. In case the time is completed without receiving the opening permit, the system will go directly to step 7 of the sequence

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