LCI Furnaces DIVISION OF LOCHABER CORNWALL INC CONTINUOUS BELT IR FURNACE	EQUIPMENT SPECIFICATIONS	DOC NBR: 21-003 - 802-101401 | R0	
		MODEL: TPS S-615	CUSTOMER: American Orthodontics
		SERIAL NBR: 202129x	SHT 1 OF 1 | PRNT 08/17/26

Equipment Model

Application: Low O2 Thick Film Firing

Model	Base Equipment	Control Zones	Furnace Heated Length	Nominal Furnace Belt Width
S-615	Continuous Belt Controlled Atmosphere Furnace	4	60 in 152 cm	15.0 in 38 cm

Equipment Arrangement

Phase	Process	Max	Length	Process Gas	Temperature (typ)
Phase 1	IR Furnace, 4 Zones	1000 °C	60 in 152 cm	N2	25-1000 C
Phase 2	Transition Tunnel		15 in 38 cm	N2	250-450 C
	Gas Convective Cooling, Exterior Fan Heat Removal		30 in 76 cm	N2	25-300 C

Process Sections

Function	Name	Location	Length	Process Gas	Temperature (typ)
	Load Station	Entrance load area	15.0 in 38 cm		ambient
IR Furnace	Entrance Stack	Entrance Stack	.0 in 0 cm	none	25 °C
	ENTRANCE BAFFLE	Entrance barrier	15.0 in 38 cm	N2	250 °C
	ZONE 1	Heating chamber 1	10.0 in 25 cm	N2	750 °C
	ZONE 2	Heating chamber 1	20.0 in 51 cm	N2	775 °C
	ZONE 3	Heating chamber 1	20.0 in 51 cm	N2	800 °C
	ZONE 4	Heating chamber 1	10.0 in 25 cm	N2	775 °C
Cooling	TRANS TUNNEL	Heat/cool barrier, single ed	15.0 in 38 cm	N2	675 °C
	Trans Tunnel Stack	Transition tunnel ed	.0 in 0 cm	none	675 °C
	Fan Cooling Section	Before unload station	60.0 in 152 cm	N2	
	LAMP PLENUMS	Heat chamber sides	240.0 in 610 cm	N2	
Product Unload	Unload Station	Exit station	15.0 in 38 cm		ambient
	Total		180.0 in 457 cm		

Process Gas

	Actual Conditons		Low O2 Thick Film Firing		Low O2 firing		Max (all flowmeters open)	
Furnace Replenishment Rate			3.4 rep/min		4.1 rep/min		4.2 rep/min	
	Temp °C	Press psi	Min Flow scfh	Min Flow sL/m	Typical scfh	Typical sL/m	scfh	Max Compressor sL/m
N2 Supply	21	70	674	318	752	355	2,814	1 328

Exhaust Gas

	Temp °C	Press in H_2O	Min Flow scfh	Min Flow sL/m	Typical scfh	Typical sL/m	scfh	Maximum Exhaust sL/m
N2	200	6	197	93	673	318	6,564	6 564

Cabinet Ventilation

Cabinet Ventilation Fans (vent to room or exhaust system)	Flowrate	1100 cfm	520 L/s
	Temperature	<86°F	<30°C

Transport System

Belt width	15.0 in 38.1 cm	Belt Edge Heater(s): none
Belt type	Balanced spiral weave	
Product height	2 in (5.1 cm) above belt level.	Baffle plate clearance: 1.5" above belt
Belt speed range	1 - 20 inches per minute	2.54 - 50.8 cm per minute
Conveyor height	36.0 in to 40.0 in adjustable	91.4 cm to 101.6 cm adjustable

Electrical System

Voltage required	480 Vac, 60 Hz, 3 Ph
Maximum power required	54.3 kW, 65.3 A
Typical (operating) power required	28.7 kW, 34.6 A

Materials of Construction

Heating Chamber	304 Stainless steel	Cooling	SS/Aluminum, aircraft	Belt	Nichrome V, 80%Ni,20%Cr, <1% Fe
Baffle & Eductor	304 Stainless steel	Belt support	Quartz rod, Quartz tube	Frame	Steel, powder coat
Heating element	Quartz, near infrared	Belt Return	UHMW-PE	Cover Panels	18GA Steel, urethane or powder coat

Furnace Dimensions

		Length	Width	Height (floor to stack)	Furnace Sect	Coolg Sectn	Weight
Furnace, English	Net	180 in	47.5 in	75 in +/- 1.5 in			2268 LB
Furnace, Metric	Net	4.57 m	1.21 m	1.91 m +/- 0.04 mm			1030 kg
Crate, English	Gross	188 in	53 in	81 in		Gross Wt:	2668 LB
Crate, Metric	Gross	4.78 m	1.33 m	2.06 m		Gross Wt:	1220 kg

Standard Conditions	Pressure	14.7 psia	101.3 kPa	Temperature	70 °F	21 °C

LCI Furnaces
DIVISION OF LOCHABER CORNWALL INC

Customer: American Orthodontics

DATA SHEET

IR FURNACE SYSTEM POWER & CURRENT

DOC NBR:	21-003	802-101501	R0
MODEL:	TPS S-615	APVL	SLB 3/27/14
SERIAL NBR:	202129x	CONF:	JMC 2/9/21
PRINT:	08/17/26	SHT	1 of 1

INPUT TABLE	Entry OK?	VALID		
Enter Line Voltage: (208,220,380,400,415,480)	480	Vac	TRUE	
Limit Lamps to Max Rating? (Y/N)	Y		TRUE	
Line Frequency (50/60)	60	Hz	TRUE	
Number of Phases:	3	Φ	TRUE	
Lamp Length (6, 9, 15, 24, 36)	15	inches	TRUE	
Typical Operating %	52	%	TRUE	

SUMMARY OF RESULTS	
Max Power:	54.2 kW
Max Current:	65.2 A
Typical Power:	28.7 kW
Typical Current:	34.5 A

HARDWARE			
Lamps: 60		SCRs: 4	
EMs: 20		TCs: 4	
EM IDC5: 5			
Nbr strings	20		
Nbr Lamps in 10" zone:	6	AOV-25: 2	
		AITM: 2	

CONFIGURATION	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7	Zone 8	Zone 9	Zone 10	Zone 11	Zone 12	Totals
Length (6.6,7.5,10,14.3,15,20,30) in.	10	20	20	10									60 in.
Length Entry OK?	TRUE	TRUE	TRUE	TRUE									
(F)urn., Furn. (1) SCR-Zn, (D)ryer	1	1	1	1									4
Zone Type OK?	TRUE	TRUE	TRUE	TRUE									
No. Lamps in Series/String (1-5)	3	3	3	3									
Lamps/String OK?	TRUE	TRUE	TRUE	TRUE									
No. Lamps in Top/Bottom	6/6	9/9	9/9	6/6									Plenum:
Power	H	H	H	H									240
SCR PHASE Zone Entry OK?	VALID	VALID	VALID	VALID									Lamp Balance (kW)
Top Lamp Phase (1/2/3):	1	2	3	1									Phase 1: 21.3
SCR POWER													Phase 2: 16.0
Rated Lamp Voltage	225	225	225	225									Phase 3: 16.0
Max. Lamp Wired Voltage	160	160	160	160									
50% Power SCR Cal Span Setting	**304**	**304**	**304**	**304**									<-- Vrms
Max. Lamp Wired Power (W)	887	887	887	887									
No. Strings per SCR	4	6.0	6.0	4									
Max. Current per String (A)	5.5	5.5	5.5	5.5									
No. Lamps in Zone	12	18	18	12									60
No. SCRs in Zone	1	1	1	1									4
No. Strings in Furnace Zones	4	6	6	4									20
											Nbr. lamp strings per element monitor:		1
Top Lamp Power (kW)	10.6	16.0	16.0	10.6									
Bottom Lamp Power (kW)													
Total Power/Zone (kW)	10.6	16.0	16.0	10.6									53.2
Current Required Top SCR (A)	22.2	33.3	33.3	22.2									
Current Required Bottom SCR (A)													
Color Temp (K) (nominal: 2500K)	**2204**	**2204**	**2204**	**2204**									
Peak Wavelength (µm)	**1.31**	**1.31**	**1.31**	**1.31**									
Estimated Lamp Life (hrs)	Long	Long	Long	Long									
Lumen Output vs. Rated (%)	34	34	34	34									

Furnace Total	Number of Item?	Voltage (Vac)	Current (Amps)	Power (kW) Max	Power (kW) Typical	Phase Assigned	EH in EM? (y/n)	Other Items
Lamps	60	480	as above	53.2	27.7	as above	Y	10" Cabinet or CACT Fans, 117 Vac, 0.30/029 A for 50/60 Hz
PC, Monitor	1	220	1.3	0.3	0.3	1	TRUE	4" Box (Muffin) Fans, product cooling, 117 Vac, 0.16 A
Belt, Opto22, EM	1	220	2.1	0.5	0.5	1		Cross-flow Fans, product cooling, 230 Vac, 1.27 A max
UC (Pump & Gen)		220	10.0					Lower Cabinet Blowers (Impellers), 230 Vac, 0.72 A max
UC (Tank Heater)		220	8.4					H2 Igniters, 120 Vac, 5 A 24 Vdc PS, 120 Vac, 2 A
UCD (Blower)		220	2.0					No more than 8 SCRs/phase per TRx xfmr 24 Vac secondary
UCD (Heater)		480	16.0					TR1: 2 TR2: 1 TR3: 1
Edg Htr 1 **Length**								EH1 Ω: Current: Cal Span:
Edg Htr 2 **Length**								EH2 Ω: Current: Cal Span:
Edg Htr 3 **Length**								EH3 Ω: Current: Cal Span:
Cabinet Vent Fan 10"	2	117	0	0.0	0.0	1	OK	Cabinet/CACT/Control Box Fans: 0 A
CACT Fans 10"	0	117	0.29			1	Item	
CACT Fans 4"	0	117	0.16					
Control Box Fans 4"	0	117	0.16					
Prod Cooling fans	4	220	0.29	0.3	0.3	1	OK	
			Furnace Totals:	**54.2**	**28.7**			

PHASE BALANCING	1	2	3	TOTAL ALL
LAMP PWR, kW	21.3	16.0	16.0	53.2
EH/OTHER	1.0	0.0	0.0	1.0
TOTAL	22.3	16.0	16.0	54.2

Enter Mfg=LCI, FPD, RTC

LCI Furnaces DIVISION OF LOCHABER CORNWALL INC	FLOWMETER SETTINGS	DOC NBR: 21-003 - 802-101460-01 R0		
Customer: American Orthodontics		MODEL: S-615	DWN: SLB	01/20/14
		SERIAL NBR: 202129x	APVL: JMC	01/20/14
		PRINT: 17Aug26	PM: JMC	02/09/21

PROCESS GAS

GAS1	N2	Nitrogen	cfh
GAS2	N2	Nitrogen	

SETTINGS FOR LOW O2 FIRING: SINGLE GAS MODEL
Low O2 Thick Film Firing

Replenish Rate is the number of times/minute that the furnace (or a section of the furnace) evacutes its gas

Replenish Rate	Furnace or Section Replenishes/Hour	Time to Refresh Furnace or Section
1 times/minute	60 times/hour	60 seconds
2 times/minute	120 times/hour	30 seconds
3 times/minute	180 times/hour	20 seconds
4 times/minute	240 times/hour	15 seconds

Different sections of the furnace can be replenished at different rates, if required

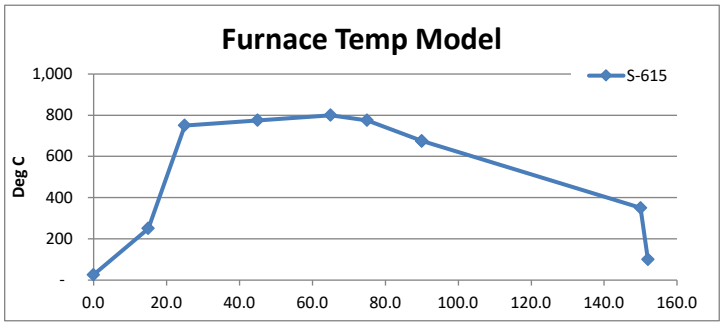
Flowmeters graduated in: scfh (lg=RMC flowmeters, sm=small RMA flowmeters) **1 per Minute Replenish Rate** 3.4

BALANCE

0.0	scfh difference	Balanced atmosphere in furnace	
0	scfh grad	0.0%	incr (decr) of inflows over outflows

No.		Location	Label	deg C	Metered Gas	Flowmeter Size cfh	Replenish Rate Flow Setting scfh grad	Desired Replenish Rate per Minute	Initial Flowmeter Setting scfh grad	Initial Flowmeter Setting scfh grad
1	BESE	Entrance barrier	ENTRANCE BAFFLE		N2	200	27.1	2.0	54	54
2	Z1	Heating chamber 1	ZONE 1	750	N2	400	14.4	13.0	188	188
3	Z2	Heating chamber 1	ZONE 2	775	N2	400	28.2	3.4	96	96
4	Z3	Heating chamber 1	ZONE 3	800	N2	400	27.5	3.4	94	94
5	Z4	Heating chamber 1	ZONE 4	775	N2	400	14.1	3.4	48	48
6	TTSE	Heat/cool barrier, single ed	EXIT BAFFLE		N2	200	15.4	2.0	30	30
7	HC	Heat chamber sides	PLENUM		N2	400	57.6	2.1	120	120
8						2400	184	3.4	630	630

	EXHAUST						distr %	scfh grad	scfh grad
9	EEBE	Entrance Stack	ENTR EXH STACK		N2	200	70%	29.5	29.5
10	EETT	Transition tunnel ed	EXIT EXH STACK		N2	200	30%	12.6	12.6
11						400	100%	42.1	42.1
12						2800		673	



Furnace Balance	scfh	scfh
Gas Inflow to furnace	631	631
Gas to Eductors	42	42
Total Gas Required	673	673
- Stack Exhaust Flow	673	673
(Net outflow)	0	0
	cu ft	L
Furnace internal volume	7	188

PROCESS GAS SUPPLY REQUIREMENTS			Temp °C	Press psi	Gas	scfh	scfh
1	Gas 1	All	21	70	N2	673	673
			STP = 21C, 1 atm		Total	673	673

LCI Furnaces DIVISION OF LOCHABER CORNWALL INC	FLOWMETER SETTINGS	DOC NBR: 21-003 - 802-101460-02 R0			
Customer: American Orthodontics		MODEL: S-615	DWN: SLB	01/20/14	
		SERIAL NBR: 202129x	APVL: JMC	01/20/14	
		PRINT: 17Aug26	PM: JMC	04/18/22	

PROCESS GAS

GAS1	N2	Nitrogen	cfh	PH2	SETTINGS FOR LOW O2 FIRING: SINGLE GAS MODEL Low O2 firing
GAS2	N2	Nitrogen			

Replenish Rate is the number of times/minute that the furnace (or a section of the furnace) evacutes its gas

Replenish Rate	Furnace or Section Replenishes/Hour	Time to Refresh Furnace or Section
1 times/minute	60 times/hour	60 seconds
2 times/minute	120 times/hour	30 seconds
3 times/minute	180 times/hour	20 seconds
4 times/minute	240 times/hour	15 seconds

Different sections of the furnace can be replenished at different rates, if required

Flowmeters graduated in: scfh (lg=RMC flowmeters, sm=small RMA flowmeters) **1 per Minute** 4.8

BALANCE

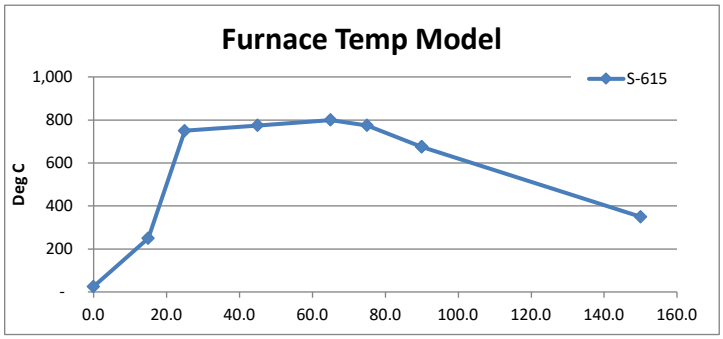
200.0 scfh difference => Positive pressure in furnace to purge O2

200 scfh grad 26.5% incr (decr) of inflows over outflows

No.		Location	Label	deg C	Metered Gas	Flowmeter Size cfh	Replenish Rate Flow Setting scfh grad	Desired Replenish Rate per Minute	Initial Flowmeter Setting scfh grad	Initial Flowmeter Setting scfh grad
1	BESE	Entrance barrier	ENTRANCE BAFFLE		N2	200	27.1	1.9	52	52
2	Z1	Heating chamber 1	ZONE 1	750	N2	400	14.4	13.0	188	188
3	Z2	Heating chamber 1	ZONE 2	775	N2	400	28.2	4.8	135	135
4	Z3	Heating chamber 1	ZONE 3	800	N2	400	27.5	4.8	132	132
5	Z4	Heating chamber 1	ZONE 4	775	N2	400	14.1	4.8	68	68
6	TTSE	Heat/cool barrier, single ed	EXIT BAFFLE		N2	200	15.4	1.1	17	17
7	HC	Heat chamber sides	PLENUM		N2	400	57.6	2.8	161	161
8						2400	184.4	4.1	752	752

EXHAUST

							distr %	scfh grad	scfh grad
9	EEBE	Entrance Stack	ENTR EXH STACK		N2	200	70%	25.8	25.8
10	EETT	Transition tunnel ed	EXIT EXH STACK		N2	200	30%	11.1	11.1
11						400	100%	36.9	36.9



Furnace Balance	scfh	scfh
Gas Inflow to furnace	753	753
Gas to Eductors	37	37
Total Gas Required	790	790
- Stack Exhaust Flow	590	590
Net inflow	200	200
	cu ft	L
Furnace internal volume	6.6	188

PROCESS GAS SUPPLY REQUIREMENTS			Temp °C	Press psi	Gas	scfh	scfh
1	Gas 1	All	21	70	N2	673	673
			STP = 21C, 1 atm		Total	673	673

Model S-615

I/O Channel Assignments

Channel	Description	Module #
Analog Module In AITM-4i Thermocouple		1
0	Thermocouple Input Zone 1	
1	Thermocouple Input Zone 2	
2	Thermocouple Input Zone 3	
3	Thermocouple Input Zone 4	
Analog Module Output AOVA-8		2
0	SCR ZONE 1 TOP	
1	Spare	
2	SCR ZONE 2 TOP	
3	Spare	
4	SCR ZONE 3 TOP	
5	Spare	
6	SCR ZONE 4 TOP	
7	Spare	
Analog Module Output AOV-25		3
0	Edge Heat Left	
1	Edgr Heat Right	
Analog Module Output AOV-25		4
0	Motor Control Signal Control	
1	Spare	
Analog Module Input AIV -4		5
0	Motor Control Signal Feedback	
1	Spare	
2	Spare	
3	Spare	
Digital Module Input IDC5		6
0	Spare	
1	Spare	
2	Transport Motion Fault	
3	Spare	
Digital Module Output ODC5SNK		7
0	Main Power	
1	Lamp Power	
2	Alarm	
3	Light Tower Green	
Digital Module Output ODC5SNK		8
0	Light Tower Yellow	
1	Light Tower Red	
2	Auto Shut Down	
	Spare	

Digital Module Output ODC5SNK		10
0	Oxygen Valve Source	
1	Oxygen Valve Zone 1	
2	Oxygen Valve Zone 3	
3	Oxygen Valve Zone 4	
Digital Module Output ODC5SNKFM		11
0	Nitrogen Valve	
1	Hydrogen Valve	
2	Purge Valve	
3	Igniters	
Digital Module Input IDC-HT-16		12
0	Igniter 1	
1	Igniter 2	
2	Igniter 3	
3	Igniter 4	
4	Igniter 11	
5	Igniter 22	
6	Igniter 33	
7	Igniter 44	
8	Ent.Exhaust1	
9	Ent.Exhaust2	
10	Transition Exhaust	
11	Exit Exhaust	
12	Ent.Baffle1	
13	Ent.Baffle2	
14	Transition Baffle	
15	Exit Baffle	
Digital Module Input IDC5		13
0	Plenum Top	
1	Plenum Bottom	
2	N2 Pressure	
3	Spare	
Digital Module Output ODC5SNK		14
0	Auto Shut off	
1	Spare	
Analog Module Input AIMA-4		15
0	H2 Sensor Entrance End	
1	H2 Sensor Plumbing Box	
2	H2 Sensor Exit End	
3	Spare	

TP solar

INNOVATIVE FURNACE TECHNOLOGIES

Serial Number	2021296
Model Number	S-615
Input Service	480 Vac, 3 Wire / Neutral / Ground
Frequency	60 Hz
Peak Power	30 kW
Peak Current	55 A
CDA/Nitrogen Max Input Pressure	75 PSI
Process Exhaust	2 at 10 LPS Each
Cabinet Exhaust	650 LPS
Cooling Exhaust	2 at 500 LPS Each
CDA/Nitrogen Flow	2800 SCFH Max
Maximum Temperature	1000°C
Manufactured Date	11-2021

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