EQUIPMENT Resources

Tempering Furnace Maintenance Agreement

THE DIFFERENCE IS CLEAR.

A division of **Salem Fabrication Technologies Group, Inc.**

EQUIPMENT Resources

Tier Levels and Price

Tier 1 Maintenance Visit	
1 Visit	
2 Days + Expenses	
Tier 2 Maintenance Visit:	
2 Additional Visits	
4 Days (2 days per visit) + Expenses	
Inspection plus lubrication PM and adjustment of conveying and nozzle lift systems as outlined below:	
Tier 3 Maintenance Visit	
4 Additional Visits	
8 Days (2 days per visit) + Expenses	
All blower and electrical cabinet maintenance as detailed below.	

*In the event your account becomes past due sixty (60) days this MSA becomes null and void

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EQUIPMENT Resources

	Tier One Maintenance Visit	
	Audit/Inspection Mechanical and Safety	
1	**Points of inspection**	
1a	UPS Backup	
1b	Over-temperature controller	
1c	Shunt trip operation	
1d	Proper fuse sizes	
1e	All guards in place	
1f	Neutral to ground check	
1g	Safety signs in place	
2	**Furnace**	
2a	**Zones**	
2b	Record line voltages. Phase-phase and phase-neutral	
2c	Exterior condition	
2d	Element condition (including connections)	
2e	Current draws/resistance measurement	
3	**Insulation**	
3a	Roll seals	
3b	Roof and wall refractory	
3c	Door insulation	
3d	Convection tubes and plenums	
3e	Aspiration tubes	
3f	T/C condition	
3g	Overall interior condition (element covers, ceramics, etc.)	
4	**Drive system**	
4a	Belt condition	
4b	Line shaft connection points, shafts and bearings	
4c	Drive motor-GB condition	
4d	Cooling fan	
4e	Bearings and sheaves	

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	Tier One Maintenance Visit	
5	**Examine the condition and operation of the load recognition sensors on the loading and unloading conveyors. Clean the sensors.**	
6	**Check the following:**	
6a	Condition the loading and unloading conveyor rollers and castor wheels.	
6b	The cleanliness, condition and operation of entry and exit door sensors.	
6c	Condition of the insulation of the furnace doors.	
6d	Furnace for unusual temperature differences.	
6e	Condition and operation of the vents on the furnace roof.	
6f	Condition and the operation of the furnace rollers.	
6g	All gearboxes and reducers for oil leaks.	
6h	Quenching and cooling section(s) are to be clean and free from glass particles and dust.	
6i	Condition and the Kevlar cording of the quench rollers.	
6j	Blower room for dust and loose trash. (If applicable)	
6k	Unusual noise or vibration in blowers. (no analysis)	
6l	All pneumatic components for leaks.	
6m	SO^2 system for leaks. Keep a record of SO^2 checks. (If applicable)	
7	**Test the operation of the emergency stop circuit.**	
8	**Examine the condition and operation of the load recognition sensors on the loading and unloading conveyors:**	
8a	Clean the sensors	
9	**Check the following**	
	Condition of and cleanliness of:	
9a	Loading conveyors	
9b	Unloading conveyors	
9c	Castor wheels	
10	**Cleanliness, condition and operation of:**	
10a	Entry door sensors	
10b	Exit door sensors	
11	**Condition of the insulation of the furnace doors**	

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	Tier One Maintenance Visit	
12	**Furnace for unusual temperature differences**	
13	**Condition and operation of:**	
13a	Vents on the furnace roof	
13b	Furnace rollers	
14	**All gearboxes and reducers for oil leaks**	
15	**Condition and the cording of the quench rollers**	
16	**All pneumatic components for leaks**	
17	**SO^2system for leaks. Keep a record of SO^2 checks (if applicable)**	
18	**Cleanliness of the air inlet filters of the electrical cabinets.**	
19	**Condition and tightness of the drive belts of the furnace**	
20	**Keep the quenching and cooling section(s) clean from glass particles and dust**	
21	**Test the operation of the emergency drive**	
22	**Examine and tighten if necessary:**	
22a	Drive belts	
22b	Chains	
22c	Encoder couplings on the furnace	
23	**Examine the condition and operation of:**	
23a	Air intake	
23b	Nozzles of the quench	
23c	Limit switches of the nozzle blocks	
23d	All limit switches	
23e	Canvas tubes of the quenching and cooling sections	
23f	Convection blowing system	
24	**Check the cleanliness of the pneumatic filters**	
25	**Examine the condition of the roller wheels of the furnace drive.**	
25a	Clean the roller wheels	
26	**Examine the insulation of the furnace**	
27	**Test the operation of the overheat protection temperature controller**	

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Tier 2 Maintenance Visit			
Loading/Unloading Conveyor			
Gears and Chains			
Lubrication			
ITEM NO.	**DESCRIPTION**	**LUBRICANT**	
1	Drive Gear Reducer	Shell Gadus S-2U1000	
2	Drive Chain	Mobil 1 High Performance Synthetic Universal Grease or equivalent	
Checks			
ITEM NO.	**DESCRIPTION**	**CHECK**	
1	Chain of roller drive	Condition and tightness	
2	Round belts for rollers	Condition and tightness	
Furnace			
Gears			
Lubrication			
ITEM NO.	**DESCRIPTION**	**LUBRICANT**	
1	Drive Gear Reducer	Shell Gadus S-2U1000	
2	Lifting Gear Reducer	Shell Gadus S-2U1000	
3	Lifting Screw Jack Gear	Mobil 1 High Performance Synthetic Universal Grease or equivalent	
4	Lifting Screw Jack Thread	Mobil 1 High Performance Synthetic Universal Grease or equivalent	
Bearings			
Lubrication			
ITEM NO.	**DESCRIPTION**	**LUBRICANT**	
1	Rollers	Mobil 1 High Performance Synthetic Universal Grease or equivalent	
2	Furnace doors		
3	Drive shaft		

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Tier 2 Maintenance Visit			
Belts/Chains			
Lubrication			
ITEM NO.	**DESCRIPTION**	**LUBRICANT**	
1	Roller drive	Mobil 1 High Performance Synthetic Universal Grease or equivalent	
Checks			
ITEM NO.	**DESCRIPTION**	**CHECK**	
1	Round belts for rollers	Condition and tightness	
2	Encoder Coupling	Condition and tightness	
3	Chain of Roller Drive	Condition and tightness	
Quench			
Gears			
Lubrication			
ITEM NO.	**DESCRIPTION**	**LUBRICANT**	
1	Drive Gear Reducer	Shell Gadus S-2U1000	
2	Nozzle Lift Gearbox	Full Synthetic Gear Lube 70w-90	
3	Nozzle Oscillation Gearbox	Full Synthetic Gear Lube 70w-90	
Bearings			
Lubrication			
ITEM NO.	**DESCRIPTION**	**LUBRICANT**	
1	Lifting shaft and swing shaft	Mobil 1 High Performance Synthetic Universal Grease or equivalent	
2	Drive Shaft		
Chains			
Lubrication			
ITEM NO.	**DESCRIPTION**	**LUBRICANT**	
1	Roller drive	Mobil 1 High Performance Synthetic Universal Grease or equivalent	
2	Nozzle lift		
Checks			

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Tier 2 Maintenance Visit			
ITEM NO.	**DESCRIPTION**	**CHECK**	
1	Chain of roller drive	Condition and tightness	
2	Encoder coupling	Condition and tightness	
3	Round belts for rollers	Condition and tightness	

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EQUIPMENT Resources

Tier 3 Maintenance Visit

	Note:	
	*** Fan should only run when in peak condition. There can be no bypass or work arounds for issues not corrected in the proper manner to OEM specifications.	
1	Test operations after repair are required to ensure the integrity of the repair.	
2	Keep inside of fans clean. Dust and grime buildup on the impeller and scroll will hold moisture and cause corrosion.	
	When performing repairs, all safety procedures need followed. (Lock out/tag out, etc.)	
	Basic checks/repair:	
3	Clean and check the fan and enclosure. Check for leaks.	
4	Check bearings and ensure shaft is not damaged or bent.	
5	Inspect rotor, repair or replace as needed.	
6	Check coupling and replace star bushing if necessary.	
7	Check alignment of blower	
8	Check and adjust belt tension if so equipped.	
9	Clean air valves, cylinders and any adjusting or open/close devices.	
10	Check inverter cabinet for cleanliness and clean filters.	
11	Record temperature of bearings while running 10 minutes minimum.	
12	Ensure all guards are in place.	
	Bearings:	
13	Clean bearings and replace grease. Mobil Polyrex EM both motor and fan	
	• Case should be filled 1/3 to ½ full.	
14	Grease should be filled monthly and changed quarterly.	
	Belts: (if so equipped)	
15	Belts should be replaced in matched sets.	
	• Do not mix belts that are not matched.	
16	Check alignment to prevent heat and premature wear.	

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Tier 3 Maintenance Visit

THERMAL IMAGING OF ELECTRICAL COMPONENTS

An inspection by infrared or thermal scan utilizes a modern non-contact thermal imaging camera to inspect an electrical system. This is typically performed to provide an annual thermal imaging report to a company's insurance carrier, or as a part of a preventative maintenance program to look for problem areas which could lead to potential failure.

A thermal graphic or infrared scan is used to detect higher than normal temperatures within electrical components such as switchgear, circuit breaker panels, and fuses. Higher than normal temperatures in electrical components is usually a precursor to a potential fault which could lead to unplanned downtime or in more severe cases a potentially dangerous electrical fire. A thermal imaging camera is an easy method of identifying "hot" spots in electrical components because it is non-contact and an image can be archived for future comparison to determine degradation over time. Routine inspections of electrical switchboards and/or electrical equipment can help prevent failures that could potentially cause expensive shutdowns of critical processes or manufacturing systems. Moreover, a scheduled preventative maintenance program will help to manage budgets and reduce the risk of unexpected repair costs.

	WHAT CAN BE DETECTED FROM AN INFRARED SCAN?	
17	Hot spots	
18	Overloaded circuit breakers	
19	Electrical faults	
20	Loose connections	
21	Harmonics	
22	Open circuits	

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