

## SELEE® LIG Ultra Series Fully Automatic Filter Preheat System

The SELEE® LIG Ultra Series gas preheat lid is an advanced, fully automatic gas-fired filter preheat system. LIG Ultra will provide consistent, safe and reliable preheating of SELEE® CS-X™ filters with the Safeseal® expandable gasket and filter bowls. It is available for monoplex, duplex or triplex filter bowls in both single- and dual-stage configurations. These systems can be custom engineered to meet specific cast house site requirements.

### Description

The LIG Ultra fully automatic preheat system is push button operated and incorporates PLC control to provide easily adjustable temperature, producing the optimum preheat for the filter and filter bowl. The burner system forces hot combustion gas evenly throughout the entire filter body, consistently heating the filter internally to the proper filter operating temperature as well as expanding the Safeseal® gasket material and the filter bowl refractory.

A main control panel contains the PLC with Ethernet connectivity, touch screen operator interface and display, over temp controller, flame safety monitor and operator controls for burner off/on and for raising and lowering the lid. The use of a PLC allows adjustable preheat set points and holding time. Warning lights and audible alarms during lid raising and lowering are available depending on customer site safety requirements.

SELEE® LIG Ultra Series preheat lid systems have the following features and advantages:

- Automatic filter system startup - less human error/improved safety/increased productivity
- Burner status display including fault diagnostics
- Ethernet connectivity for SCADA data collection and remote access, use of startup permissives
- Excess air burner with air modulation control
- Digital temperature control and over temperature protection
- Rapid and uniform filter preheat via convective heat transfer
- Programmable multiple set point temperatures
- Wide burner turndown range



**LIG Ultra - Filter Preheat System and Stand**



**LIG Ultra – Control Panel**

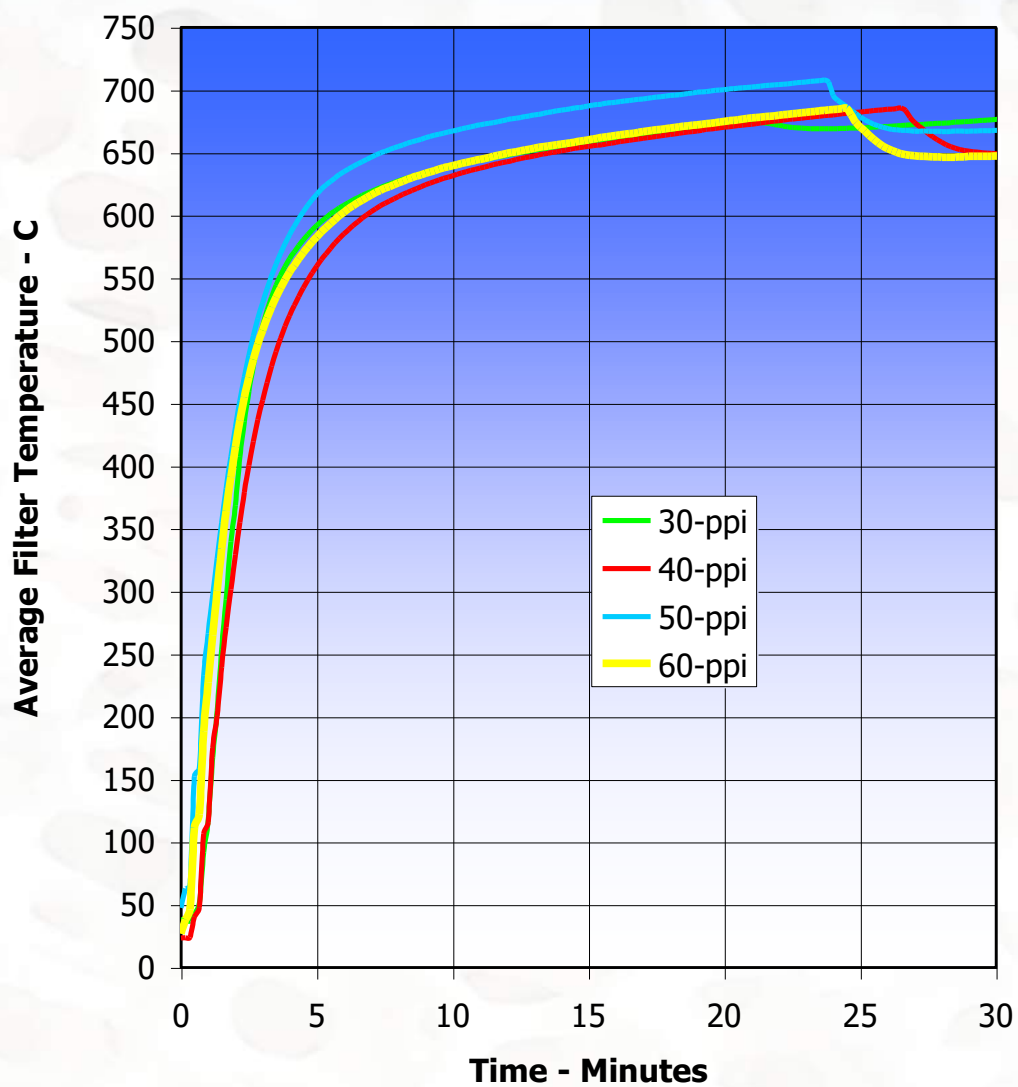
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<b>SELEE® LIG Ultra Series Filter Preheat System Details</b>	
Lid Shell Construction	Welded hot rolled steel plate coated with heat resistant aluminum paint.
Lid Insulation Package	Thermal Ceramics Pyro-bloc, 12 lb/ft <sup>3</sup> [192 kg/m <sup>3</sup> ] density, 9" [175 mm] thick.
Lid Actuator	Electromechanical screw jacks with internal integral limit switches and brake.
Lid Support Stand	Independent of filter bowl.
Control System	Allen-Bradley CompactLogix L23E with Ethernet connectivity is standard. Other PLC control systems may be negotiated.
Burner System Components/ Burner	Eclipse or Hauck Burner: Monoplex Bowl: 1,000,000 BTU/Hour [293 kW] at gas-air stoichiometry operates at 290,000 BTU/Hour [85 kW]. Duplex Bowl: 2,000,000 BTU/Hour [586 kW] at gas-air stoichiometry operates at 500,000 BTU/Hour [146 kW].
Air Modulation Output Gas Temperature Range	1292°F to 1562°F [700°C to 850°C] (typical)
Flame Safety Standard	NFPA (National Fire Protection Association)
Flame Safety Control System	Kromschroder BCU370 with flame ionization rod. Honeywell or FireEye systems negotiable.
Natural Gas Requirements (propane available)	Gas Pressure: 2 psi [0.14 Bar] maximum – 1 psi [0.07 Bar] minimum <u>Gas Flow Rates</u>  Monoplex: 300 cfh [140 LPM] Duplex: 790 cfh [370 LPM]
Electricity:	30 amps at 120 Volts, 50/60 Hz [20 amps @ 240 Volts, 50/60 Hz]
Required Filter Preheat Time:	Single Stage System: 15 - 20 minutes Two-Stage Systems: 20 - 25 minutes

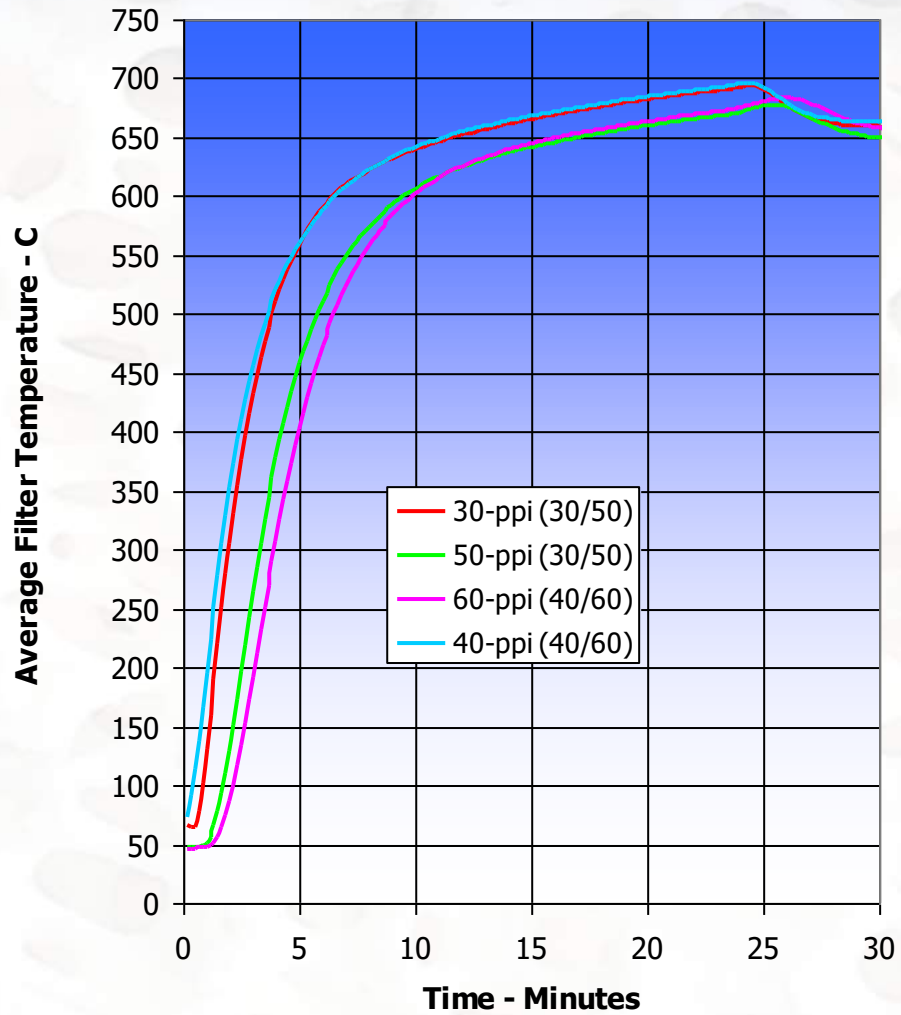
The LIG Ultra Series gas lids includes the following services:

1. Engineering site survey
2. Proposal drawing with quotation
3. On-site installation supervisor
4. On-site operator and maintenance training
5. On-site startup assistance
6. Technical manual and electrical documentation

### Typical Single Element Filter Preheat Results



### Typical Two-Stage Preheat Results





## CE, NFPA 86

SELEE's past CE reports conducted by Antietam Compliance Company (ACC) dated July 10, 2011 and July 27, 2012 cover only the 750,000 btu/hr (220kW) burners being used in SELEE's currently operating monoplex systems.

All new monoplex burners use the 1,000,000 btu/hr (293KW) burner, and the new duplex burners use the 2,000,000 btu/hr (586kW) burner.

### Standards from 2011:

- Machinery Directive 2006/42/EC, including the Essential Health and Safety Requirements of Annex 1
- Low Voltage Directive 2006/95/EC through the article 1.5.1 of the annex I of the machinery directive
- The Section on Hazards Due to Combustion of Fuel references the following:
  - EN746-1
  - EN298 (Burner Controller)
  - EN161 (Gas Solenoids Valves)
- The cabinet section references IP2X, IP3, IP4X, IP65 for the enclosure, terminals, gas valves, switches and motors
- The following electronic components are CE Marked: Kromschröder BCU, Ethernet Switch, HMI, Over-temperature Controller, PLC and cards, 24VDC power supply, Thermocouple Transmitter VFD
- The fused disconnect references IEC 60947-3
- The wiring diagram references IEC60617-DB and EN60204-1
- The CE Declaration page references the following in terms of compliance:
  - Machinery Directive 2006/42/EC;
  - Electromagnetic Compatibility Directive 2004/108/EC.
- The CE Declaration page references the following in terms of consideration:
  - EN ISO 12100-1:2003/A1:2009, EN ISO 12100-2:2003/A1:2009
  - EN 60204-1:2006, EN ISO 13849-1:2008, EN 746-2:2010
  - EN 61000-6-2:2005, EN 61000-6-4:2007
- Annex IV references the following EN Standards as considered in the examination:
  - EN 12100-1 Safety of Machinery - Basic concepts, general principles for design
  - Part 1: Basic terminology, methodology
  - EN 12100-2 Safety of Machinery - Basic concepts, general principles for design
  - Part 2: Technical principles and specifications

- EN 13850 Safety of Machinery - Emergency stop equipment - principles for design
- EN 13857 Safety of Machinery - Safety distances to prevent danger zones to be reached by upper and lower limbs
- EN 14121-1 Safety of Machinery - Principles of Risk Assessment - Machinery Safety Standards of the EC Community
- EN 13849-1 Safety of Machinery - Safety related parts of control systems. Part 1: General principles for design
- EN 13849-2 Safety of Machinery - Safety related parts of control systems. Part 1: Validation
- EN 13732-1 Safety of Machinery - Temperatures of touchable surfaces.
- EN 60204-1 Safety of Machinery - Electrical equipment of machines. Part 1: General requirements
- EN 983 Safety of Machinery - Fluid power systems and components; Pneumatics
- EN 349 Safety of Machinery - Minimum gaps to avoid crushing of parts of the human body
- EN 953 Safety of Machinery - General requirements for the design and construction of guards
- EN 1088 Safety of Machinery - Interlocking devices, with and without guard locking; general principles
- EN 1037 Safety of Machinery - Isolation and energy dissipation; prevention of unexpected start-up
- EN 614 Ergonomic design principles
- EN 979 Basic list of definitions of human body dimensions for technical design
- EN 981 Safety of Machinery - System of danger and non-danger signals with sound and light
- EN 1005-1 Safety of Machinery - Human physical performance. Part 1: Terms and definitions
- EN 842 Safety of Machinery - Visual danger signals - General requirements - Design and testing
- EN746-2 Industrial Thermoprocessing Equipment – Part 2: Safety requirements for combustion and fuel handling systems

### **Standards from 2012:**

- EMC Directive 2004/108/EC
- EN ISO 13849-1 is referenced in the following sections
  - Hardwired Emergency Stop (p10)
  - Lid Actuator Motion (control of tilting movement p14)

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