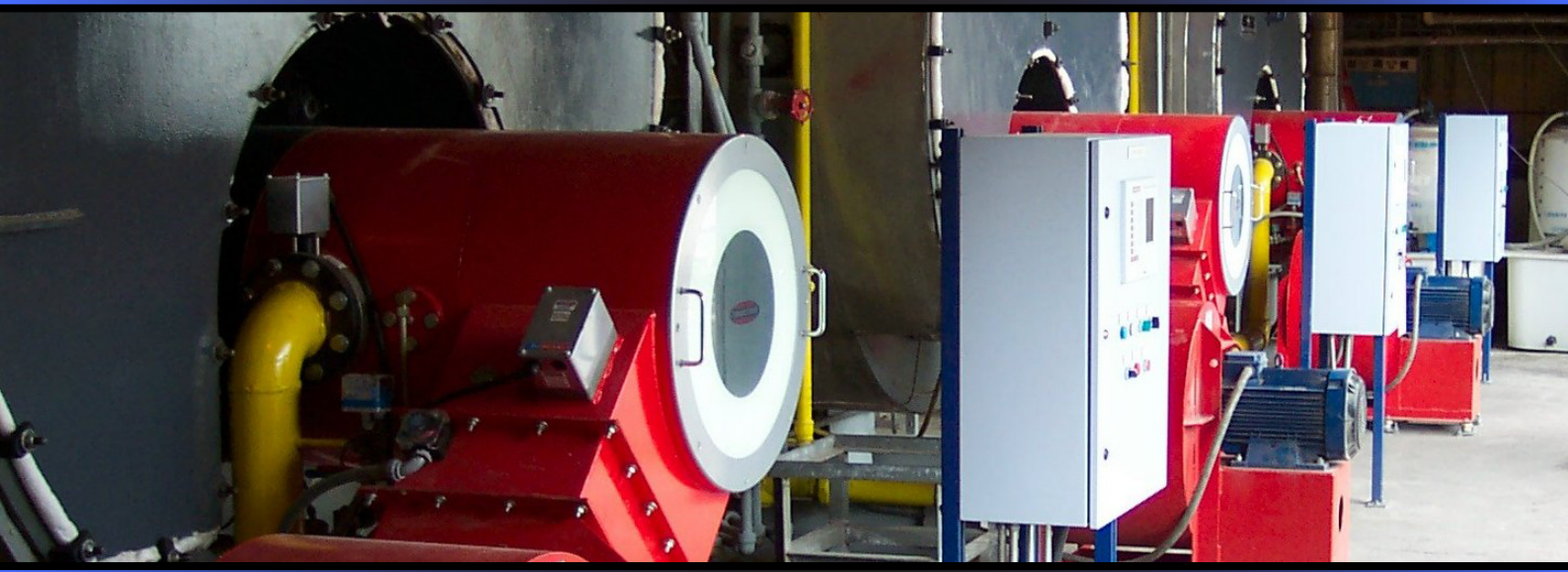
Limpsfield

LC BURNER SERIES



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Contents

Disclaimer: The information supplied in this brochure is only correct at the time of publish.

Introduction

Limpsfield Combustion is an industrial burner manufacturer, offering complete solutions to combustion requirements from standard burners to individually engineered solutions. Experienced in all common aspects and many more specialised areas of its field, Limpsfield offers experience, quality and competitive prices.

Limpsfield Burners are of an Industrial Forced Draft design, suitable for alternative or simultaneous firing of all types of gaseous fuels and mineral fuel oils. Limpsfield Combustion offers burners for a range of application inputs from 3 - 110 MmBtu/hr (0.9 - 31MW)

Designed and manufactured to exacting specifications, the Limpsfield LC burner line is an exceptional combination of form and function. Every feature, from the powder coated finish to the sealed damper bearings and large viewing port, exemplifies the commitment to quality and performance. With the ability to orient both the fuel and air inlets independently of one another the application possibilities are virtually unlimited

In addition to being easy to set up and adjust, the unique forced draft combustion design distributes the combustion air in the burner head so that the necessary static pressure is maintained for stable combustion and flame geometry, throughout the complete burner firing range. Therefore the burner achieves less than 3% O_2 throughout the complete firing range making the boiler more efficient with low emissions and assist with being "Green".

Burner Range

Limpsfield offer standard burners from 3,000,000 Btu/hr (0.9 MW) to 110,000,000 Btu/hr (31 MW), firing a wide range of fuels from natural gas, diesel, #2 oil to heavy fuel oil, waste oils, animal fats, fish oils, bio gases etc. Excellent results have been achieved when firing such fuels offering the end user substantial fuel savings through high performance.

Burner Features

Standard burners have the following features:

- Autoflame burner control system fitted as standard to maximise efficiency and reliability of equipment.
- Large rear flame viewing port, enabling a unique view of the combustion process
- Fuel inlets on both sides of burner housing offering build flexibility to suit site application.
- Simple construction allows easy access to internal components for maintenance. All components can be accessed and replaced without the need to remove the burner from the boiler front.
- Stainless steel diffusers and blast tube cones.
- Split head combustion head design. Adjustable to alter gas injection velocity.
- Adjustable gas head/diffuser position for optimum performance.
- Multiple fixings on the burner rear section allows fan to be mounted in a variety of different positions to over come site space restraints.
- Remote combustion air fan. Allows forced draught fan to be sized for actual project and sized to meet turndown requirements.

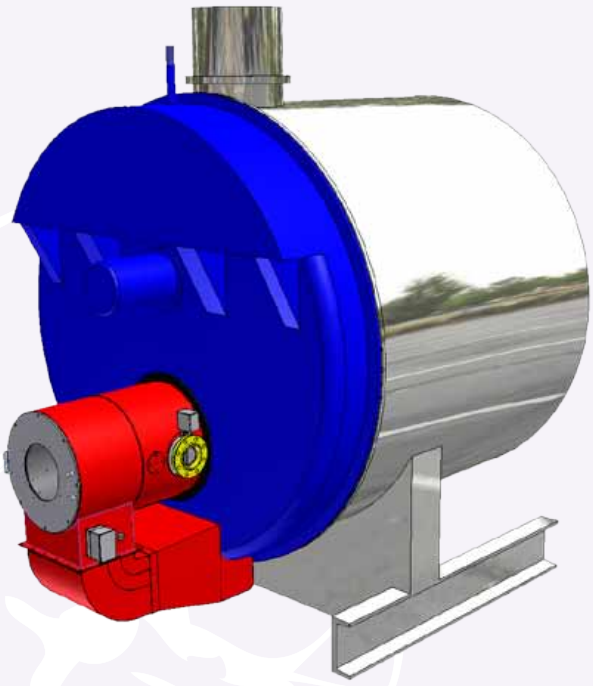
Retrofit package

Limpsfield's engineered solutions enables all burners to be fitted to both new boilers as well as being retro fitted to existing boilers allowing fuel savings to be made by replacing an existing burner with this high efficiency burner.

The construction of the Limpsfield burner allows it to be easily retro fitted to the Cleaver Brooks boiler. A transitional duct is sized and designed to transfer combustion air using the original boiler front door fan impeller and motor assembly. Typical turndown rations of 5:1 and 6:1 on gas firing with O_2 levels less than 3% throughout the firing range make this retro fit have a very quick and realistic return on investment. Many customers have realised savings of over 10% when retro fitting their existing burner with a Limpsfield burner.

At a major Semiconductor manufacturer in Texas, USA further saving were made by data linking all burner controllers and sequencing the boilers. With the reliability of the Limpsfield burners and the gained confidence from the site operators, only one burner/boiler fires at any one time with the other two boilers in a warming status ready to produce steam when the demand dictates. Previously all three boilers would be in operation all the time as the boiler house operators did not have the confidence to leave only one boiler dealing with the demand as they had experienced many start up failures in the past.

Cleaver Brooks retrofit installation



3D Cleaver Brooks conversion

Applications

Limpsfield will engineer a project to suit the requirements whether it is single fuel, dual fuel, multi fuel, change over on the fly between fuels or burning waste stream fuels. The burner can be supplied as a low NOx burner for both gas and oils.

We have carried out many applications to suit our customers requirements and have extensive experience in firing many fuels in a wide range of applications including fire tube boilers, water tube boilers, kilns and dryers.

A selection of successful applications have been listed below;

- Change over on the fly between fuels (no boiler down time between fuel change over)
- Multi fuel firing
- Burning waste stream fuels
- Combined firing of waste stream fuels with a primary fuel
- Six fuels through one burner with out hardware changes
- We also offer a steam or air atomizing oil lance assembly
- Hydrogen
- Propane
- No6 oil with or without Low NOx
- No4 oil with or without Low NOx
- Methanol
- Isopropanol
- Toluene
- Bio Gas
- Bio Gas / Natural gas blends
- Tallow

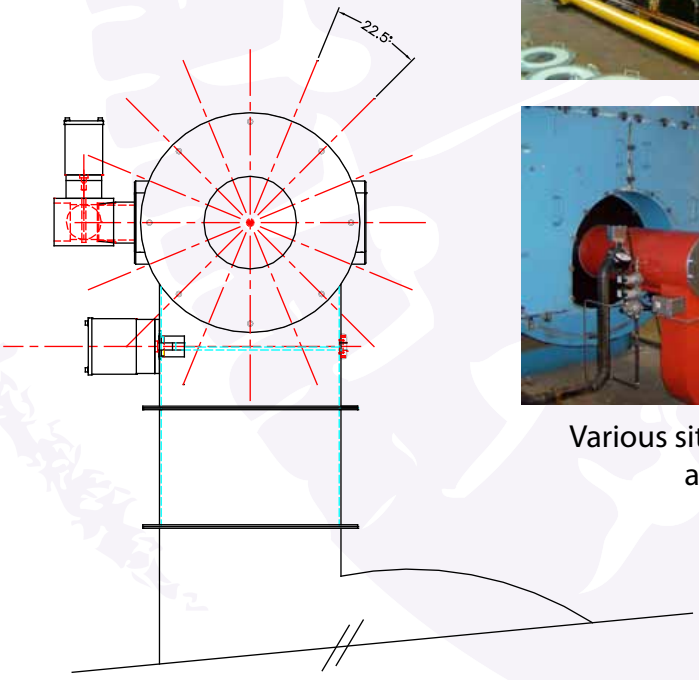
We have engineered projects for many more fuels
Limpsfield offers a total engineered solution to meet the site application and specification with high performance and reduced O_2 levels. Contact us for more information.

Combustion Air Control

Combustion air is delivered via a remote or directly mounted medium volume high pressure fan. The fan has a direct coupled, backward curved impeller, and can be supplied with a flange mounted silencer. The air damper blades are operated using fully enclosed bearing assemblies, this allows hysterisis free operation with infinite repeatability.

The Limpsfield burner is supplied as standard with a split housing which allows the air inlet duct to be rotated 360 degrees in increments of 22.5 degrees, independent of the gas inlets illustrated in the drawings. This feature allows flexibility as to the position of the blower relative to the burner, which may be governed by specific site constraints. Installation arrangements are limitless. However, for arrangements not shown please contact the factory for consultation in proper air duct design. It is recommended that the pressure drop in the air duct between the outlet of the blower and inlet to the burner be no more than ½"WC.

To properly engineer and ensure job performance, Limpsfield combustion utilizes a vast array of fan types/sizes from several manufacturers. This allows for proper air delivery in both volume and pressure for installations of high altitude, elevated furnace pressures and varying ambient conditions which affect fan performance. Thus, blower arrangement is dependant upon jobsite conditions, which must be known at the time of placing the order.



Showing possible angles of rotation of air inlet

Various sites with different combustion air inlet requirements.

Combustion Control

Limpsfield offers its users control panels to accompany the burners. These are designed and built around advanced combustion control equipment which will further enhance the reliability and performance of the LC burner.

A range of products are available, from a stand alone micro modulation unit, to exhaust gas analysers with combustion trim functions, water level monitoring, variable speed drives and boiler sequencing packages.

In addition, panel design and specification can be tailored to the end user's specific requirements.

All panels are UL approved and built in an ISO9001 environment.

Touch screen Mk7 E.G.A

Control panel for a 5 burner application

LCN123 Burner on Johnston boiler

Burner Turndown

Limpsfield burners provide high turndowns typically between 4:1 and 10:1. This turn down is established by using a split gas head or a spider head. The split gas head can be used on most applications and provides excellent mixing to maintain good combustion throughout the firing range.

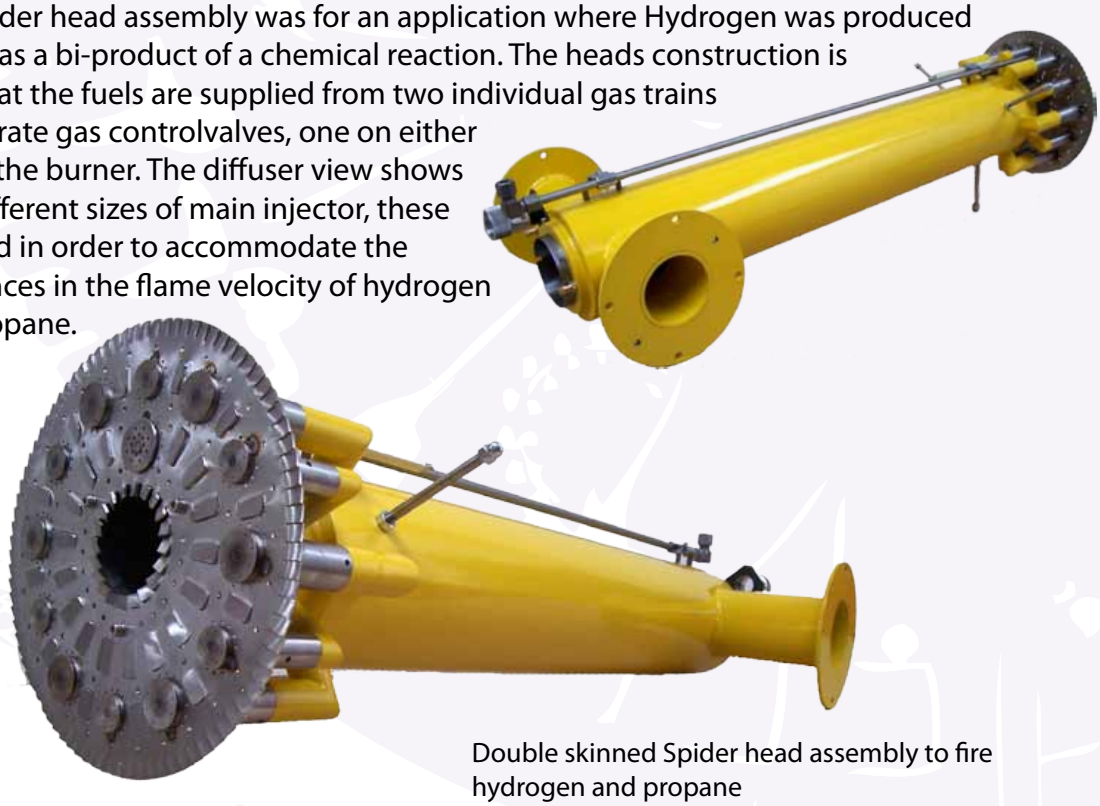
Split head assembly

The unique spider head assembly offers the user high turn down ratios. It was initially designed to be fired when using fuels with high burning velocities such as Propane or Hydrogen. Unlike the split head, the fuel is introduced after the diffuser plate enabling the flame to establish good retention whilst maintaining excellent mixing.

Limpsfield will design and engineer the correct solution to suit your application.

An example of Limpsfield's in-depth engineering capabilities;

This spider head assembly was for an application where Hydrogen was produced on-site as a bi-product of a chemical reaction. The heads construction is such that the fuels are supplied from two individual gas trains to separate gas controlvalves, one on either side of the burner. The diffuser view shows two different sizes of main injector, these are used in order to accommodate the differences in the flame velocity of hydrogen and propane.



Double skinned Spider head assembly to fire hydrogen and propane

Emissions

Limpsfield burners have been designed to ensure minimal emissions are released into the atmosphere. This means less harmful emissions are created, but also means greater efficiency of the burner due to good combustion which in turn creates great fuel savings. Typically Limpsfield burners operate at <3% O_2 and <10ppm of CO. These figures continue throughout the firing range, from low fire to high fire.

Low NOx Capabilities

All burners are capable of meeting tough US federal codes regarding low NOx emissions. Numerous installations of this nature have been carried out with excellent results.

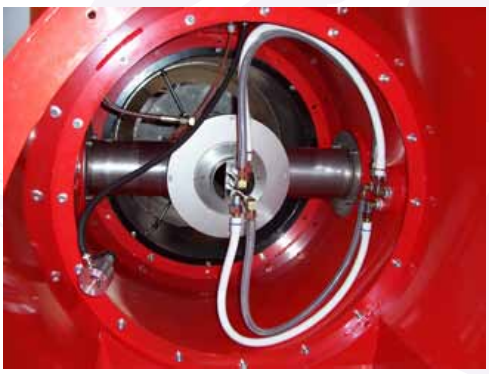
We believe that in order to meet local codes for low NOx requirements, efficiency should not be compromised; therefore our burners have been designed to operate at sub 30 ppm while operating at 3% O_2 or lower throughout the firing range. This is due to the utilisation of flue gas re-circulation and the superior flame retention and mixing achievable from the Limpsfield design.

Low NOx can be achieved by using 'Flue Gas Recirculation'. This is done by using one of two methods either forced FGR or induced FGR depending on application. FGR is accomplished by forcing the flue gases with a separate fan back into the combustion zone (forced FGR), or by drawing the flue gases through the combustion air fan (induced FGR). Both methods reduce the bulk flame temperature in the furnace to inhibit the chemical reaction between the nitrogen and oxygen. FGR systems reduce NOx emissions without reducing efficiency.

Tailor-made FGR stainless steel burner

Typical Low Nox emissions

Stainless steel FGR connections inside burner



Low Nox Flame

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Specification

Burner Model Number		9	15	21	36	44	53	62	73	88	100	123	150	175	200	263	310
	Units																
Burner Rating	Mmbtu	3	5	7	12.3	15	18	21	25	30	35	42	50	60	70	90	110
	MW	0.9	1.5	2.1	3.6	4.4	5.3	6.2	7.3	8.8	10	12.3	15	17.5	20	26.3	31
Air at 15% Excess	Cuft/hr	33,465	55,775	78,085	137,206	167,325	200,790	234,255	278,875	334,650	390,425	468,510	557,750	669,300	780,850	1,003,950	1,227,050
Air + FGR @62.9°C / 145.22°F	Cuft/hr	41,831	69,718	97,606	171,507	209,156	250,987	292,818	348,593	418,312	488,031	585,637	697,187	836,625	976,062	1,254,937	1,533,812
No.2 Oil input rate (137,080 btu/gal)	GPH	21.88	36.47	51.06	89.72	109.43	131.31	153.19	183.38	218.85	255.33	306.39	364.75	437.7	510.65	656.55	802.45
Gas input rate (1000 btu/cuft)	Cuft/hr	3,000	5,000	7,000	12,300	15,000	18,000	21,000	25,000	30,000	35,000	42,000	50,000	60,000	70,000	90,000	110,000
Minimum Pilot pressure	"WG	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Delta P Air	"WG	7	10	11	12	12	12	12	12	12	12	12	12	12	12	12	12
	mbar	17.4	24.9	27.4	29.88	29.88	29.88	29.88	29.88	29.88	29.88	29.88	29.88	29.88	29.88	29.88	29.88
Delta P Air + FGR	"WC	N/A	N/A	16.5	18	18	18	18	18	18	18	18	18	18	18	18	18
	mbar	N/A	N/A	41	44.8	44.8	44.8	44.8	44.8	44.8	44.8	44.8	44.8	44.8	44.8	44.8	44.8
Blast tube O.D	mm	176	189	254	299	314	361	386	417	456	490	540	582	638	687	775.5	852
	Inches	6.92	7.44	10	11.77	12.36	14.21	15.19	16.41	17.95	19.29	21.25	22.91	25.11	27.04	30.53	33.53
Gas Inlet	NPT	2"	2"	2.5"	2.5"	2.5"	3"	3"	4"	4"	4"	6"	6"	6"	6"	8"	8"
	lb	-	-	150lb	150lb	150lb	150lb	150lb	150lb	150lb	150lb	150lb	150lb	150lb	150lb	150lb	150lb
Mounting P.C.D	mm	240	240	355	355	355	440	440	570	570	570	785	785	785	785	998.5	998.5
	Inches	9.45	9.45	13.97	13.97	13.97	17.32	17.32	22.44	22.44	22.44	30.9	30.9	30.9	30.9	39.31	39.31
Mounting hole Ø	mm	8.5	8.5	10.5	10.5	10.5	10.5	10.5	17	17	17	14	14	14	14	21	21
	Inches	0.33	0.33	0.41	0.41	0.41	0.41	0.41	0.67	0.67	0.67	0.55	0.55	0.55	0.55	0.82	0.82
Quantity of mounting holes		4	4	8	8	8	8	8	8	8	8	12	12	12	12	8	8

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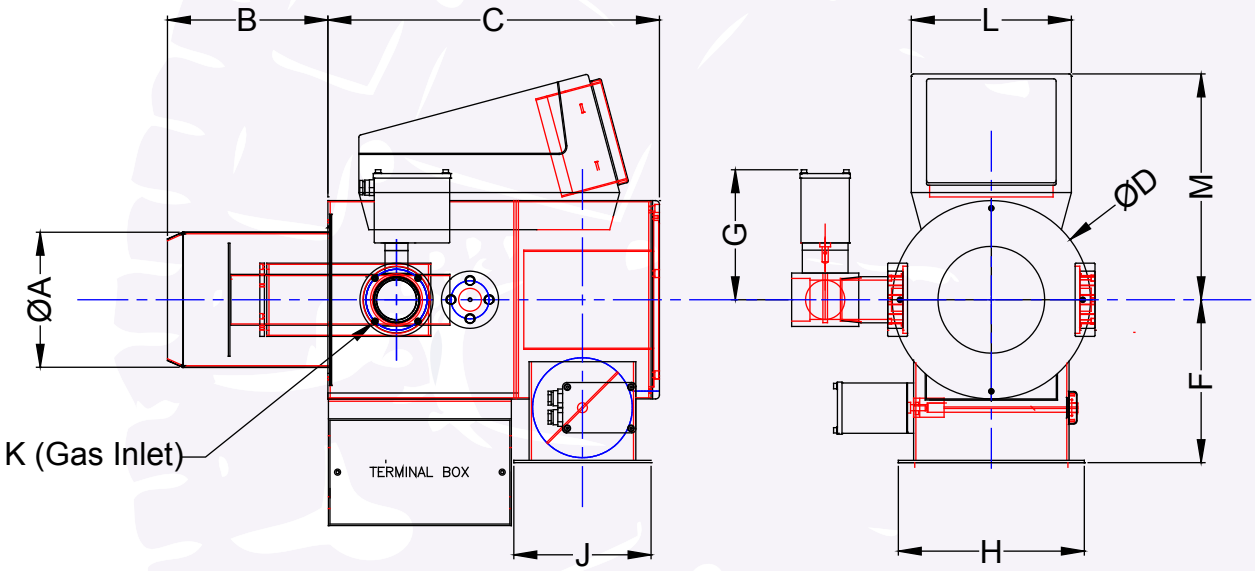
Package burner

Limpsfield have launched a new package burner range. This consists of the smaller Lc9 (P) and goes through to the Lc62 (P) with outputs ranging from 3MBtu (0.9MW) to 21MBtu (6.2MW). In this range the burner is supplied with a pre-mounted digital control panel. The control panel supplied by Autoflame allows the user to commission and alter the combustion firing process quickly and easily. The control system is pre wired into the housing, reducing onsite installation time. The burners can be supplied as gas only, oil only or as dual fuel.

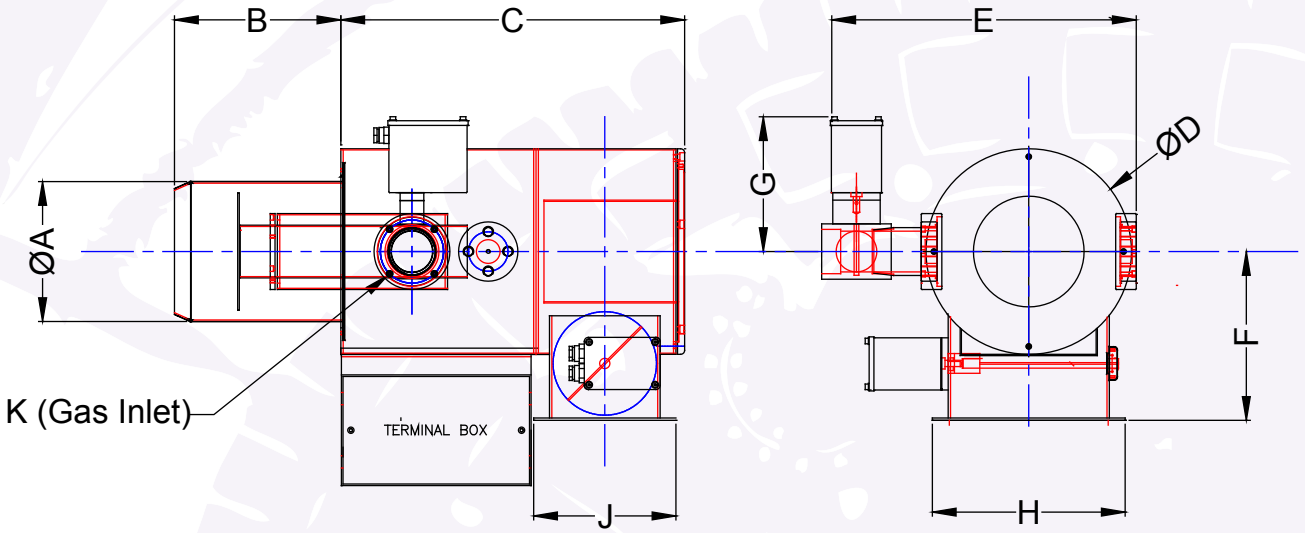
LC9/15 package burner shown



Burner Model Number	Burner Rating (Mmbtu)	(MW)	A	B	C	D	F	G	H	J	K	L	M
All dimension in mm and (inches) unless stated otherwise													
9 (P)	3	0.9	177 (6.97)	210 (8.27)	435 (17.13)	260 (10.24)	394 (15.51)	170 (6.69)	244 (9.60)	180 (7.09)	2" NPT	210 (8.27)	296 (11.65)
15 (P)	5	1.5	189 (7.44)	210 (8.27)	435 (17.13)	260 (10.24)	394 (15.51)	170 (6.69)	244 (9.60)	180 (7.09)	2" NPT	210 (8.27)	296 (11.65)
21 (P)	7	2.1	259 (10.19)	406 (15.98)	642 (25.28)	385 (15.16)	455 (17.91)	170 (6.69)	362 (14.25)	242 (9.53)	2.5" 150lb	210 (8.27)	359 (14.13)
36 (P)	12.3	3.6	299 (11.77)	408 (16.06)	642 (25.28)	385 (15.16)	455 (17.91)	170 (6.69)	362 (14.25)	242 (9.53)	2.5" 150lb	210 (8.27)	359 (14.13)
44 (P)	15	4.4	316 (12.44)	408 (16.06)	642 (25.28)	385 (15.16)	455 (17.91)	170 (6.69)	362 (14.25)	262 (10.31)	150lb	210 (8.27)	359 (14.13)
53 (P)	18	5.3	285 (11.22)	428 (16.85)	703 (27.68)	480 (18.90)	572 (22.52)	240 (9.45)	430 (16.93)	298 (11.73)	150lb	210 (8.27)	406 (15.98)
62 (P)	21	6.2	386 (15.19)	464 (18.27)	703 (27.68)	480 (18.90)	572 (22.52)	240 (9.45)	430 (16.93)	298 (11.73)	150lb	210 (8.27)	406 (15.98)

Technical Data

- Burner Dimensions



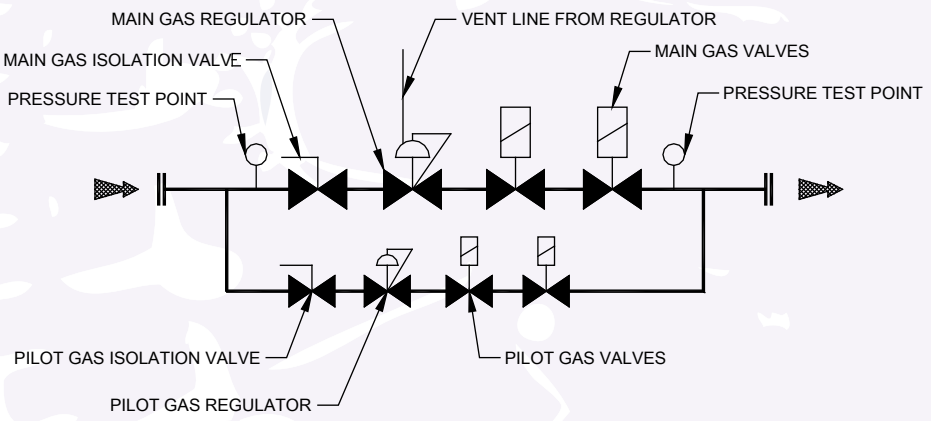
Burner Model Number	A	B	C	D	E	F	G	H	J	K
All dimension in mm and (inches) unless stated otherwise										
9	177 (6.97)	210 (8.27)	435 (17.13)	260 (10.24)	394 (15.51)	212 (8.35)	170 (6.69)	244 (9.60)	180 (7.09)	2" NPT
15	189 (7.44)	210 (8.27)	435 (17.13)	260 (10.24)	394 (15.51)	212 (8.35)	170 (6.69)	244 (9.60)	180 (7.09)	2" NPT
21	259 (10.19)	406 (15.98)	642 (25.28)	385 (15.16)	455 (17.91)	311 (12.24)	170 (6.69)	362 (14.25)	242 (9.53)	2.5" 150lb
36	299 (11.77)	408 (16.06)	642 (25.28)	385 (15.16)	455 (17.91)	311 (12.24)	170 (6.69)	362 (14.25)	242 (9.53)	2.5" 150lb
44	316 (12.44)	408 (16.06)	642 (25.28)	385 (15.16)	455 (17.91)	311 (12.24)	170 (6.69)	362 (14.25)	262 (10.31)	2.5" 150lb
53	285 (11.22)	428 (16.85)	703 (27.68)	480 (18.90)	572 (22.52)	347 (13.66)	240 (9.45)	430 (16.93)	298 (11.73)	3" 150lb
62	386 (15.19)	464 (18.27)	703 (27.68)	480 (18.90)	572 (22.52)	347 (13.66)	240 (9.45)	430 (16.93)	298 (11.73)	3" 150lb
73	412 (16.22)	556 (21.89)	814 (32.05)	630 (24.80)	721 (28.39)	460 (18.11)	253 (9.96)	550 (21.65)	396 (15.59)	4" 150lb
88	456 (17.95)	575 (22.64)	814 (32.05)	630 (24.80)	721 (28.39)	460 (18.11)	253 (9.96)	550 (21.65)	396 (15.59)	4" 150lb
100	490 (19.29)	595 (23.43)	814 (32.05)	630 (24.80)	721 (28.39)	460 (18.11)	253 (9.96)	550 (21.65)	396 (15.59)	4" 150lb
123	540 (21.26)	726 (28.58)	1205 (47.44)	838 (33.00)	942 (37.09)	561 (22.09)	264 (10.39)	721 (28.39)	594 (23.39)	6" 150lb
150	582 (22.91)	766 (30.16)	1205 (47.44)	838 (33.00)	942 (37.09)	561 (22.09)	264 (10.39)	721 (28.39)	594 (23.39)	6" 150lb
175	638 (25.12)	783 (30.83)	1205 (47.44)	838 (33.00)	942 (37.09)	561 (22.09)	264 (10.39)	721 (28.39)	594 (23.39)	6" 150lb
200	699 (27.52)	809 (31.85)	1205 (47.44)	838 (33.00)	942 (37.09)	561 (22.09)	264 (10.39)	721 (28.39)	594 (23.39)	6" 150lb
263	776 (30.55)	986 (38.81)	1608 (63.31)	1055 (41.54)	1187 (46.73)	731 (28.78)	314.8 (12.39)	893 (35.17)	710 (27.95)	8" 150lb
310	864 (34.02)	1035 (40.75)	1608 (63.31)	1055 (41.54)	1187 (46.73)	731 (28.78)	314.8 (12.39)	893 (35.17)	710 (27.95)	8" 150lb

Technical Data

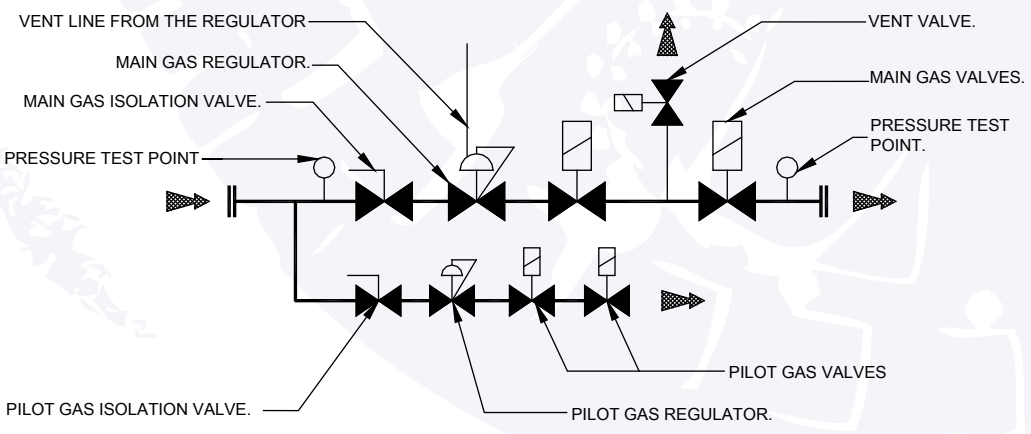
- Gas Trains

Burner Model Number	Gas input rate		Minimum Pilot pressure		Typical gas train size		Typical valve manufacturer
Units	(1000 btu/cuft)	MW	"WG	mbar	Inches	mm	
9	3,000	0.9	8	20	2"	50.8	Dungs
15	5,000	1.5	8	20	2"	50.8	Dungs
21	7,000	2.1	12	30	2"	50.8	Dungs
36	12,300	3.6	12	30	2.5"	63.5	Dungs
44	15,000	4.4	12	30	2.5"	63.5	Dungs
53	18,000	5.3	12	30	3"	76.2	Dungs
62	21,000	6.2	12	30	3"	76.2	Dungs
73	25,000	7.3	12	30	4"	101.6	Dungs
88	30,000	8.8	12	30	4"	101.6	Dungs
100	35,000	10	12	30	4"	101.6	Dungs
123	42,000	12.3	12	30	5"	127	Dungs
150	50,000	15	12	30	TBA	TBA	TBA
175	60,000	17.5	12	30	TBA	TBA	TBA
200	70,000	20	12	30	TBA	TBA	TBA
263	90,000	26.3	12	30	TBA	TBA	TBA
310	110,000	31	12	30	TBA	TBA	TBA

Note: All gas train sizes shown are typical sizes as site pressures and applications may vary. This may result in a change in selection to meet the volume flow requirements of the application to obtain full input into the boiler. These gas control trains are typically sized at the time of quoting assuming the correct pressures and volumes are supplied on the engineering form. For more information please contact us.



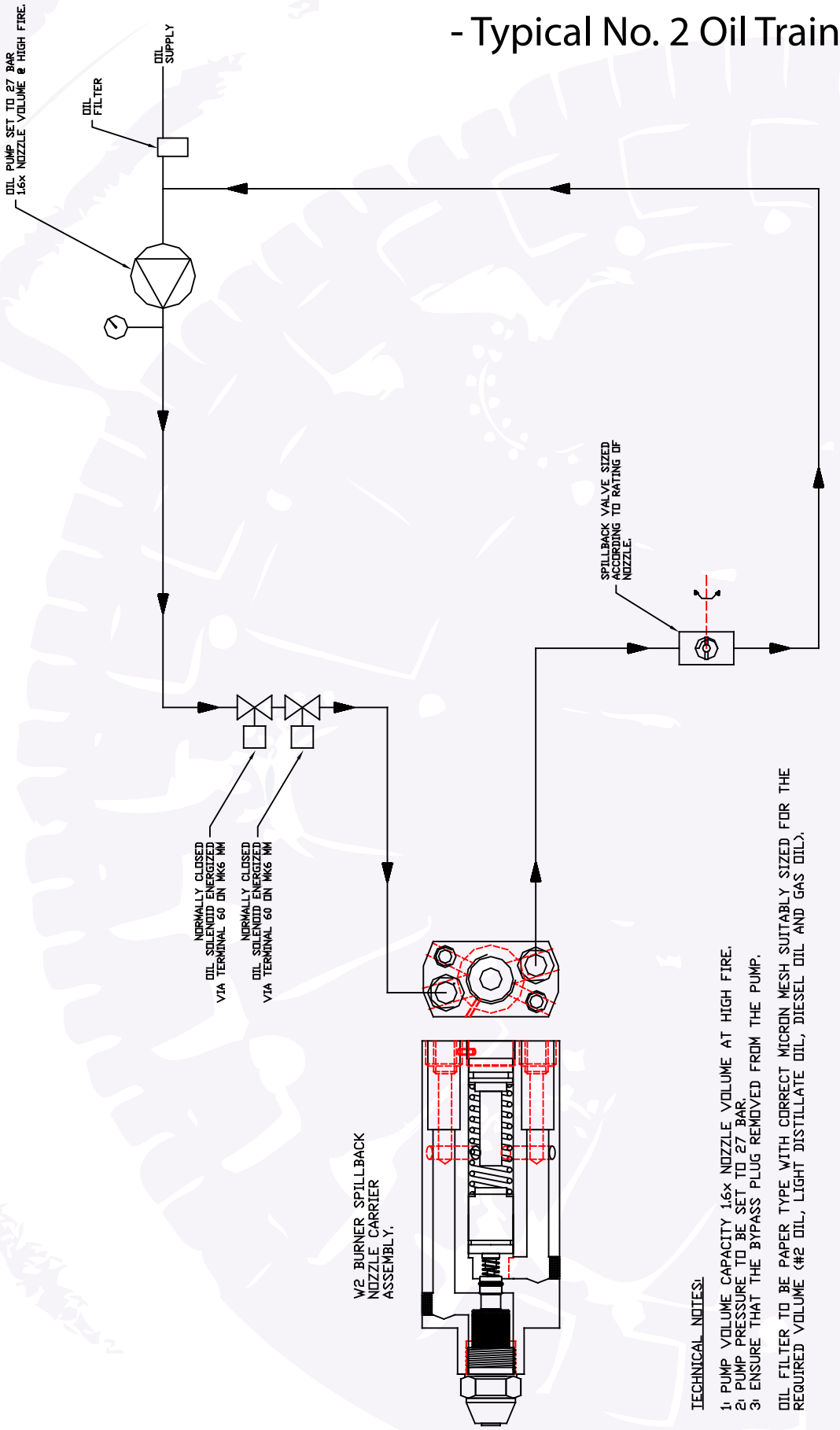
Schematic of a typical gas train (Lc9-15)



Schematic of a typical gas train (Lc21- 310)

Technical Data

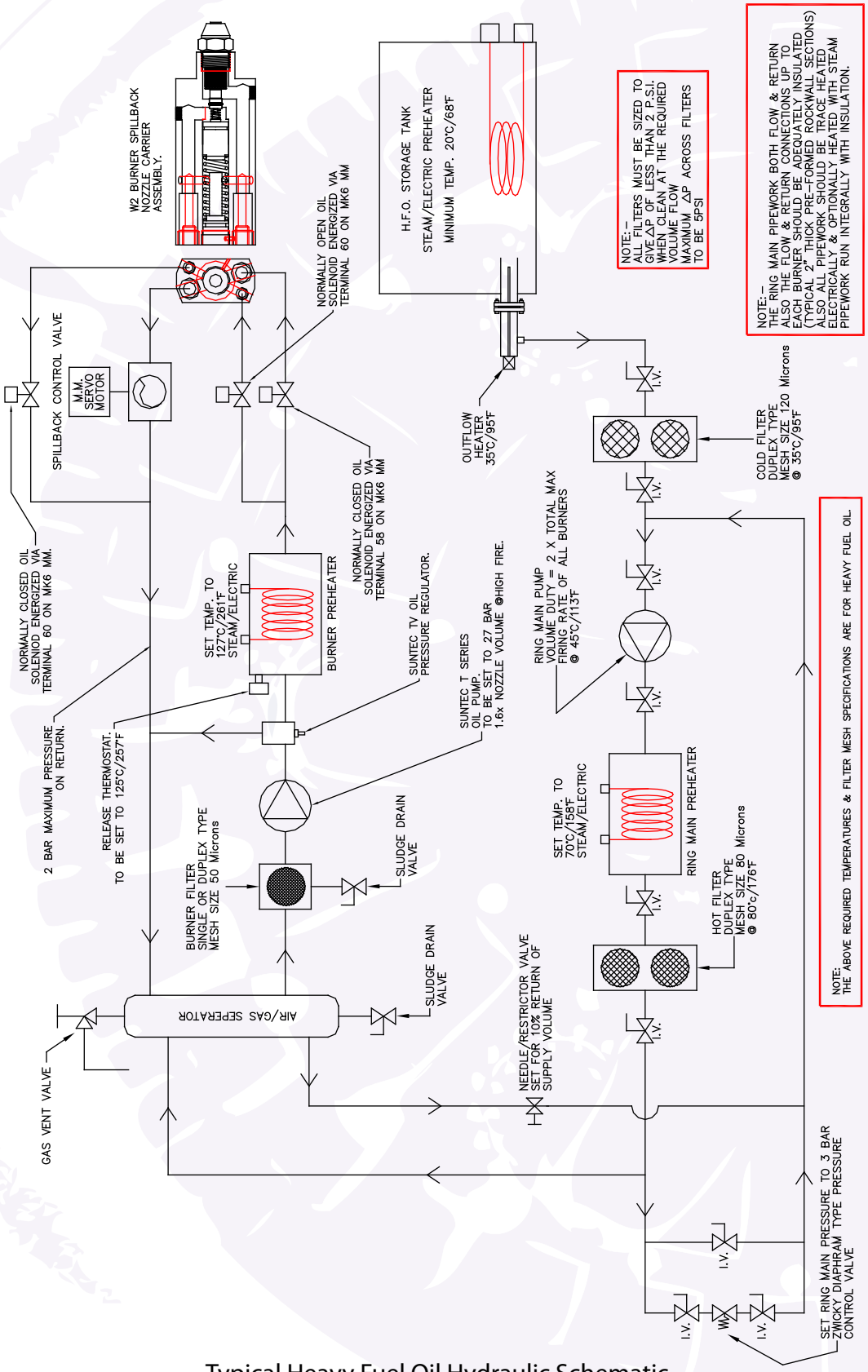
- Typical No. 2 Oil Train



Typical Light Fuel Oil Hydraulic Schematic

Technical Data

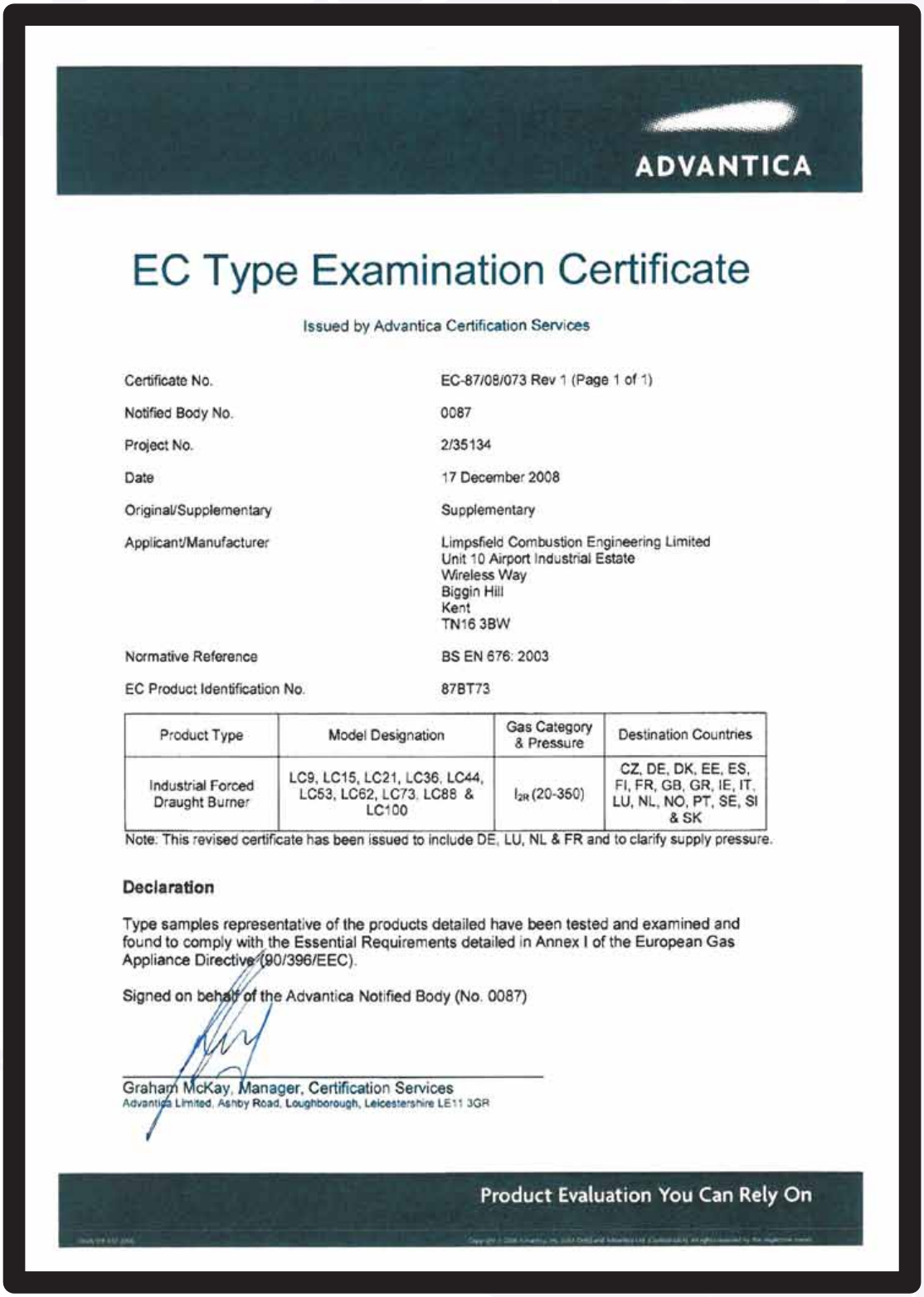
- Typical No. 6 Oil Train



Typical Heavy Fuel Oil Hydraulic Schematic

Approvals CE

In 2008 Limpsfield gained their CE BS EN 676 Certificate for the design, build and testing of the burner range. Limpsfield Combustion Engineering Limited is continuing to design and test new products, offering the combustion industry world beating products. This is achieved by enthusiastic and talented individuals working collectively as a team, this along with good sound investment by the owners of Limpsfield allow us to progress our products and people with confidence into the future.



ADVANTICA

EC Type Examination Certificate

Issued by Advantica Certification Services

Certificate No.	EC-87/08/073 Rev 1 (Page 1 of 1)
Notified Body No.	0087
Project No.	2/35134
Date	17 December 2008
Original/Supplementary	Supplementary
Applicant/Manufacturer	Limpsfield Combustion Engineering Limited Unit 10 Airport Industrial Estate Wireless Way Biggin Hill Kent TN16 3BW
Normative Reference	BS EN 676: 2003
EC Product Identification No.	87BT73

Product Type	Model Designation	Gas Category & Pressure	Destination Countries
Industrial Forced Draught Burner	LC9, LC15, LC21, LC36, LC44, LC53, LC62, LC73, LC88 & LC100	I_{2R} (20-350)	CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, NL, NO, PT, SE, SI & SK

Note: This revised certificate has been issued to include DE, LU, NL & FR and to clarify supply pressure.

Declaration

Type samples representative of the products detailed have been tested and examined and found to comply with the Essential Requirements detailed in Annex I of the European Gas Appliance Directive (90/396/EEC).

Signed on behalf of the Advantica Notified Body (No. 0087)

Graham McKay, Manager, Certification Services
Advantica Limited, Ashby Road, Loughborough, Leicestershire LE11 3GR

Product Evaluation You Can Rely On

Approvals

In 2007 Limpsfield gained their UL Certificate for the design, build and testing of the complete burner range.

Underwriters Laboratories Inc.®

File MP4134 Vol 1 Issued: 2007-06-27
Revised: 2007-06-28

FOLLOW-UP SERVICE PROCEDURE
(TYPE L)

GAS-OIL BURNERS
(KYKR)
****
Complementary Product Category
COMMERCIAL/INDUSTRIAL GAS BURNERS
(KXWT)
OIL BURNERS
(KYXZ)

Manufacturer: (100116-266) LIMPSFIELD ENGINEERING UNIT
UNIT 10 AIRPORT INDUSTRIAL ESTATE
WIRELESS WAY
KENT
TN16 3BW UNITED KINGDOM

Applicant: (100116-266) SAME AS MANUFACTURER

Listee: (100116-266) SAME AS MANUFACTURER

This Procedure authorizes the above manufacturer to use the marking specified by Underwriters Laboratories Inc.(UL), or any authorized licensee of UL, only on products covered by this Procedure, in accordance with the applicable UL Services Agreement.

The prescribed Mark or Marking shall be used only at the above manufacturing location on such products which comply with this Procedure and any other applicable requirements.

The Procedure contains information for the use of the above named Manufacturer and representatives of Underwriters Laboratories Inc. and is not to be used for any other purpose. It is lent to the Manufacturer with the understanding that it is not to be copied, either wholly or in part, and that it will be returned to Underwriters Laboratories Inc. (UL) or any authorized licensee of UL, upon request.

This PROCEDURE, and any subsequent revision, is the property of Underwriters Laboratories Inc.(UL) and the authorized licensee of UL and is not transferable.

Underwriters Laboratories Inc.

Stephen Hewson
Senior Vice President
Global Follow-Up Service Operations

William R. Carney
Director
North American Certification Program

An independent organization working for a safer world with integrity, precision and knowledge.

Approvals

In 2007 Limpsfield gained their ISO 9001:2001 International Quality Management Certificate.

ADVANTICA

Quality Management System Certificate

Issued by Advantica Certification Services

Certificate No.	QMS/07/002
Certification Body No.	079
Date	6th November 2007
Applicant	Limpsfield Combustion Engineering Ltd. Unit 10 Airport Industrial Estate Wireless Way Biggin Hill Kent TN16 3BW
Standard	BS EN ISO 9001:2000
Expiry Date	1st September 2010

Declaration

This is to certify that the Quality Management System has been assessed and registered by Advantica Certification Services for the scope of:

The design, manufacture & testing of gas & oil burners with associated valves, enclosures and housings

Signed on behalf of Advantica

Graham McKay, Manager, Certification Services
Advantica Limited, Ashby Road, Loughborough, Leicestershire LE11 3GR

UKAS QUALITY MANAGEMENT 079

Product Evaluation You Can Rely On

Limpsfield

Rep:

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UKAS QUALITY MANAGEMENT

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