

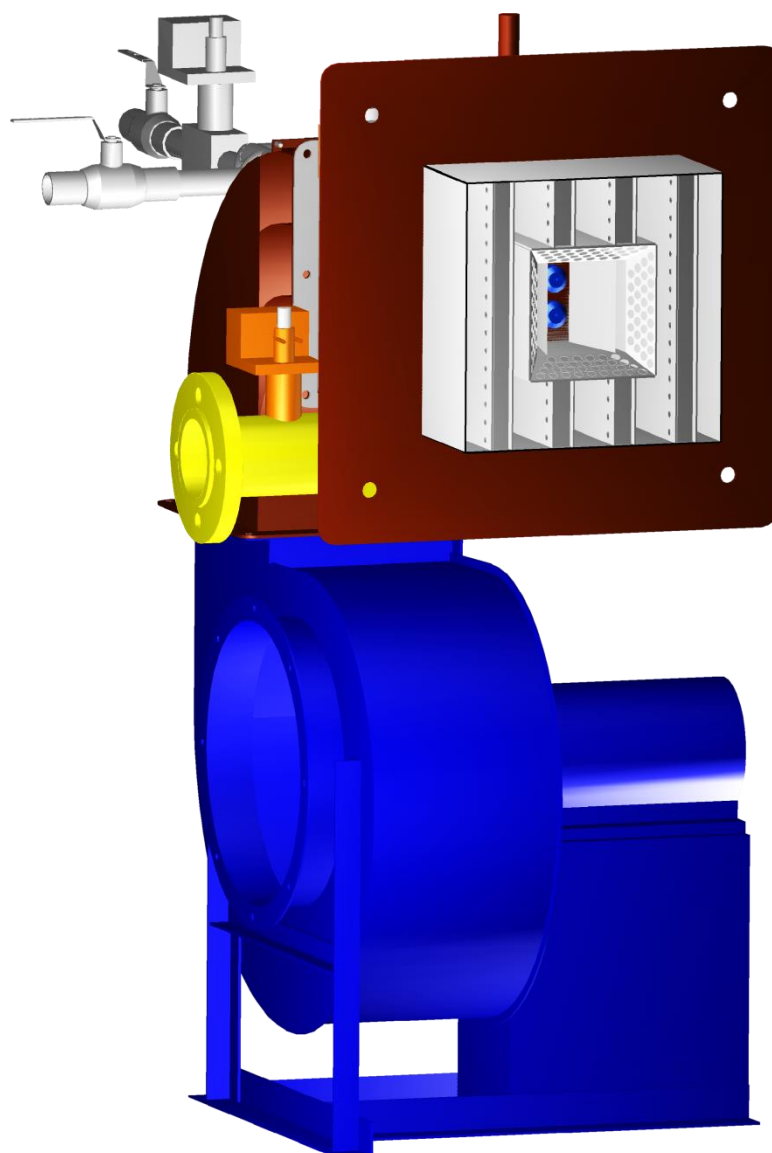
Operations and Maintenance Manual for

**INDUSTRIAL MICRODIFFUSION DUAL-FUEL BURNERS**

***Models MD-25-OG...MD-7500-OG***

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*December 2012*



# Table of Contents

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<b>INTRODUCTION .....</b>	<b>3</b>
Disclaimer.....	3
Audience.....	3
Overview.....	3
<b>SAFETY.....</b>	<b>4</b>
<b>MD BURNERS OVERVIEW .....</b>	<b>5</b>
Description.....	5
Manufacturing Materials .....	6
Markings .....	6
Specifications .....	7
Burner selection.....	7
Flame length and combustion chamber dimensions.....	8
Product Label .....	8
Dimensions.....	9
Installation .....	10
Installation Options .....	11
Optional equipment .....	11
<b>APPENDIX.....</b>	<b>12</b>
Appendix #1 – Order Burner Form .....	12

# ***INTRODUCTION***

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## **DISCLAIMER**

In accordance with the manufacturer's policy of continual product improvement, the product presented in this brochure is subject to change without notice and obligation.

Periflame warrants that these burners do not infringe upon any United States patents.

## **AUDIENCE**

This manual is written for specialists who are already familiar with all aspects (selection, use, maintenance) of operation of gas burners and fuel-firing equipment (furnaces, boilers, air heaters, etc.). The personnel working with these burners should have corresponding qualification. Specialists must know general principles of usage and maintenance of gas burners.

## **OVERVIEW**

This manual describes in detail specifications, installation instructions and usage cases for PeriFlame Burners. PeriFlame offers a variety of industrial burners for industrial heating applications. Periflame's products, designed by our experienced Engineering Department, reflect our commitment to excellence. We design and optimize our burners and combustion chambers to meet our clients' requirements and we guarantee exceptional results. Our customer-oriented approach and state-of-the-art technology make PeriFlame an attractive, innovative solution.

# SAFETY

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This manual is written for specialists who are already familiar with all aspects (selection, use, maintenance) of operation of gas burners and fuel-firing equipment (furnaces, boilers, air heaters, etc.). The personnel working with these burners must have all corresponding qualification. It is assumed that specialists know general principles of gas burner implementation, operation, usage and maintenance.

Legend:



**DANGER**



**WARNING**

You must know the meaning and importance of all safety symbols



**DANGER**

All fuel burning devices are capable of producing fire and explosions when improperly applied, installed, adjusted, controlled and maintained.

The probability of depressurization of fuel train system always exists.

For normal operation burner needs a pressure difference. Pressure difference can be provided by a blower or other configurations. The probability of malfunction of pressure difference system always exists.



**DANGER**

Do not bypass any safety features. Bypassing safety features can cause Fire and explosion.

## **For your safety**

For your safety, our burners can have a minimal inlet gas (fuel) pressure and any required air pressure difference.



**WARNING**

Burner parts might be hot during operation. Always use appropriate caution when approaching the burner.

## **For your safety**

Adjustment and maintenance of burners (mechanical and electrical parts) must be administered by qualified personnel that are experienced in combustion equipment.

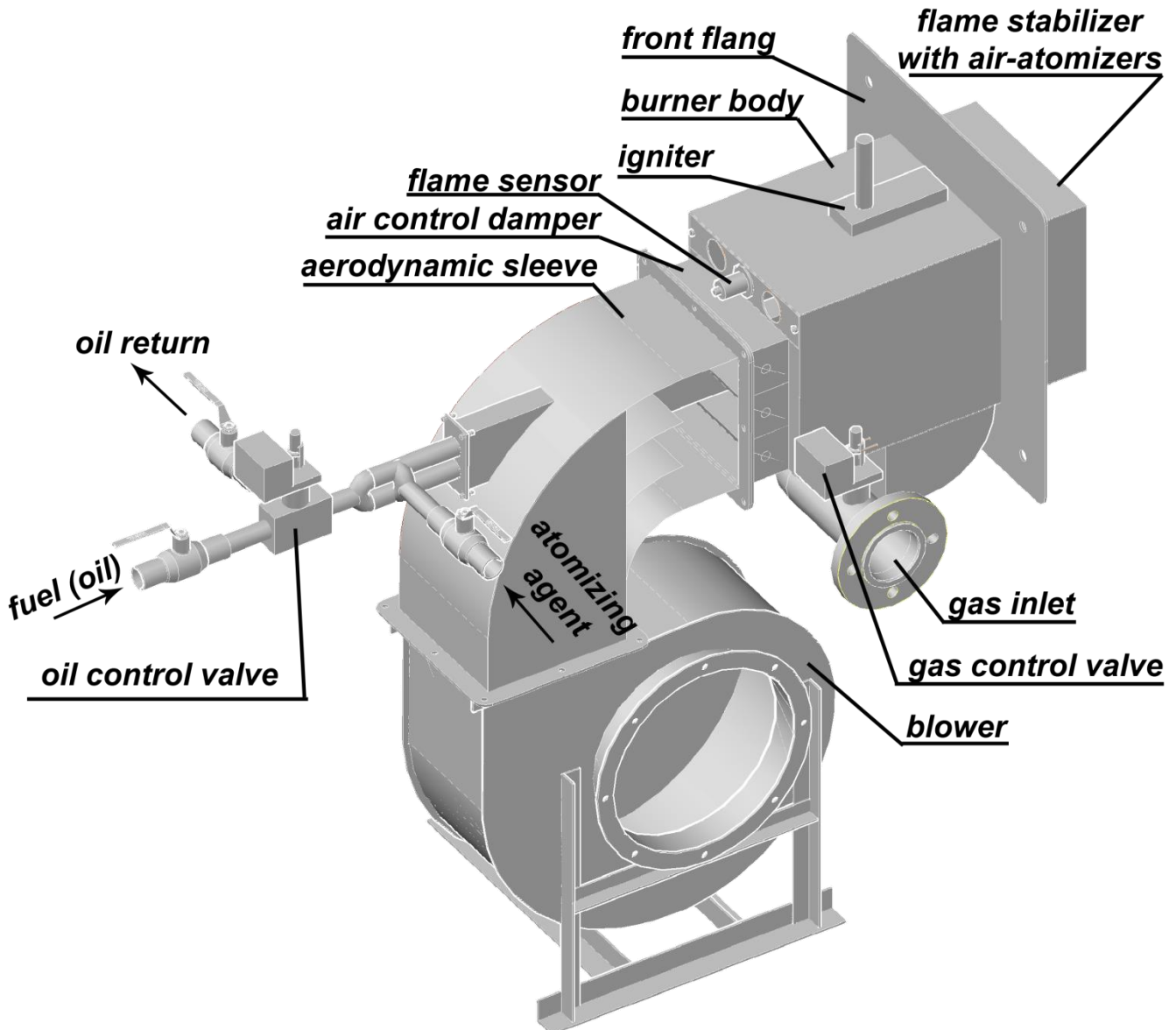
Continuous retraining of operators must be administered to ensure a high degree of proficiency.

## **For additional information**

P.O. BOX 9704 Arlington VA, 22219, USA

# MD BURNERS OVERVIEW

## DESCRIPTION



Pic. 1 – Dual burner MD-OG with blower or aerodynamic sleeve.

- MD-OG burners are intended to fire any gaseous fuels and heavy or light oil with various oxidizing parameters inputs.
- MD-OG burners use patented flame-holder system with direct-flow microdiffusion stabilizers. Depending on capacity, the number of stabilizers range from 2 to 8. Stabilizers have internal gas allocation system and oil sprayer system with air-atomizers, which provides kinetic and diffusion combustion for gaseous fuel simultaneously and provides developed zone of reverse currents for oil-firing stabilization. In addition, burners utilize the most optimum assemblage of combustion parameters.

- MD-OG burners provide a stable flame over all capacity ranges (5–120 %) for gas and (25–120 %) for oil and at excess air factors from 0.8 up to 10. Absence of CO emission warrants at excess air factors from 1.03 to 1.70 for gas and from 1.10 to 1.70 for oil.
- Low NO<sub>x</sub> emission is accomplished due to entirely transparent gas flame and a patented method of microdiffusion combustion.
- Burners are available in 14 sizes, which operate over a range of 0.25MW to 75 MW. MD-OG burners are compatible with all types of ovens, boilers, vaporizers, dryers and heaters.
- Every burner is equipped with an electric igniter, main combustion gas control valve, oil control valve, and multi-blade air damper. Each control valve and damper has servomotor (110 V, three-point guidance) and position sensor (potentiometer with resistance 1k, 5k or required).
- The burner can be completed with an aerodynamic sleeve and/or air blower.

## MANUFACTURING MATERIALS

AISI 310 (1.4541) for burner parts with the flame and shielding. AISI 304 (1.4301) for other parts. Blower housing and burner sleeves are optional. Available in 100% stainless steel or in painted carbon steel.

## MARKING

- MD-1000-OG: natural gas and light oil burner of 12,5 MW (according to “*Specification*”) completed with an aerodynamic sleeve, an electric igniter, gas control valve, oil control valve, oil cock with an adjustable orifice and air control damper.
  - Each control valve and damper has servomotor (110 V, three-point guidance) and position sensor (potentiometer with resistance 1k or 5k or required).
- MD-1000-OG-H: natural gas and Heavy oil burner of 12,5 MW (according to “*Specification*”) completed with an aerodynamic sleeve, an electric igniter, gas control valve, oil control valve, oil cock with an adjustable orifice and air control damper.
- MD-1000-OG(propane) or MD-1000-OG(butane) or MD-1000-G(CH<sub>4</sub>-50%+H<sub>2</sub>-20%+CO<sub>2</sub>-30%) or MD-1000-G(H<sub>2</sub>-50%+C<sub>n</sub>H<sub>m</sub>-50%): denotes main gaseous fuel and light oil.
- MD-1000-OG-A500: the maximum preheat combustion air temperature is 500 F.
- MD-1000-OG-O(A-50%+O<sub>2</sub>-50%)500:the maximum preheat oxidizer (air-oxygen mixture) temperature is 500 F.
- MD-1000-OG-B: the burner has an air blower instead of an aerodynamic sleeve.
- MD-1000-G-S or MD-1000-G-L: the burner has Short or Long flame length respectively.

## SPECIFICATIONS

Specification	Value
Minimal excess air factor over capacity range gas/oil	1,02 / 1,10
Admissible increase of excess air factor over capacity range	0,6 or required
Natural gas inlet pressure diff., mbar	20; 50; 100; 200
Oil inlet pressure (light / heavy), bar	2,5 / 4,5
Atomizing air (steam) pressure (light / heavy), bar	2,5 / 4,5
Atomizing air (steam) flow rate (specific), m <sup>3</sup> /(hour·MW)	3 – 5
Combustion air pressure diff. at n=1,1, mbar	15
Air turndown (gas / oil)	1:10 / 1:4
Pilot capacity,%	3-5
Flame length, types (see the next paragraph)	short    normal    long
Expansion angle of a flame, °	30 – 40

Burner	Capacity range, MW	Burner cross-section (height x width), mm
MD-25-OG	0,07...0,3	95 x 95
MD-40-OG	0,15...0,6	104 x 104
MD-75-OG	0,2...1,0	144 x 144
MD-150-OG	0,3...1,5	164 x 164
MD-200-OG	0,4...2,2	196 x 196
MD-250-OG	0,6...3,2	244 x 248
MD-400-OG	0,9...5,2	300 x 300
MD-700-OG	1,4...8,5	337 x 338
MD-1000-OG	2,1...12,5	390 x 390
MD-1500-OG	2,4...16,0	470 x 470
MD-2000-OG	3,0...22,0	500 x 500
MD-2500-OG	4,5...32,0	548 x 526
MD-5000-OG	7,0...55,0	774 x 774
MD-7500-OG	10,0...75,0	990 x 990

## BURNER SELECTION

Burner selection instructions:

- capacity (see *Specifications* above)
- main and secondary fuel (based on project requirements)
- fuel pressure (select according to project requirements, see above)
- combustion chamber pressure measuring (based on equipment)
- oxidizer parameters and air feeding type (according to technological scheme)
- installation variant (we offer few variants, see below)
- additional NOx suppression system
- additional requirements
- FILL IN THE SELECTION FORM (Appendix #1).

## FLAME LENGTH AND COMBUSTION CHAMBER DIMENSIONS

MD burners can be assembled with various flame lengths: Short (S), Normal (N) or Long (L).

- Normal (N) flame length is recommended for most equipment types.
- Short (S) flame length maybe preferred for heat generators with compact combustors and similar equipment.
- Long (L) flame length may be preferred for kilns and similar equipment.

Flame length is given for natural gas at excess air factor 1,1:

Burner	Max. flame length, m			Min. eq. diameter of comb. chamber, m
	Short	Normal	Long	
MD-25-OG	0,2	0,4	-	0,4
MD-40-OG	0,3	0,6	-	
MD-75-OG	0,4	0,8	-	0,6
MD-150-OG	0,5	1,0	-	
MD-200-OG	0,6	1,5	-	0,9
MD-250-OG	0,7	1,8	-	
MD-400-OG	1	2,2	6,0	1,3
MD-700-OG	1,0	2,7	10,0	
MD-1000-OG	1,2	3,0	12,0	1,8
MD-1500-OG	1,5	3,4	12,0	
MD-2000-OG	-	4,0	15,0	2,2
MD-2500-OG	-	4,5	15,0	
MD-5000-OG	-	5,0	18,0	3,5
MD-7500-OG	-	5,5	18,0	

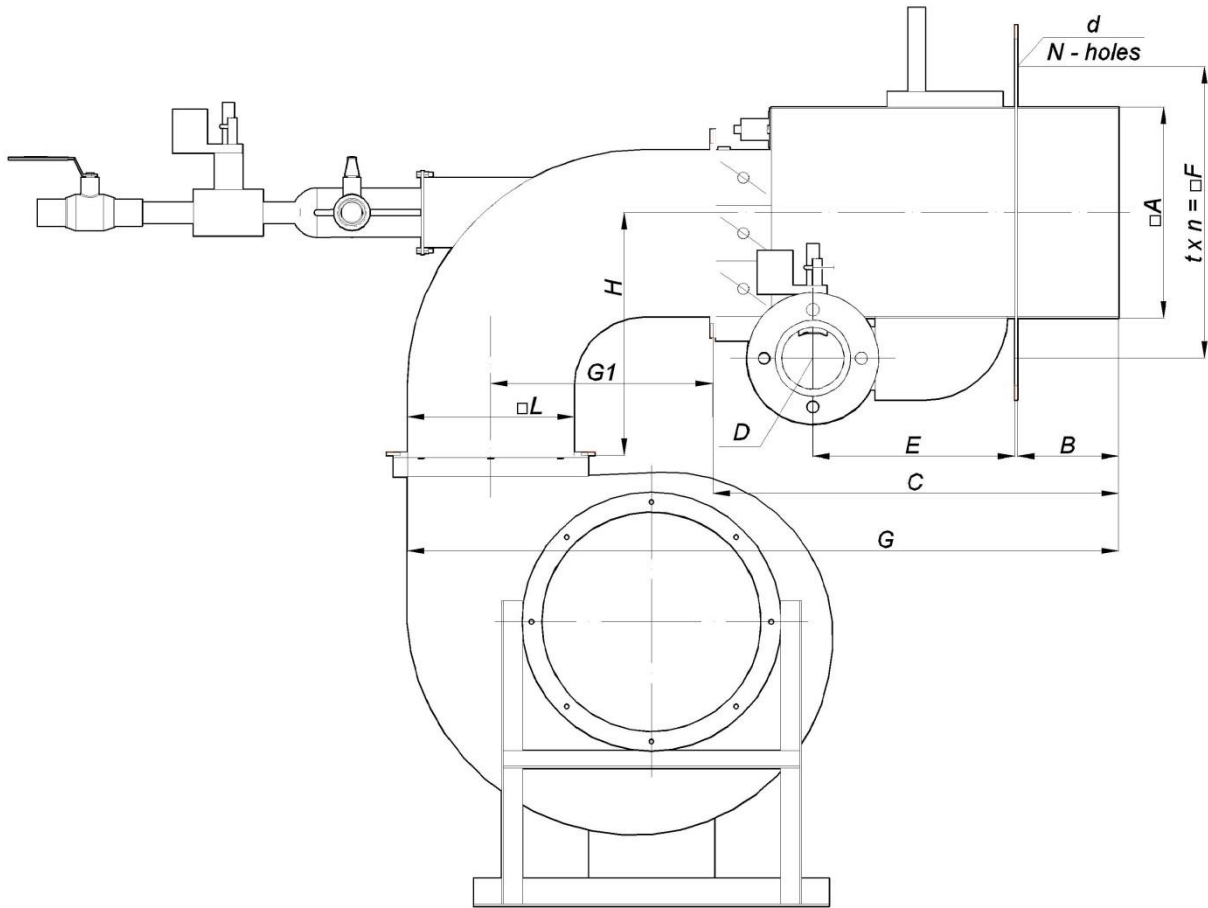
## PRODUCT LABEL

All PeriFlame burners come with a unique Serial Number for identification and tracking purposes.

<b>PeriFlame</b>		<a href="http://www.periflame.com">www.periflame.com</a>	
Burner type MD-	<input type="text"/>	-	<input type="text"/> - G - <input type="text"/>
Capacity	<input type="text"/> MW	Input gas	<input type="text"/> kPa
S/N	<input type="text"/>	MM/DD/YY	<input type="text"/>



## DIMENSIONS



Pic. 2 – Dual fuel burners dimensions.

Dual-fuel burner dimensions are represented in the table below, mm (may vary).

Burner	Burner's dimensions, mm										Sleeve dims, mm			G
	A	B	C	D	E	F	t	n	N	d	L	G1	H	
MD-25-OG	95	135	350	25	120	175	175	1	4	14	75	200	210	588
MD-40-OG	104	140	400	25	140	184	184	1	4	14	75	200	210	638
MD-75-OG	144	150	450	40	150	224	224	1	4	18	140	300	300	820
MD-150-OG	164	160	500	50	170	264	264	1	4	18	140	300	310	870
MD-200-OG	196	160	500	65	180	296	296	1	4	18	175	400	410	988
MD-250-OG	238	170	500	80	200	338	338	1	4	18	175	400	430	988
MD-400-OG	300	180	550	100	250	420	420	1	4	18	220	470	510	1130
MD-700-OG	338	180	550	100	270	458	458	1	4	21	280	520	550	1210
MD-1000-OG	390	180	600	125	300	540	270	2	8	21	350	550	570	1325
MD-1500-OG	470	200	600	150	320	620	310	2	8	21	430	600	620	1415
MD-2000-OG	500	210	600	150	340	650	325	2	8	21	450	600	620	1425
MD-2500-OG	548	210	600	150	350	698	349	2	8	21	500	700	720	1550
MD-5000-OG	774	220	700	200	400	924	308	3	12	24	710	800	830	1855
MD-7500-OG	990	250	700	225	450	1191	397	3	12	24	920	1000	1040	2160

## INSTALLATION

PeriFlame strongly recommends organizing an embrasure of the burner in accordance with the scheme below. Otherwise must fulfill the following demands:

- must expel contact of combustion products to an exterior parts of the burner's body;
- must consider that high furnaces gases near a flame will influence burning characteristics.

### Burner embrasure in front wall of combustion chamber:

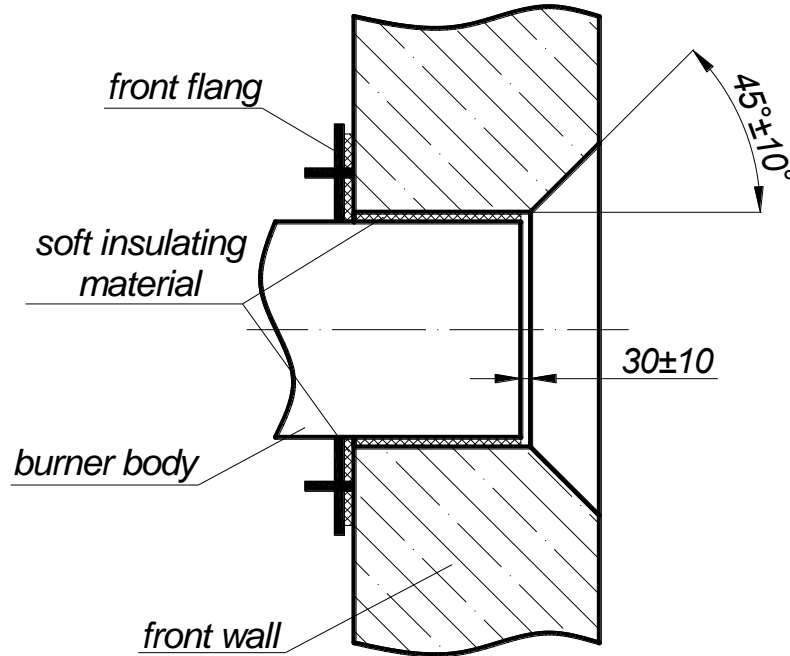


Fig. 3 – Burner embrasure (recommendations).

### Pipe connection

The gas inlet of MD burners can be supplied with NPT or BSP pipe fittings (gas inlet) for sizes from MD-25-OG to MD-150-OG. For sizes MD-200-OG and above gas inlet has an ANSI or DIN flange.

The oil inlet is supplied with NPT ½ in. fitting.

### Burner and air inlet orientation

Normal position of burner means that aerodynamic sleeve directs air flow from below upwards to the burner. Reverse position means the contrary.

The burner can be positioned horizontally.

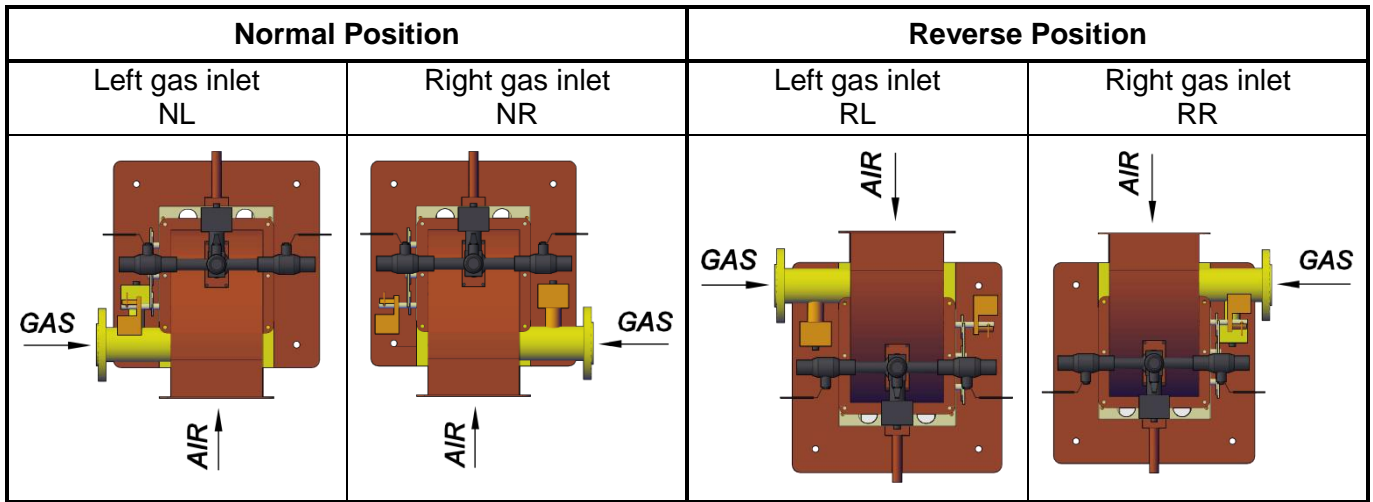
### Gas inlet orientation

Gas inlet may be on the left or on the right (if looking at a front wall of combustor). The Customer may specify inlet location: left gas inlet or right gas inlet.

### Air inlet System

Every burner has multi-blade damper for creating optimal aerodynamic structure of oxidizer. In addition, the damper allows for best flame stabilization and for supplying of required flame shape. Air inlet system can consist of aerodynamic sleeve with rotation displacement at  $90^{\circ}$  or from a blower.

## INSTALLATION OPTIONS



## OPTIONAL EQUIPMENT

### Combustion chamber pressure control

When commissioning the burner pressure differentials, measurements between input lines and the combustion chamber are required. Air blower or other air feeding system must be correlated and tuned with this pressure. It is very important to know exact pressure at the *peak* capacity when the system is being designed.

### Fuel pressure control and gas train safety system

The burner has combustion gas and oil control valve. Gas inlet pressure (before the control valve) can be defined by the Customer or chosen from the following meanings: 20; 50; 100 and 200 mbar. Oil inlet pressure (before the control valve) can be defined by the Customer or chosen from the following meanings: 2,5 or 5,0 bar for light oil and 4,5 or 10,0 bar for heavy oil.

Fuel train safety system should be designed to meet the requirements of the local codes and insurance carriers.

### Ignition system

Electric igniter consists of pilot gas cock with an adjustable orifice and full-wave spark transformer.

Advised pilot capacity should be about 3-5% of nominal. Pilot gas piping diameter is ½ or 1 in.

### Flame monitoring system

The burner has two different brackets for flame sensor installation. Flame sensor (UV scanner) must be matched with the flame monitoring system.

MD burners can be supplied with UV sensor for flame detection with relay output.

# APPENDIX



## APPENDIX #1 – ORDER BURNER FORM

#	Feature	Value							
1	Capacity, MW								
2	Main gas fuel / liquid fuel	G:				L:			
3	Gas pressure, mbar								
4	Combust. chamber pressure (diapason)	- mbar				+ mbar			
5	Air feeding type	blower				sleeve			
6	Oxidizer parameters (if with a sleeve)	P= mbar		T= ° F					
7	Installation variant	NR	NL	RR	RL	HRD	HRU	HLD	HLU
8	Additional NOx suppression system	Yes				No			
9	Flame length	short		normal		long			
10	Additional requirements								

Send request to get detail information.

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