

**AIR HEATERS • DRYERS • OVENS**

4988 Zephyr Burners are ideal for lower temperature applications, up to 1200 F. Standard burners include an integral combustion air blower, pilot, spark igniter, flame rod, and other features that simplify installation and operation. Zephyr Burners have unmatched flexibility and adaptability to a wide variety of conditions. Consult with North American for applications above 1200 F.

**Low or variable duct** air velocities do not affect burner performance or stability.

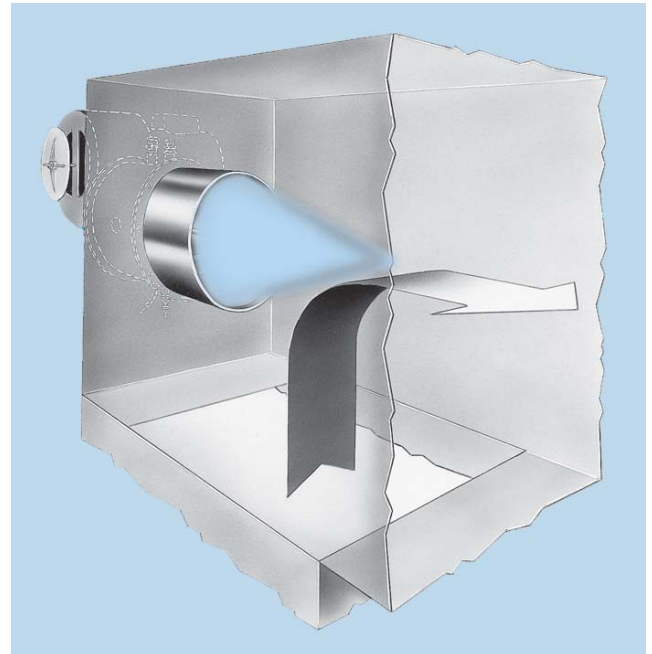
**High Turndown.** 50 to 1 (and higher) by control of gas only. Advantages of high turndown include: (a) better oven temperature uniformity, (b) simplified burner selection because each burner can operate over a wide range of firing rates, and (c) simplified control circuitry. During process interruptions, burner can idle at very low fuel rates, eliminating need for burner shut-down and time-consuming restarts.

**Low Gas Pressure Requirement.** Only 3"wc above duct pressure at the burner. If burner is on suction side of recirculating fan, even less pressure is needed.

**Variety of Mounting Arrangements.** Any position inside duct or on exterior duct wall, as long as motor shaft is horizontal. When wall-mounted, burner protrudes into duct, preventing overheating of adjacent oven walls.

**High Strength Construction.** Burner housing is sturdy aluminized steel, rigidly assembled and braced to resist distortion and warping at operating temperatures. All parts in contact with flame are stainless steel.

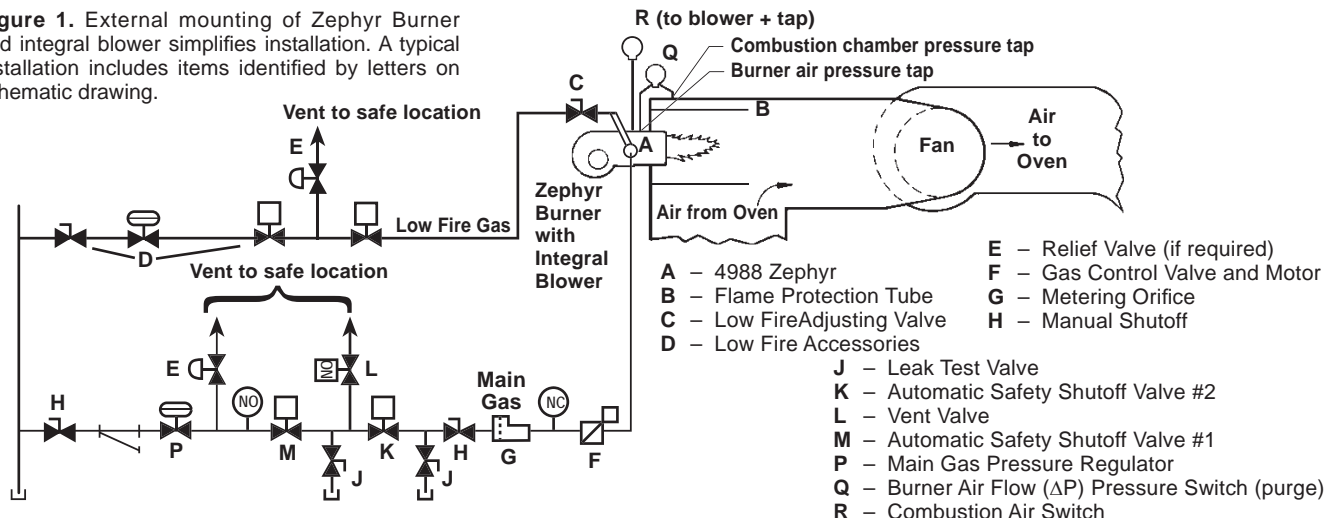
**Fuels.** Zephyr Burners are designed for natural gas. They will burn vaporized propane (containing no propylene) or butane (containing no butylene). Internal modification of 4988-1000 through -6000 is required. 4988-9000-L burners require no modification. When ordering, specify fuel.



Zephyr Burners have nominal ratings of 1, 2.5, 4, 6, and 9 million Btu/hr. Three combustion air fan arrangements are available, all with the same burner body:

- **4988- -L** with low pressure blower: for installation on suction side of a recirculating fan.
- **4988- -H** (-1000 through -6000 only) with higher pressure blower: for use on discharge side of recirculating fan (where duct pressure is no more than 3.5"wc cold).
- **4988- -R** with no integral blower: for remote blower installations or those requiring blowers different from standard.

**Figure 1.** External mounting of Zephyr Burner and integral blower simplifies installation. A typical installation includes items identified by letters on schematic drawing.

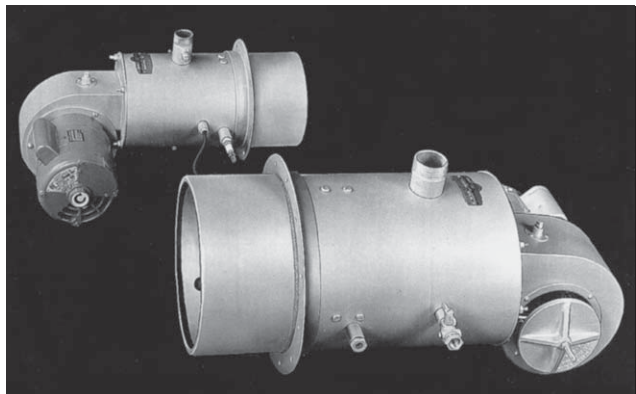


**Flame Supervision and Ignition.** All Zephyrs can be used with ultraviolet flame detection systems. A UV-based flame supervision system must be designed to ignore spark detection by use of an appropriate flame relay, or other code compliant means, to prevent interruption of the ignition sequence. Flame rods are suitable for all but the 4988-9000. Burners include special spark plug (4-5635-1) and 5' of ignition cable. An ignition transformer with 6000 volt secondary is required. Pressure taps are provided on burner.

With propane or butane, carbon tends to form on flame rods, so scanner type flame detectors are recommended.

**Installation.** Zephyrs can be installed in any horizontal or vertical duct (but motor shaft must be horizontal). To promote even heating of duct air stream, position burner in a section of duct where air flow is reasonably straight( 3 duct diameters). Avoid sharp turns, obstructions, or dampers immediately upstream of burner. Consult North American about supply of flame protection tube.

Installation can be made downstream of a circulation fan, but Zephyr blower and connection ductwork have to be selected carefully to overcome oven pressure (unless Zephyr blower is installed within the duct). Zephyr burners are not designed to fire into ducts above 3.5"wc pressure.



**Figure 2.** Two of the five sizes of 4988 ZEPHYR™ Gas Burners with integral blower. Construction is simple and durable. Installation is easy. There is convenient access to all components.

If duct air temperature is over 100 F, blower must be mounted outside duct. Dimensions of interconnecting air duct are important: Check with factory for recommended dimensions. Provide access doors for inspection and servicing burner. Sight ports or windows are necessary for observation of flame.

**Caution:** Multiple burner installations must include two safety shutoff valves for each burner. These valves must be shut during low fire ignition.

**Table 1. CAPACITIES**

	Burner designation	millions of Btu/hr	motor hp and rpm		blower volume cfh at 1"wc ΔP	Flame lengths at 1"wc ΔP
			"L"	"H"		
"L" blowers develop 1"wc air pressure at burner.						
"H" models develop 4.5"wc at burner.	<b>4988-1000</b>	1.0	1/3 -3450	1/2-3450	16 200	30"
	<b>4988-2500</b>	2.5	1 -3450	2-3450	40 800	36"
Motors are 230-460/3/60, except 115/1/60 is an option for -1000 burners.	<b>4988-4000</b>	4.0	1 -1725	3-3450	64 800	48"
	<b>4988-6000</b>	6.0	1 1/2 -1725	3-3450	96 000	60"
	<b>4988-9000</b>	9.0	3 -3450	—	123 000	78"

**Temperature Effect.** Burner performance may change as oven air temperature rises from start-up to operating levels. Effect is most marked at elevated temperatures, but burner operation should be checked at all temperatures. Table 2 indicates how fan pressure changes with temperature. Altitude also affects blower capacity and pressure. Above 5000 feet, larger motors are usually required--consult North American.

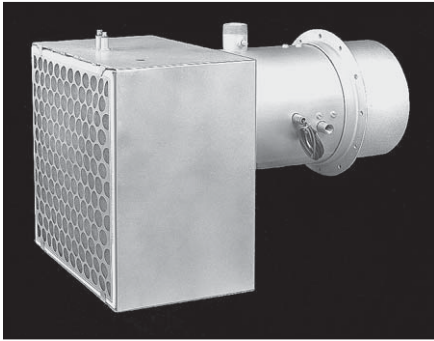
When selecting burners, make sure pressure drop between burner and process is within the stability ranges of Table 3 at all temperatures and all firing rates.

**Table 2.** Effect of air temperature on pressure developed by a recirculating fan.

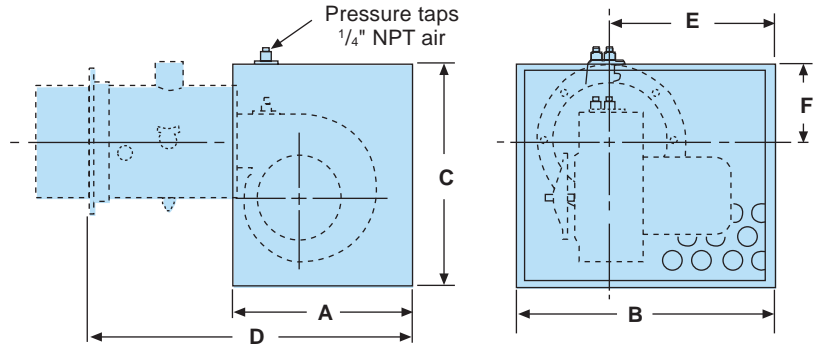
temperature	factor	temperature	factor
60 F	1.00	600 F	0.49
100 F	0.93	700 F	0.45
150 F	0.85	800 F	0.42
200 F	0.79	900 F	0.38
300 F	0.68	1000 F	0.36
400 F	0.60	1100 F	0.33
500 F	0.54	1200 F	0.31

**Table 3.** Flame stability ranges.

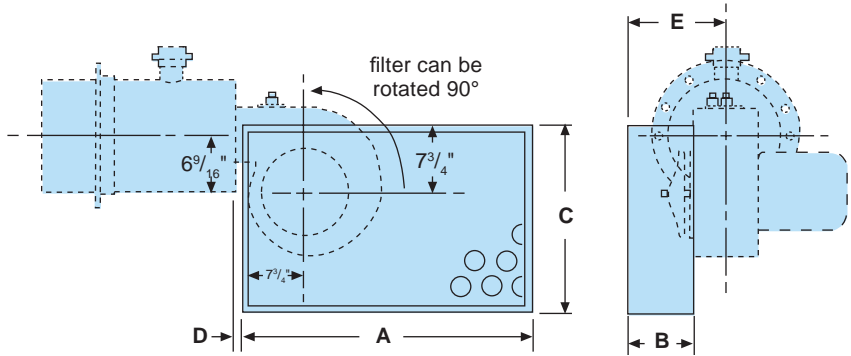
4988- -L, H, or R	air pressure drop, "wc	
	minimum	maximum
1000	0.25	4.0
2500	0.50	3.0
4000	0.25	3.0
6000	0.25	2.5
9000	0.50	2.5



**Filter Assemblies**, optional for 4988 Burners, use inexpensive throwaway panel filters to clean air entering Zephyr™ blowers. On 4988-1000, -2500, -4000, and -6000-L Burners, filter housing completely encloses blower and motor; pressure taps and a conduit knockout on the housing permit connections to blower and motor. Filters for -6000-H and -9000-L Burners attach to blower inlet. Filters are shipped loose for field installation.



**Filter for 4988-1000, -2500, -4000, and -6000-L**



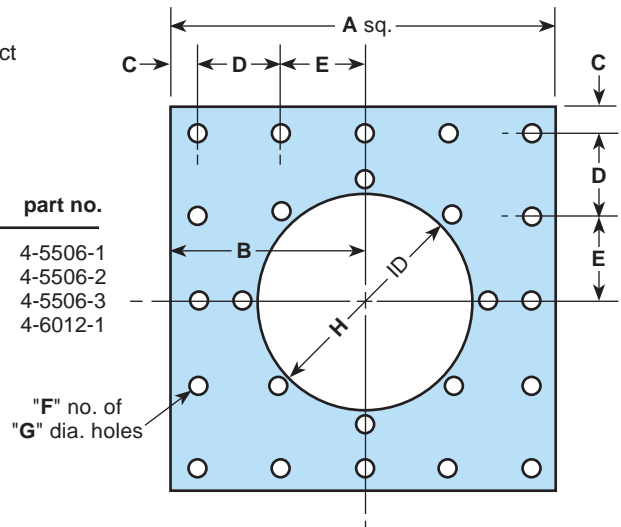
**Filter for 4988-6000-H and -9000-L**

filter assembly for 4988	dimensions in inches						no. of filter panels	filter size	filter elements only (panels)
	A	B	C	D	E	F			
4-5676-1 filter assembly for -1000-L & -H	13 <sup>1</sup> / <sub>8</sub>	20 <sup>1</sup> / <sub>4</sub>	20 <sup>1</sup> / <sub>4</sub>	23 <sup>3</sup> / <sub>4</sub>	13	6	1	20" × 20" × 2"	R260-3241
4-5683-1 filter assembly for -2500-L & -H	17 <sup>1</sup> / <sub>8</sub>	22 <sup>1</sup> / <sub>4</sub>	20 <sup>1</sup> / <sub>4</sub>	32 <sup>3</sup> / <sub>4</sub>	15	7	1	20" × 20" × 2"	R260-3241
4-5687-1 filter assembly for -4000-L & -H and -6000-L	20 <sup>1</sup> / <sub>2</sub>	25 <sup>1</sup> / <sub>2</sub>	24 <sup>1</sup> / <sub>8</sub>	38 <sup>3</sup> / <sub>8</sub>	16	9	2	20" × 25" × 2"	R260-3242
4-5968-1 filter assembly for -6000-H and -9000-L	40 <sup>7</sup> / <sub>8</sub>	10 <sup>1</sup> / <sub>8</sub>	25 <sup>1</sup> / <sub>2</sub>	21 <sup>1</sup> / <sub>16</sub>	14 <sup>5</sup> / <sub>8</sub>	—	3	20" × 25" × 2"	R260-3242

**Adapter plates** simplify mounting circular Zephyr flanges to square duct cutouts. All plates are <sup>3</sup>/<sub>16</sub>" thick steel.

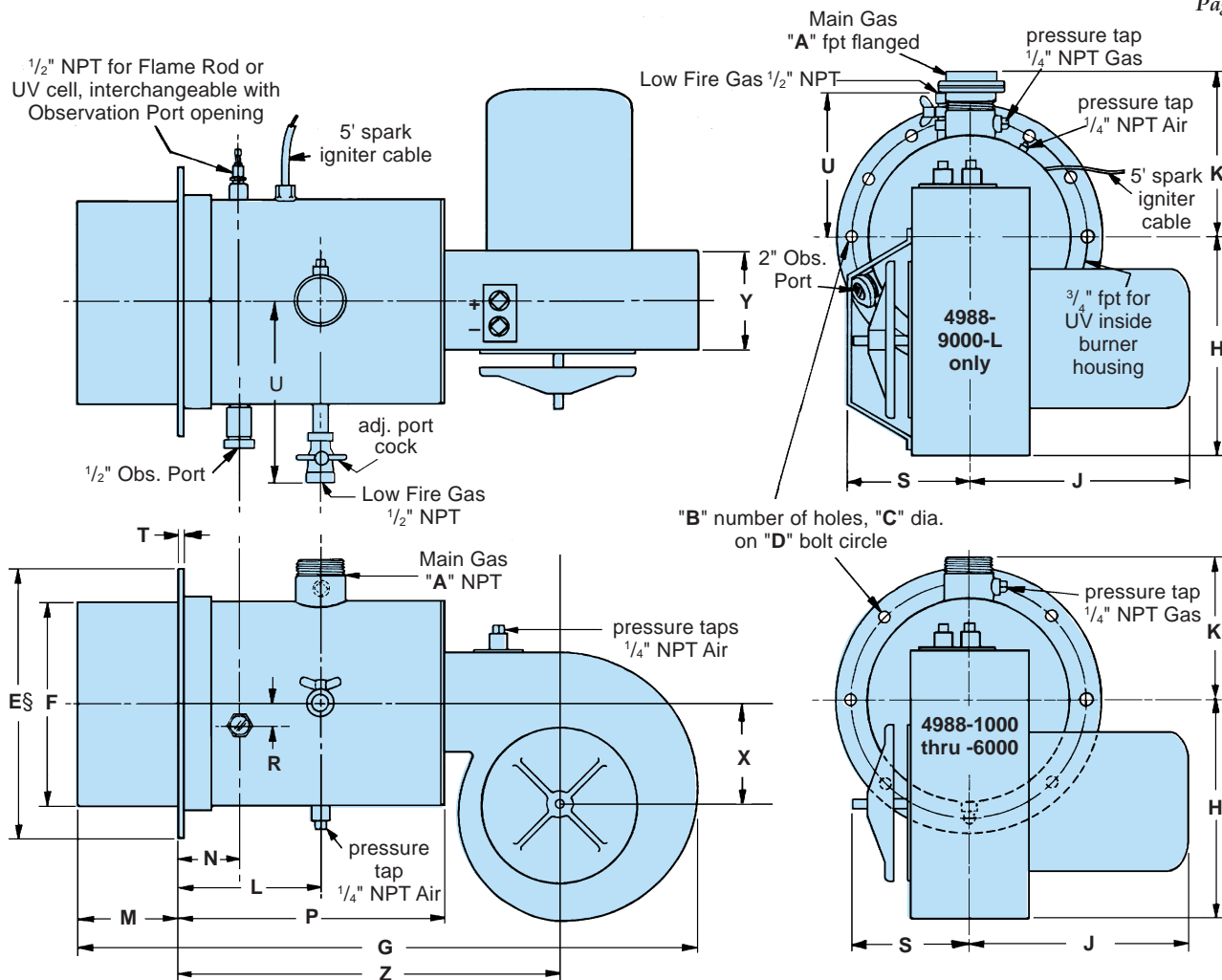
adapter plate for 4988-	dimensions in inches								part no.
	A	B	C	D	E	F	G	H	
1000	14	7	1/2	4 <sup>5</sup> / <sub>16</sub>	—	12	5 <sup>5</sup> / <sub>16</sub>	8 <sup>7</sup> / <sub>8</sub>	4-5506-1
2500	19	9 <sup>1</sup> / <sub>2</sub>	1/2	6	—	12	5 <sup>5</sup> / <sub>16</sub>	12 <sup>15</sup> / <sub>16</sub>	4-5506-2
4000 & 6000	23	11 <sup>1</sup> / <sub>2</sub>	1/2	7 <sup>5</sup> / <sub>16</sub>	—	12	5 <sup>5</sup> / <sub>16</sub>	17	4-5506-3
9000	31	15 <sup>1</sup> / <sub>2</sub>	3/4	7 <sup>3</sup> / <sub>8</sub>	7 <sup>3</sup> / <sub>8</sub>	16	9 <sup>1</sup> / <sub>16</sub>	23	4-6012-1

**To order:**  
Specify part number of adapter plate.



DIMENSIONS SHOWN ARE SUBJECT TO CHANGE. PLEASE OBTAIN CERTIFIED PRINTS FROM FIVES NORTH AMERICAN COMBUSTION, INC. IF SPACE LIMITATIONS OR OTHER CONSIDERATIONS MAKE EXACT DIMENSION(S) CRITICAL.

**WARNING:** Situations dangerous to personnel and property may exist with the operation and maintenance of any combustion equipment. The presence of fuels, oxidants, hot and cold combustion products, hot surfaces, electrical power in control and ignition circuits, etc., are inherent with any combustion application. Parts of this product may exceed 160F in operation and present a contact hazard. Fives North American urges compliance with National Safety Standards and insurance Underwriters recommendations, and care in operation.



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Zephyr™ designation	dimensions in inches															
	A	B	C	D	E§	F	GL†	GH‡	HL†	HH‡	JL†	JH‡	K	L	M	N
4988-1000	1 1/4	8	11 3/32	9 1/2	10 5/8	8 1/16	24 3/16	25 13/16	7 1/2	8 7/8	9 13/16	9 7/8	6 1/2	5 5/8	5	2 1/4
4988-2500	2	12	13 3/32	13 13/16	15 3/16	12 1/8	32 3/8	36 5/16	8 13/16	12 1/8	11 9/16	12 3/8	8 5/8	10 3/16	6 1/2	4 1/8
4988-4000	3	16	13 3/32	18 1/8	19 3/4	16 1/8	42 1/4	42 1/4	12 1/8	12 1/8	12 13/16	14 9/16	10 7/8	11 1/4	10	4 1/4
4988-6000	3	16	13 3/32	18 1/8	19 3/4	16 1/8	42 1/4	49 7/8	12 1/8	17 1/8	13 9/16	16 1/8	10 7/8	11 1/4	10	4 1/4
4988-9000	4	12	5 5/8	25 1/2	27 3/8	22 1/4	54 3/4	—	17 1/8	—	16 1/8	—	17 1/8	15 1/2	10 5/16	—

Zephyr™ designation	P	R	SL†	SH‡	T	U	For -L Only			Obs. Port	weight, lb			4988- -R SW style connection pipe size (inches)
							X	Y	Z		4988-L	4988-H	4988-R	
4988-1000	10 3/4	3/4	5 13/16	5 9/16	1/8	7 1/2	3 1/4	3 3/4	15 1/16	8790-0	45	52	24	4 A round
4988-2500	15 13/16	1 1/8	6 1/16	7 5/16	3/16	10 1/4	3 7/8	4 3/4	20 7/8	8790-0	88	117	57	6 SW connection,
4988-4000	18 1/8	1 1/4	8 9/16	7 9/16	3/16	12 5/8	5 9/16	6 5/8	24 13/16	8790-0	137	181	96	8 suitable for
4988-6000	18 1/8	1 1/4	8 9/16	9 1/4	3/16	12 5/8	5 9/16	6 5/8	24 13/16	8790-0	142	221	96	10 flexible sleeve or
4988-9000	22 11/16	—	9 1/4	—	3/8	13 3/8	6 9/16	9	33 1/2	8790-4-A	300	—	180	12 welded connection

§ Allow at least 6" on each side to withdraw flame supervisory device or spark igniter.

† 4988- -L only.

‡ 4988- -H only.

To order, specify: 4988-(capacity designation)-any modifiers (L = low pressure fan, H = high pressure fan, R = remote blower, P or B = no charge modification for propane or butane--not required on -9000) electrical characteristics for burner blower motor.

Examples: 4988-1000-L Low Pressure Burner complete 230-460/3/60

4988-6000-HP High Pressure Burner complete for Propane 230-460/3/60

Fives North American Combustion, Inc., 4455 East 71st Street, Cleveland, OH 44105 USA, Phone 216.271.6000

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