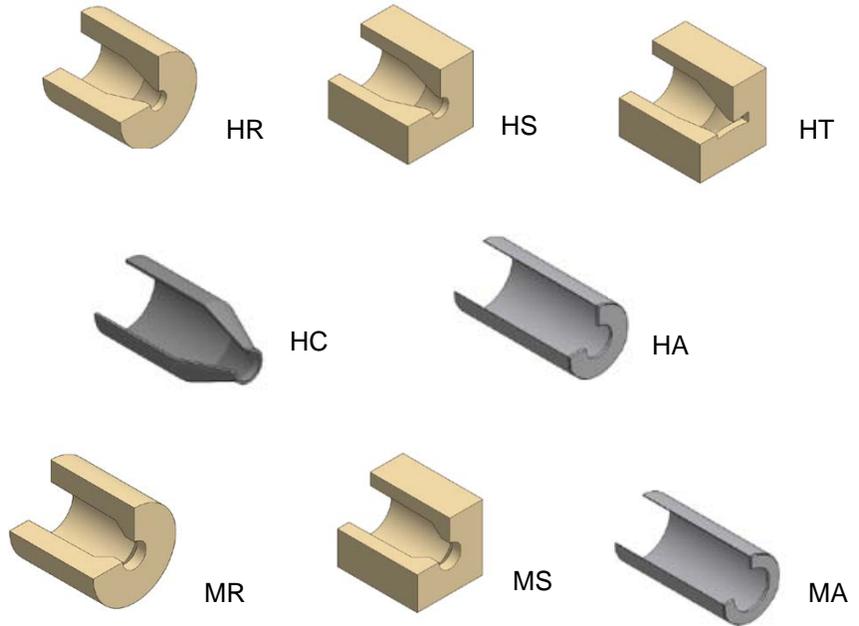
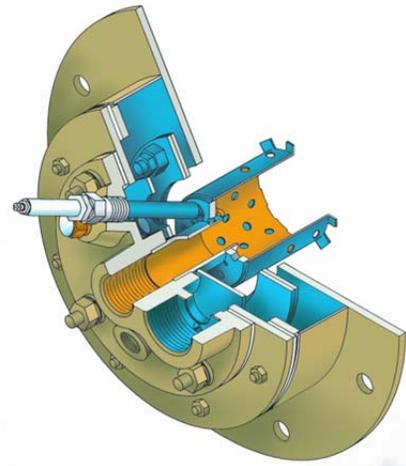




SVG SUPER VERSATILE GAS BURNER




WARNING
 These instructions are intended for use only by experienced, qualified combustion start-up personnel. Adjustment of this equipment and its components by unqualified personnel can result in fire, explosion, severe personal injury, or even death.

<u>Subject</u>	<u>Page</u>
A. General Information	2
B. Receiving and Inspection	2
C. Capacities	3
D. Dimensions	5
E. Installation	5
F. Ignition	9
G. Initial Set-up	12
H. Operation.....	13
I. Maintenance	14
J. Recommended Spare Parts List	15

These instructions are intended to serve as guidelines covering the installation, operation, and maintenance of Hauck equipment. While every attempt has been made to ensure completeness, unforeseen or unspecified applications, details, and variations may preclude covering every possible contingency. **WARNING: TO PREVENT THE POSSIBILITY OF SERIOUS BODILY INJURY, DO NOT USE OR OPERATE ANY EQUIPMENT OR COMPONENT WITH ANY PARTS REMOVED OR ANY PARTS NOT APPROVED BY THE MANUFACTURER.** Should further information be required or desired or should particular problems arise which are not covered sufficiently for the purchaser's purpose, contact Hauck Mfg. Co.



WARNING

This equipment is potentially dangerous with the possibility of serious personal injury and property damage. Hauck Manufacturing Company recommends the use of flame supervisory equipment and fuel safety shutoff valves. Furthermore, Hauck urges rigid adherence to National Fire Protection Association (NFPA) standards and insurance underwriter's requirements. Operation and regular preventative maintenance of this equipment should be performed only by properly trained and qualified personnel. Annual review and upgrading of safety equipment is recommended.

A. GENERAL INFORMATION

The SVG Super Versatile Gas Burner is designed for applications that benefit from intensive combustion gas recirculation, increased efficiency, improved temperature uniformity, and substantially reduced emissions. Offered in three separate series. The 100 series has full capacity at 16 osig (6,900 Pa) while the 200 series reaches the same capacity at a lower air inlet pressure typically at 8 osig (3,450 Pa). The 'E' series has the rating of the 200 series with metric air and gas connections. Available in a variety of tile materials and configurations, the SVG burner family includes medium and high velocity models. SVG burners reliably and dependably fire any clean industrial fuel gas over a wide operation range from excess air to excess fuel. Supplemental data sheets list detailed burner performance data.

B. RECEIVING AND INSPECTION

Upon receipt, check each item on the bill of lading and/or invoice to determine that all equipment has been received. A careful examination of all parts should be made to ascertain if there has been any damage in shipment.



WARNING

Use care when handling as the equipment may be heavy, have sharp edges or dust/fibers from refractory or gasket material. Always wear personal protective gear and use appropriate equipment during handling and installation.

IMPORTANT

If the installation is delayed and the equipment is stored outside, provide adequate protection as dictated by climate and period of exposure. Special care should be given to all motors and bearings, if applicable, to protect them from rain or excessive moisture.

C. CAPACITIES

BURNER MODEL	TILE DESIGNATION							
	HR	HS	HT	HC	HA	MR	MS	MA
	High Velocity Round	High Velocity Square	High Velocity Hauck Tail	High Velocity Ceramic	High Velocity Alloy	Medium Velocity Round	Medium Velocity Square	Medium Velocity Alloy
	BURNER NOMINAL CAPACITY (10 ³ Btu/hr) RATINGS							
SVG 110 / 210	110	110	Not Available	110	95	120	120	120
SVG 112 / 212	250	250	Not Available	250	240	275	275	260
SVG 115 / 215	410	410	Not Available	410	385	415	415	410
SVG 120 / 220	700	700	700	700	735	750	750	735
SVG 125 / 225	1,000	1,000	1,000	1,000	1,000	1,200	1,200	1,240
SVG 130 / 230	1,300	1,300	1,300	1,300	1,250	1,500	1,500	1,510
SVG 135 / 235	1,610	1,610	1,610	Not Available	Not Available	Not Available	Not Available	Not Available
SVG 140 / 240	2,100	2,100	2,100	2,100	2,005	2,350	2,350	2,320
SVG 160 / 260	4,700	Not Available	Not Available	4,700	4,295	5,520	Not Available	4,980
SVG 180 / 280	8,515	Not Available	Not Available	Not Available	8,515	9,000	Not Available	9,624

NOTES:

1. Capacities based on natural gas with HHV of 1034 Btu/ft³, 0.59 S.G., and an stoichiometric air:gas ratio of 9.74:1 with burner firing into chamber under no pressure @ 10% excess air. For **CP** model capacities, refer to data as listed under the appropriate HR, HS, MR or MS tile designation.
2. Air and gas flows based on 60°F @ sea level.
3. Static air pressure measured at the burner air inlet pressure tap.
4. All data based on industry standard air and gas piping practices.
5. Flame detection available via UV scanner or flame rod.
6. Burners operating above the rated capacity; consult Hauck.
7. See individual burner sheets for detailed capacity ratings and operational data, SVG-4.

Table 1. Burner Capacities (10³ Btu/hr)

C. CAPACITIES (Continued)

BURNER MODEL	TILE DESIGNATION							
	HR	HS	HT	HC	HA	MR	MS	MA
	High Velocity Round	High Velocity Square	High Velocity Hauck Tail	High Velocity Ceramic	High Velocity Alloy	Medium Velocity Round	Medium Velocity Square	Medium Velocity Alloy
	BURNER NOMINAL CAPACITY (kW) RATINGS							
SVG-E10	29.1	29.1	Not Available	29.1	24.8	31.7	31.7	31.7
SVG-E12	66.1	66.1	Not Available	66.1	69.5	72.7	72.7	69.2
SVG-E15	108	108	Not Available	108	116	110	110	108
SVG-E20	185	185	185	185	195	198	198	194
SVG-E25	265	265	265	265	265	317	317	328
SVG-E30	343	343	343	343	330	395	395	400
SVG-E35	425	425	425	Not Available	Not Available	Not Available	Not Available	Not Available
SVG-E40	554	554	554	554	529	620	620	612
SVG-E60	1,241	Not Available	Not Available	1,241	1,134	1,457	Not Available	1,315
SVG-E80	2,250	Not Available	Not Available	Not Available	2,250	2,376	Not Available	2,541

NOTES:

1. Capacities based on natural gas with LHV of 36.74 MJ/nm³, 0.59 S.G., and an stoichiometric air:gas ratio of 9.74:1 with burner firing into chamber under no pressure @ 10% excess air. For **CP** model capacities, refer to data as listed under the appropriate HR, HS, MR or MS tile designation.
2. Air and gas flows based on 0°C @ sea level.
3. Static air pressure measured at the burner air inlet pressure tap.
4. All data based on industry standard air and gas piping practices.
5. Flame detection available via UV scanner or flame rod.
6. Burners operating above the rated capacity; consult Hauck.
7. See individual burner sheets for detailed capacity ratings and operational data, SVG-E-4.

Table 2. Metric Burner Capacities (kW)

D. DIMENSIONS

See appropriate Dimension sheet for detailed dimensional information.

E. INSTALLATION

1. For applications with atmosphere or cross stream velocity using SVG burners, if the cross stream velocity over the end of the tile exceeds 1000 ft/min (305 m/min), a flame shield is required to prevent flame quenching; consult Hauck.
2. If UV (ultraviolet) flame detection is utilized, the burner should be positioned so that the UV flame detector is located above the horizontal centerline to prevent moisture or airborne debris from settling into the scanner port and blocking the lens.
3. If the integrated air differential pressure taps are to be used for air flow measurement, install a threaded pipe nipple into the air connection of the burner having a length that is at least 4 times the pipe diameter. This will allow the use of the built-in differential air orifice taps for accurate air flow measurement. For example, for 1-1/4 NPT (DN32) pipe use a pipe nipple that is at least 5" (127mm) long.



WARNING

Use care when handling as the equipment may be heavy, have sharp edges or dust/fibers from refractory or gasket material. Always wear personal protective gear and use appropriate equipment during handling and installation. Be sure your installation conforms to appropriate safety guidelines for your application such as NFPA 86 or EN746.

Using a Hauck Supplied Tile

4. Furnish an opening in the furnace shell 1/2" (13mm) larger than the burner tile outside diameter. Since SVG burners can be fired in any position, they can be installed through the roof, walls, or bottom of the furnace.
5. For installation in an existing hard or soft wall furnace (see Figure 1), make the hole in the insulating material, where the burner tile will be installed, 3 to 6" (76 to 152mm) larger than the outside diameter of the tile.
6. Wrap tile with two layers of 1" (25mm) fiber rated for a higher temperature than the furnace. Secure fiber wrap with tape or twine to compress the ceramic fiber wrap by 25% to retain the fiber during installation. Pack additional fiber to fill any remaining openings completely. It is important to make sure the fiber is well packed around the burners firing tile or tube.
Fiber must be repacked after the initial firing of the burner.

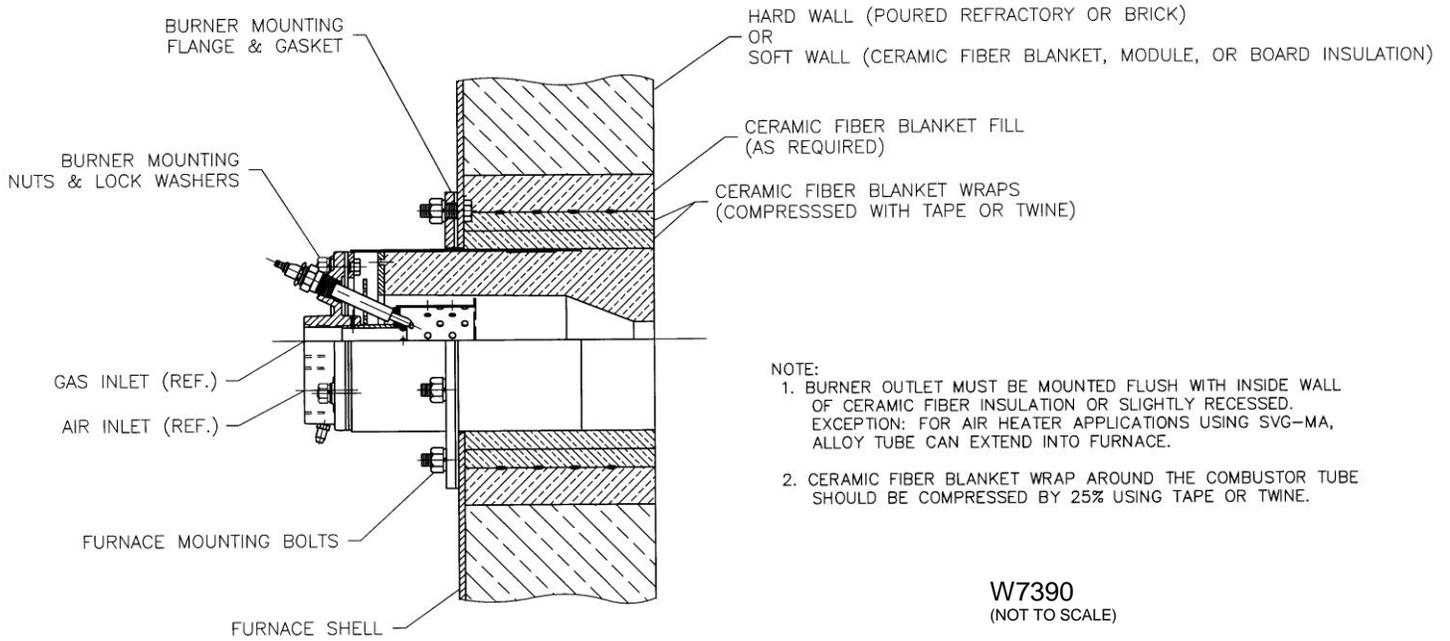


Figure 1. Burner Installation



WARNING

Refractory can be heavy and laden with dust or fibers, use care in lifting and always wear appropriate personal protective gear such as a respirator or dust mask around refractory or gasket material.

7. For installations where it is desired to ram or cast refractory around the burner, allow 3 to 6" (76 to 152mm) larger diameter hole and pack as outlined in item 6.

Using a Cast In Place Tile

4. For applications where the burner tile will be poured, cast, or rammed into the furnace wall, a "Cast in Place" (CP) burner must be used to ensure proper air distribution and combustion stability.
5. Create a mold of the burner tile according to Figure 2. The tolerance on the dimensions specified on the drawing must be $\pm 1/16$ inch (± 1.5 mm) to ensure proper combustion, operating range, emissions, and velocity

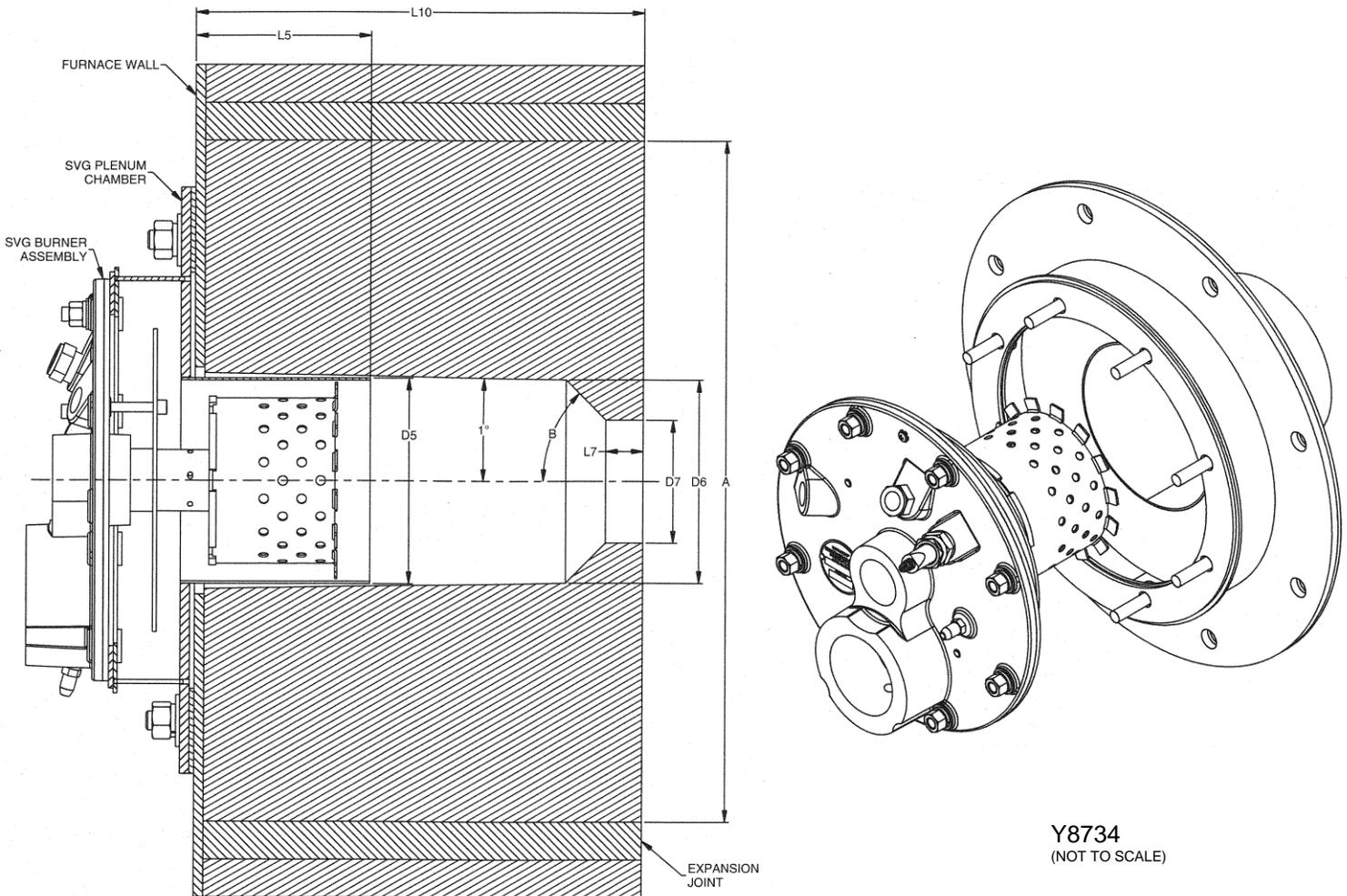


Figure 2. Burner Installation – Cast In Place (CP) Tile

Burner		Mandrel Dimensions							
		A (min)	B	D5	D6	D7	L5	L7	L10
SVG_10-MR	(in)	6 1/4	45°	2 15/16	3	1 1/16	3 1/2	1/2	6 11/16
	(mm)	159	45°	75	76	27	89	13	170
SVG_10-HR	(in)	6 1/4	30°	2 15/16	3	13/16	3 1/2	7/16	6 11/16
	(mm)	159	30°	75	76	21	89	11	170
SVG_12-MR	(in)	7 3/8	45°	3 3/4	3 13/16	1 5/8	4 3/8	3/4	7 1/2
	(mm)	187	45°	95	97	41	111	19	191
SVG_12-HR	(in)	7 3/8	28°	3 3/4	3 7/8	1 1/8	4 3/8	7/16	7 1/2
	(mm)	187	28°	95	98	29	111	11	191
SVG_15-MR	(in)	7 3/8	45°	3 3/4	3 11/16	2	4 3/8	3/4	10 7/8
	(mm)	187	45°	95	94	51	111	19	276
SVG_15-HR	(in)	7 3/8	21°	3 3/4	3 3/4	1 7/16	4 3/8	7/8	10 7/8
	(mm)	187	21°	95	95	37	111	22	276
SVG_20-MR	(in)	10 3/4	45°	4 3/4	4 13/16	2 9/16	4 1/8	1	8 7/8
	(mm)	273	45°	121	122	65	105	25	225
SVG_20-HR	(in)	10 3/4	24°	4 3/4	4 7/8	1 7/8	4 1/8	11/16	8 7/8
	(mm)	273	24°	121	124	48	105	17	225
SVG_25-MR	(in)	10 3/4	45°	5 7/16	5 3/8	3 1/4	4 5/8	1	11 7/8
	(mm)	273	45°	138	137	83	117	25	302
SVG_25-HR	(in)	10 3/4	28°	5 7/16	5 7/16	2 1/4	4 5/8	7/8	11 7/8
	(mm)	273	28°	138	138	57	117	22	302
SVG_30-MR	(in)	13	45°	6 3/32	6	3 5/8	4 1/8	1 1/8	11 7/8
	(mm)	330	45°	155	152	92	105	29	302
SVG_30-HR	(in)	13	31°	6 3/32	6 1/16	2 3/4	4 1/8	1 1/16	11 7/8
	(mm)	330	31°	155	154	70	105	27	302
SVG_35-MR	(in)	N/A							
	(mm)								
SVG_35-HR	(in)	13	45°	7 1/2	7 3/16	3 1/16	4 3/8	1 3/8	12 7/8
	(mm)	330	45°	191	183	78	111	35	327
SVG_40-MR	(in)	13	45°	7 1/2	7 7/16	4 9/16	4 3/4	1 3/8	13 1/8
	(mm)	330	45°	191	189	116	121	35	333
SVG_40-HR	(in)	13	38°	7 1/2	7 1/2	3 5/8	4 3/4	1 3/8	13 1/8
	(mm)	330	38°	191	191	92	121	35	333
SVG_60-MR	(in)	16	45°	8 3/4	8 11/16	6 1/4	5 3/8	1 3/8	13 1/8
	(mm)	406	45°	222	221	159	137	35	333
SVG_60-HR	(in)	16	35°	8 3/4	8 3/4	4 5/8	5 3/8	1	13 1/8
	(mm)	406	35°	222	222	117	137	25	333
SVG_80-MR	(in)	18	45°	10 3/8	10 3/16	8 5/8	5 3/8	1 3/8	15 3/8
	(mm)	457	45°	264	259	219	137	35	391
SVG_80-HR	(in)	18	30°	10 3/8	10 1/4	6 1/2	5 3/8	1	15 3/8
	(mm)	457	30°	264	260	165	137	25	391

Table 3. SVG Cast in Place (CP) Dimensions for Y8734

6. Using the mold, create a burner tile with the above dimensions. Even if the burner tile is an integral part of furnace wall, an expansion joint of appropriate size must be provided (see Figure 2). Failure to provide an expansion joint may cause damage to the burner tile or burner itself.
7. After the burner tile has been completed and allowed to cure, remove the mold and install the CP burner.
8. Care must be taken at initial startup and after extended idle times to assure refractory components have been sufficiently dried prior to normal firing conditions. It is highly recommended that low fire drying for at least 6-8 hours at 100% excess air occur at initial startup prior to exposing refractory components to normal firing operations. Thereafter, if the refractory components are exposed to excessive moisture, condensation, or high humidity for extended periods, allow at least 30 minutes of low fire drying before beginning normal operation. Failure to do so may cause any moisture present to expand rapidly resulting in refractory spalling and/or premature failure.

NOTE

If the burner is operated in adverse conditions, Hauck recommends installing a cooling/cleaning air line to the UV scanner. Typically, this can be accomplished by installing a 1/2 NPT (DN 15) pipe tee between the UV scanner and the UV scanner connection on the burner backplate. Connect a clean air source of approximately 100 scfh (2.7 nm³/hr) to the pipe tee. Conditions such as preheated air, dirty combustion air, hot ambient air, or high moisture dictate this change.

THE FLAME ROD AND SPARK IGNITER CONNECTIONS ARE INTERCHANGEABLE, HOWEVER, DO NOT ATTEMPT TO IGNITE THE BURNER WITH THE FLAME ROD.



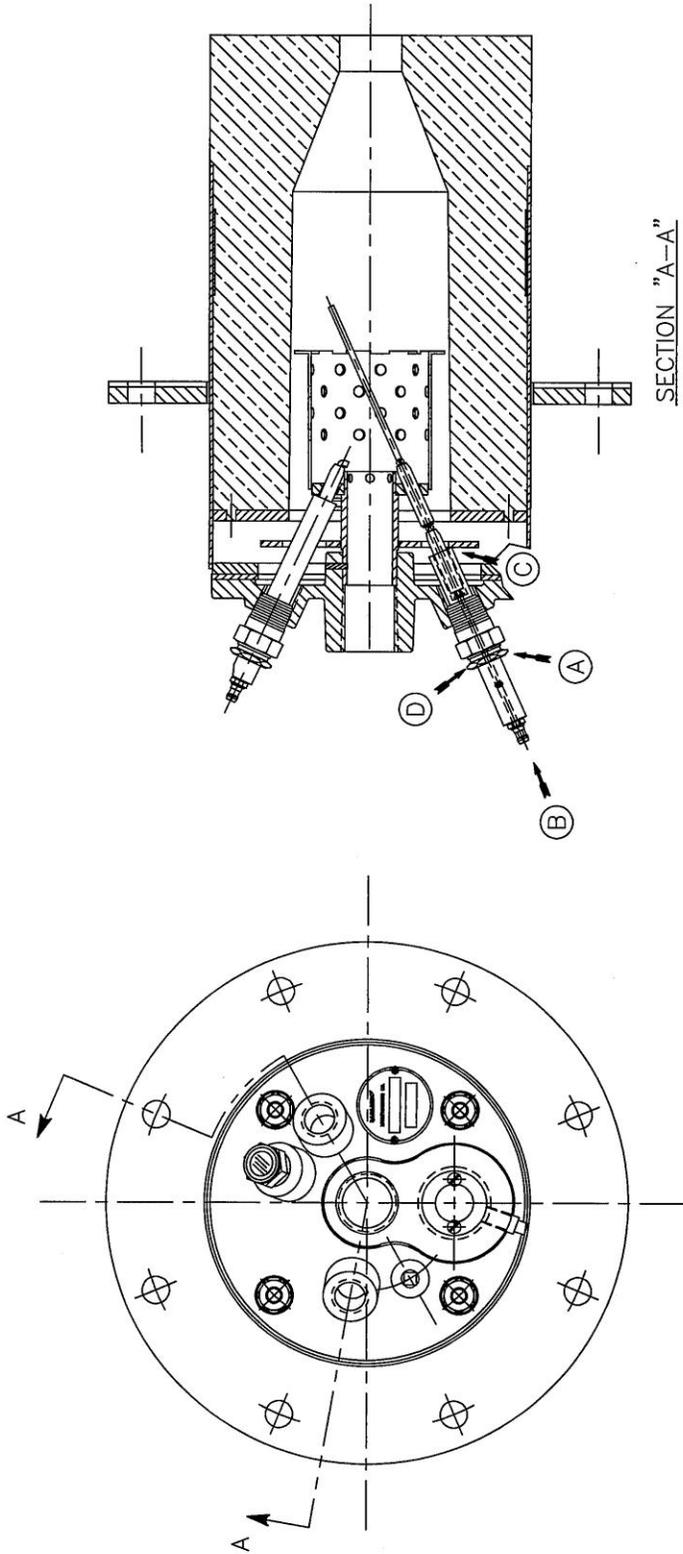
WARNING

Adjustment of this equipment by unqualified personnel can result in fire, explosion, severe personal injury, or even death.

F. IGNITION

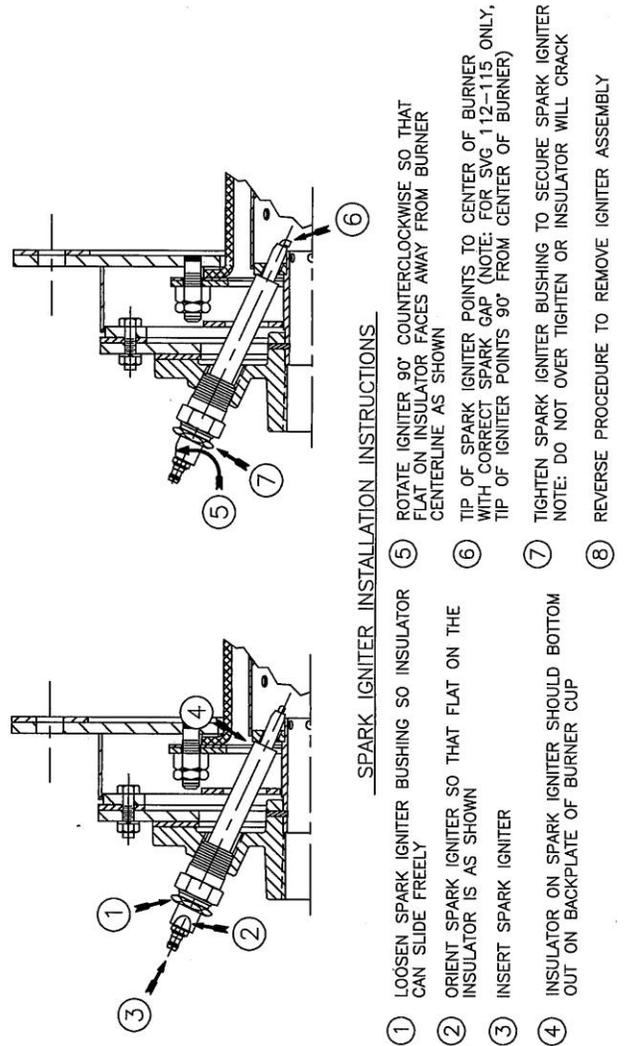
Ignition of the SVG is by a direct spark igniter (included). A 5000/6000 volt standard coil type ignition transformer or a half-wave "spark blind" solid state type transformer can be utilized. Both transformers yield satisfactory results, however, the standard coil type transformer provides reliable ignition over a wider range of air/fuel ratios than the half-wave type. For applications requiring burner ignition with combustion air at or above 4 osi (1724 Pa), a standard coil ignition transformer must be used.

F. IGNITION (Continued)



FLAME ROD INSTALLATION INSTRUCTIONS

- (A) LOOSEN FLAME ROD BUSHING SO INSULATOR CAN SLIDE FREELY
- (B) INSERT FLAME ROD
- (C) INSULATOR ON FLAME ROD SHOULD BOTTOM OUT ON BAFFLE IN BURNER AIR PLENUM
- (D) TIGHTEN FLAME ROD BUSHING TO SECURE FLAME ROD
NOTE: DO NOT OVERTIGHTEN OR INSULATOR WILL CRACK
- (E) REVERSE PROCEDURE TO REMOVE FLAME ROD ASSEMBLY



SPARK IGNITER INSTALLATION INSTRUCTIONS

- (1) LOOSEN SPARK IGNITER BUSHING SO INSULATOR CAN SLIDE FREELY
- (2) ORIENT SPARK IGNITER SO THAT FLAT ON THE INSULATOR IS AS SHOWN
- (3) INSERT SPARK IGNITER
- (4) INSULATOR ON SPARK IGNITER SHOULD BOTTOM OUT ON BACKPLATE OF BURNER CUP
- (5) ROTATE IGNITER 90° COUNTERCLOCKWISE SO THAT FLAT ON INSULATOR FACES AWAY FROM BURNER CENTERLINE AS SHOWN
- (6) TIP OF SPARK IGNITER POINTS TO CENTER OF BURNER WITH CORRECT SPARK GAP (NOTE: FOR SVG 112-115 ONLY, TIP OF IGNITER POINTS 90° FROM CENTER OF BURNER)
- (7) TIGHTEN SPARK IGNITER BUSHING TO SECURE SPARK IGNITER
NOTE: DO NOT OVER TIGHTEN OR INSULATOR WILL CRACK
- (8) REVERSE PROCEDURE TO REMOVE IGNITER ASSEMBLY

X7391
(NOT TO SCALE)

Figure 3. Spark Igniter and Flame Rod Installation

F. IGNITION (Continued)

CAUTION

The ignition transformer can cause an electric shock. Use care around the ignition cable. The igniter should be electrically grounded and should **NOT** be handled while the transformer is energized.

NOTE

For safety reasons, it is recommended that the burner be ignited under low fire conditions.

NOTE

Like all high velocity burners, the SVG will not ignite from a hot chamber.



WARNING

If standard coil ignition transformer is used, provisions must be made to eliminate the ignition spark falsely satisfying the "flame on" UV flame detector.

G. INITIAL SET-UP

CAUTION

All cast refractory burner components are porous and therefore subject to moisture absorption. Refractory components should not be stored or exposed to damp conditions potentially reducing their normal expected life. Care **must** be taken at initial startups and after extended idle times to assure refractory components have been sufficiently dried prior to normal firing conditions. It is highly recommended that **low fire drying for at least 6-8 hours at $\geq 100\%$ excess air** occur at initial startups prior to exposing refractory components to normal firing operation. Thereafter, if the refractory components are exposed to excessive moisture, condensation, or high humidity for extended periods, **allow at least 30 minutes of low fire drying** before beginning normal operation. Failure to do so may cause any moisture present to expand rapidly resulting in refractory spalling and/or premature failure.

CAUTION

Initial adjustment and burner start-up should be undertaken only by trained and experienced personnel familiar with combustion systems, control and safety circuitry and overall installation procedures. Avoid burns from flame, high surface temperature, hot components and exhaust gas. Verify proper installation and condition of gaskets & seals. In addition to heat and noise; burning paint (solvents or sealing material), exhaust leaks, carbon monoxide (CO) and other by-products of the combustion process may be present at or near the combustion equipment. Always wear appropriate clothing and personal protective gear (gloves, ear plugs, safety glasses, respirator, etc.) when working with equipment in operation.

SVG burners typically operate with automatic control systems. The burners are capable of proportional control over their entire capacity range. In a typical system, ignition will be preceded by a series of steps. The following steps detail initial set-up of a cross-connected (gas ratio regulated) system. For other types of control systems contact Hauck.

1. Once installed, the burner is ready for initial set-up. The specific operation of the burner will depend on the individual system components in the entire combustion system. Refer to the instruction sheets that accompany the individual components.
2. Combustion air pressure should be set at the combustion air control valve. Typical settings will be specific to the application. Hauck recommends that the combustion air setting remain at minimum until the burner has been ignited (refer to the burner capacities in the appropriate Supplemental Data Sheet for minimum burner air flow at low fire conditions).
3. Adjust the limiting gas orifice valve to an initial opening (readjustment of the limiting gas orifice may be necessary for final burner set-up). Typically 2 to 3 turns open from the closed position, but this will depend on the make and model of limiting gas orifice valve.
4. Refer to Section F for spark igniter set-up.
5. Once the spark igniter is set and the initial gas and air adjustments are made, the burner can be ignited. **BE SURE THAT THE BURNER IS BEING IGNITED UNDER LOW FIRE CONDITIONS (MINIMUM AIR AND GAS FLOWS).** Ignite the burner.

6. Setting high fire (maximum) burner capacity:
 - A. When the burner is ignited, increase the combustion air valve to the high fire position (refer to burner capacities in the appropriate Supplemental Data Sheet for burner air flow at high fire conditions).
 - B. Proper high fire combustion air flow should be set at the combustion air control valve.
 - C. After the high fire combustion air is set, adjust the limiting gas orifice valve to achieve the desired gas flow at high fire.
 - D. Verify air/gas ratio using orifice meters in the air and gas lines. Static air pressure at the burner inlet can be related to air flows if an air orifice meter is not available.
7. Setting low fire (minimum) burner capacity:
 - A. After high fire flows have been established, decrease the combustion air control valve to the low fire position (refer to burner capacities in the appropriate Supplemental Data Sheet for burner air flow at low fire conditions).
 - B. Proper low fire combustion air flow should be set at the combustion air control valve.
 - C. After the low fire combustion air is set, adjust the low fire ratio regulator bias adjustment to achieve the desired gas flow at low fire.
 - D. Verify air/gas ratio using orifice meters in the air and gas lines. Static air pressure at the burner inlet can be related to air flows if an air orifice meter is not available.
8. Repeat steps 5 through 7 as necessary until ignition high and low fire settings remain consistent.
9. To shut down the burner system:
 - A. Return the burner to the low fire position
 - B. Close all fuel shutoff valves.

H. OPERATION

Once properly installed, and set-up, the burner is ready for operation. The operation of the burner will depend on the specific components in the combustion control system and the application of the burners. Refer to the instruction sheet that accompanies each item. When the burner is firing, the spark igniter should be shut off.

I. MAINTENANCE

The SVG burners have no moving parts requiring any lubrication. However, periodic inspection should be performed to determine if cleaning is required and to inspect the condition of the combustion tile or tube.

CAUTION

Be sure burner internals have cooled sufficiently before attempting to disassemble any components. Use care when separating gasket surfaces to avoid damage to the gaskets. All maintenance work should be accomplished by trained and experienced personnel only.

Should it become necessary to remove the spark igniter for cleaning or inspection, the spark igniter must be inserted properly for best ignition (see Figure 3 in Section F for proper spark igniter installation procedure).



WARNING

Use care when handling as the equipment may be heavy, have sharp edges or dust/fibers from refractory or gasket material. Always wear personal protective gear and use appropriate equipment during handling and installation. Verify proper installation and condition of gaskets & seals. Damaged gaskets or seals could allow the escape of hot gases or eject hot material.

Should the combustor tube become damaged for the SVG-HC, it can be replaced as follows:

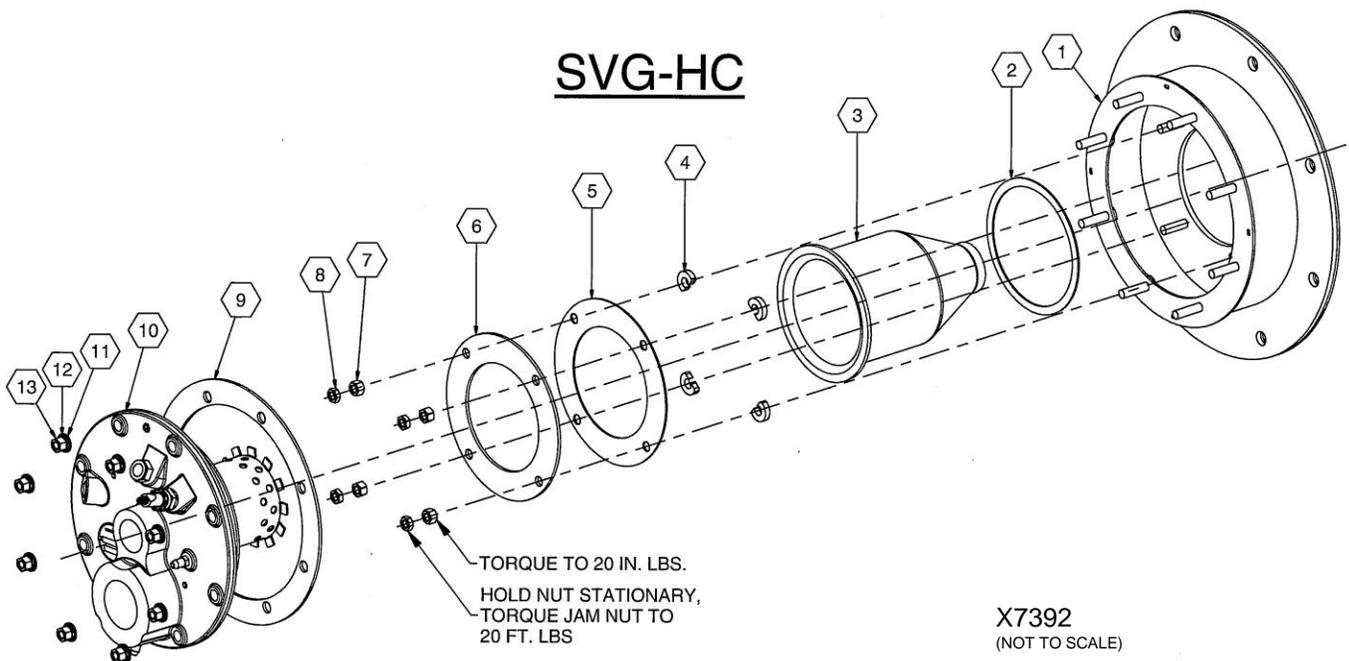


Figure 4. Combustor Tube Replacement

1. Disconnect air and gas piping from burner, remove ignition wire from igniter, and remove UV scanner or flame rod.
2. Remove burner assembly (10) by removing nuts (13) and washers (11, 12), and retain burner mounting gasket (9).
3. Remove the retaining and jam nuts (7) and (8).
4. Remove combustor tube retainer (6).
5. Slide combustor tube (3) out of tile assembly (1).
6. Discard combustor mounting gaskets (2) and (5).
7. Slide the tile gasket (2) around the combustor tube (3) and insert into the tile assembly (1).
8. Position tile spacers (4), tile retaining gasket (5), and retainer plates (6) over the mounting screws in the body.
9. Tighten retainer nuts (7) to 20 in-lb (2.3 Nm) torque and fasten jam nuts (8) to prevent loosening.
10. Install burner assembly mounting gasket (9) and burner assembly (10) with washers 11, 12) and nuts (13).
11. Repack fiber around combustor tile after burner assembly has been replaced (see Figure 1).

J. RECOMMENDED SPARE PARTS LIST

Item	Qty.	Part Number	Description
1	1	See Parts List	Spark Igniter Assembly
2	1	See Parts List	Flame Rod Assembly (If Applicable)
3	1	See Parts List	UV Scanner (If Applicable)
4	*	See Parts List	Replacement Tube Assembly (If Applicable)

* - Quantity dependent upon number of burners installed; contact Hauck.

Table 4. Recommended Spare Parts

This page left intentionally blank.