

# BOILER AND ENGINE EXHAUST CHIMNEY SYSTEMS

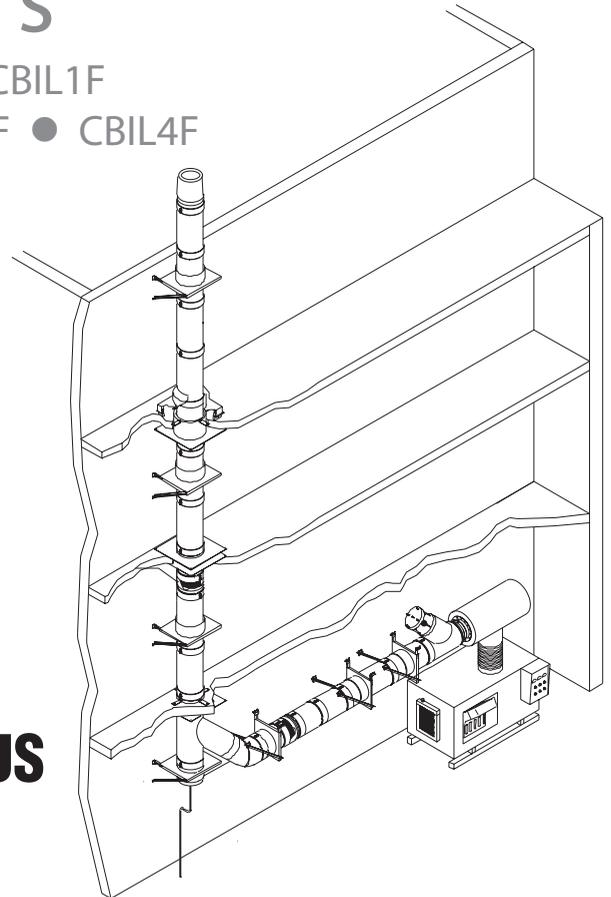
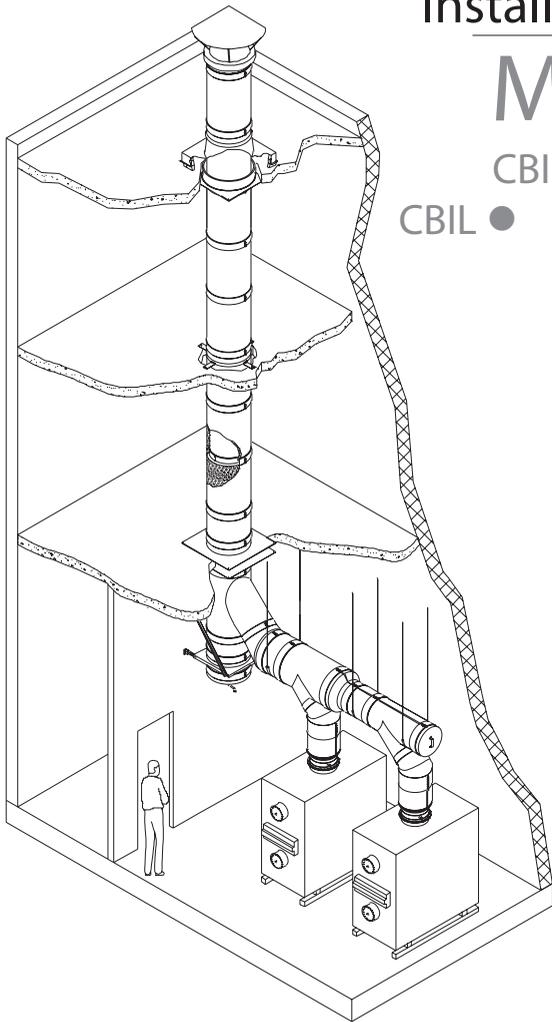
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## Double Wall Construction Positive Pressure Piping System

### Installation Instructions

# Models

CBILA ● CBIL1 ● CBIL1F  
CBIL ● CBIL2 ● CBIL2F ● CBIL4F



This symbol shows that Cleaver-Brooks boiler and engine exhaust chimney models are Listed in the US and certified for Canada under Underwriters Laboratories inc. file no. MH16456. Tests are made in accordance with UL 103 standard for Factory-Built chimneys and the Canadian standard for industrial chimneys CAN/ULC-959.

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A MAJOR CAUSE OF CHIMNEY RELATED FIRE IS FAILURE TO MAINTAIN REQUIRED CLEARANCES (AIR SPACES) TO COMBUSTIBLE MATERIALS. IT IS OF UTMOST IMPORTANCE THAT THIS CHIMNEY BE INSTALLED ONLY IN ACCORDANCE WITH THESE INSTRUCTIONS.

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**WARNING**

Failure to follow these installation instructions could cause FIRE, CARBON MONOXIDE POISONING, and OR DEATH. If you are unsure of installation requirements, contact Cleaver-Brooks.

SUITABLE FOR POSITIVE PRESSURE VENTING APPLICATIONS WITH MAXIMUM 60" WATER COLUMN INTERNAL STATIC PRESSURE AT 1000°F.

**General Notes:**

Use only factory-supplied components. Failure to do so will void the certification and the warranty of this chimney. In areas with continuous temperatures below -18°C (0°F) the use of an exterior chimney may result in operating problems such as poor draft and excessive condensation of combustion products. If you do install an exterior chimney, we recommend that you install a double wall insulated chimney model CBIL1, CBIL1F, CBIL2, CBIL2F or CBIL4F.

**Maintenance Notes:**

**Chimney Cleaning:** Other than for standard natural gas chimney applications where minimal maintenance is necessary. Keep your chimney clean. Access should be provided for the inspection and cleaning of all sections of the chimney. Have your chimney cleaned by a qualified chimney sweep. If you want to clean the chimney yourself, clean with a nylon or metal chimney brush of the correct size. Do not use a brush that will scratch the stainless steel interior of the chimney.

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# General Information

## UNDERWRITERS LABORATORIES LISTINGS:

Cleaver-Brooks boiler and engine exhaust chimney models are Listed by Underwriters Laboratories, inc. (UL) under File MH16456 and Tested in accordance with UL 103 Standard for Factory-Built Chimneys For Residential Type and Building Heating Appliances and the Canadian Standard For 540°C And 760°C industrial Chimneys CAN/ULC-C959. Listings include the following chimney product categories and diameters.

Table A-1 - UL/ ULC Listings  
**UL 103**

Model	Classification	Diameter
CBILA, CBIL, L1, L1F, L2, L2F, L4F	Building Heating Appliance (1000°F)	6" to 48" I.D.
CBILA, CBIL, L1F, L2F, L4F	1400°F Type Chimney	6" to 48" I.D.

## CAN / ULC C-959

Model	Classification	Diameters
CBILA, CBIL, L1, L1F, L2, L2F, L4F	540°C Industrial Chimneys	6" to 48" I.D.
CBILA, CBIL, L1F, L2F, L4F	760°C Industrial Chimneys	6" to 48" I.D.

## FEATURES

All models are part of IPP (Industrial Positive Pressure) products for industrial and commercial applications. They are prefabricated modular venting systems designed for quick assembly and using the same continuous laser welding stainless steel inner wall. Given that all parts have a male and female end, each model part fit into one another, thus eliminating the need for all kinds of adapters. This unique method of coupling provides an incomparable flexibility in selecting models of flues and chimneys. Models CBILA and CBIL are a double wall construction with 1" and 2" air space between walls. Models CBIL1 and CBIL2 are also a double wall construction with 1" and 2" of mineral fiber insulation. Models CBIL1F and CBIL2F as 1" and 2" high temperature ceramic fiber insulation and model CBIL4F as 4" high temperature ceramic fiber insulation. The high quality of stainless steel inner wall construction using a continuous laser welding method for the longitudinal joint provides a high strength-to-weight ratio and low friction losses.

## APPLICATION UL 103

1. Building Heating Appliance Chimney Listing (1000°F Chimney Listing) – Under this category, models CBILA, CBIL, CBIL1, CBIL2, CBIL1F, CBIL2F and CBIL4F have been determined suitable for venting flue gases at a temperature not exceeding 538°C (1000°F) under continuous operating conditions, from gas, liquid, oil or solid fuel fired appliances. And comply with tests at 760°C (1400°F) temperature for 10 minutes.

2. Building Heating Appliance Chimneys are suitable for use with Building Heating Appliances and Low Heat Appliances as described in the Chimney Selection Chart of National Fire Protection Association (NFPA) Standard No.211.

3. 1400°F Chimney Listing – Under this category, models CBILA, CBIL, CBIL1F, CBIL2F and CBIL4F have been determined suitable for venting flue gases at a temperature not exceeding 760°C (1400°F) under continuous operating conditions, from gas, liquid, oil or solid fuel fired appliances. And comply with

tests at 982°C (1800°F) temperature for 10 minutes. As such, they are suitable for use with ovens and furnaces as described in the Chimney Selection Chart of NFPA No. 211, in addition to other applications.

4. Positive Pressure Listing – These models are rated for use at a maximum of 60 inch water column internal pressure when used in a positive pressure application.

## CAN/ULC-C959

5. 540°C and 760°C Industrial Chimneys Listing – Under this category, models CBILA, CBIL, CBIL1, CBIL2, CBIL1F, CBIL2F, CBIL4F have been determined suitable for venting flue gases at a temperature not exceeding 538°C (1000°F), and at a maximum of 760°C (1400°F) for models CBILA, CBIL, CBIL1F, CBIL2F and CBIL4F under continuous operating conditions, from gas, oil and solid fuel fired appliances.

## SURROUNDINGS/ENCLOSURES

1. All chimney models are primarily intended to be installed in fire resistive, noncombustible surroundings or in unenclosed installation. They are not intended for use in one or two-family dwellings. (CAUTION: Do not enclose this chimney in chase or passageway made of wood or other combustible material.)

2. Where the chimney extends through any zone of a building outside the area in which the heating appliance connected to it is located, it shall be provided with an enclosure having a fire resistance rating equal to or greater than the fire rating of the floor, wall or roof assemblies through which it passes.

3. All chimney models may penetrate a combustible roof or wall using the Ventilated Flashing Roof assembly (VF). For wall penetrations, use of the Insulated Wall Firestop (IFS) or Wall Firestop (WFS) assembly are required. These are the only parts intended for use with combustible construction. All other parts, such as Anchor Plate (AP) and Wall Support (WS), Wall (WG) and Floor Guide (FG) are for attachment to non-combustible construction.

4. Where, according to local code, no chase enclosure is necessary, all models may be placed adjacent to or in a corner made of walls of combustible construction at the clearance specified on each pipe section and in the individual Listing; see "CLEARANCES". Contact Local Building or Fire Officials about restrictions and installation inspection in your area.

## SYSTEM SIZING

Complete system sizing and capacity may be obtained from the "Chimney, Gas Vent, and Fireplace Systems" chapter of the ASHRAE Handbook or contact your Cleaver-Brooks representative. In spite of any sizing guidelines, when sizing exhaust systems, it is most important that the heating appliance, engine or turbine manufacturer's installation instructions be followed. Not following these instructions may result in inadequate chimney performance and/or a violation of the equipment manufacturer's installation requirements.

## General Information

### PART NUMBERS

These instructions identify major models parts by part a number.

Example no.1:

Number: CBILA 48L 12

Model	Description	Inside Diameter
1" Air Insulation	48" Pipe Section Length	12"

Example no.2:

Number: CBIL1 T45 24

Model	Description	Inside Diameter
1" Mineral fiber insulation	45" Tee Section	24"

Example no.3:

Number: CBIL2F WS 36

Model	Description	Inside Diameter
2" Ceramic fiber* insulation	Wall support Section	36"

Example no.4:

Number: CBIL4F WS 48

Model	Description	Inside Diameter
4" Ceramic fiber* insulation	Wall support section	48"

\* High temperature insulation.

### CLEARANCES

The following table serves to identify the venting categories. The maximum continuous flue gas temperature for each venting category and the type of installation either enclosed or unenclosed. Table A-2 gives the clearance for each chimney model.

Table A-2 - Minimum air space clearance to combustible construction

Clearance	CBILA - I.D.		CBIL - I.D.
	1000°F	1400°F	1000°F/1400°F
4"	3"-6"	3"-6"	6"-12"
5"	7"-10"	7"-10"	14"
6"	11"-16"	-	16"-18"
7"	17"-20"	-	20"-24"
8"	21"-24"	-	26"-28"
9"	25"-30"	-	30"-34"
10"	31"-34"	-	36"-38"
11"	35"-40"	-	40"-48"
12"	41"-46"	-	-
13"	47"-48"	-	-

Clearance	CBIL1 - I.D.		CBIL2 - I.D.
	1000°F	1400°F	1000°F
1"	3"-6"	3"-6"	6"-12"
1.5"	7"-10"	-	14"
2"	-	-	16"-18"
2.5"	11"-16"	-	-
3"	17"-18"	-	20"-22"
4"	19"-26"	-	24"-26"
5"	27"-32"	-	28"-32"
6"	33"-38"	-	34"-36"
7"	39"-44"	-	38"-40"
8"	45"-48"	-	42"-48"

Clearance	CBIL1F - I.D.		CBIL2F and CBIL4F - I.D.
	1000°F	1400°F	1000°F/1400°F
1"	3"-6"	3"-6"	6"-12"
1.5"	7"-10"	-	14"
2"	-	-	16"-18"
2.5"	11"-16"	-	-
3"	17"-18"	7"-10"	20"-22"
4"	19"-26"	-	24"-26"
5"	27"-32"	-	28"-32"
6"	33"-38"	-	34"-36"
7"	39"-44"	-	38"-40"
8"	45"-48"	-	42"-48"

### OPENINGS

The following table and equation serves to calculate the minimum opening required when installing a chimney through a floor made of combustible construction. For openings through a roof or wall, see all details in Section D.

Table A-3. Models dimensions for 1", 2" and 4" insulated models

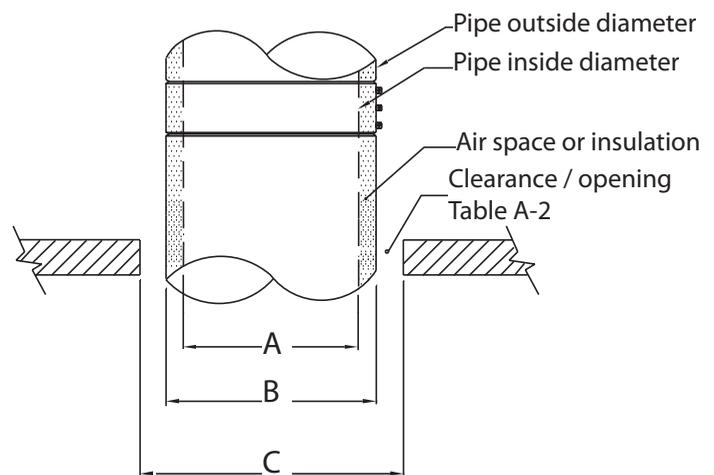
Inside Diameter	1" insul.	2" insul.	4" insul.
	O.D.	O.D.	O.D.
A	B	B	B
6"	8"	10"	14"
8"	10"	12"	16"
10"	12"	14"	18"
12"	14"	16"	20"
14"	16"	18"	22"
16"	18"	20"	24"
18"	20"	22"	26"
20"	22"	24"	28"
22"	24"	26"	30"
24"	26"	28"	32"
26"	28"	30"	34"
28"	30"	32"	36"
30"	32"	34"	38"
32"	34"	36"	40"
34"	36"	38"	42"
36"	38"	40"	44"
38"	40"	42"	46"
40"	42"	44"	48"
42"	44"	46"	50"
44"	46"	48"	52"
46"	48"	50"	54"
48"	50"	52"	56"

### Opening dimension

$B = A + (2 \times \text{insul. thk.})$   
 $C = B + (2 \times \text{Clearance}^*)$   
 See table A-2 for clearance

Note: for opening through a roof or wall see section D of this manual

Ex: Opening through combustible construction for chimney models



**WARNING**  
 DO NOT INSTALL ANY TYPE OF INSULATION IN THE REQUIRED CLEARANCE SPACES SURROUNDING THE CHIMNEY

## General Information

### BOILER APPLICATIONS PIPE AND FITTING JOINT ASSEMBLY

All components have a male and a female end. The installation orientation is indicated on the labeling of each pipe section with an arrow. The arrow indicates the direction of the flue. (See Fig. A-1a) Clean all inner and outer surfaces of male and female ends with an appropriate organic solvent, such as acetone, MeK, or other commercial degreaser.

1. Before fitting the male and female ends in one another, a sealant is applied on the male end, at the gap between the inner band and the inner pipe. (See Fig. A-1a and A-3a). Table A-4a for Sealant.
2. After joining the male and female ends together, a layer of sealant is applied inside the V-groove of the Assembly Band (AB) prior to its installation over the joint (See Fig. A-3a). Table A-4a for Sealant.
3. The Assembly Band (AB) (Fig. A-2a and A-3a) is installed and clamped in place with the 4 screws (supplied).
4. Insert the insulation strip around the inner joint assembly for insulated models.
5. The Finishing Band (FB) is then installed by slipping the edges of the band in to the outer pipe edges and clamping it with the 3 screws (supplied).
6. Where the chimney passes out door, an exterior sealant (ES) is applied at the joint of the Finishing Band (FB) and the outer wall of the pipe for weather protection (see Fig. A-3a) Table A-4a for sealant.

#### CAUTIONS

- A. THE FINISHING BANDS (FB) ARE DESIGNED TO SLIDE IN THEIR MATING GROOVES. DO NOT ATTACH BY SCREWS INTO THE OUTER CASING. THE SCREWS SUPPLIED ARE THE ONLY ONES NEEDED FOR PROPER ASSEMBLY.
- B. DO NOT ALLOW SCREWS TO PENETRATE THE INNER PIPE. THIS CAN CAUSE CORROSION, GAS LEAKAGE OR EXPANSION FAILURE.
- C. NEVER USE SCREWS THROUGH THE OUTER JACKET OF A VARIABLE (VL) AND AN ADJUSTABLE (AL) LENGTH OR BELLOWS EXPANSION JOINT (EJ).
- D. OBSERVE ADEQUATE SAFETY MEASURES WHEN USING A DEGREASER.

Fig. A-1a - Flue Direction

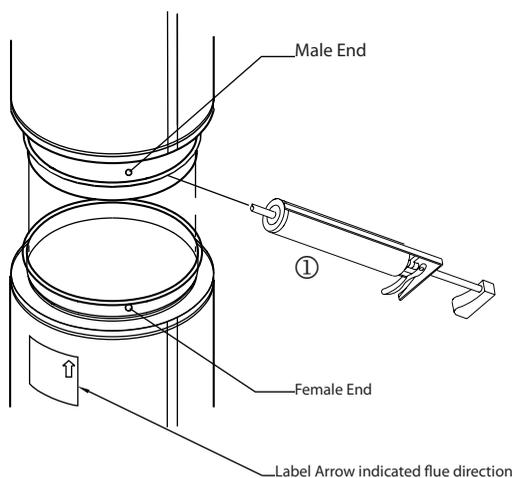


Table A-4a. Sealant Usage

Interior Installation				
Sealant Application	Supplier	Model	Color	Max. Temp.
Inner Joints	Adchem	X-Trasil H.T. 4706_3	red	500°F
alternate	GE	RTV-106	red	500°F
alternate	Dow Corning	RTV-736	red	500°F
Outer Joints	n/a	n/a	n/a	n/a
Exterior Installation				
Sealant Application	Supplier	Model	Color	Max. Temp.
Inner Joints	Adchem	X-Trasil H.T. 4706_3	red	500°F
alternate	GE	RTV-106	red	500°F
alternate	Dow Corning	RTV-736	red	500°F
Outer Joints	Adchem	Adsil 4809	Gray	375°F

Fig. A-2a - Joint components

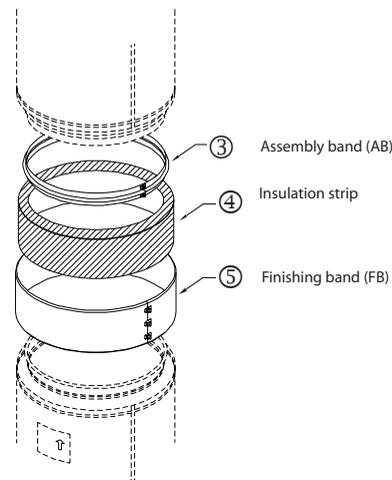
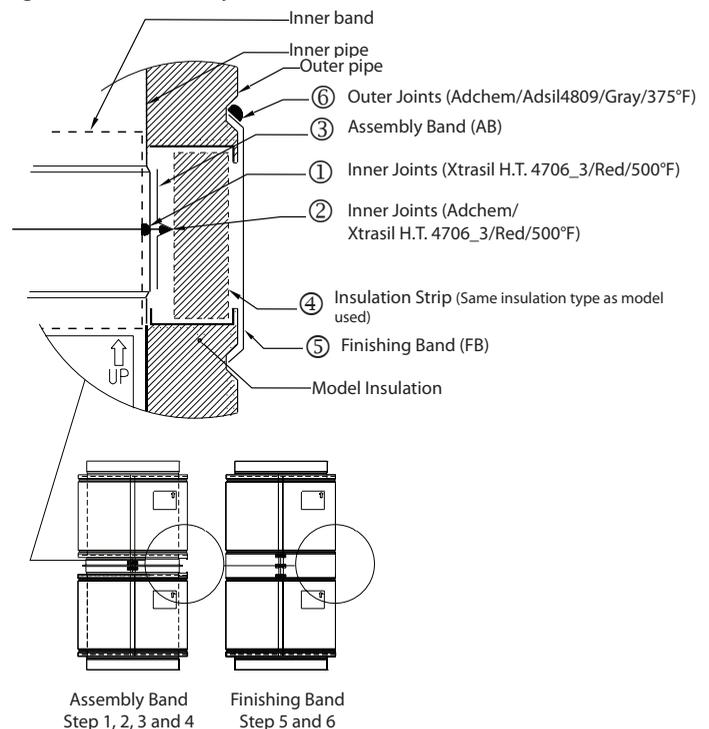


Fig. A-3a - Assembled joint



## General Information

### ENGINE APPLICATIONS PIPE AND FITTING JOINT ASSEMBLY

All components have a male and a female end. The installation orientation is indicated on the labeling of each pipe section with an arrow. The arrow indicates the direction of the flue. (See Fig. A-1b) Clean all inner and outer surfaces of male and female ends with an appropriate organic solvent, such as acetone, MeK, or other commercial degreaser.

1. Before fitting the male and female ends in one another, a sealant is applied on the male end, at the gap between the inner band and the inner pipe. (See Fig. A-1b and A-3b). Table A-4b for Sealant.
2. After joining the male and female ends together, a layer of sealant is applied inside the V-groove of the Assembly Band (AB) prior to its installation over the joint (See Fig. A-3b). Table A-4b for Sealant.
3. The Assembly Band (AB) (Fig. A-2b and A-3b) is installed and clamped in place with the 4 screws (supplied).
4. Insert the insulation strip around the inner joint assembly for insulated models.
5. The Finishing Band (FB) is then installed by slipping the edges of the band in to the outer pipe edges and clamping it with the 3 screws (supplied).
6. Where the chimney passes outdoors, an exterior sealant (ES) is applied at the joint of the Finishing Band (FB) and the outer wall of the pipe for weather protection (see Fig. A-3b). Table A-4b for sealant.

**CAUTION**

- A. THE FINISHING BANDS (FB) ARE DESIGNED TO SLIDE IN THEIR MATING GROOVES. DO NOT ATTACH BY SCREWS INTO THE OUTER CASING. THE SCREWS SUPPLIED ARE THE ONLY ONES NEEDED FOR PROPER ASSEMBLY.
- B. DO NOT ALLOW SCREWS TO PENETRATE THE INNER PIPE. THIS CAN CAUSE CORROSION, GAS LEAKAGE OR EXPANSION FAILURE.
- C. NEVER USE SCREWS THROUGH THE OUTER JACKET OF A VARIABLE (VL) AND AN ADJUSTABLE (AL) LENGTH OR BE LOWS EXPANSION JOINT (EJ).
- D. OBSERVE ADEQUATE SAFETY MEASURES WHEN USING A DEGREASER.

Fig. A-1b - Flue Direction

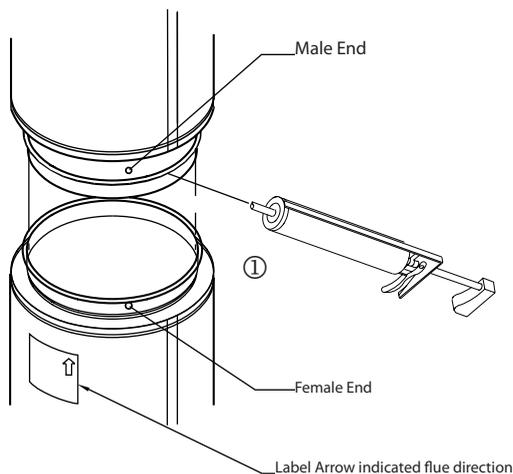


Table A-4b - Sealant Usage

Interior Installation				
Sealant Application	Supplier	Model	Color	Max. Temp.
Inner Joints	Imperial	KK0076	black	2100°F
Outer Joints	n/a	n/a	n/a	n/a
Exterior Installation				
Sealant Application	Supplier	Model	Color	Max. Temp.
Inner Joints	Imperial	KK0076	Black	2100°F
Outer Joints	Adchem	Adsil 4809	Gray	375°F

Fig. A-2b - Joint components

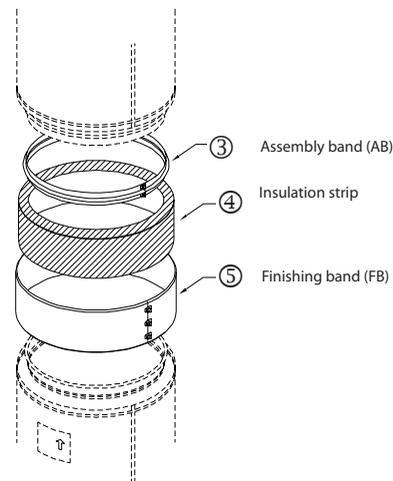
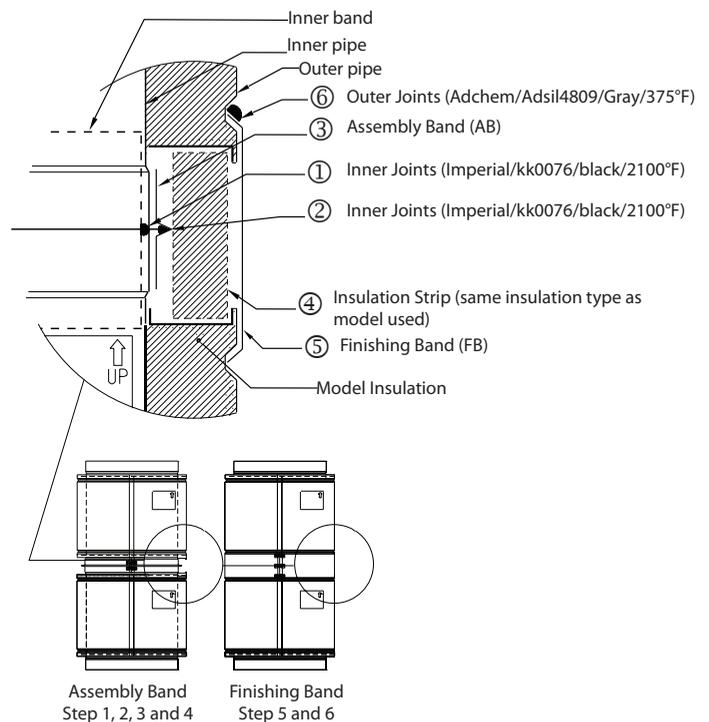


Fig. A-3b - Assembled joint



# General Information

## SUPPORT METHODS AND HEIGHT LIMITS

1. Several support and guiding methods are used to anchor a chimney against upward, downward and angular displacement.

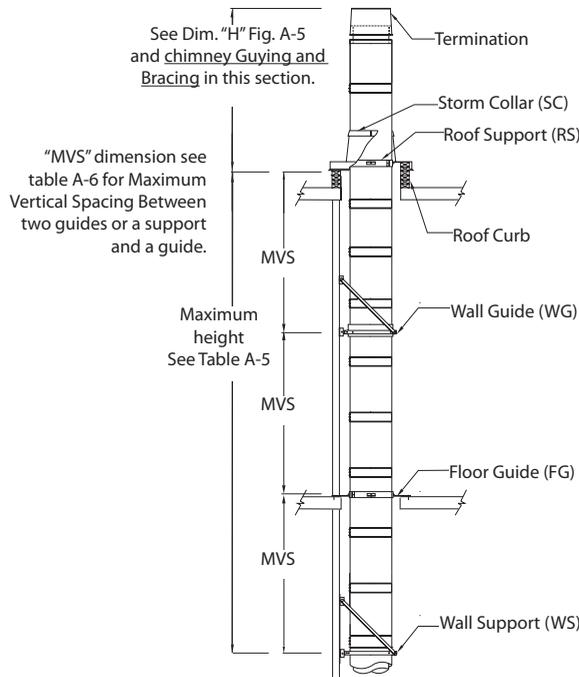
2. These supports and guides used with thermal expansion devices prevent bending stresses on the chimney elbows and joints.

3. Supports and guiding methods and installation are described in Section C. Certain limitations apply for proper installation of supports and guides. See Table A-5 and A-6.

Table A-5. Maximum chimney Heights and Support Method for All Models

Support method	Code	CBILA/ CBIL	CBIL1/ CBIL1F	CBIL2/ CBIL2F	CBIL4F
Wall Support Assembly	WS				
Size 6" thru 12"		70'	62'	55'	33'
Size 14" thru 24"		45'	40'	35'	23'
Size 26" thru 36"		35'	32'	30'	21'
Size 38" thru 48"		30'	26'	23'	16'
Anchor Plate Assembly	AP				
Size 6" thru 48"		50'	40'	30'	18'
Tee Section	T				
Size 6" thru 24"		26'	23'	20'	12'
Size 26" thru 48"		20'	17'	15'	10'
Roof Support	RS				
Size 6" thru 48"		12'	10'	8'	4'
Suspension Band	SB				
Size 6" thru 48"		16'	14'	10'	6'

Fig. A-4 - Maximum chimney Height and Support



Note: When max. height from table A-5 is exceeded, resupport using another support and expansion joint.

## SUPPORT AND GUIDE SPACING

Table A-6 Maximum spacing between two guides or a support and a guide for All Model

Inside Diameter (in)	CBILA, CBIL1 and CBIL1F		CBIL2, CBIL2F and CBIL4F	
	MVS*	H**	MVS*	H**
6	11'-0"	10'-0"	10'-0"	10'-0"
8	11'-4"	10'-0"	10'-4"	10'-0"
10	11'-8"	10'-0"	10'-8"	10'-0"
12	12'-0"	10'-0"	11'-0"	10'-0"
14	12'-4"	10'-0"	11'-4"	10'-0"
16	12'-8"	10'-0"	11'-8"	10'-0"
18	13'-0"	10'-0"	12'-0"	10'-0"
20	13'-4"	10'-0"	12'-4"	10'-0"
22	13'-8"	10'-0"	12'-8"	10'-0"
24	14'-0"	10'-0"	13'-0"	10'-0"
26	14'-4"	10'-0"	13'-4"	10'-0"
28	14'-8"	10'-0"	13'-8"	10'-0"
30	15'-0"	10'-0"	14'-0"	10'-0"
32	15'-4"	10'-0"	14'-4"	10'-0"
34	15'-8"	10'-0"	14'-8"	10'-0"
36	16'-0"	10'-0"	15'-0"	10'-0"
38	15'-0"	10'-0"	14'-0"	10'-0"
40	14'-8"	10'-0"	13'-8"	10'-0"
42	14'-0"	10'-0"	13'-0"	10'-0"
44	13'-0"	10'-0"	12'-0"	10'-0"
46	12'-4"	10'-0"	11'-4"	10'-0"
48	11'-8"	10'-0"	10'-8"	10'-0"

\* MVS = Maximum Vertical Spacing between two guides or a support and a guide in a vertical position.

\*\* H = Maximum free standing Height above the roof.

MHS = Maximum Horizontal Spacing between two guides or a support and a guide is 10 Feet. Exception for Hanger Bracket assembly (HB) where max. spacing is 5 feet.

## THERMAL EXPANSION

Good installation practice requires that any length of exhaust system between two fixed points subject to more than 1/4" expansion must have an Variable Length (VL) or bellows Expansion Joint (EJ) to compensate for expansion. All models will expand approx. 1 inch per 100° F temperature rise per 100 feet of pipe.

It is essential that these parts be properly installed and provided with adequate support and guidance to prevent binding or bending moments. (See detailed installation information contained in Section F.)

## PIPE WEIGHT

Pipe weight is given in pounds per foot of pipe for each diameter. It is important to know the weight of the chimney section for chimney support or guiding. Pipe weight (Table A-7) along with maximum chimney height (Table A-5) are necessary to calculate the proper anchor strength needed with Wall Supports (WS), Anchor Plate (AP) supports, Wall Guides (WG), Wall Bands (WB) and Suspension Bands (SB).

## General Information

Table A-7 - Pipe weight in lb/ft

I.D.	CBILA	CBIL1/ CBIL1F	CBIL	CBIL2/ CBIL2F	CBIL4F
6	5.3	6.5	5.9	8.8	14.6
8	6.8	8.4	7.4	11.1	17.7
10	8.4	10.3	9.0	13.4	20.7
12	9.9	12.2	10.5	15.6	23.8
14	11.5	14.0	12.1	17.9	26.8
16	13.0	15.9	13.6	20.2	29.9
18	14.6	17.8	15.2	22.5	32.9
20	16.1	19.7	16.7	24.7	35.9
22	17.7	21.6	18.3	27.0	39.0
24	19.2	23.5	19.8	29.3	42.0
26	20.8	25.4	21.4	31.6	45.1
28	22.3	27.3	22.9	33.9	48.1
30	23.9	29.2	24.5	36.1	51.2
32	25.4	31.1	26.0	38.4	54.2
34	27.0	33.0	27.6	40.7	57.3
36	28.5	34.9	29.1	43.0	60.3
38	30.1	36.8	30.7	45.2	63.3
40	31.6	38.7	32.2	47.5	66.3
42	46.5	53.5	47.5	63.1	83.3
44	48.7	56.0	49.6	66.0	87.0
46	50.9	58.5	51.8	68.9	90.6
48	53.0	61.0	54.0	71.7	94.3

EX: Model CBIL2F 6" diameter section of 25 ft in length  
 From table A-7, weight in lb/ft = 8.8  
 Total weight = 8.8 x 25 = 220 lbs

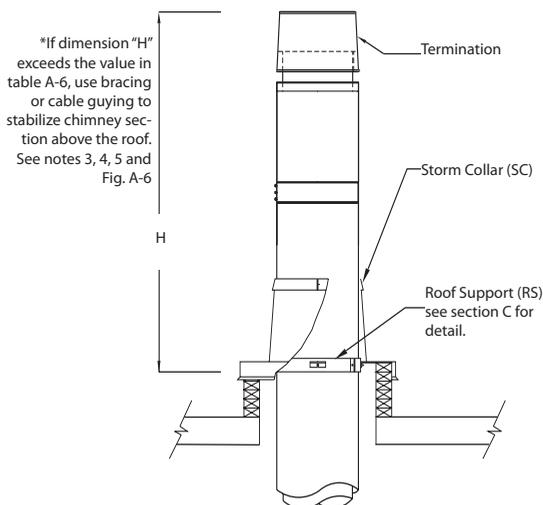
### CHIMNEY GUYING AND SPACING

1. Proper guying and bracing is essential for the part of the chimney that extends above the roof or a parapet wall. The chimney at this point is subject to wind conditions and needs special attention for proper stabilization.

2. For low freestanding installations the chimney needs no special guying or bracing if overall height between the roof support and the top of the chimney is no greater than 10 feet. See Fig. A-5 for detail

Note: In general, no additional support is needed below the roof provided that the overall height of the chimney up to the roof support does not exceed the maximum height Described in Table A-5. See Fig.A-4.

Fig. A-5 - Maximum freestanding chimney height

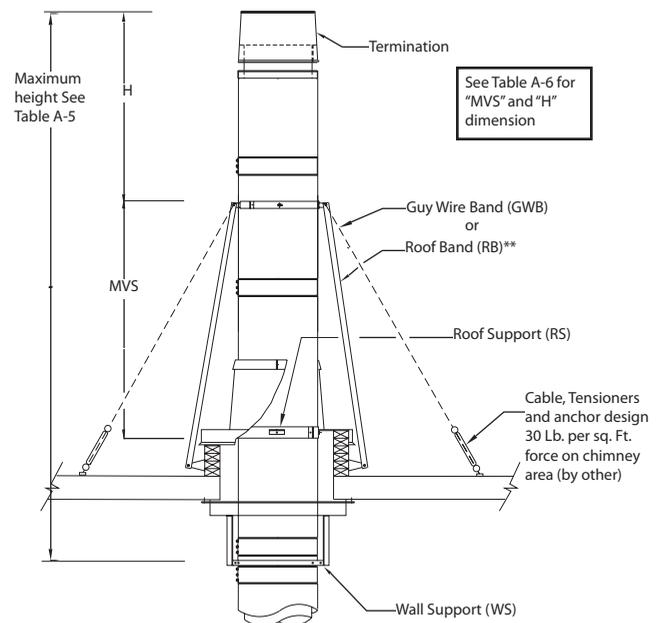


3. For above the roof installations where freestanding height limits are exceeded, cables or bracing are needed to resist heavy wind conditions and effects and prevent structural damage. Rigid bracing can be used where the chimney height above roof is relatively low.

4. Roof Band assembly (RB) model part is used for rigid bracing in above the roof installations. Guy Wire Band (GWB) model can also be used as an option, instead of the roof band assembly.

5. In addition to the roof support where freestanding height is exceeded, the chimney needs to be secured below the roof with a support to protect the roof flashing against additional loads caused by wind on the exposed chimney. (See Fig. A-6).

Fig. A-6 Chimney height with rigid bracing or guying option



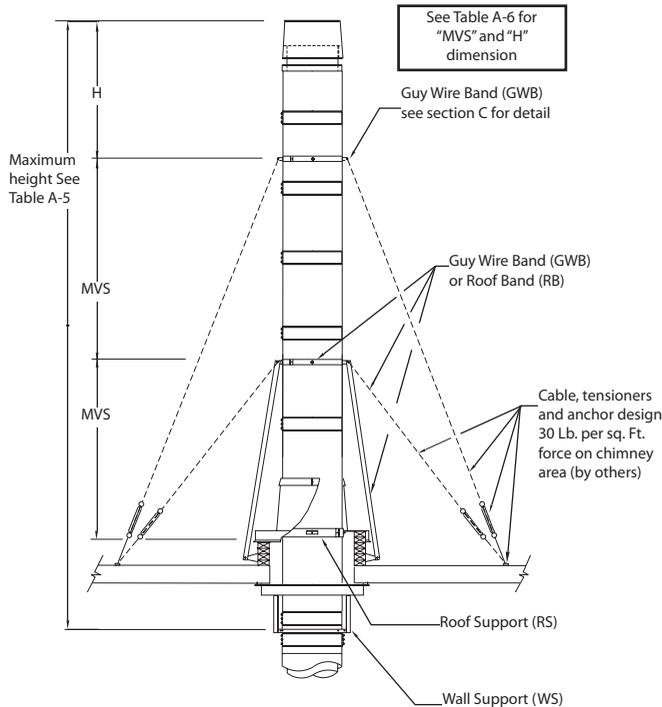
Note: Max. height over the roof for single guying or roof band is MVS + H. For greater heights see Fig. A-7

\*\* See Roof Band (RB) and Guy Wire Band (GWB) assembly details in section C.

# General Information

6. Greater height above the roof can be allowed by stabilizing the exposed chimney with additional guying cables as seen in Fig.-A-7.

Fig. A-7 - Maximum chimney height with multi-level guying



Note: Max. height over the roof is  $(2 \times MVS) + H$ . For greater height use of welded joints is necessary.

## TERMINATION HEIGHT

Chimney and vents shall terminate above the roof level in accordance with the following requirements:

1. Five feet above the roof level or any adjacent flat roof, wall parapet or air in takes, and/or in accordance with the following NFPA 211 requirements.
2. Where chimney terminates at less than 10 feet from any adjacent ridge, wall or parapet, the chimney shall terminate at minimum of 3 feet above the ridge, wall, or parapet.
3. Where chimney terminates at more than 10 feet from ridge, wall, or parapet, a minimum height of 2 feet shall be required above the ridge wall or parapet.

## MULTI-ENGINE EXHAUST NOT RECOMMENDED

A common exhaust system for multiple engine or turbine installations is generally not recommended. Check with your engine or turbine manufacturer prior to common exhaust system design, because exhaust gas from operating units tends to flow to stand-by units where condensation may form. WATER IN ENGINE OR TURBINES AT START-UP MAY CAUSE DAMAGE. IN GENERAL, A SEPARATE EXHAUST SYSTEM SHOULD BE PROVIDED FOR EACH ENGINE OR TURBINE.

## 90° TEE (T90)

1. Generally used to connect the horizontal length from an appliance to the vertical length in boiler exhaust systems.

2. The 90° Tee (T90) will support up to 20 to 30 feet of vertical chimney height when it is supported from below.

3. The assembly includes a Finishing Band (FB); Assembly Band (AB) and insulation strip (where applicable). Joint assembly for the tee, elbow, Tee Cap (TC) and connection to the pipe sections is done in the same manner as described in Section A, Piping and Fitting Assembly.

4. A Tee Cap (TC) or Drain-Tee Cap (DC) may be used to block one of the openings for purposes of cleaning, inspection or drainage.

5. When used for drainage purposes, the Drain-Tee Cap (DC) is installed at the base of the tee and is piped to a suitable drain (3/4" diameter) and serves to collect rain or condensation water. (See Fig.B-6)

## 90° TEE SUPPORT

When designing a boiler exhaust system, special care will be observed in supporting tees and elbows. Following are design guidelines for this purpose.

1. Use expansion joints in all horizontal or lateral breechings. (See Fig.B-2)
2. Provide access for easy removal of tee cap.
3. Never use the chimney outer casing for support.
4. Design system so that sliding of expansion joints takes place, rather than bending at tees or elbows.
5. Single Axis Support: In short laterals where no more than 1/4" of thermal expansion (See Table-B-1) is expected in the horizontal run between an appliance connection and a tee, use single axis vertical support as described in Table-B-2.
6. Two Axis Support: Where thermal expansion in the horizontal run between an appliance connection and a tee is more than 1/4" the assembly needs to be supported both vertically and horizontally to allow the Variable Length (VL) or the bellows Expansion Joint (EJ) to absorb expansion movement and prevent damage to the Tee. (See Table-B-3)

Note: Note: The 90° Tee (T90) should not be used on engine or turbine exhaust except when used as an inspection access where no change in flow direction is applicable.

Table B-1. Maximum allowable length for single axis support

Gas Temperature Rise	Maximum Length	Expansion
200°F	12'-0"	0.25"
300°F	8'-0"	0.25"
400°F	6'-0"	0.25"
500°F	5'-0"	0.25"
600°F	4'-0"	0.25"
700°F	3'-6"	0.25"
800°F	3'-0"	0.25"
900°F	2'-6"	0.25"
1000°F	2'-0"	0.25"

Note: 60°F - 70°F ambient T°

Note: Do not use with Engine or Turbine Exhaust

Table B-2 Single axis support for 90° tee (T90)

## Tee location

Adjacent to:	Interior	Exterior	Use Support Type	Detail
Roof*	x		Wall Support (WS)	See Fig B-1a
Floor**	x		Anchor Plate (AP)	See Fig B-1b
Wall	x		Wall Support (WS)	See Fig B-1c
Wall		x	Wall Support (WS)	See Fig B-1d

Table B-3 - Two axis support\*\*\* for 90° Tee (T90)

## Tee location

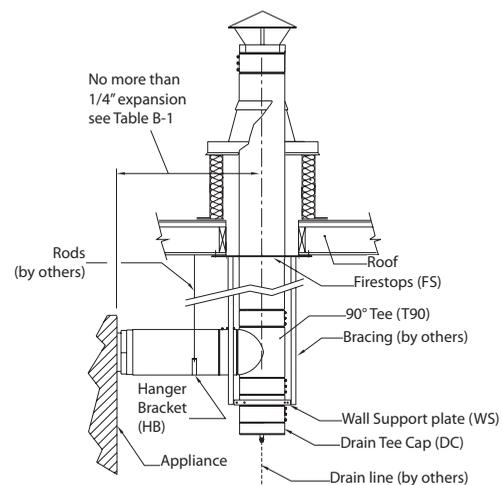
Adjacent to:	Interior	Exterior	Use Support Type	Detail
Roof*	x		Wall Support (WS)	
Floor**	x		Anchor Plate (AP)	
Wall	x		Wall Support (WS)	See Fig B-2
Wall		x	Wall Support (WS)	

\* Where chimney exits directly to the outside.

\*\* Where chimney passes through one or more floors before exit to outside.

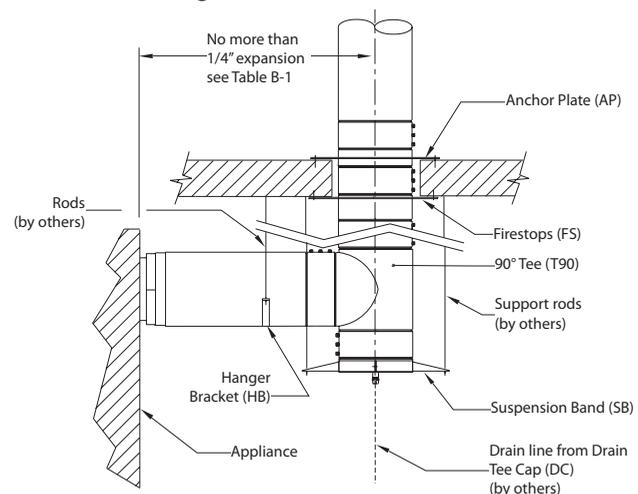
\*\*\* Install Variable length (VL) or bellows Expansion Joint (EJ) to absorb thermal expansion in horizontal run.

Fig. B-1 a - Single axis 90° Tee (T90) support from roof



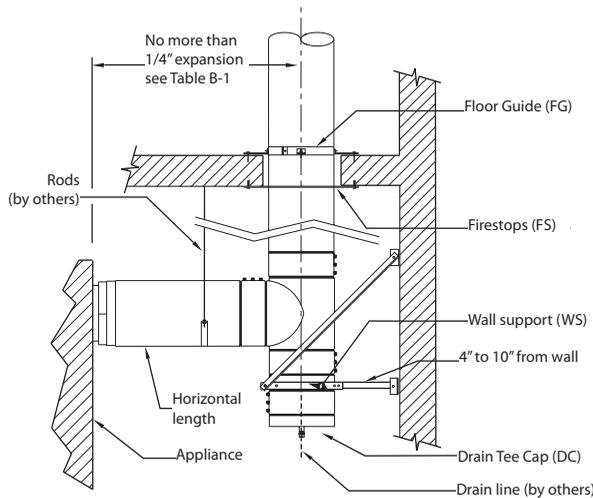
Note: Do not use with Engine or Turbine Exhaust

Fig. B-1 b - Single axis 90° Tee (T90) support from interior floor and ceiling



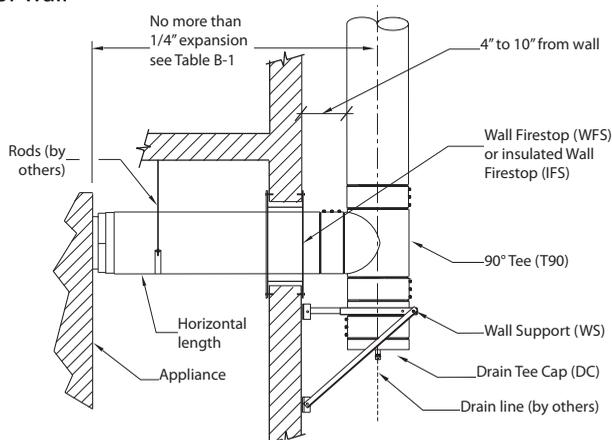
Note: Do not use with Engine or Turbine Exhaust

Fig B-1c - Single axis 90° Tee (T90) support from interior wall



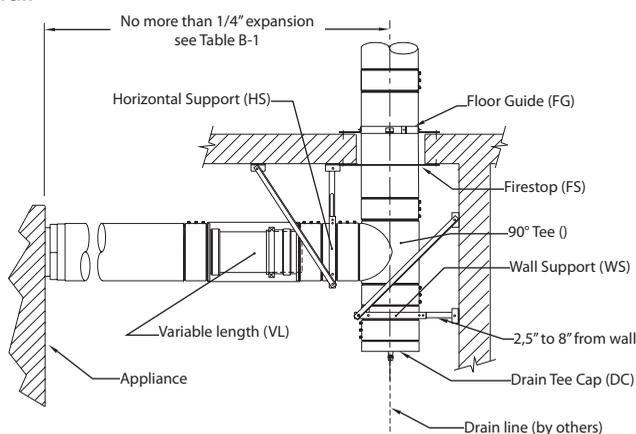
**Note: Do not use with Engine or Turbine Exhaust**

Fig. B-1d - Single axis 90° Tee (t90) support from exterior wall



**Note: Do not use with Engine or Turbine Exhaust**

Fig. B-2 Two axis 90° Tee (T90) support from interior wall



**Note: Do not use with Engine or Turbine Exhaust**

Table B-4 - single axis support\*\*\* for 45° Tee (T45)

Tee location	Interior	Exterior	Use Support Type	Detail
Roof*	x		Wall Support (WS)	See Fig B-3a
Floor**	x		Anchor Plate (AP)	See Fig B-3b
Wall	x		Wall Support (WS)	See Fig B-3c
Wall		x	Wall Support (WS)	See Fig B-3d

\* Where chimney exits directly to the outside.

\*\* Where chimney passes through one or more floors before exit to outside.

\*\*\* Install Variable length (VL) or bellows Expansion Joint (EJ) to absorb thermal expansion in horizontal run.

## 45° TEE (T45)

1. The use of this part will require an additional 45° Elbow (E45) to provide the low resistance 90° flow direction change. (See Fig.B-3a)

2. The 45° Tee (T45) is also used for multiple appliance exhaust in manifold breaching. It allows lower friction losses thus resulting in smaller manifold diameter. See Fig.B-8

3. Like the 90° Tee (T90), a Tee Cap (TC) or Drain-Tee Cap (DC) may be used to block one of the openings for purposes of cleaning, inspection or drainage. See Fig B-5 and B-6 for tee caps installation.

4. The 45° Tee (T45) will support up to 20 to 30 feet of vertical chimney height when it is supported from below. The assembly includes a Finishing Band (FB), Assembly Band (AB) and insulation strip (where applicable).

5. Joint assembly for the tee, elbow, tee cap and connection to the pipe sections is done in the same manner as described in Section A Piping and Fitting Assembly.

## 45° TEE SUPPORT

1. Use expansion joints in all horizontal or lateral breachings.

2. Provide access for easy removal of tee cap

3. Never use the chimney outer casing for support.

4. Design system so that sliding of expansion joints takes place, rather than bending at fittings.

5. Single Axis Support: In short laterals where no more than 1/4" of thermal expansion (See Table-B-1) is expected in the horizontal run between an appliance connection and a tee, use single axis vertical support as described in Table-B-4.

6. Two Axis Support: Where thermal expansion in the horizontal run between an appliance connection and a tee is more than 1/4" the assembly needs to be supported both vertically and horizontally to allow the Variable Length (VL) or the bellows Expansion Joint (EJ) to absorb expansion movement and prevent damage to the tee. (See Table-B-5.)

Fig. B-3a Single axis 45° Tee (T45) support from roof

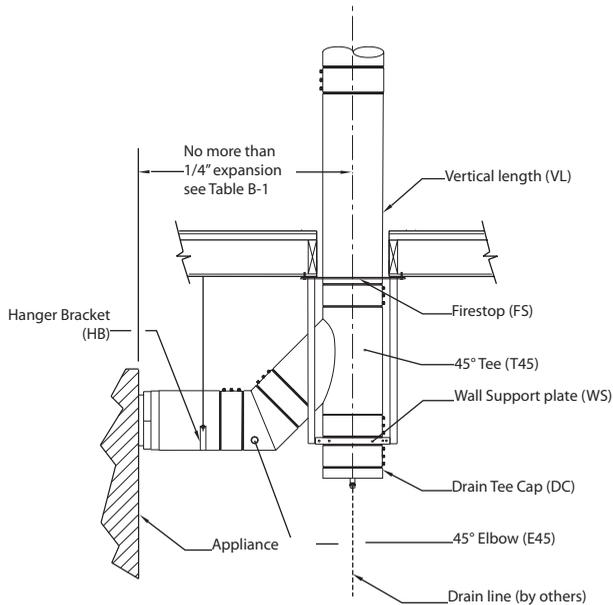


Fig. B-3c - Single axis 45° Tee (T45) support from interior wall

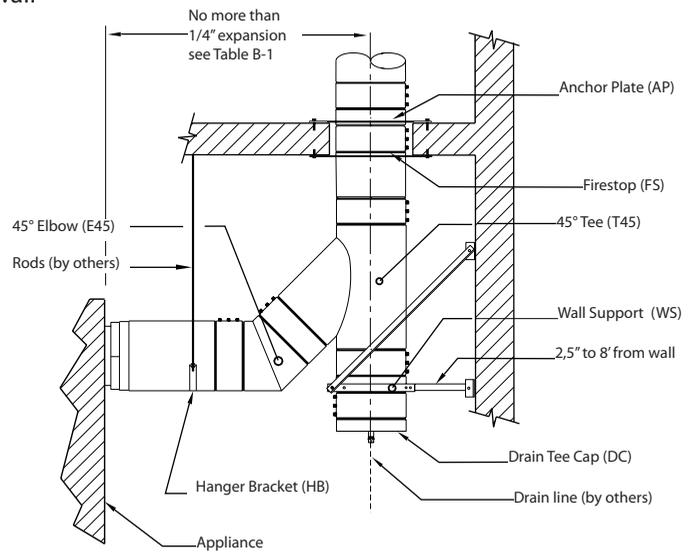


Fig. B-3b - Single axis 45° Tee (T45) support from floor and ceiling

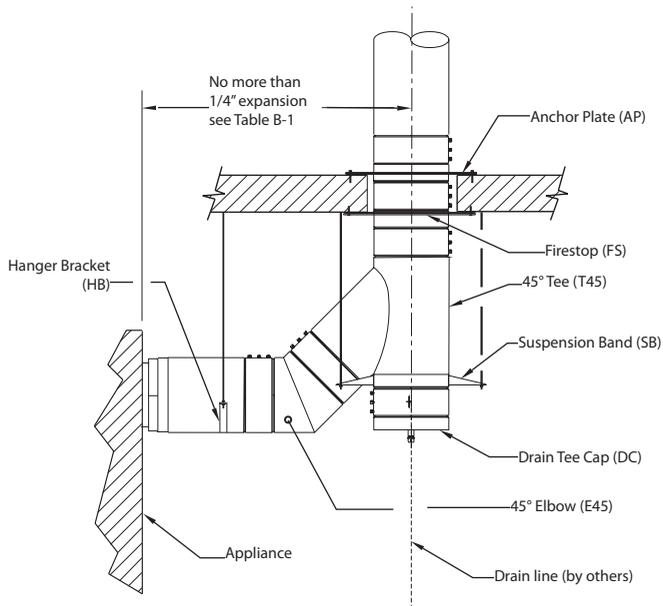


Fig. B-3d - Single axis 45° Tee (T45) support from exterior wall

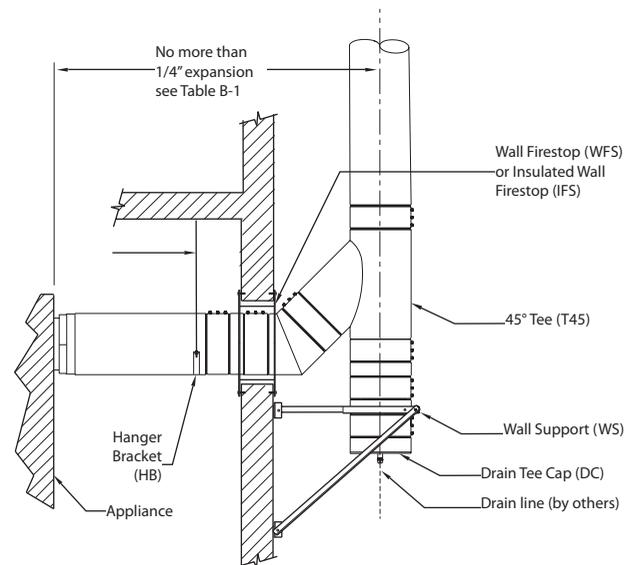


Table B-5 - Two axis support\*\*\* for 45° Tee (T45)

Tee location	Interior	Exterior	Use Support Type	Detail
Roof**	x		Wall Support (WS)	
Floor**	x		Wall Support (WS)	See Fig B-4a
Wall	x		Wall Support (WS)	See Fig B-4b
Wall		x	Wall Support (WS)	

\* Where chimney exits directly to the outside.

\*\* Where chimney passes through one or more floors before exit to outside.

\*\*\* Install Variable length (VL) or bellows Expansion Joint (EJ) to absorb thermal expansion in horizontal run.

Note: Two axis support using Horizontal Support (HS).

Fig. B-4a - Two Axis 45° Tee (T45) support from ceiling

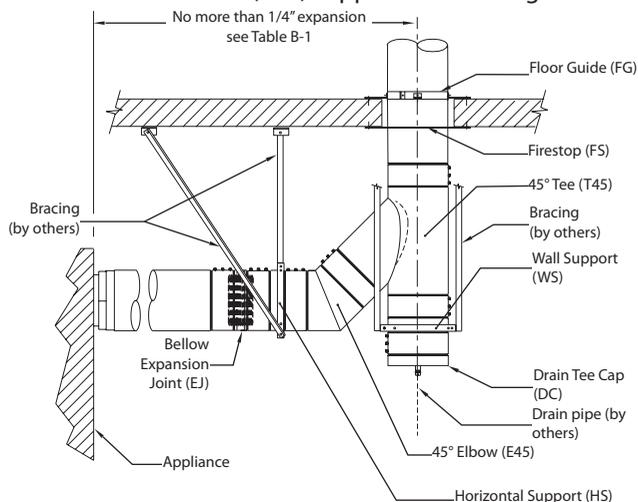
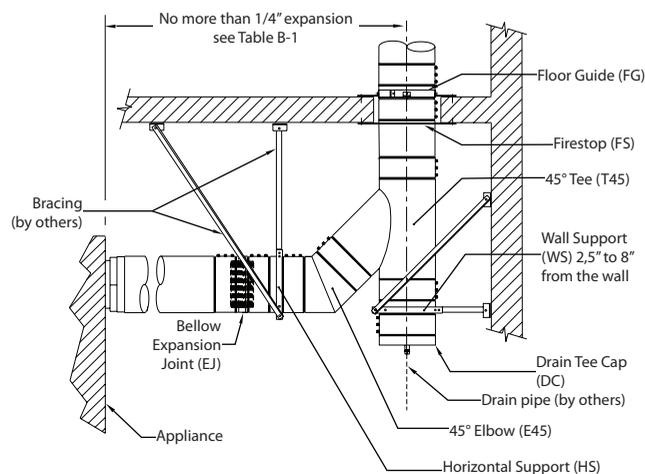


Fig. B-4b - Two axis 45° Tee (T45) support from interior wall



## WYE 90° (W90)

Used for inspection or pipe cleaning, the Wye 90° (W90) is normally used in grease duct application. (See grease duct installation instruction manual).

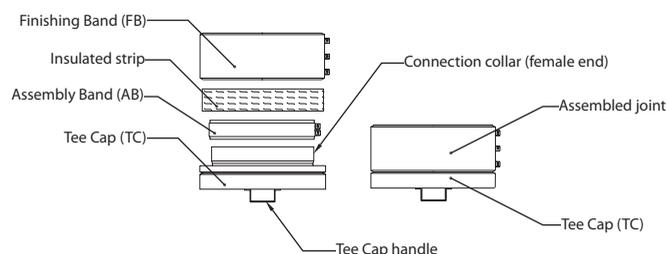
## TEE CAP (TC)

1. Used to block one of the openings of horizontal or vertical tee. Removable, it facilitates access for inspection and maintenance of the chimney.

2. The assembly includes a Finishing Band (FB), Assembly Band (AB) and insulation strips (where applicable).

3. Joint assembly between the Tee Cap (TC) and the Tee is done in the same manner as described in Section A Piping and Fitting Assembly.

Fig. B-5 - Tee Cap (TC)



## DRAIN TEE CAP (DC)

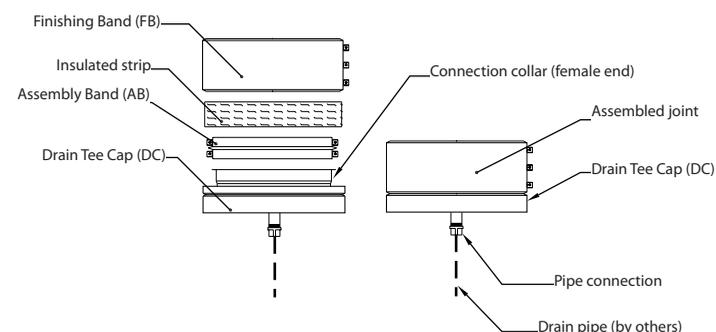
1. Used to block the lower vertical opening of a tee. It serves to collect rainwater that may enter the chimney or water caused by condensation.

2. Removable, it facilitates access for inspection and maintenance of the chimney.

3. To be connected to a drain of 3/4" diameter-NPT. It is connected to the tee with the joint assembly.

4. Joint assembly between the Drain-Tee Cap (DC) and the tee is done in the same manner as described in Section A Piping and Fitting Assembly.

Fig. B-6 - Drain Tee Cap (DC)



## INCREASER (I)

- Used to increase the diameter of the flue or chimney.
- The Inserter (I) can be connected directly to a 45° Tee (T45). (See Fig.B-7b) and can be used in a multiple appliance manifold. (See Fig.B-8)
- The Inserter (I) includes a transition section tapered at a 14° angle, which provides a lower friction loss coefficient. (See Fig.B-7a Detail B)
- Larger diameter Inseters (I) are available on order or as specified. The angle of the Inserter (I) is standard but the length of the fitting varies depending on the diameter to be increased.
- Joint assembly between the Inserter (I) and the flue is done in the same manner as described in Section A Piping and Fitting Assembly.

Fig. B-7a - 4" and 2" diameter increased

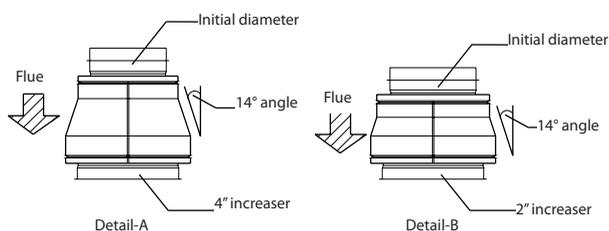
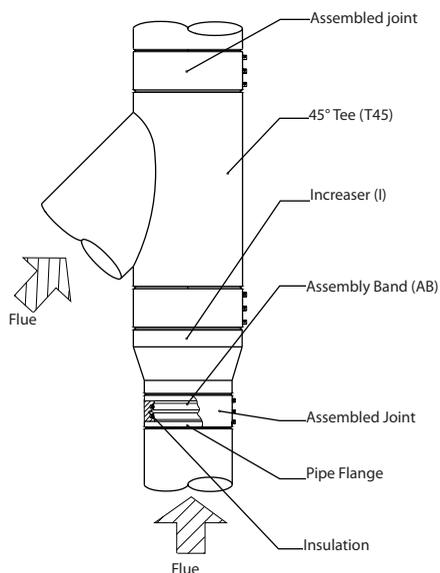


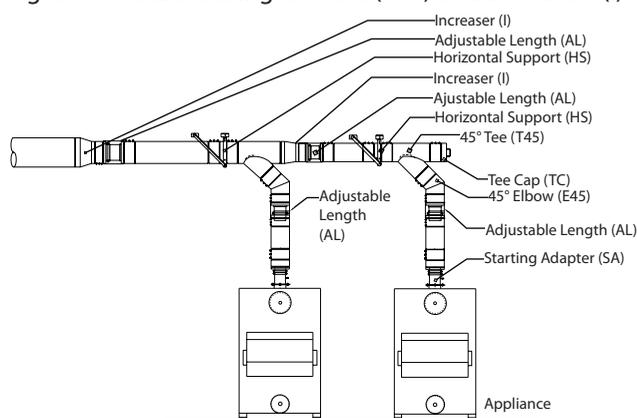
Fig B-7b - Inserter (I) with 45° Tee (T45)



## REDUCER (R)

- Used to reduce the diameter of the flue. It is used mainly at the inlet of the chimney.
- Specify the diameter of the inlet and outlet of the fitting. It is connected to the flue in the same manner as for Inserter (I) model except that the ends are inverted.
- Joint assembly between the Reducer (R) and the flue is done in the same manner as described in Section A Piping and Fitting Assembly.

Fig. B-8 - Manifold using 45° Tees (T45) and Inseters (I)



## ELBOWS

- Elbows are used for changes in direction in horizontal or vertical portions of a chimney system.
- All elbows feature the standard joint assembly as described in Section A Piping and Fitting Assembly.
- Elbows are used in combination to make up different angles ranging from 5° to 90° in horizontal and vertical breechings of the chimney system.
- When elbows are used for offsets in the main vertical portion of the chimney, caution should be exercised to prevent excessive bending forces and/or design problems. (See OFFSETS in this Section for details)

## 5° ELBOW (E5)

- Used for offset or deviation of the horizontal part of the flue or chimney by 5°.
- May be used to slope a flue to facilitate the run-off of condensation water from the flue or chimney. (See Fig.B-9b)

Fig. B-9a - 5° Offset using 2 x 5° Elbows (E5)

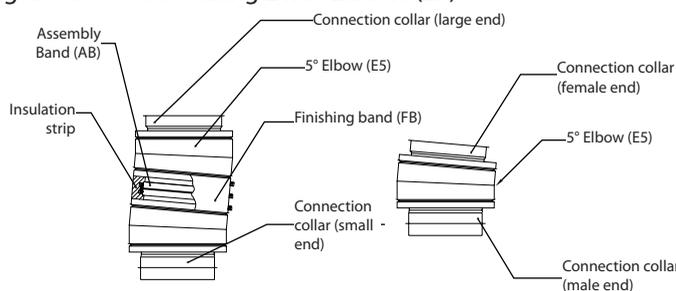
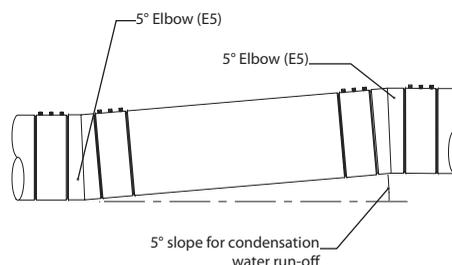
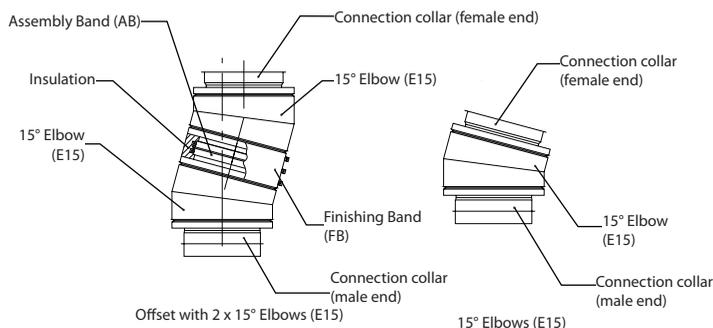


Fig. B-9b - 5° Horizontal slope for condensation Water run-off using 5° elbows (E5)



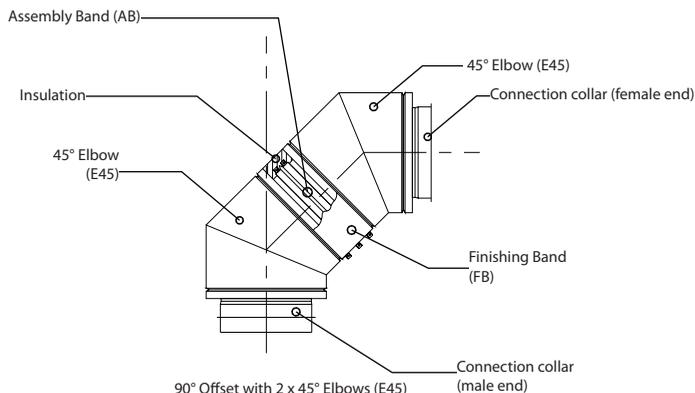
## 15° ELBOW (E15)

Used for offset or deviation of the flue or chimney by 15°. Fig. B-10 - 15° Elbow (E15)



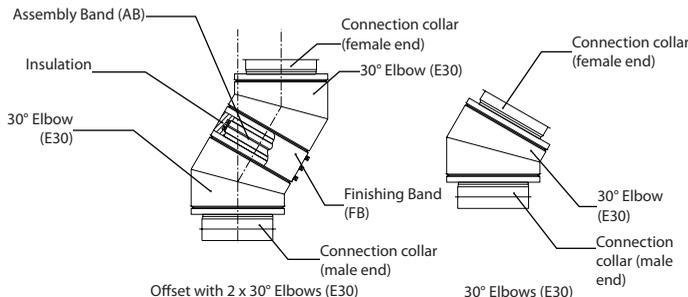
## 90° ELBOW

Used deviation of the flue or chimney by 90°. Fig. B-8e - 90° Elbow w 2 x (E45) or also 1 piece 90° Elbow (E90)



## 30° ELBOW (E30)

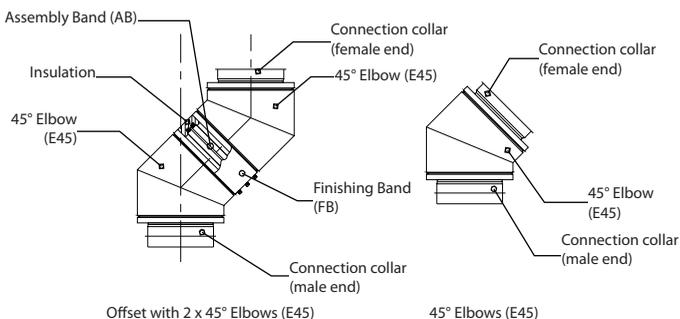
Used for deviation of the flue or chimney by 30°. Fig. B-8c - 30° Elbow (E30)



## 45° ELBOW (E45)

Used for deviation of the flue or chimney by 45°. Can also form a 90° elbow by using two elbows. (See fig. B-8e)

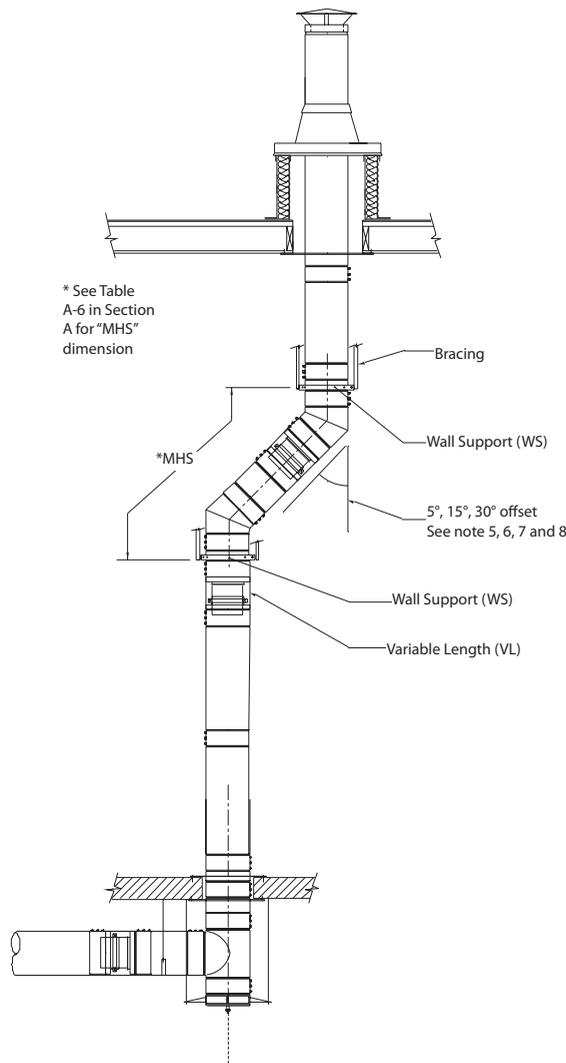
Fig. B-8d - 45° Elbow (E45)



## OFFSETS

1. Except where absolutely necessary, sloped or horizontal offsets in the vertical portion of a chimney above the breeching should be avoided.
2. Sloped offsets require more expansion joints and secure bracing above and below elbows.
3. Because elbows (and fittings) can only take limited forces due to any bending moments, special care should be exercised in designing the bracing for elbows.
4. Structural parts such as posts or beams may also be needed to hold chimney supports in position.
5. Chimneys for combination fuel heating appliances that are capable of burning solid fuel or are convertible to solid fuel are limited to the same 30° slope even if the current choice of fuel is gas or oil.
6. The length of offset, if one is necessary, is determined by strength considerations. The maximum dimension between supports, given as the "MHS" dimension in Section A of these instructions, is applicable to all horizontal and sloped orientations. (See Fig. B-9)
7. To assure proper guidance of expansion joints and to prevent unnecessary joint bending, use an adequate number of supports at closer intervals.
8. With generator set or turbine exhaust use bellows Expansion Joint (EJ) below each support in offset runs. For boiler exhaust use Variable Length (VL).

Fig. B-9 - Maximum horizontal offset



9. With frequent resupport, there is no structural or operating limit to the length of horizontal or sloped portions of a chimney models, providing the system meets the capacity, pressure drop of available equipment.

10. The carrying capacity of all models supports and their structural attachments must take into account the weight of the offset plus whatever vertical pipe is carried by that support.

11. Height limits for supports are tabulated in Section A of these instructions.

12. The ends of any sloped or horizontal offset must be anchored to prevent overstressing elbows and to assure proper operation of expansion joints.

13. The vertical sections of chimney above the offset must also be supported or anchored and guided where necessary.

14. All models Roof Support (RS), Wall Support (WS), Wall Guide (WG) may be used in a variety of ways for offset support to achieve the structural stability of the chimney system.

Preferred methods of using all models supports are shown in Section C.

15. Resupports such as those shown in Fig. B-9 must be securely anchored to walls, posts, or locally fabricated rigid framework. This framework must be designed to assure stability of attached all models supports, such as Anchor Plate (AP) supports and Wall Supports (WS).

16. Supports suspended by threaded rods or from small size angles or straps are usually not satisfactory to resist bending moments due to offsets.

### SPECIAL PARTS

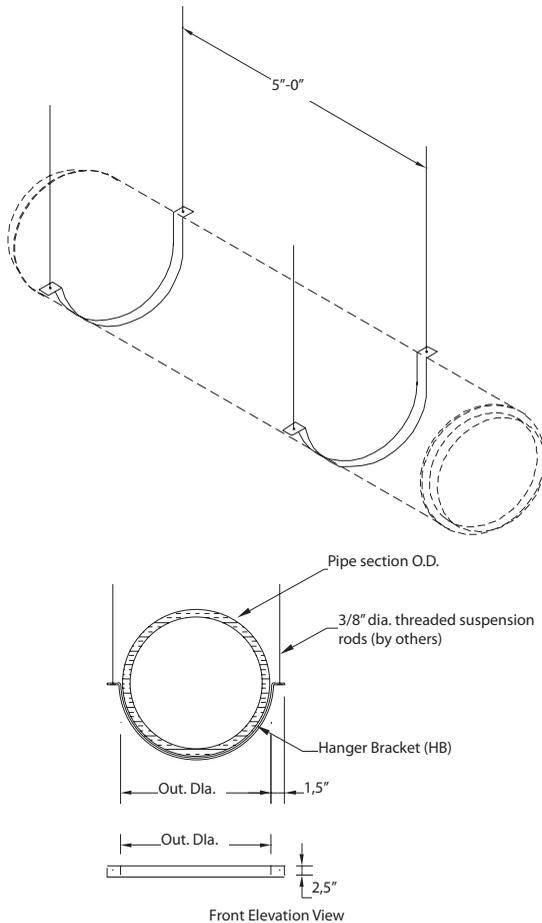
Available when specified are special parts or components used in chimney systems that can be factory-built to accommodate field situations where standard parts cannot be used.

# Structural Support and Guiding

## HANGER BRACKET ASSEMBLY (HB)

Used to support the flue in horizontal runs. To be installed by means of 3/8" diameter threaded suspension rods (by others). Generally installed every 5'-0" of chimney section. (See Fig. C-1.)

Fig. C-1 - Hanger Bracket Support Assembly (HB)



## WALL SUPPORT ASSEMBLY (WS)

1. The Wall Support (WS) Assembly consists of a 12" chimney (11" effective length) section, plasma-welded to a square support plate.

2. The chimney section, which extends both above and under the support plate is used as connection collars for quick and easy joint assembly.

3. The assembly is supplied with mounting brackets and angle struts for diagonal bracing (See Fig. C-2), Assembly Band (AB) and Finishing Band (FB).

4. The chimney sections are joined to the Wall Support (WS) in the same manner as described in Section A Pipe and Fitting Joint Assembly. Fig. A-1, 2 and 3. Also See Fig. C-2a in this Section.

5. Used to support the chimney in vertical runs, it maintains the chimney at an adjustable distance between 4" and 10" from the wall.

6. The diagonal braces may be attached to the wall either above or below the supporting plate.

7. The Wall Support (WS) is the maximum strength support for vertical models. It is used to maintain joint alignment and support for expansion joints.

8. The support may be required to support both upstream and downstream parts of a tee, which will be protected from excessive bending stresses.

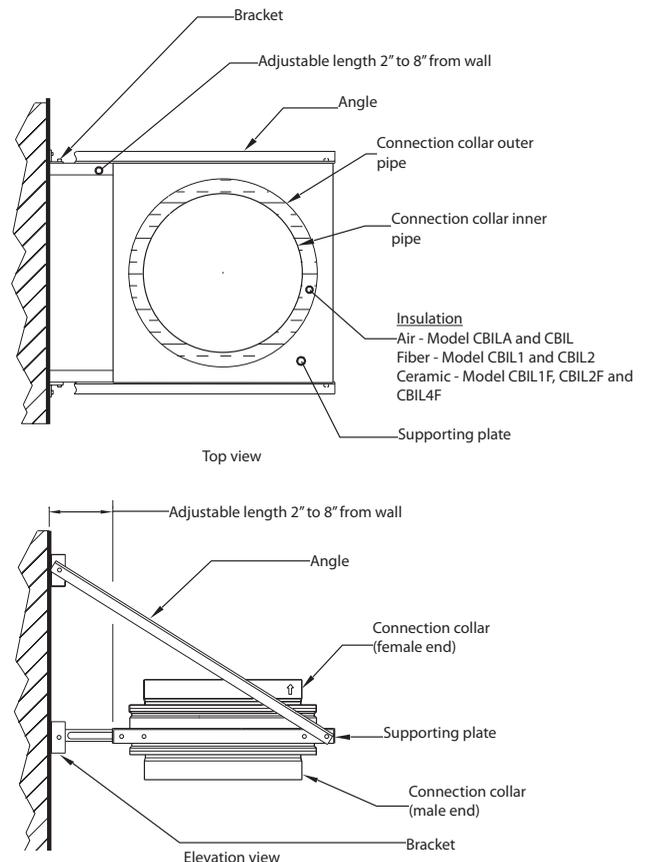
9. Greater heights may be obtained by adding Wall Supports (WS), using Variable Length (VL) or bellows Expansion Joint (EJ) below each point of support.

10. The wall support method is intended only for attachment to NON-COMBUSTIBLE surroundings such as steel structure, concrete blocks or other masonry, with clearances adequate for access and assembly. Heat conduction can be reduced by means of spacers. Wall Support (WS) is not suitable for attachment to wood or combustible wall structures.

Height Limit: See Section A Table A-5 for maximum height of Wall Support (WS)

Wall Support must be secured to the building with rigid structural framework.

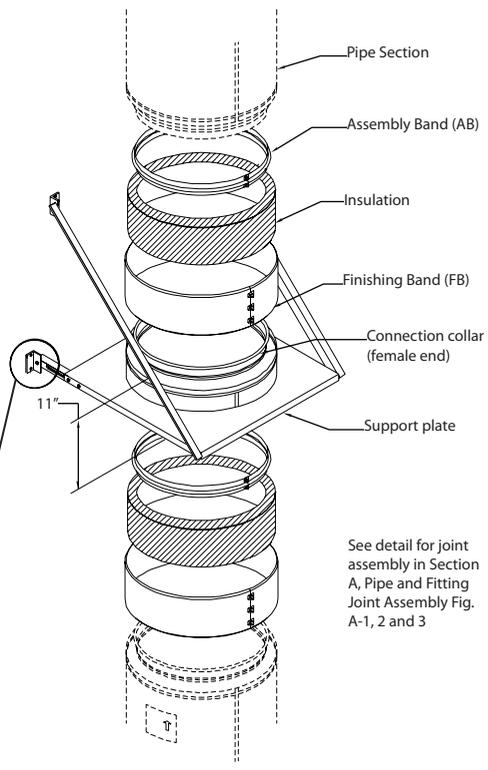
Fig. C-2 - Wall Support Assembly (WS)



Note: For connection of the Wall Support (WS), Horizontal Support (HS) and Anchor Plate (AP) support to the chimney system, see typical installation detail (Fig. C-2a) on next page.

# Structural Support and Guiding

Fig. C-2a - Typical joint for Wall (WS), Horizontal (HS) and Anchor Plate support(AP)



Note: Minimum clearance between chimney and combustibles is 2.5" when installed with wall brackets only. Do not attach the supporting plate directly to combustible materials. Always use wall brackets. For more than 2.5" clearance, use wall brackets and adjustable angles.

## HORIZONTAL SUPPORT (HS)

1. The Horizontal Support assembly (HS) consists of a 12" chimney (11" effective length) section, plasma-welded to a square support plate.
2. The chimney section, which extends both ahead and behind the support plate, is used as connection collars for quick and easy joint assembly.
3. The assembly is supplied with mounting brackets, an Assembly (AB) and Finishing Band (FB). See Fig.C-3.
4. The chimney sections are joined to the Horizontal Support (HS) in the same manner as described in Section A Pipe and Fitting Joint Assembly. Fig. A-1, 2 and 3. Also See Fig.C-2a in this Section.
5. Used to support the flue in horizontal runs. It holds the flue at an adjustable distance from the ceiling. The diagonal braces may be attached to the ceiling either ahead or behind the supporting surface. See Fig. C-3.
6. The horizontal support must be secured to the building with a rigid structure. Under no circumstance should a horizontal support be secured with threaded suspension rods, since this will not prevent pipe sway.

Fig. C-3 - Horizontal Support Assembly (HS)

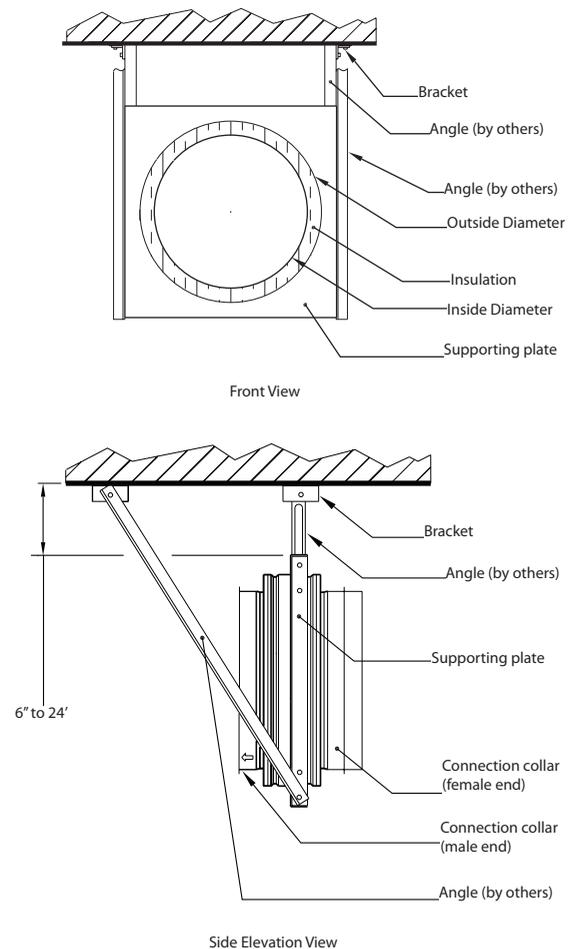
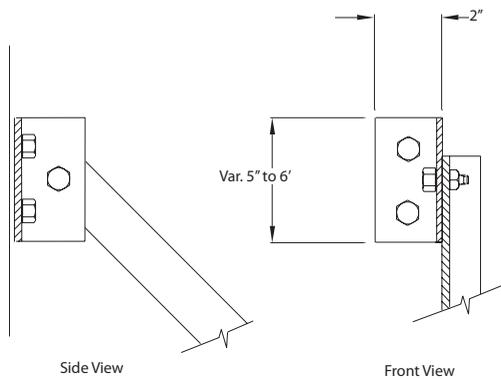


Fig. C-2b - Wall Bracket Detail



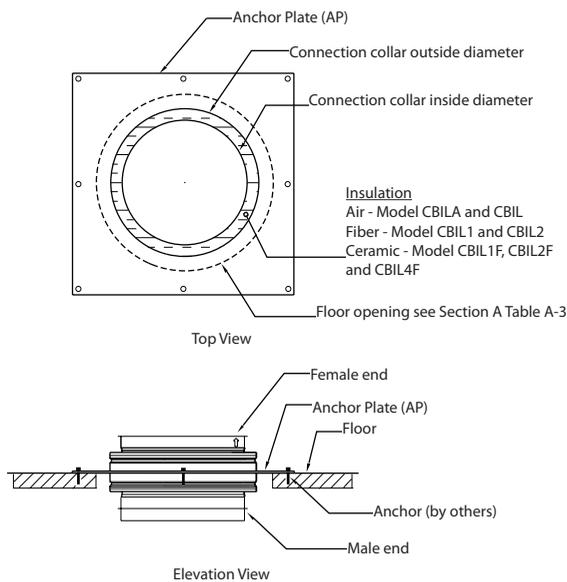
# Structural Support and Guiding

## ANCHOR PLATE ASSEMBLY (AP)

1. The anchor plate assembly consists basically of a 12" chimney (11" effective length) section that is welded to a steel plate.
2. The chimney section that extends both above and under the plate is used as connection collars for quick and easy joint assembly to the pipe sections.
3. It is supplied with both an Assembly Band (AB) and Finishing Band (FB).
4. Used to support the chimney in vertical runs. It is attached to the floor by means of anchors (by others) See Fig.C-4.
5. Pipe sections are then attached to the support collars in the same manner as described in Section A Pipe and Fitting Joint Assembly Fig. A-1, 2 and 3. Also See Fig. C-2a in this Section

Height Limits: See Section A Table 5 for maximum support height of Anchor Plate (AP).

Fig. C-4 - Anchor Plate Assembly (AP)

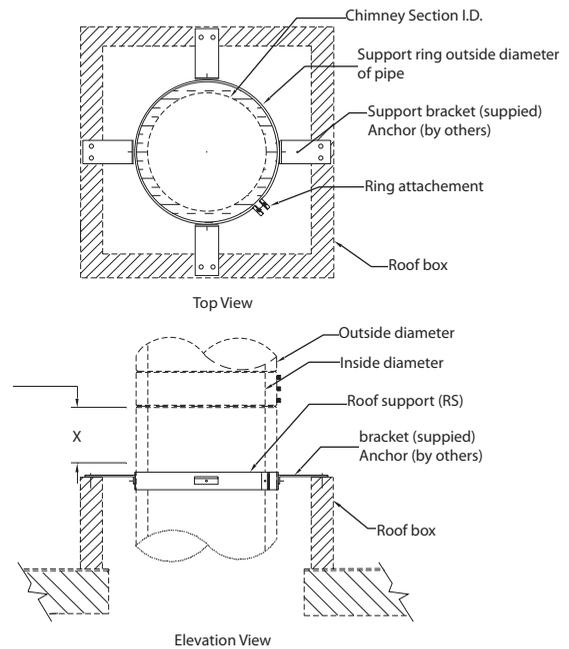


## ROOF SUPPORT (RS)

Used to support and guide the portion of the chimney, which extends to the roof. It is attached to the roof box by means of four angles (See Fig.C-5). It maintains a minimum distance between the chimney and combustible materials at the roof.

Height Limits: See Section D Roof and Wall Penetration for complete Roof Support (RS) assembly details and use.

Fig. C-5 - Roof Support (RS)

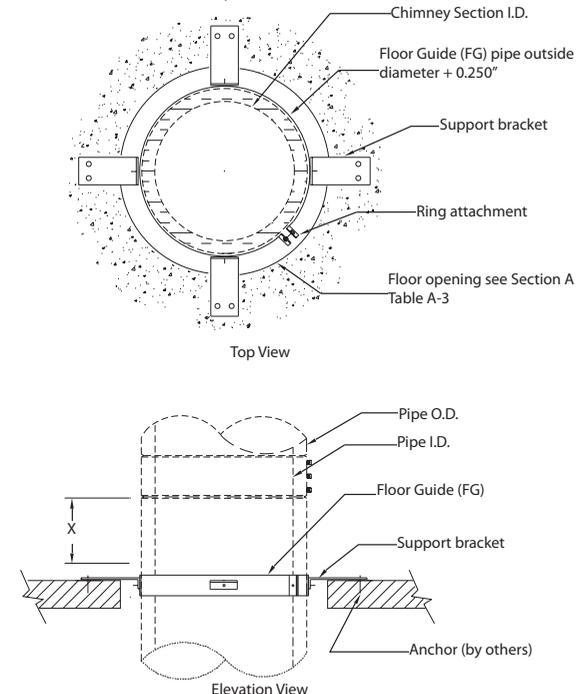


Keep joint away from support X = 6" Min. above and under

## FLOOR GUIDE ASSEMBLY (FG)

Used as a guide at a floor penetration. It is attached to the floor by means of 4 angle brackets. It maintains a minimum distance between the chimney and combustible floor material.

Fig. C-6 - Floor Guide assembly (FG)



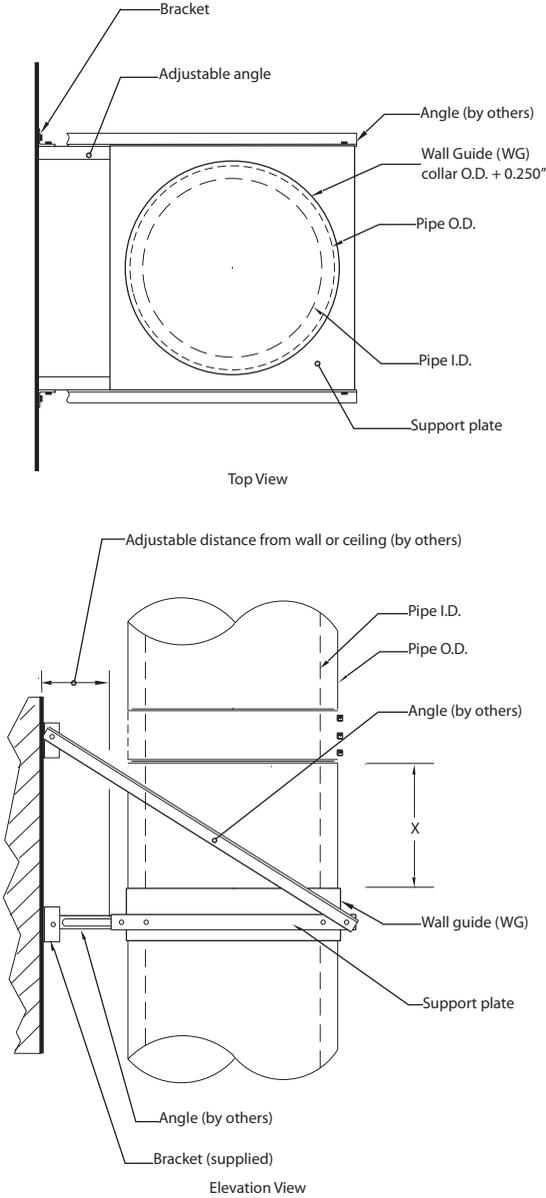
Keep joint away from support X = 6" Min. above and under

# Structural Support and Guiding

## WALL AND CEILING GUIDE ASSEMBLY (WG)

Used to guide and allow the expansion of the flue or chimney. It holds the flue or chimney at an adjustable distance from ceiling or wall. The diagonal braces may be attached above or below the guide plate. The ring is 1/4 " larger than the outside diameter of the chimney pipe to allow for sliding. (See Fig.C-7)

Fig. C-7 - Wall and Ceiling Guide Assembly (WG)



Keep joint away from support X = 6" Min. above and under

## WALL BAND ASSEMBLY (WB)

Stabilization of the chimney along a vertical wall is obtained by the use of the Wall Band (WB) assembly. For maximum recommended distance between a Wall Band (WB) and another guide or support, see Table-A-6 "MVS".

Fig. C-8a - Wall Band Assembly (WB)

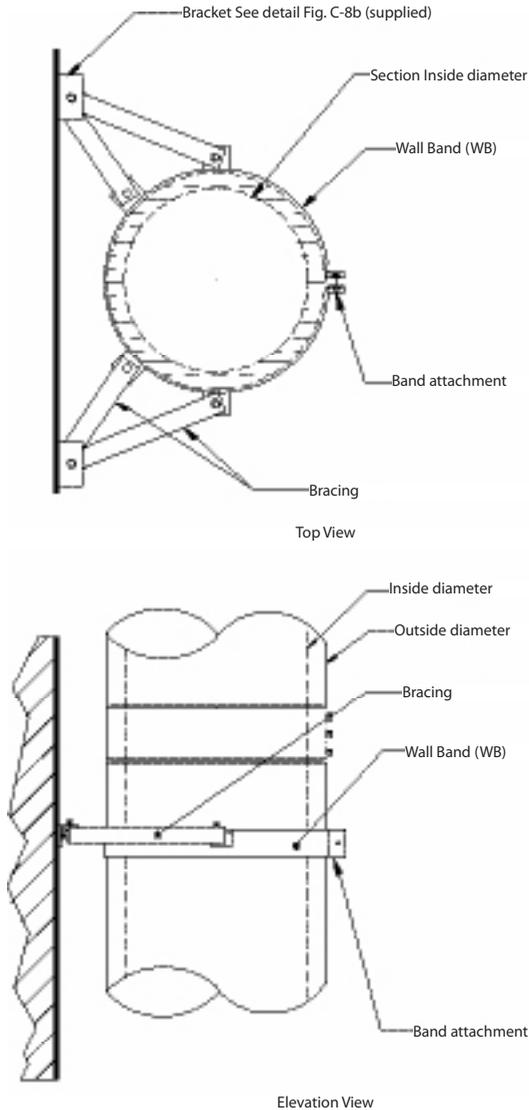
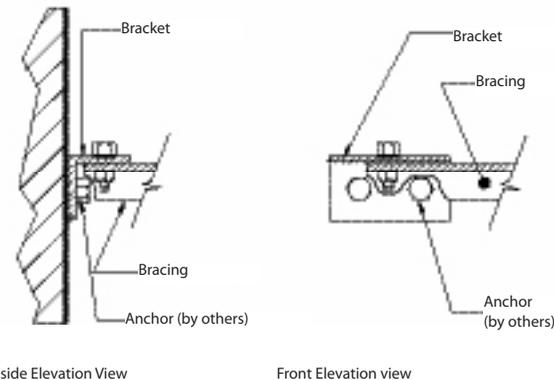


Fig. C-8b - Bracket Detail



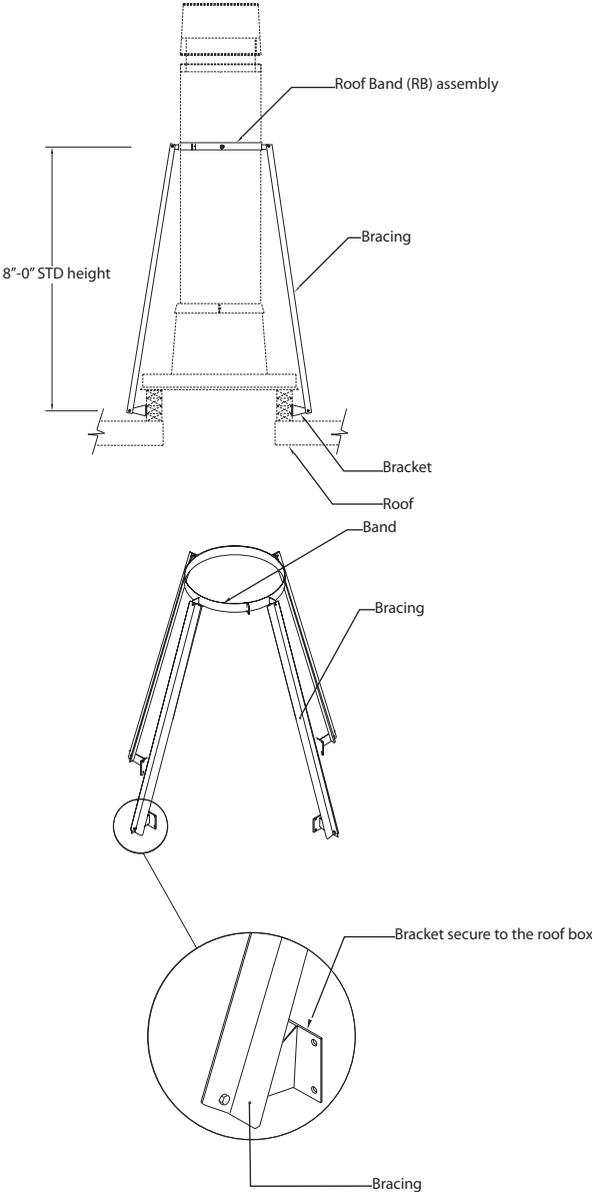
# Structural Support and Guiding

### ROOF BAND (RB)

Used to stabilize the chimney laterally where it rises more than 10'-0" beyond the roof or for places exposed to strong winds. It is attached to the chimney and the roof box, and does not require anchoring to the roof.

Height Limits: See Section A Chimney Guying and Bracing for maximum height of roof band (RB) assembly.

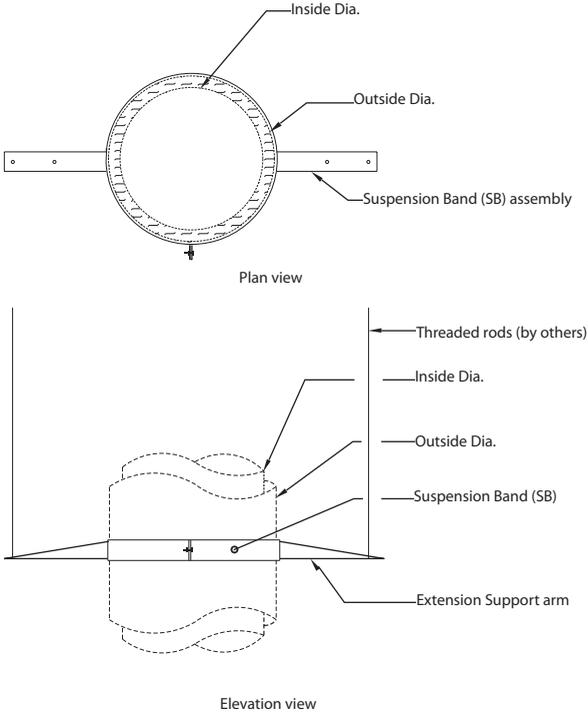
Fig. C-9 - Roof Band Assembly



### SUSPENSION BAND (SB)

Used to stabilize and support a flue or chimney in vertical runs. It avoids the transfer of the flue weight to the appliance. To be used with threaded rods (By others).

Fig. C-10 - Suspension Band (SB)



Height Limits: See Table A-5 for maximum height of chimney using Suspension Band (SB) support.

# Structural Support and Guiding

## GUY WIRE BAND (GWB)

Used to stabilize a chimney laterally where it extends more than 10'-0" beyond the roof or for places exposed to strong winds. It is attached to the chimney and is designed to receive 3 guy cables 120° apart. It may be manufactured to receive 4 guy cables 90° apart. See Fig.C-10b.

Height Limits: See Section A Chimney Guying and Bracing for maximum height Guy Wire Band (GWB) assembly.

Fig. C-10b - Guy Wire Band (GWB) Detail

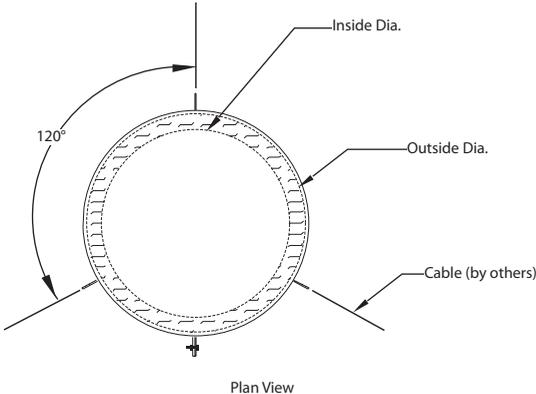
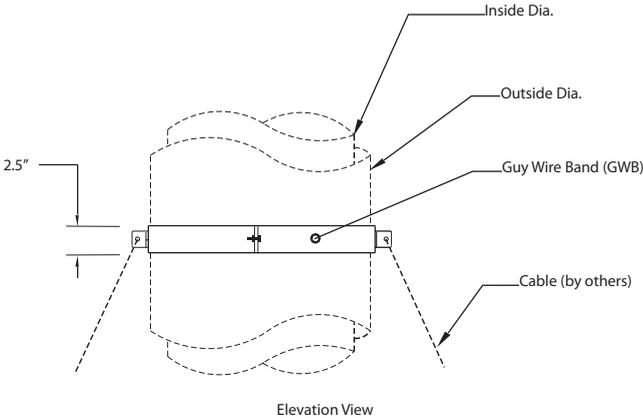
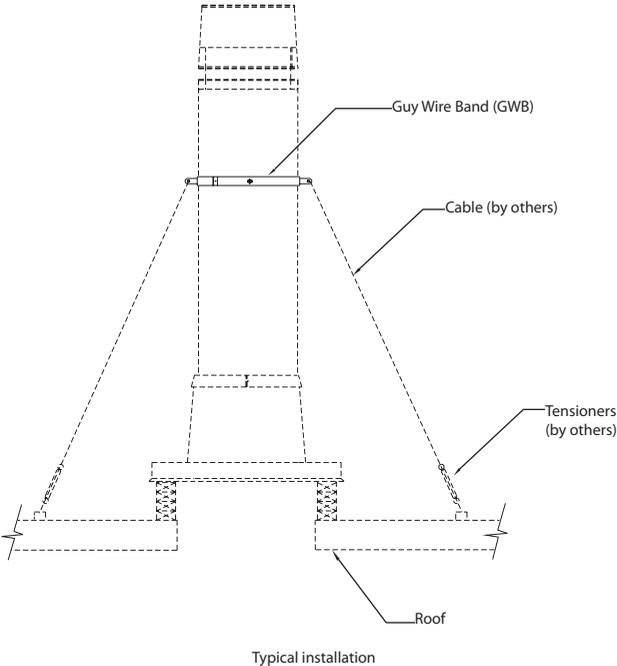


Fig. C-10a - Guy Wire Band (GWB) Typical installation

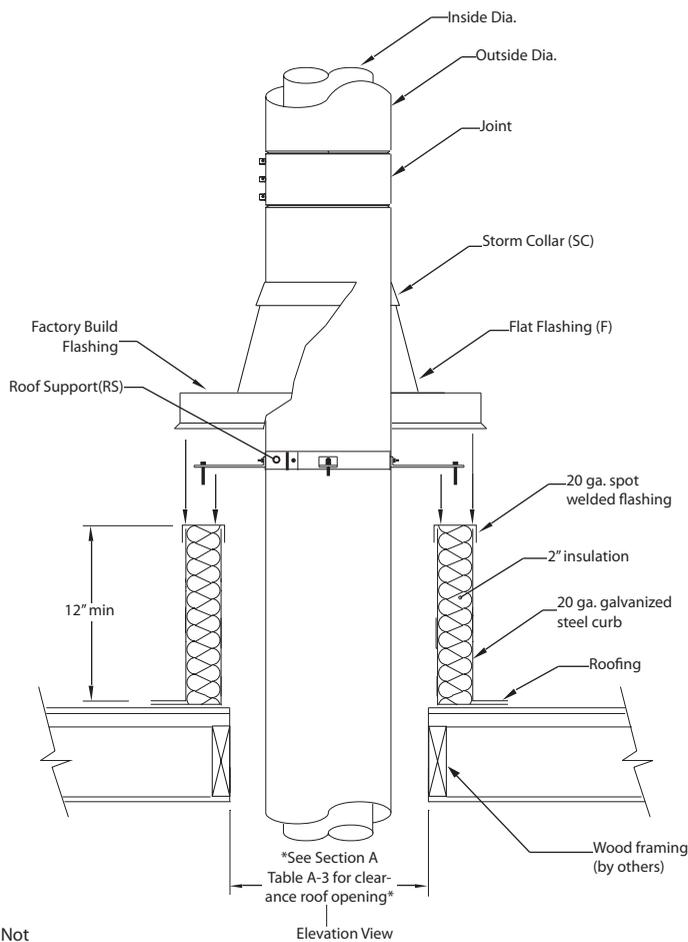


## Roof and Wall Penetration

### FLAT FLASHING ASSEMBLY (F)

The Flat Flashing assembly (F) is primarily used for boiler or low temperature exhaust where a chimney section passes through a roof made of combustible material. It is designed to be installed on a flat roof curb of a minimum height of 12" (See Fig. D-1). For some areas, greater heights may be needed according to local code requirements. The roof framing dimension must provide sufficient opening to comply with the minimum clearance from combustibles. (See Section A Table-3, for minimum clearance) The Roof Support (RS) is secured to the top of the roof curb using two 1/4" x 2 1/2" inch lag bolts in each support bracket. (See Section C for detail of Roof Support (RS)). The Flat Flashing (F) is then lowered on to the curb and the Storm Collar (SC) secured to the chimney section with the screws supplied. A Ventilated Flashing (VF) option is also available where air circulation between the chimney and the roof structure is wanted. The Ventilated Flashing (VF) option may serve as a ventilation outlet in small boiler rooms with gravity air supply.

Fig. D-1 - Flat Flashing Roof Assembly (F)



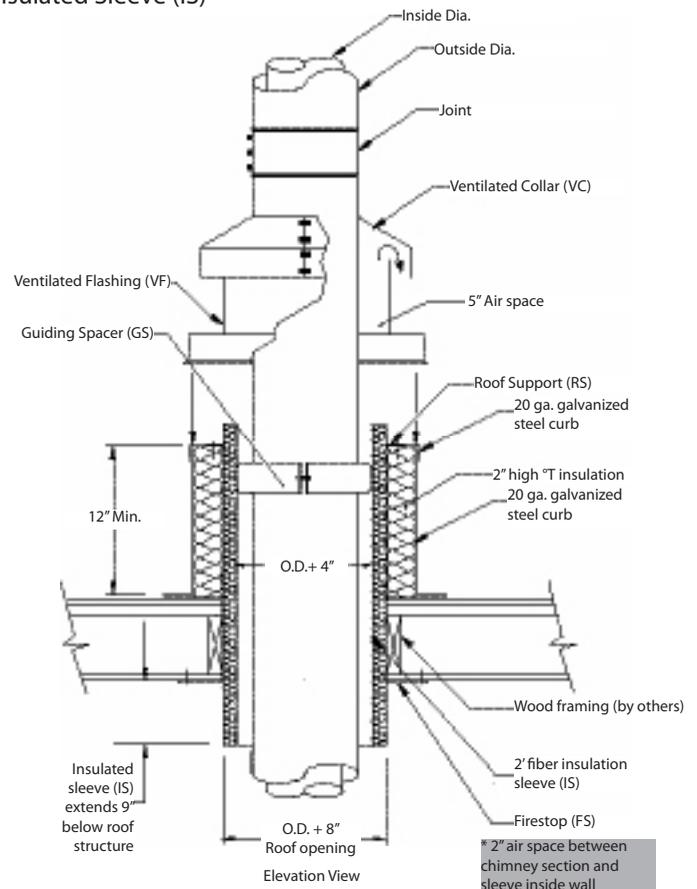
\* Not Table-A-3 for roof openings.  
2. Framing of roof openings for combustible roof applications must meet specified clearances in Section A Table-A-3. Proper framing is the responsibility of the installing contractor.

### VENTILATED FLASHING (VF) WITH INSULATED SLEEVE (IS)

The Ventilated Flashing assembly (VF) is primarily used for engine or turbine or high temperature exhaust where a chimney section passes through a roof made of combustible construction. It protects the structure against built up heat temperatures by allowing air circulation between the chimney and the roof structure. It is designed to be installed on a flat roof curb of a minimum height of 12" (See Fig. D-2). For some areas, greater curb height may be needed according to local code requirements. (See Fig.D-2 for curb and framing dimensions).

The Insulated Sleeve (IS) is secured to the top of the roof curb using two 1/4" x 2 1/2" inch lag bolts in each support bracket (See Fig. D-4 for detail of Insulated Sleeve (IS)). The Ventilated Flashing (VF) is then lowered on to the curb and the Ventilated Collar (VC) secured to the chimney section with the screws supplied. (See also see Fig.D-5)

Fig. D-2 - Ventilated Flashing (VF) Roof Assembly with Insulated Sleeve (IS)



Note: Proper framing of openings for combustible roof applications must meet specified clearance I. D. +12" and is the responsibility of the installing contractor.

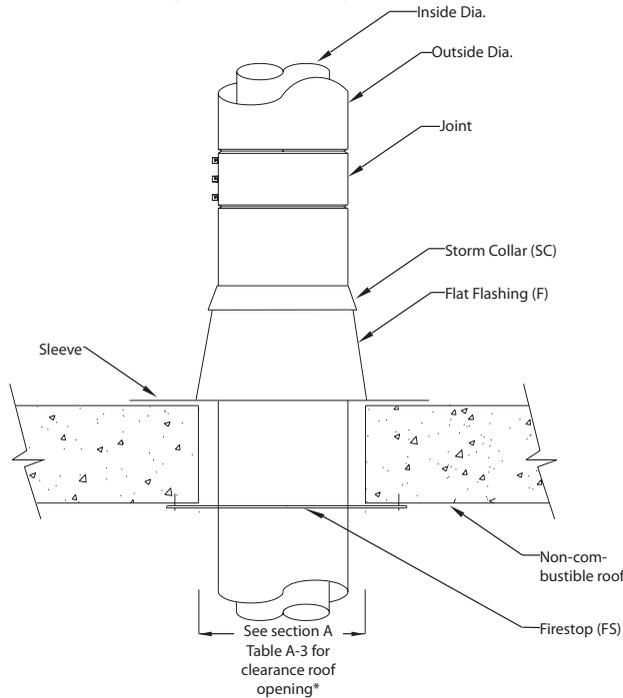
**WARNING**  
DO NOT CAULK OR SEAL OR USE ANY TYPE OF INSULATION IN THE VENTILATING OPENINGS BETWEEN THE CHIMNEY AND THE INSULATED SLEEVE (IS) AS WELL AS BETWEEN THE ROOF CURB AND THE VENTILATED FLASHING (VF). ALLOW FOR FREE AIR CIRCULATION AT ALL TIMES.

# Roof and Wall Penetration

## FLAT FLASHING (F) WITHOUT ROOF CURB

The Flat Flashing (F) assembly is primarily used for low temperature exhaust where a chimney section passes through a roof made of non-combustible material.

Fig. D-3 - Flat Flashing Roof Assembly (F)



## INSULATED SLEEVE (IS)

1. Used with CBILA and CBIL chimney model to protect combustible materials where a flue or chimney passes through a floor or roof. It can also be used with all other models, when added security is needed to protect combustibles.
2. It ensures a minimum space of 2" from combustible materials. (See Fig.D-4)
3. Reduces excessive heat by means of its double wall 2" high-temperature insulation.
4. It can be used with Ventilated Flashing (VF) roof assembly. (See Fig.D-5)

Fig. D-4 - Insulated Sleeve (IS)

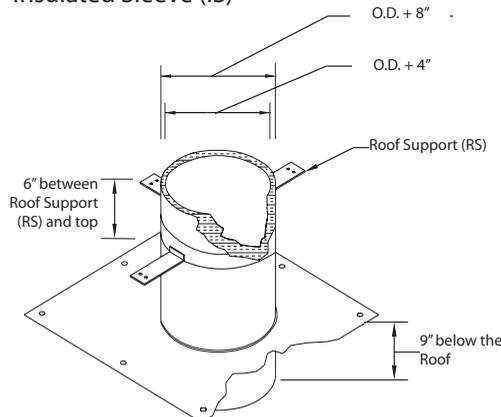
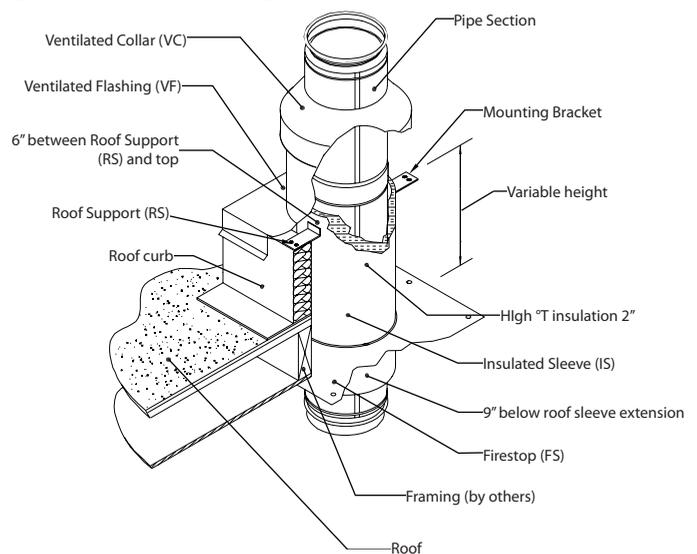


Fig. D-5 - Typical through the roof installation



## INSTALLATION

1. Install roof curb over the roof opening.
2. Install the Guiding Spacer (GS) on the chimney section passing through the roof to allow for expansion of the chimney section by allowing it to slide in the Insulated Sleeve (IS) assembly.
3. Install Insulated Sleeve (IS) by sliding it in over the guide and chimney section. Secure the sleeve to the roof curb with the mounting brackets or the Roof Support (RS).
4. Install the Ventilated Flashing (VF) over the roof curb and Insulated Sleeve (IS) assembly.
5. Install the Ventilated Collar (VC) by securing it to the pipe section leaving a 4" gap between the collar and the top of the Ventilated Flashing (VF).
6. Install the firestop by sliding it over the Insulated Sleeve (IS) and securing it under the roof structure.

## WALL PENETRATION

1. Where a chimney section passes through a wall, the combustible material in the wall need to be protected from radiation heat from the chimney.
2. Table-D-1 shows the different parts that provide sufficient clearance between the chimney and the combustibles in the wall.
3. Table-D-1 also shows required clearance between the chimney and the combustibles as well as the wall opening needed for each chimney model.

Table-D-1 Wall Penetrations

Model	Wall Penetration Part	Max. Wall Thickness	Wall Opening	Clearance	See detail
CBILA and CBIL	Firestop Type	18"	I.D. + 12"	4" CBILA = 5"	Fig.D-6, 7, 8
	Insulated (IFS) with finishing collar				
CBIL1 and CBIL2	Non-insulated (WFS)	18"	Table A-3	Table A-2	Fig. D-9, 10, 11
CBIL1F, CBIL2F and CBIL4F	Non-insulated (WFS)	18"	Table A-3	Table A-2	Fig. D-9, 10, 11

Note: 1. Finishing collar is used only for exterior wall application.  
2. Clearance are calculated from O.D. to the combustibles.

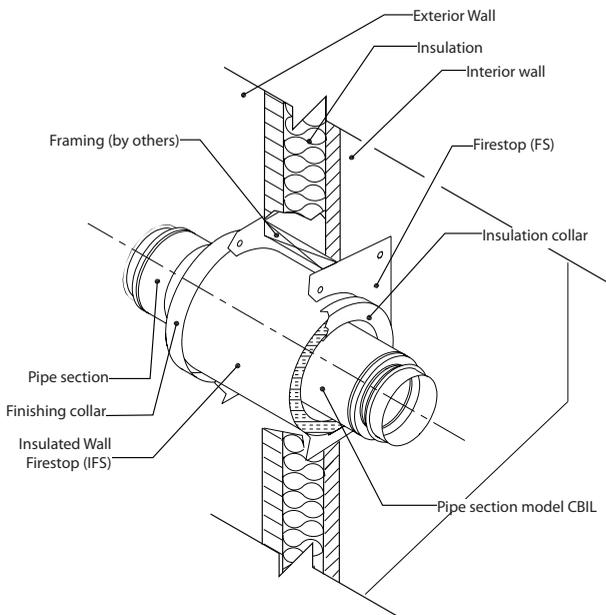
# Roof and Wall Penetration

## INSULATED WALL FIRESTOP (IFS)

1. The Insulated Wall Firestop (IFS) assembly is primarily used for wall penetration allowing a section to pass through a wall made of combustible material. It is used to maintain a minimum clearance between the combustible wall material and the chimney section passing through the wall (see Fig D-8). It protects the wall from heat radiated from the chimney.

2. The Insulated Wall Firestop (IFS) is used with double wall non-insulated model CBIL/CBILA. For other models see non-insulated Wall Firestop (WFS) Fig. D-9.

Fig. D-6 - Insulated Wall Firestop (IFS) assembly



Do not install insulation in the opening between the pipe outside wall and the firestop inner wall, allow for free air circulation at all times.

Fig. D-7 - Insulated Wall Firestop (IFS)

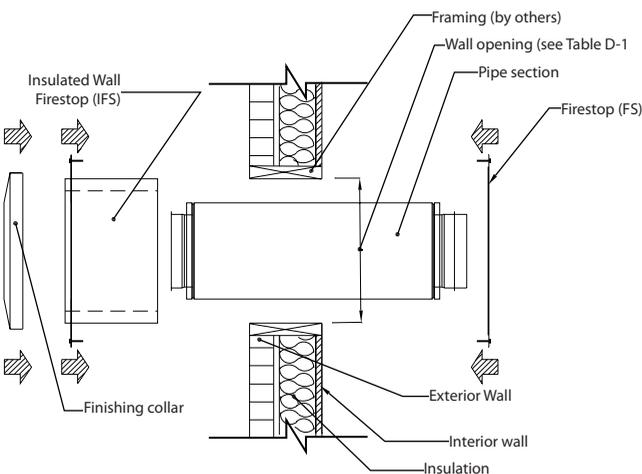
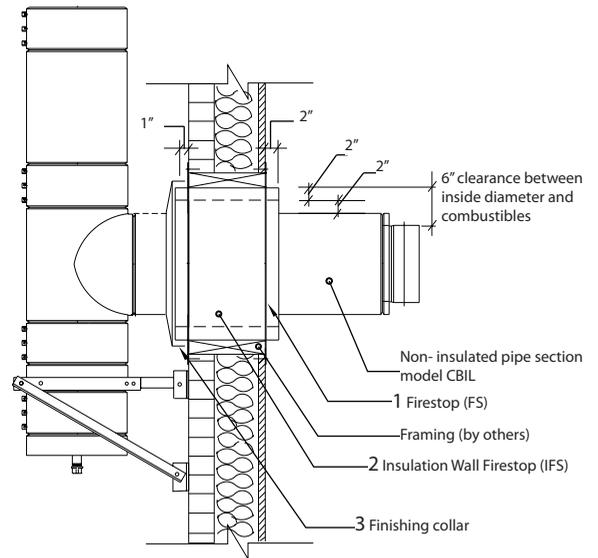


Fig. D-8 - Typical Insulated Wall Firestop (IFS) installation for exterior wall application CBIL/CBILA model



Do not install insulation in the opening between the pipe outside wall and the firestop inner wall, allow for free air circulation at all times.

### INSTALLATION FOR EXTERIOR WALL

1. From Table-D-1 (in this section) determine the wall opening for the chimney model to be installed.
2. From the interior wall side, put the firestop (1) in place before passing the pipe section in the opening. (See Fig.D-7)
3. From the exterior wall side, slide the Insulated Wall Firestop (IFS) (2) in the opening and secure to the exterior wall with anchors (by installer).
4. Install finishing collar (3) for an exterior wall application. Install flush with the wall surface and apply an outdoor sealant. (See fig.D-8)
5. From interior wall side, secure firestop (1) to inside wall with anchors (by installer).

### INSTALLATION FOR INTERIOR WALL

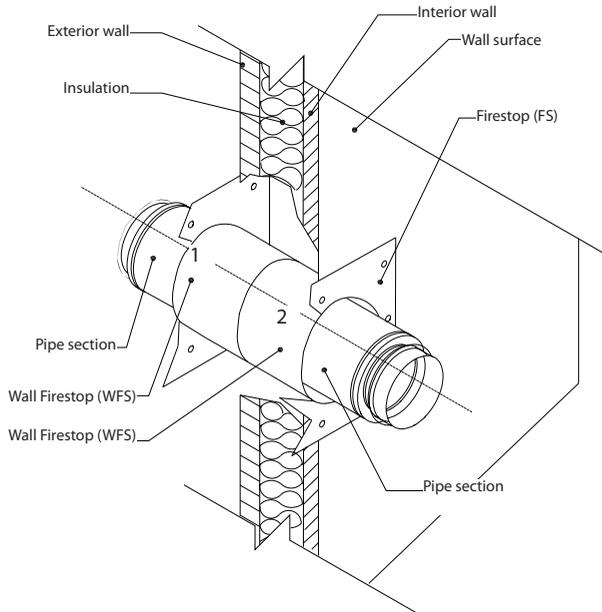
1. From Table-D-1 (in this section) determine the wall opening for the chimney model to be installed.
2. When chimney passes through an interior wall, the finishing collar is not necessary.
3. Repeat step 2,3 and 5 as described in exterior wall installation.

# Roof and Wall Penetration

## WALL FIRESTOP (WFS)

The Wall Firestop assembly (WFS) is primarily used for wall penetration allowing a section to pass through a wall made of combustible material. It is used to maintain a minimum clearance between the combustible wall material and the chimney section passing through the wall.

Fig. D-9 - Wall Firestop assembly



Do not install insulation in the opening between the pipe outside wall and the firestop inner wall, allow for free air circulation at all times.

Fig. D-10 - Wall Firestop (WFS) assembly

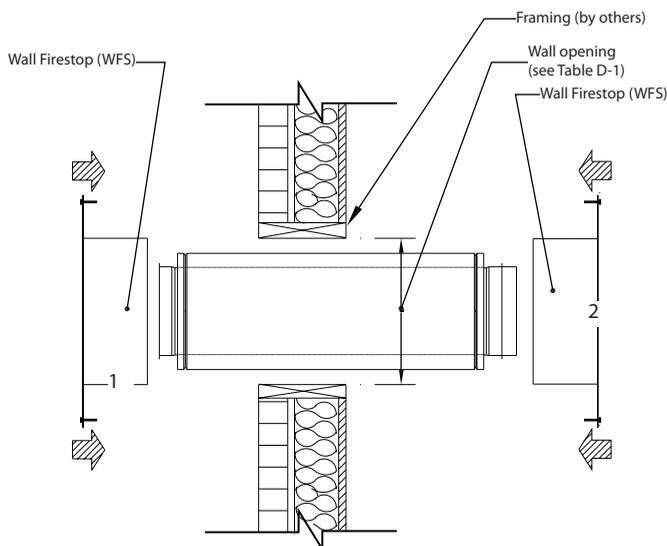
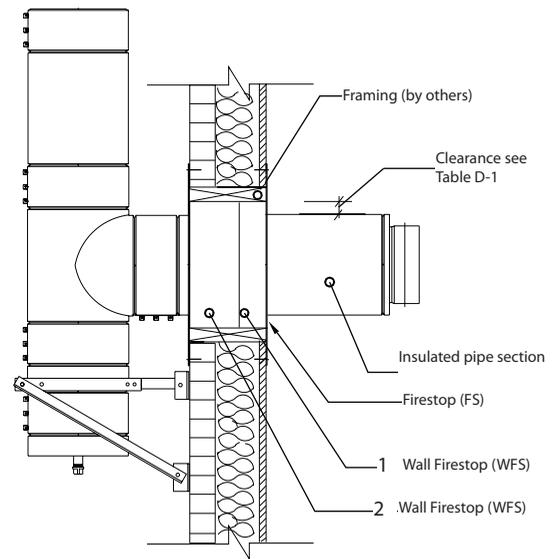


Fig. D-11 - Wall Firestop (WFS) assembly



Do not install insulation in the opening between the pipe outside wall and the firestop inner wall, allow for free air circulation at all times.

### INSTALLATION FOR EXTERIOR WALL

1. From Table-D-1 (in this section) determine the wall opening for the chimney model to be installed.
2. From the interior wall side, put the Wall Firestop (1)(WFS) in place before passing the pipe section in the opening. (See Fig.D-9 and D-10)
3. From the exterior wall side, slide the Wall Firestop (2) (WFS) in the opening and secure to the exterior wall with anchors (by installer).
4. From interior wall side, secure Wall Firestop (1)(WFS) to inside wall with anchors (by installer)

### INSTALLATION FOR INTERIOR WALL

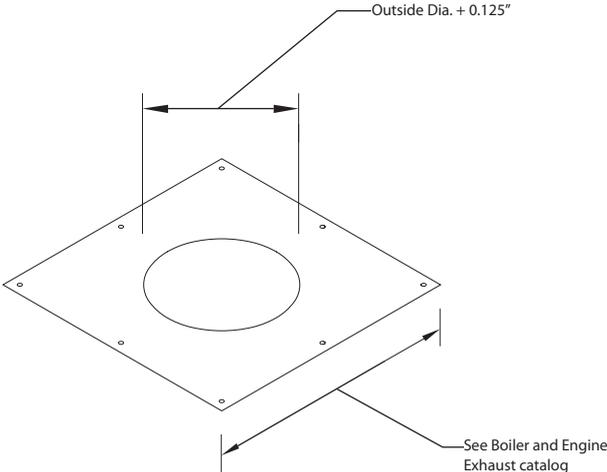
1. From Table-D-1 (in this section) determine the wall opening for the chimney model to be installed.
2. Repeat steps 2, 3 and 4 as described in exterior wall installation.

Roof and Wall Penetration

FIRESTOP (FS)

Used to maintain a minimum space between any combustible material of a wall, floor or roof, where a flue or chimney passes through.

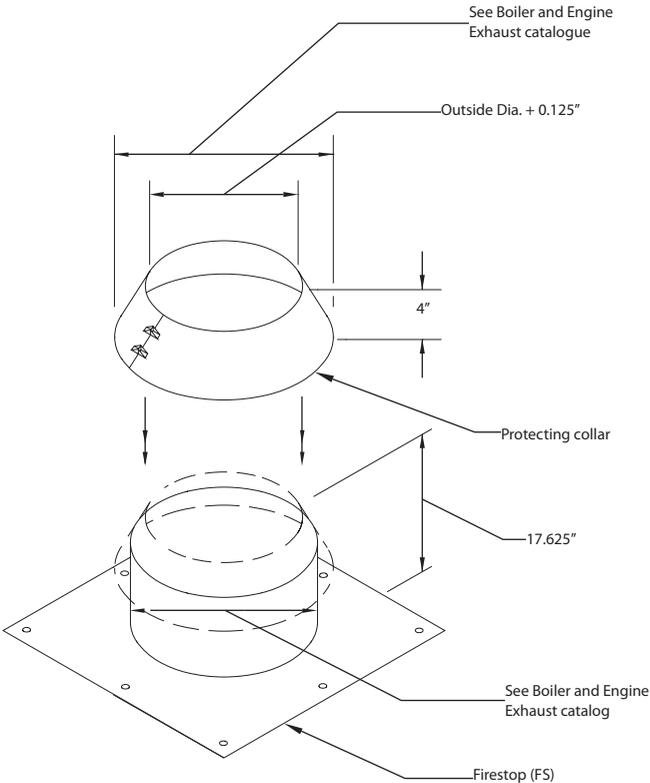
Fig. D-12 - Firestop (FS) Detail



RADIANT FIRESTOP (RFS)

Used to protect combustible materials where a chimney passes through a floor, ceiling or attic. It ensures a minimum distance from combustible materials.

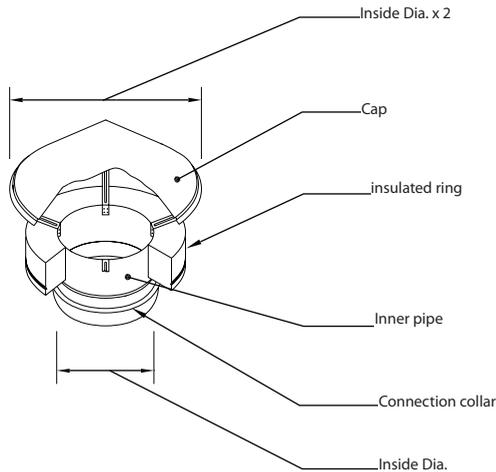
Fig. D-13 - Radiant Firestop (RFS) Detail



## RAIN CAP (RC)

Installed at the top of the chimney, it prevents entry of rain into the chimney. (See Fig.E-12 for assembly)

Fig. E-1 - Rain Cap (RC) Detail

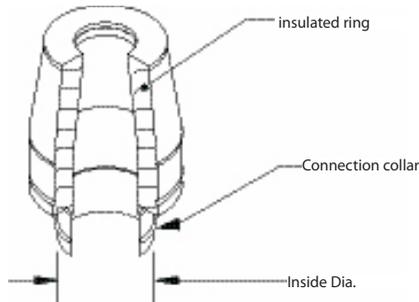


Note: Do not use with Engine or Turbine Exhaust

## EXHAUST CONE (EC)

Installed at the top the chimney, it improves the draft and increases the speed of escaping gases by 50%. Installation of a Drain-Tee Cap (DC) at the base of the chimney is required to collect rainwater. For installation details Exhaust Cone (EC) (See Fig.E-12).

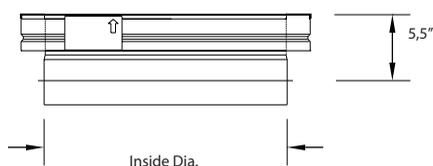
Fig. E-2 - Exhaust cone Detail



## CLOSURE SECTION (CS)

Installed at the chimney extremity. It protects the chimney against water infiltration in the insulation between the inner and outer wall of the chimney. The use of the Drain Section (DS) or Drain Tee Cap (DC) is necessary with this piece to collect any excess rain that may enter the chimney.

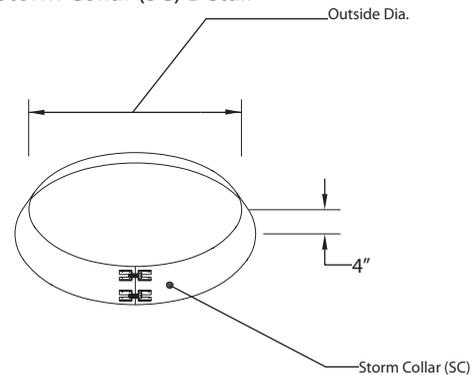
Fig. E-3 - Closure Section (CS) Detail



## STORM COLLAR (SC)

Used for sealing the opening between the chimney and flashing, the Storm Collar (SC) must be sealed to the chimney with silicone putty. It is supplied with the Flat Flashing (F) roof assembly or Adjustable Flashing (AF) roof assembly.

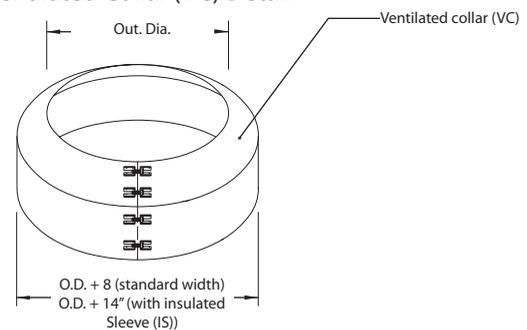
Fig. E-4 - Storm Collar (SC) Detail



## VENTILATED COLLAR (VC)

Used for sealing the opening between the chimney and Ventilated Flashing (VF), the Ventilated Collar (VC) must be sealed to the chimney with silicone putty. It is supplied with the Ventilated Flashing (VF).

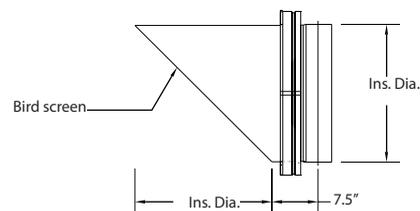
Fig. E-5 - Ventilated Collar (VC) Detail



## MITER SECTION (MS)

Installed at the chimney extremity in horizontal exhaust application. To be used with engine exhaust. Diameter range from 6" to 16". Material thickness is the same as the chimney section it is used with.

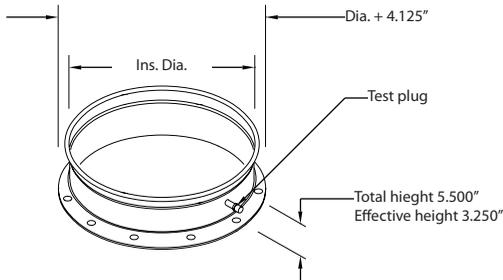
Fig. E-6 - Miter Section (MS) Detail



## STARTING ADAPTER (SA)

1. Used to connect the flue to the appliance. It allows flue gas analysis by means of the verification plug.
2. See Fig.E-11 and E-11a for assembly.

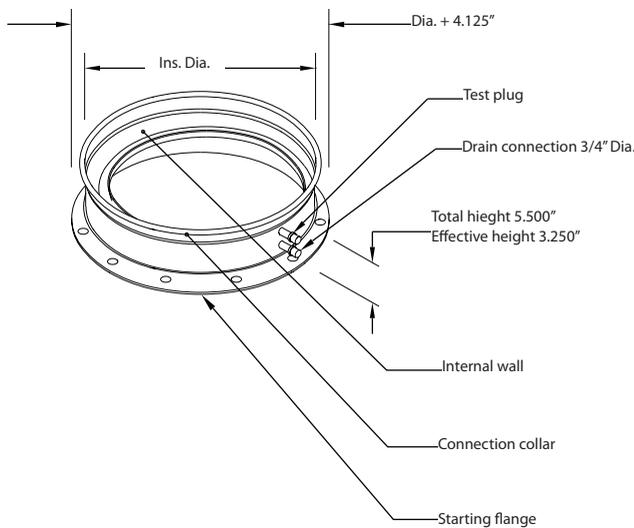
Fig. E-7 - Starting Adapter (SA) Detail



## STARTING ADAPTER-DRAIN (SAD)

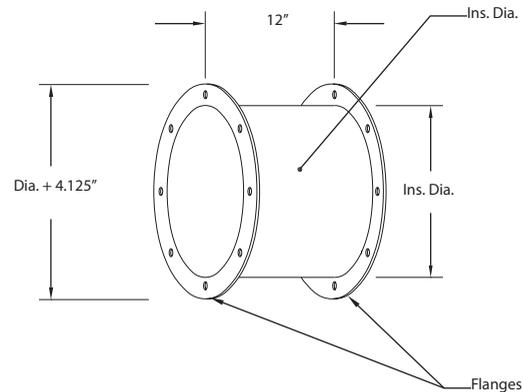
1. Used to connect the flue to the appliance.
2. It allows flue gas analysis by means of the verification plug.
3. Also used for collection of condensation water by means of a 3/4" diameter drain connection.
4. Its elliptical collar construction also provides for improved condensation water drainage.
5. See Fig.E-11 and E-11a for assembly.

Fig. E-8 - Starting Adapter-Drain (SAD) Detail



1. Used to connect the flue to the appliance.
2. Removable, it facilitates access to the appliance for inspection purposes and cleaning.
3. To be used with 3/8" diameter nuts and bolts (not included).
4. See Fig.E-11 and E-11a for assembly.

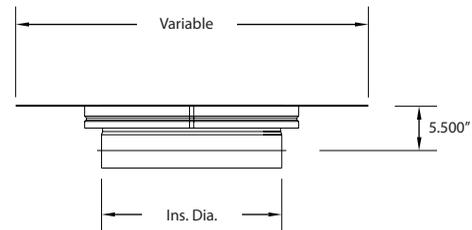
Fig. E-9 - Starting Sleeve (SS) Detail



## FAN ADAPTER (FA)

Installed at the chimney extremity. It is used to connect the chimney to an up-blast or sidewall type exhaust fan.

Fig. E-10 - Fan Adapter (FA) Detail



## STARTING SLEEVE (SS)

Fig. E-11 - Typical installation for Starting Adapter (SA) and Starting Adapter-Drain (SAD)

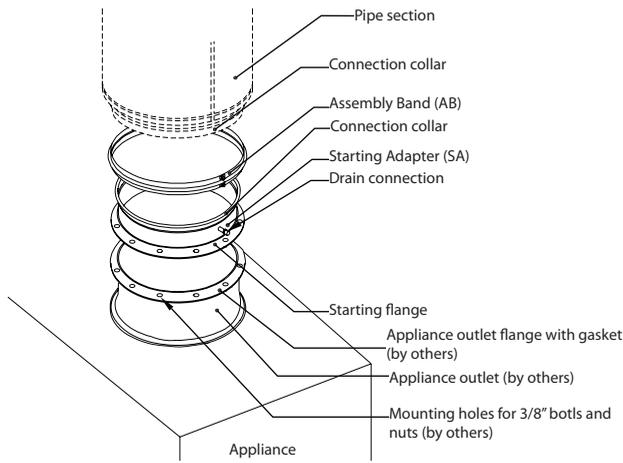


Fig. E-11a - Typical Finished Assembly for Starting Adapter (SA) and Starting Adapter-Drain (SAD)

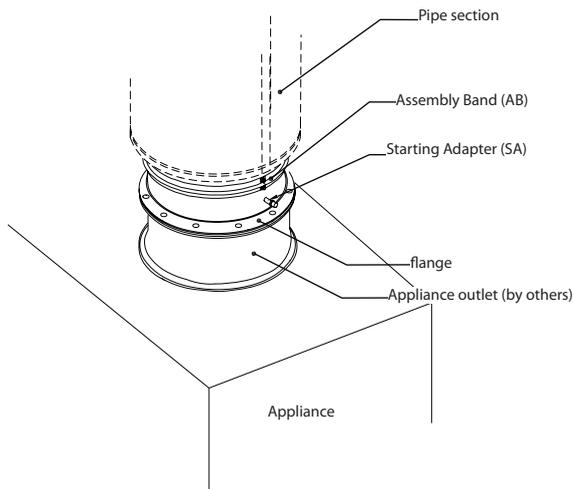


Fig. E-12 - Typical Installation for Rain Cap (RC) and Exhaust Cone (EC)

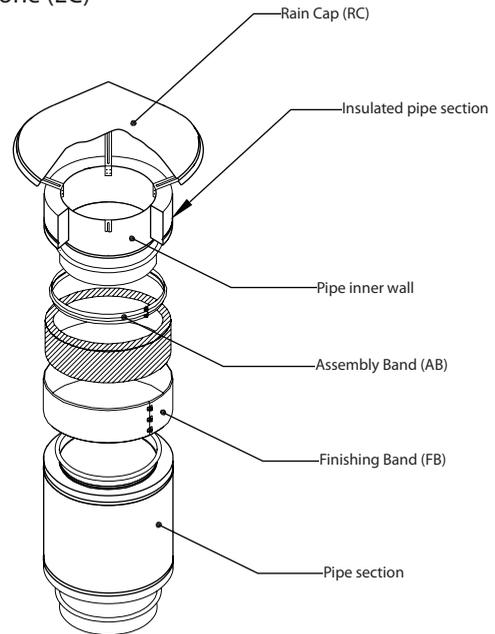
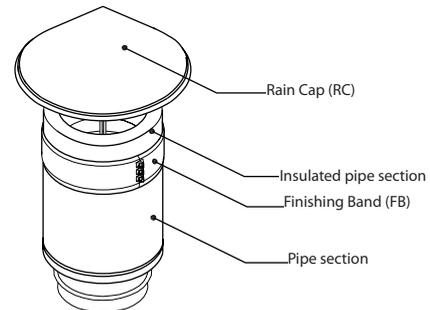


Fig. E-12a - Finished assembly for Rain Cap (RC) and Exhaust Cone (EC)



### Termination use and application

Termination	Model	Temperature from 0°F to less than 1000°F continuous or boiler applications
Rain Cap	ALL MODELS	6" to 24" diameter
Exhaust Cone	ALL MODELS	6" to 48" diameter
Rainsheild	ALL MODELS	6" to 16" diameter

Termination	Model	Temperature from 1000°F to less than 1400°F continuous or boiler applications
Rain Cap	CBILA, CBIL, CBIL1F, CBIL2F, CBIL4F	6" to 24" diameter
Exhaust Cone	CBILA, CBIL, CBIL1F, CBIL2F, CBIL4F	6" to 48" diameter
Rainsheild	CBILA, CBIL, CBIL1F, CBIL2F, CBIL4F	6" to 16" diameter

## RELIEF VALVE (RV)

1. Used on all engine exhausts.
2. It helps control the venting pressure should a backfire occur at start up or in case of generator malfunction.

Fig. E-13 - Relief valve (RV)

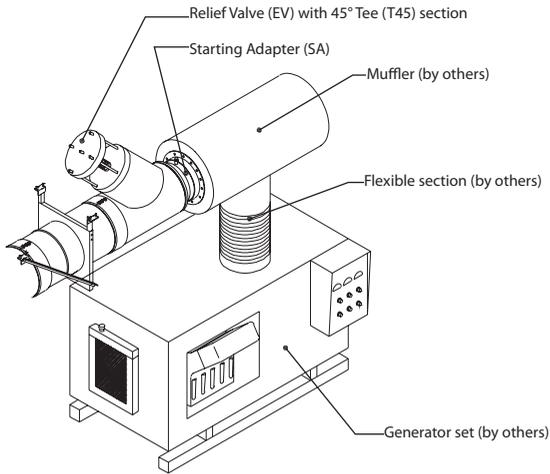


Fig. E-13a - Relief Valve (RV) Detail

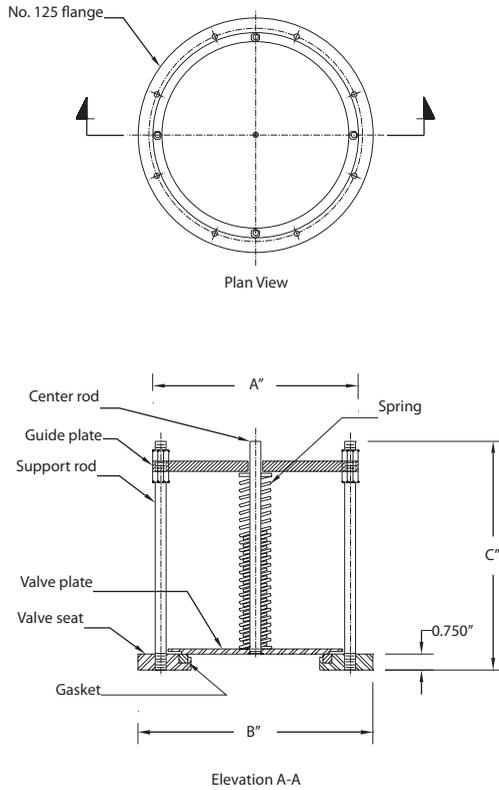


Table E-1 - Relief Valve (RV) dimension

Inside Diameter (inches)	* dimension (inches)		
	"A"	"B"	"C"
6	9.625	11.000	10.750
8	12.250	13.500	10.750
10	14.000	16.000	10.750
12	16.750	19.000	10.750
14	18.250	21.000	10.750
16	20.250	23.500	10.750
18	22.250	25.000	10.750
20	24.250	27.500	10.750
22	26.250	29.000	10.750
24	28.500	32.000	10.750

\*Tolerance 1/32"

# Thermal Expansion

## THERMAL EXPANSION

1. Elbows, tees, and joints are not designed to resist bending moment forces as a result of thermal expansion. The forces due to thermal expansion therefore need to be compensated by expansion joints.

2. Whether in the vertical or the horizontal run, the thermal expansion of the inner pipe is directly dependent on the internal wall temperature and the length of pipe between fixed points.

3. Proper installation practice requires that expansion greater than 1/4" will be compensated by using a bellows Expansion Joint (EJ) or Variable Length (VL), depending on the maximum pressure encountered.

4. All chimney models have an expansion coefficient of 8,9 in the formula below. (See Fig. F-1.)

5. Though thermal expansion can be calculated from the formula, a rule of thumb for exhaust pipe expansion estimation is that the axial growth will be approximately 1" per 100' of pipe length for each 100°F the flue gas temperature difference between flue gas and surrounding air ambient temperature. (See Table-F-1.)

6. Because the amount of outer casing axial movement is the same as inner casing movement, the outer piping jacket must slide to avoid excessive forces on tees, elbows or fixed points. To accommodate outer casing movements, external guides along walls at floors, or in lateral breechings, must allow for movement of pipe.

7. When resupporting a system with considerable height and expansion, Variable Lengths (VL) or bellows Expansion Joint (EJ) must be used just below every support above the first to compensate for thermal expansion.

8. For engine or turbine exhaust systems requiring pressures up to 60 inches of water column, or where the construction must be absolutely gas tight, all welded bellows Expansion Joints (EJ), either with a liner or without a liner are recommended for expansion and vibration movements of the exhaust piping.

9. Low pressure systems, such as boilers (up to 6 inches water column), can effectively use the Variable Length (VL) expansion joint.

10. Spacing of guides and supports, when a thermal expansion part is used, should not be greater than that specified in Section A. Table A-5.

11. Proper guiding and support of expansion parts often requires closer spacing.

Fig. F-1 - Formula for Thermal Expansion

$$\Delta E \text{ (in.)} = \frac{EC (8,9) \times \Delta T \text{ (}^\circ\text{F)} \times \text{Pipe Length (in.)}}{1\,000\,000}$$

Ex.: Thermal Expansion for 100' of pipe at 1 000 (° F)

$$\Delta E \text{ (in.)} = \frac{EC (8,9) \times 940 \text{ (}^\circ\text{F)} \times 1200 \text{ (in.)}}{1\,000\,000}$$

$$\Delta E \text{ (in.)} = \frac{10\,039\,200}{1\,000\,000}$$

$$\Delta E \text{ (in.)} = 10.04 \text{ (in.)}$$

\*  $\Delta T$  (° F) = 1000 (° F) - ambient temp. (For instance 60° F)  
 $\Delta T$  (° F) = 940 (° F)

## BELLOWS EXPANSION JOINT (EJ)

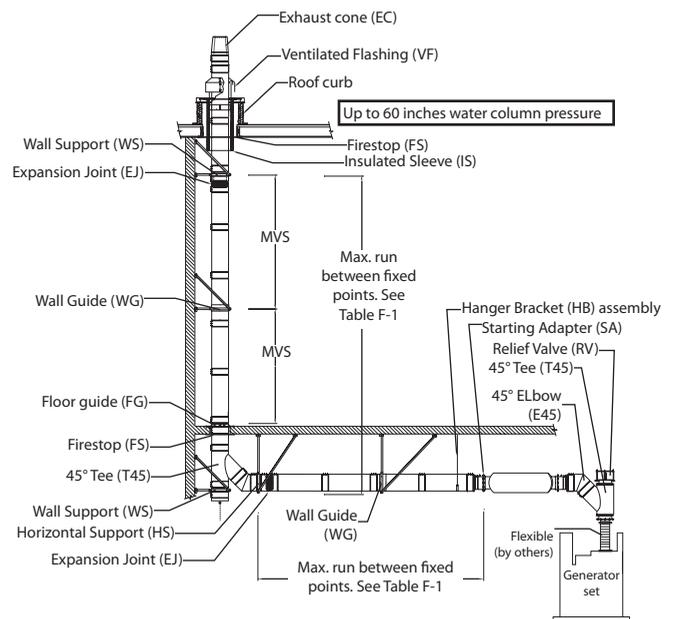
1. For exhaust pressure up to 60 inches water column, bellows Expansion Joints (EJ) are recommended to compensate for piping expansion and vibration. See fig. F-3 for an illustration of a bellows Expansion Joint (EJ).

2. Fig.F-2 illustrates the use of bellows Expansion Joints (EJ) in a typical installation. The use of the lined bellows Expansion Joint (EJ) is shown to compensate for the axial expansion of the long horizontal run.

3. System is used for axial movements and vibration only and must be accurately supported and guided. This part has limited lateral movement. Lateral offsets and parallel misalignments should be avoided.

4. The lined bellows requires careful positioning of piping guides to avoid interference on thermal expansion.

Fig. F-2 - Use of bellows Expansion Joints (EJ) in typical engine exhaust installation



5. Any piping system requiring low axial expansion forces, the bellows Expansion Joints (EJ) will deflect with minimum friction at a known "spring rate". The values for spring rates given in the tables assume there are no other frictional constraints and also proper alignment of the liner in case of the bellows Expansion Joint (EJ).

6. At an operating gas temperature of 1000°F (70°F ambient), the CBIL2F inner pipe in a typical engine exhaust system will be subjected to a temperature of approximately 650°F.

7. Allowable expansion movements for bellows Expansion Joints (EJ) are given in figures F-3 and in Table-F-1.

# Thermal Expansion

Fig. F-3 - Bellows Expansion Joint (EJ)

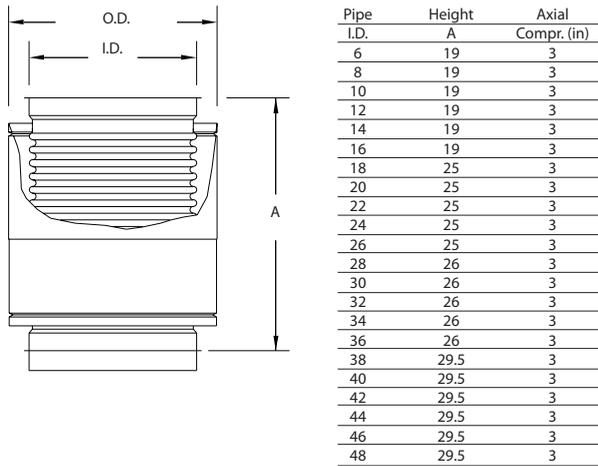


Table F-1 - Maximum run length for bellows Expansion Joint (EJ) between fixed points

Operating Temperature* (°F)	Chimney model	
	CBILA / CBIL	CBIL1, CBIL2, CBIL1F, CBIL2F, CBIL4F
700	56'-0"	40'-0"
800	49'-0"	35'-0"
900	43'-0"	31'-2"
1000	37'-6"	28'-0"
1100	35'-0"	25'-6"
1200	29'-6"	23'-4"
1300	26'-9"	21'-6"
1400	24'-6"	20'-0"

### VARIABLE LENGTH (VL)

1. The Variable Length (VL) has two major functions: To make up odd lengths of pipe as needed in short runs, and, in addition, to serve as an expansion joint for thermal expansion in longer runs of pipe.

2. The Variable Length (VL) may be used when pressures do not exceed 6" water column or in well ventilated areas. When used in systems of any orientation, it can perform both functions simultaneously.

3. The Variable Length (VL) includes a sliding inner section, a fixed outer pipe with gasket and a finishing outer jacket.

4. At the sliding joint the assembly as shipped is fitted with a special graphite packing seal.

5. The sliding outer jacket is the same thickness as that used on piping outer casings. It is placed around the sliding inner joint and must also slide in order to avoid expansion stresses.

6. For proper installation, a Variable Length (VL) must have adequate overlap and sufficient allowance for thermal expansion movement (see Fig.F-5 and Table 2).

7. An adjustable length sliding inner pipe may be trimmed to ensure correct mating to a fitting or other short part. Care must be exercised so that proper penetration is maintained at low temperatures and no interference occurs at high temperatures.

Fig. F-4 - Use of Adjustable (AL) and Variable Length (VL) in typical installation

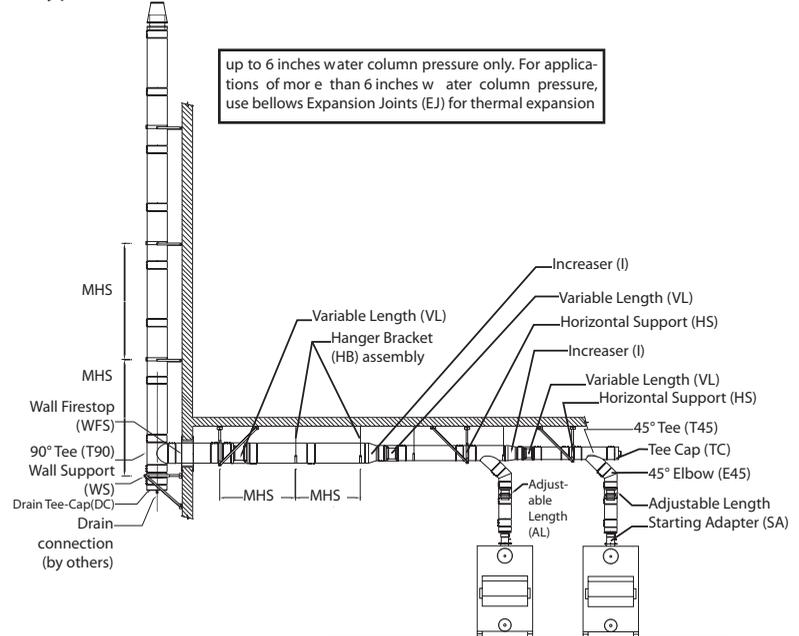


Fig. F-5 - Variable Length (VL)

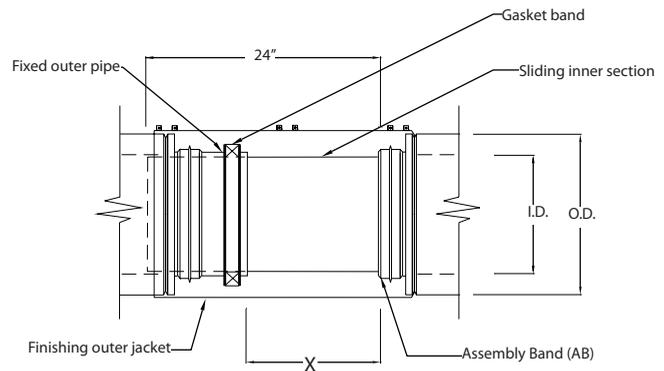


Table F-2 - Minimum X dimension for chimney Length

*Operating Temperature	200°	300°	400°	500°	800°	1000°	1200°	1400°
25'-0" Length	0.4"	0.7"	0.9"	1.2"	2.0"	2.5"	3.0"	3.6"
50'-0" Length	0.75"	1.3"	1.8"	2.4"	4.0"	5.0"	6.0"	7.2"
75'-0" Length	1.0"	1.9"	2.7"	3.5"	6.0"	7.5"	9.0"	10.7"
100'-0" Length	1.5"	2.5"	3.6"	4.7"	8.9"	10.0"	12.2"	14.3"

Ex.: For a chimney run of 75' at 1000° F the chimney will expand approximately 7.5". Thus the x dimension shall not be less than 7.5" to allow proper sliding of Variable Joint inner sliding section.  
\* Note that assumed ambient temperature is 70° F. Temperature rise for 1000°F is 930° F.

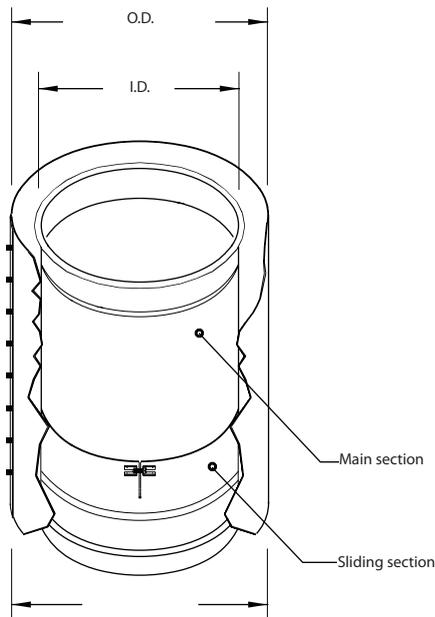
# Thermal Expansion

## ADJUSTABLE LENGTH (AL)

1. Used in straight runs, the Adjustable Length (AL) serves two major functions:

- a) To make up for odd lengths of pipe in short runs
- b) To provide for joint sealing.

Fig. F-6 - Adjustable Length (AL) Detail



2. This part is designed to be adjustable to any needed exact length and its internal joint must be sealed by working sealant under the seal section, as well as at the joint between the male and the female ends to be closed with the Assembly Band (AB).

3. The adjustable length includes a main section and an outer sliding section that can be secured in the desired length position. Cutting the main section may be required for proper fitting.

4. The sliding section is designed to fit outside the standard main section.

5. Once the final length of the section is set, it is secured using a single clamp and screw. This seal section will prevent the inner section from slipping after the assembly.

6. The sliding outer jacket is of the same thickness as that used on piping outer casings.

7. It is placed around the assembled liner and finishes the appearance of the Adjustable Length (AL).

8. For detailed methods of installation see instructions contained elsewhere in this section.

## EXPANSION JOINTS INSTALLATION

Bellows Expansion Joint (EJ) and Variable Length (VL) in vertical runs

1. A bellows Expansion Joints (EJ) or Variable length (VL) installed vertically should be installed directly below the highest support or one pipe length below, between fixed points. (See Fig.F-2)

2. Always use bellows Expansion Joints (EJ) or Variable Lengths (VL) between fixed points when expansion is over 1/4". See Table-F-1 for maximum run between fixed points and Table-F-2 for expansion of Variable Length (VL).

3. Install proper guiding between fixed points (supports) when using bellows Expansion Joint (EJ) or Variable Length (VL), to allow chimney vertical movement due to expansion.

Bellows Expansion Joint (EJ) and Variable Length (VL) in horizontal runs

1. Same guidelines apply as for vertical run with respect to expansion estimate and proper support and guiding with the use of bellows Expansion Joint (EJ) and Variable Length (VL).

2. Install sliding inner portion of Variable Length (VL) so that the fixed part is attached in the opposite direction of the flue. The sliding inner part will then absorb expansion by sliding in the direction of the flue. (See Fig. F-5.)



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SUITABLE FOR EXTERIOR INSTALLATION



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**MODEL**  
CBIL □ CBIL2 □ CBIL2F □ CBIL4F □

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MODEL CBIL		MODEL CBIL2		MODEL CBIL2F/ MODEL CBIL4F
INSIDE DIAMETERS	CLEARANCE (1000°F and 1400°F)	INSIDE DIAMETERS	CLEARANCE (1000°F)	CLEARANCE (1400°F)
6" to 12"	4"	6" to 12"	1"	1"
14"	5"	14"	1.5"	1.5"
16" to 18"	6"	16" to 18"	2"	2"
20" to 24"	7"	20" to 22"	3"	3"
26" to 28"	8"	24" to 26"	4"	4"
30" to 34"	9"	28" to 32"	5"	5"
36" to 38"	10"	34" to 36"	6"	6"
40" to 48"	11"	38" to 40"	7"	7"
		42" to 48"	8"	8"

SEALANT: REFER TO INSTALLATION INSTRUCTIONS FOR PROPER SEALANT USAGE.

“THIS CHIMNEY SYSTEM IS RATED FOR USE AT MAXIMUM 60 INCH WATER COLUMN INTERNAL PRESSURE WHEN USED IN POSITIVE PRESSURE APPLICATIONS.”





**FACTORY BUILT CHIMNEY SYSTEM PART LISTED AS: BUILDING HEATING APPLIANCE AND 1400°F CHIMNEY PART**

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**MODEL**  
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**MODEL**  
CBILA  CBIL1  CBIL1F

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MINIMUM AIR SPACE CLEARANCE TO COMBUSTIBLE MATERIALS AND BUILDING INSULATION FOR 1000°F AND 1400°F CONTINUOUS TEMPERATURE CHIMNEY SYSTEMS							
I.D.	Clearance CBILA		I.D.	Clearance CBIL1		Clearance CBIL1F	
	1000°F	1400°F		1000°F	1000°F	1400°F	1400°F
3"-6"	4"	4"	3"-6"	1"	1"	1"	1"
7"-10"	5"	5"	7"-10"	1.5"	1.5"	1.5"	3"
11"-16"	6"	-	11"-16"	2.5"	2.5"	-	-
17"-20"	8"	-	17"-18"	3"	3"	-	-
21"-24"	8"	-	19"-26"	4"	4"	-	-
25"-30"	9"	-	27"-32"	5"	5"	-	-
31"-34"	10"	-	33"-38"	6"	6"	-	-
32"-40"	11"	-	39"-44"	7"	7"	-	-
41"-46"	12"	-	45"-48"	8"	8"	-	-
47"-48"	13"	-					

**SEALANT:** REFER TO INSTALLATION INSTRUCTIONS FOR PROPER SEALANT USAGE.

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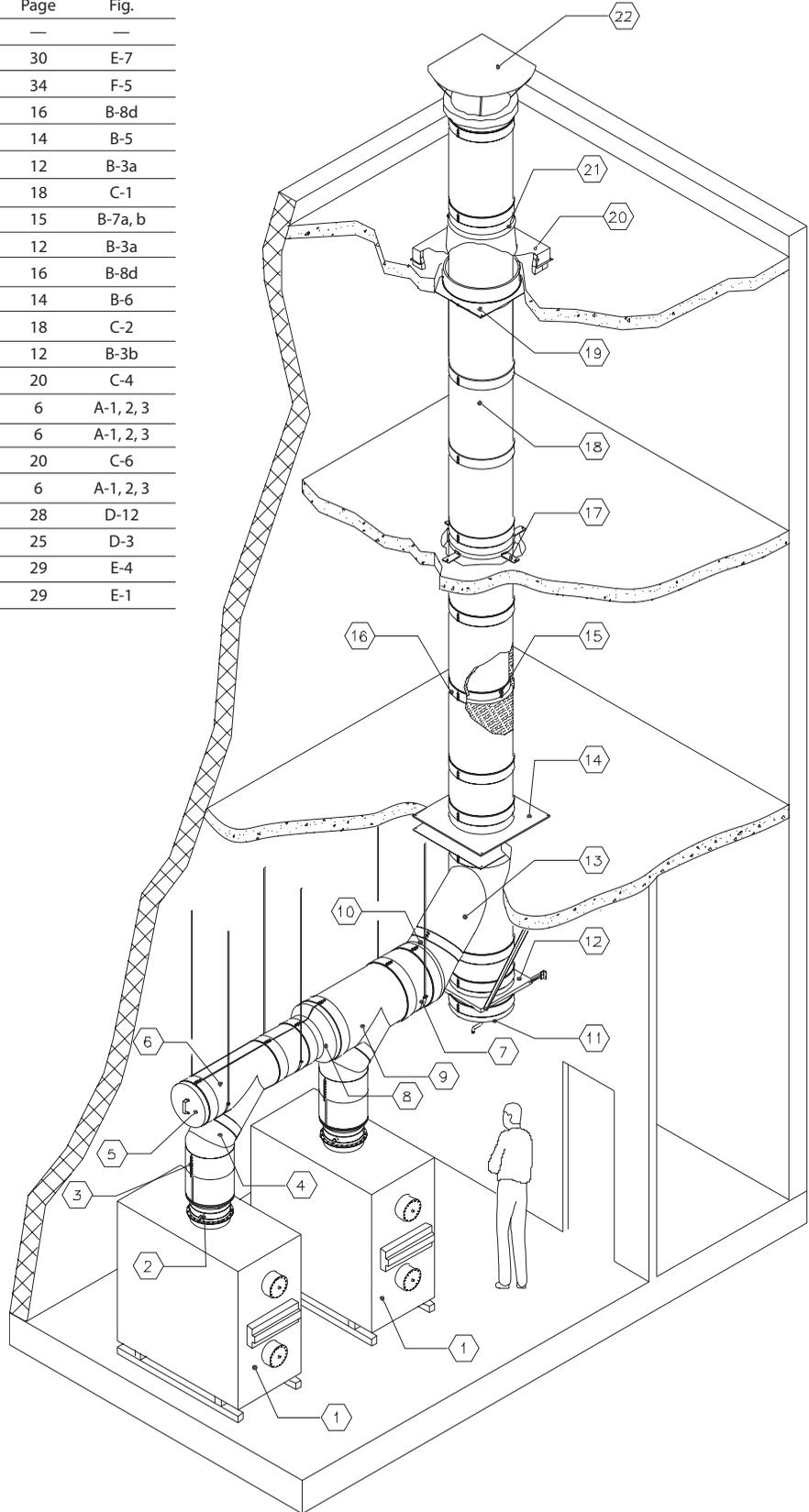
**MODEL**  
CBILA  CBIL1  CBIL1F

**SYSTEM COMPONENT**

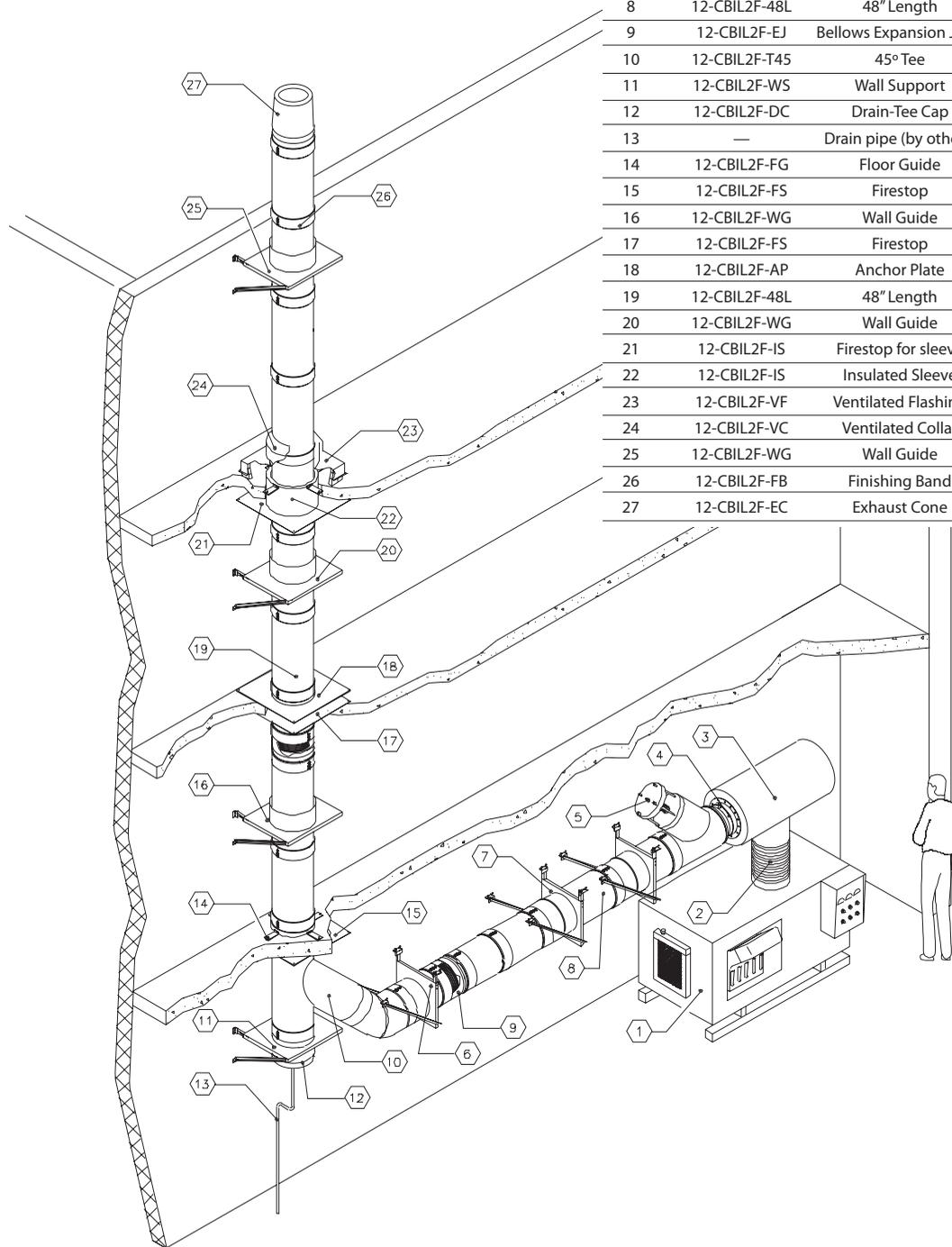
MATERIAL FOR USE WITH FACTORY BUILT CHIMNEY MODEL CBILA, CBIL1 or CBIL1F.

"INSTALL AND USE ONLY IN ACCORDANCE WITH CHEMINÉE LINING.E INC. INSTALLATION INSTRUCTIONS."

No.	Part no.	Description	Section	Page	Fig.
1	—	Appliance	—	—	—
2	16-CBIL2-SA	Starting Adapter	E	30	E-7
3	16-CBIL2-VL	Variable Length	F	34	F-5
4	16-CBIL2-E45	45° Elbow	B	16	B-8d
5	16-CBIL2-TC	Tee-Cap	B	14	B-5
6	16-CBIL2-T45	45° Tee	B	12	B-3a
7	16-CBIL2-HB	Hanger Bracket	C	18	C-1
8	16-CBIL2-I	Increaser	B 1	15	B-7a, b
9	20-CBIL2-T45	45° Tee	B	12	B-3a
10	20-CBIL2-E45	45° Elbow	B	16	B-8d
11	20-CBIL2-DC	Drain-Tee Cap	B	14	B-6
12	20-CBIL2-WS	Wall Support	C	18	C-2
13	20-CBIL2-T45	45° Tee	B	12	B-3b
14	12-CBIL2-AP	Anchor Plate	C	20	C-4
15	20-CBIL2-AB	Assembly Band	A	6	A-1, 2, 3
16	20-CBIL2-FB	Finishing Band	A	6	A-1, 2, 3
17	20-CBIL2-FG	Floor Guide	C	20	C-6
18	20-CBIL2-48L	48" Length	A	6	A-1, 2, 3
19	20-CBIL2-FS	Firestop	D	28	D-12
20	20-CBIL2-F	Flat Flashing	D	25	D-3
21	20-CBIL2-SC	Storm Collar	E	29	E-4
22	20-CBIL2-RC	Rain Cap	E	29	E-1



No.	Part no.	Description	Section	Page	Fig.
1	—	Engine (by others)	—	—	—
2	—	Adapter (by others)	—	—	—
3	—	Muffler (by others)	—	—	—
4	12-CBIL2F-SA	Starting Adapter	E	30	E-7
5	12-CBIL2F-RV	Relief Valve	E	32	E-13, 13a
6	12-CBIL2F-HS	Horizontal Support	C	19	C-3
7	12-CBIL2F-WG	Wall Guide	C	21	C-7
8	12-CBIL2F-48L	48" Length	A	6	A-1, 2, 3
9	12-CBIL2F-EJ	Bellows Expansion Joint	F	33-34	F-2, 3
10	12-CBIL2F-T45	45° Tee	B	12	B-3a
11	12-CBIL2F-WS	Wall Support	C	18	C-2, 2a
12	12-CBIL2F-DC	Drain-Tee Cap	B	14	B-6
13	—	Drain pipe (by others)	—	—	—
14	12-CBIL2F-FG	Floor Guide	C	20	C-6
15	12-CBIL2F-FS	Firestop	D	28	D-12
16	12-CBIL2F-WG	Wall Guide	C	21	C-7
17	12-CBIL2F-FS	Firestop	D	28	D-12
18	12-CBIL2F-AP	Anchor Plate	C	20	C-4
19	12-CBIL2F-48L	48" Length	A	6	A-1, 2, 3
20	12-CBIL2F-WG	Wall Guide	C	21	C-7
21	12-CBIL2F-IS	Firestop for sleeve	D	28	D-12
22	12-CBIL2F-IS	Insulated Sleeve	D	24	D-2
23	12-CBIL2F-VF	Ventilated Flashing	D	24	D-2
24	12-CBIL2F-VC	Ventilated Collar	E	29	E-5
25	12-CBIL2F-WG	Wall Guide	C	21	C-7
26	12-CBIL2F-FB	Finishing Band	A	6	A-1, 2, 3
27	12-CBIL2F-EC	Exhaust Cone	E	29	E-2





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