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.

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.
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 1000ºF.

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 -18ºC (0ºF) 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.
# CONTENTS

A- General Information
- Listings: Page 4
- Features: Page 4
- Application: Page 4
- Surroundings / Enclosures: Page 4
- System Sizing: Page 4
- Part Numbers: Page 5
- Clearances: Page 5
- Openings: Page 5
- Boiler Applications: Page 6
- Sealant: Page 6
- Engine Applications: Page 7
- Sealant: Page 7
- Support Methods and Height Limits: Page 8
- Support and Guide spacing: Page 8
- Thermal Expansion: Page 8
- Pipe weight: Pages 8-9
- Chimney Guying and Bracing: Page 9
- Termination Height: Page 10
- Multi Engine Exhaust: Page 10

B- Tees, Elbows, Increasers and Offsets
- 90º Tee (T90): Page 11
- 45º Tee (T45): Page 12
- Tee Cap (TC): Page 14
- Drain-Tee Cap (DC): Page 14
- Increaser (I): Page 15
- Reducer (R): Page 15
- 5º Elbow (E5): Page 15
- 15º Elbow (E15): Page 16
- 30º Elbow (E30): Page 16
- 45º Elbow (E45): Page 16
- 90º Elbow (E90): Page 16
- Offsets: Page 16

C- Structural Support and Guiding
- Hanger Bracket Assembly (HB): Page 18
- Wall Support Assembly (WS): Page 18
- Horizontal Support Assembly (HS): Page 19
- Anchor Plate Assembly (AP): Page 20
- Roof Support Assembly (RS): Page 20
- Floor Guide Assembly (FG): Page 20
- Wall and Ceiling Guide Assembly (WG): Page 21
- Wall Band (WB): Page 21
- Roof Band (RB): Page 22
- Suspension Band (SB): Page 22
- Guy Wire Band (GWB): Page 23

D- Roof and Wall Penetrations
- Flat Flashing Roof Assembly (F): Page 24
- Ventilated Flashing (VF) Roof Assembly with Insulated Sleeve (IS): Page 24
- Flat Flashing without Roof Curb (F): Page 25
- Insulated Sleeve (IS): Page 25
- Typical Roof Installation: Page 25
- Wall Penetration: Page 25
- Insulated Wall Firestop (IFS): Page 26
- Wall Firestop (WFS): Page 27
- Firestop (FS): Page 28
- Radiant Firestop (RFS): Page 28

E- Terminations, Starting Adapters/ Relief Valve
- Rain Cap (RC): Page 29
- Exhaust Cone (EC): Page 29
- Closure Section (CS): Page 29
- Storm Collar (SC): Page 29
- Ventilated Collar (VC): Page 29
- Miter Section (MS): Page 29
- Starting Adapter (SA): Page 30
- Starting Adapter Drain (SAD): Page 30
- Starting Sleeve (SS): Page 30
- Fan Adapter (FA): Page 30
- Typical Installation for Starting Adapters: Page 31
- Typical Installation for terminations: Page 31
- Relief Valve (RV): Page 32

F- Thermal Expansion
- Expansion Joint (EJ): Page 33
- Variable Length (VL): Page 34
- Adjustable Length (AL): Page 35

G- Markings
- Chimney Length Markings: Page 36
- Component Markings: Page 36

H- Sample Drawings
- Boiler Exhaust: Page 37
- Boiler Exhaust: Page 38
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 S 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

<table>
<thead>
<tr>
<th>Model</th>
<th>Classification</th>
<th>Diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBILA, CBIL, L1F, L2, L2F, L4F</td>
<td>Building Heating Appliance (1000°F)</td>
<td>6” to 48” I.D.</td>
</tr>
<tr>
<td>CBILA, CBIL, L1F, L2, L2F, L4F</td>
<td>1400°F Type Chimney</td>
<td>6” to 48” I.D.</td>
</tr>
</tbody>
</table>

CAN / ULC C-959

<table>
<thead>
<tr>
<th>Model</th>
<th>Classification</th>
<th>Diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBILA, CBIL, L1F, L2, L2F, L4F</td>
<td>540°C Industrial Chimneys</td>
<td>6” to 48” I.D.</td>
</tr>
<tr>
<td>CBILA, CBIL, L1F, L2, L2F, L4F</td>
<td>760°C Industrial Chimneys</td>
<td>6” to 48” I.D.</td>
</tr>
</tbody>
</table>

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 fits 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 CBIL 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 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 resistant, non-combustible surroundings or in unenclosed installations. 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.

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General Information

Installation Instruction
Section A

PART NUMBERS
These instructions identify major models parts by part 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

<table>
<thead>
<tr>
<th>Clearance 1000°F</th>
<th>CBILA - I.D. 1000°F/1400°F</th>
<th>CBIL - I.D. 1000°F/1400°F</th>
</tr>
</thead>
<tbody>
<tr>
<td>4&quot;</td>
<td>3&quot;-6&quot;</td>
<td>3&quot;-6&quot;</td>
</tr>
<tr>
<td>5&quot;</td>
<td>7&quot;-10&quot;</td>
<td>7&quot;-10&quot;</td>
</tr>
<tr>
<td>6&quot;</td>
<td>11&quot;-16&quot;</td>
<td>16&quot;-18&quot;</td>
</tr>
<tr>
<td>7&quot;</td>
<td>17&quot;-20&quot;</td>
<td>20&quot;-24&quot;</td>
</tr>
<tr>
<td>8&quot;</td>
<td>21&quot;-24&quot;</td>
<td>26&quot;-28&quot;</td>
</tr>
<tr>
<td>9&quot;</td>
<td>25&quot;-30&quot;</td>
<td>30&quot;-34&quot;</td>
</tr>
<tr>
<td>10&quot;</td>
<td>31&quot;-34&quot;</td>
<td>36&quot;-38&quot;</td>
</tr>
<tr>
<td>11&quot;</td>
<td>35&quot;-40&quot;</td>
<td>40&quot;-48&quot;</td>
</tr>
<tr>
<td>12&quot;</td>
<td>41&quot;-46&quot;</td>
<td>-</td>
</tr>
<tr>
<td>13&quot;</td>
<td>47&quot;-48&quot;</td>
<td>-</td>
</tr>
</tbody>
</table>

### 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

<table>
<thead>
<tr>
<th>Inside Diameter</th>
<th>1&quot; insul. O.D.</th>
<th>2&quot; insul. O.D.</th>
<th>4&quot; insul. O.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>3&quot;</td>
<td>5&quot;</td>
<td>7&quot;</td>
</tr>
<tr>
<td>B</td>
<td>4&quot;</td>
<td>6&quot;</td>
<td>8&quot;</td>
</tr>
<tr>
<td>C</td>
<td>5&quot;</td>
<td>8&quot;</td>
<td>10&quot;</td>
</tr>
</tbody>
</table>

**Opening dimension**

\[ B = A + (2 \times \text{insul. thk.}) \]

\[ \text{C} = B + (2 \times \text{Clearance}^*) \]

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

<table>
<thead>
<tr>
<th>Opening dimension</th>
<th>Pipe outside diameter</th>
<th>Pipe inside diameter</th>
<th>Air space or insulation</th>
<th>Clearance / insulation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>B</td>
<td>C</td>
<td></td>
</tr>
</tbody>
</table>

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

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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 it's 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 into 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-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.

Table A-4a. Sealant Usage

<table>
<thead>
<tr>
<th>Interior Installation</th>
<th>Supplier</th>
<th>Model</th>
<th>Color</th>
<th>Max. Temp.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inner Joints</td>
<td>Adchem</td>
<td>X-Trasil H.T. 4706_3</td>
<td>red</td>
<td>500°F</td>
</tr>
<tr>
<td></td>
<td>alternate</td>
<td>GE RTV-106</td>
<td>red</td>
<td>500°F</td>
</tr>
<tr>
<td></td>
<td>alternate</td>
<td>Dow Corning RTV-736</td>
<td>red</td>
<td>500°F</td>
</tr>
<tr>
<td>Outer Joints</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Exterior Installation</th>
<th>Supplier</th>
<th>Model</th>
<th>Color</th>
<th>Max. Temp.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inner Joints</td>
<td>Adchem</td>
<td>X-Trasil H.T. 4706_3</td>
<td>red</td>
<td>500°F</td>
</tr>
<tr>
<td></td>
<td>alternate</td>
<td>GE RTV-106</td>
<td>red</td>
<td>500°F</td>
</tr>
<tr>
<td></td>
<td>alternate</td>
<td>Dow Corning RTV-736</td>
<td>red</td>
<td>500°F</td>
</tr>
<tr>
<td>Outer Joints</td>
<td>Adchem</td>
<td>Adsil 4809</td>
<td>Gray</td>
<td>375°F</td>
</tr>
</tbody>
</table>

Fig. A-2a - Joint components

Fig. A-3a - Assembled joint

---

Fig. A-1a - Flue Direction

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Fig. A-2a - Joint components

---

Fig. A-3a - Assembled joint

---

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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 together, 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 into 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 BELOW AN EXPANSION JOINT (EJ).
D. OBSERVE ADEQUATE SAFETY MEASURES WHEN USING A DEGREASER.

Table A-4b - Sealant Usage

<table>
<thead>
<tr>
<th>Interior Installation</th>
<th>Supplier</th>
<th>Model</th>
<th>Color</th>
<th>Max. Temp.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inner Joints</td>
<td>Imperial</td>
<td>KK0076</td>
<td>Black</td>
<td>2100°F</td>
</tr>
<tr>
<td>Outer Joints</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Exterior Installation</th>
<th>Supplier</th>
<th>Model</th>
<th>Color</th>
<th>Max. Temp.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inner Joints</td>
<td>Imperial</td>
<td>KK0076</td>
<td>Black</td>
<td>2100°F</td>
</tr>
<tr>
<td>Outer Joints</td>
<td>Adchem</td>
<td>Adsil4809</td>
<td>Gray</td>
<td>375°F</td>
</tr>
</tbody>
</table>

Fig. A-2b - Joint components

Fig. A-3b - Assembled joint

---

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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

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

Fig. A-4 - Maximum chimney Height and Support

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

<table>
<thead>
<tr>
<th>Inside Diameter (in)</th>
<th>CBILA, CBIL, CBIL1 and CBIL1F</th>
<th>CBIL2, CBIL2F and CBIL4F</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MVS*</td>
<td>H**</td>
</tr>
<tr>
<td>6</td>
<td>11'-0&quot;</td>
<td>10'-0&quot;</td>
</tr>
<tr>
<td>8</td>
<td>11'-4&quot;</td>
<td>10'-0&quot;</td>
</tr>
<tr>
<td>10</td>
<td>11'-8&quot;</td>
<td>10'-0&quot;</td>
</tr>
<tr>
<td>12</td>
<td>12'-0&quot;</td>
<td>10'-0&quot;</td>
</tr>
<tr>
<td>14</td>
<td>12'-4&quot;</td>
<td>10'-0&quot;</td>
</tr>
<tr>
<td>16</td>
<td>12'-8&quot;</td>
<td>10'-0&quot;</td>
</tr>
<tr>
<td>18</td>
<td>13'-0&quot;</td>
<td>10'-0&quot;</td>
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<td>10'-0&quot;</td>
</tr>
<tr>
<td>38</td>
<td>15'-0&quot;</td>
<td>10'-0&quot;</td>
</tr>
<tr>
<td>40</td>
<td>14'-8&quot;</td>
<td>10'-0&quot;</td>
</tr>
<tr>
<td>42</td>
<td>14'-0&quot;</td>
<td>10'-0&quot;</td>
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<tr>
<td>44</td>
<td>13'-0&quot;</td>
<td>10'-0&quot;</td>
</tr>
<tr>
<td>46</td>
<td>12'-4&quot;</td>
<td>10'-0&quot;</td>
</tr>
<tr>
<td>48</td>
<td>12'-0&quot;</td>
<td>10'-0&quot;</td>
</tr>
</tbody>
</table>

* 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 a Variable Length (VL) or bellows Expansion Joint (EJ) to compensate for expansion. All models will expand approx. 1 inch per 100º 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 guidance. 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).

Note: When max. height from table A-5 is exceeded, resupport using another support and expansion joint.
Table A-7 - Pipe weight in lb/ft

<table>
<thead>
<tr>
<th>I.D.</th>
<th>CBILA</th>
<th>CBIL1F</th>
<th>CBIL</th>
<th>CBIL2F</th>
<th>CBIL4F</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>5.3</td>
<td>6.5</td>
<td>5.9</td>
<td>8.8</td>
<td>14.6</td>
</tr>
<tr>
<td>8</td>
<td>6.8</td>
<td>8.4</td>
<td>7.4</td>
<td>11.1</td>
<td>17.7</td>
</tr>
<tr>
<td>10</td>
<td>8.4</td>
<td>10.3</td>
<td>9.0</td>
<td>13.4</td>
<td>20.7</td>
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<td>12.1</td>
<td>17.9</td>
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<td>13.0</td>
<td>15.9</td>
<td>13.6</td>
<td>20.2</td>
<td>29.9</td>
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<td>14.6</td>
<td>17.8</td>
<td>15.2</td>
<td>22.5</td>
<td>32.9</td>
</tr>
<tr>
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<td>19.7</td>
<td>16.7</td>
<td>24.7</td>
<td>35.9</td>
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<tr>
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<td>21.6</td>
<td>18.3</td>
<td>27.0</td>
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</tr>
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<td>23.5</td>
<td>19.8</td>
<td>29.3</td>
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<td>20.8</td>
<td>25.4</td>
<td>21.4</td>
<td>31.6</td>
<td>45.1</td>
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<td>22.3</td>
<td>27.3</td>
<td>22.9</td>
<td>33.9</td>
<td>48.1</td>
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<tr>
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<td>23.9</td>
<td>29.2</td>
<td>24.5</td>
<td>36.1</td>
<td>51.2</td>
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<td>26.0</td>
<td>38.4</td>
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<td>33.0</td>
<td>27.6</td>
<td>40.7</td>
<td>57.3</td>
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<td>28.5</td>
<td>34.9</td>
<td>29.1</td>
<td>43.0</td>
<td>60.3</td>
</tr>
<tr>
<td>38</td>
<td>30.1</td>
<td>36.8</td>
<td>30.7</td>
<td>45.2</td>
<td>63.3</td>
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<td>40</td>
<td>31.6</td>
<td>38.7</td>
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<td>46.5</td>
<td>53.5</td>
<td>47.5</td>
<td>63.1</td>
<td>83.3</td>
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<td>44</td>
<td>48.7</td>
<td>56.0</td>
<td>49.6</td>
<td>66.0</td>
<td>87.0</td>
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<td>46</td>
<td>50.9</td>
<td>58.5</td>
<td>51.8</td>
<td>68.9</td>
<td>90.6</td>
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<td>48</td>
<td>53.0</td>
<td>61.0</td>
<td>54.0</td>
<td>71.7</td>
<td>94.3</td>
</tr>
</tbody>
</table>

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 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.

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 when 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 to protect the roof flashing against additional loads caused by wind on the exposed chimney. (See Fig. A-6).

Fig. A-5 - Maximum freestanding chimney height

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.
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

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.

Note: Max. height over the roof is (2xMVS) + H. For greater height use of welded joints is necessary.
**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)

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

<table>
<thead>
<tr>
<th>Gas Temperature Rise</th>
<th>Maximum Length</th>
<th>Expansion</th>
</tr>
</thead>
<tbody>
<tr>
<td>200°F</td>
<td>12'-0&quot;</td>
<td>0.25&quot;</td>
</tr>
<tr>
<td>300°F</td>
<td>8'-0&quot;</td>
<td>0.25&quot;</td>
</tr>
<tr>
<td>400°F</td>
<td>6'-0&quot;</td>
<td>0.25&quot;</td>
</tr>
<tr>
<td>500°F</td>
<td>5'-0&quot;</td>
<td>0.25&quot;</td>
</tr>
<tr>
<td>600°F</td>
<td>4'-0&quot;</td>
<td>0.25&quot;</td>
</tr>
<tr>
<td>700°F</td>
<td>3'-6&quot;</td>
<td>0.25&quot;</td>
</tr>
<tr>
<td>800°F</td>
<td>3'-0&quot;</td>
<td>0.25&quot;</td>
</tr>
<tr>
<td>900°F</td>
<td>2'-6&quot;</td>
<td>0.25&quot;</td>
</tr>
<tr>
<td>1000°F</td>
<td>2'-0&quot;</td>
<td>0.25&quot;</td>
</tr>
</tbody>
</table>

Note: 60°F - 70°F ambient T°

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

<table>
<thead>
<tr>
<th>Tee location</th>
<th>Adjacent to</th>
<th>Interior</th>
<th>Exterior</th>
<th>Use Support Type</th>
<th>Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roof*</td>
<td>x</td>
<td>Wall Support (WS)</td>
<td>See Fig B-1a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Floor**</td>
<td>x</td>
<td>Anchor Plate (AP)</td>
<td>See Fig B-1b</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wall</td>
<td>x</td>
<td>Wall Support (WS)</td>
<td>See Fig B-1c</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wall</td>
<td>x</td>
<td>Wall Support (WS)</td>
<td>See Fig B-1d</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* 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.

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

<table>
<thead>
<tr>
<th>Tee location</th>
<th>Adjacent to</th>
<th>Interior</th>
<th>Exterior</th>
<th>Use Support Type</th>
<th>Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roof*</td>
<td>x</td>
<td>Wall Support (WS)</td>
<td>See Fig B-1a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Floor**</td>
<td>x</td>
<td>Anchor Plate (AP)</td>
<td>See Fig B-2</td>
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<td></td>
</tr>
<tr>
<td>Wall</td>
<td>x</td>
<td>Wall Support (WS)</td>
<td>See Fig B-3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wall</td>
<td>x</td>
<td>Wall Support (WS)</td>
<td>See Fig B-4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

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

**Note:** Do not use with Engine or Turbine Exhaust
Tees, Elbows, Increasers and Offset

Installation Instruction

Section B

Tees, Elbows, Increasers and Offset

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

Fig B-1d - Single axis 90° Tee (T90) support from exterior wall

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

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

<table>
<thead>
<tr>
<th>Tee location</th>
<th>Adjacent to:</th>
<th>Interior</th>
<th>Exterior</th>
<th>Use Support Type</th>
<th>Detail</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
<td>Wall Support (WS)</td>
<td>See Fig B-3a</td>
<td></td>
</tr>
<tr>
<td>Floor**</td>
<td>x</td>
<td></td>
<td>Anchor Plate (AP)</td>
<td>See Fig B-3b</td>
<td></td>
</tr>
<tr>
<td>Wall</td>
<td>x</td>
<td></td>
<td>Wall Support (WS)</td>
<td>See Fig B-3c</td>
<td></td>
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<tr>
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<td>x</td>
<td></td>
<td>Wall Support (WS)</td>
<td>See Fig B-3d</td>
<td></td>
</tr>
</tbody>
</table>

* 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 brechings.
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.)
Tees, Elbows, Increasers and Offset

Installation Instruction
Section B

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

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

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

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

No more than 1/4" expansion see Table B-1

Vertical length (VL)

Hanger Bracket (HB)

Appliance

Drain Tee Cap (DC)

45° Elbow (E45)

Drain line (by others)

Firestop (FS)

45° Tee (T45)

Wall Support plate (WS)

Firestop (IFS)

Anchor Plate (AP)

45° Elbow (E45)

Rods (by others)

Wall Support (WS)

2.5” to 8” from wall

Hanger Bracket (HB)

Appliance

Drain Tee Cap (DC)

45° Elbow (E45)

Suspension Band (SB)

Drain line (by others)

Firestop (FS)

Hanger Bracket (HB)

45° Tee (T45)

Wall Firestop (WFS) or Insulated Wall Firestop (IFS)

Anchor Plate (AP)

Wall Support (WS)

45° Tee (T45)

Drain Tee Cap (DC)

Drain line (by others)
Table B-5 - Two axis support*** for 45° Tee (T45)
Tee location
<table>
<thead>
<tr>
<th>Adjacent to:</th>
<th>Interior</th>
<th>Exterior</th>
<th>Use Support Type</th>
<th>Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roof*</td>
<td>x</td>
<td></td>
<td>Wall Support (WS)</td>
<td></td>
</tr>
<tr>
<td>Floor**</td>
<td></td>
<td>x</td>
<td>Wall Support (WS)</td>
<td>See Fig B-4a</td>
</tr>
<tr>
<td>Wall</td>
<td></td>
<td>x</td>
<td>Wall Support (WS)</td>
<td>See Fig B-4b</td>
</tr>
</tbody>
</table>

* 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)
1. Used to increase the diameter of the flue or chimney.
2. The Increaser (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)
3. The Increaser (I) includes a transition section tapered at a 14° angle, which provides a lower friction loss coefficient. (See Fig.B-7a Detail B)
4. Larger diameter Increasers (I) are available on order or as specified. The angle of the Increaser (I) is standard but the length of the fitting varies depending on the diameter to be increased.
5. Joint assembly between the Increaser (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 - Increaser (I) with 45° Tee (T45)

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

ELBOWS
1. Elbows are used for changes in direction in horizontal or vertical portions of a chimney system.
2. All elbows feature the standard joint assembly as described in Section A Piping and Fitting Assembly.
3. Elbows are used in combination to make up different angles ranging from 5° to 90° in horizontal and vertical breechings of the chimney system.
4. 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 OFF-SETS in this Section for details)

5° ELBOW (E5)
1. Used for offset or deviation of the horizontal part of the flue or chimney by 5°.
2. 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)
Tees, Elbows, Increasers and Offset

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

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)

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

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 or inclined configurations. (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).
9. With frequent resupport, there is no structural or operating limit to the length of horizontal or sloped portions of a chimney model, 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)

![Diagram of Hanger Bracket Support Assembly](image)

5'-0'

Pipe section O.D.

3/8” dia. threaded suspension rods (by others)

Out. Dia.

Out. Dia.

Hanger Bracket (HB)

Front Elevation View

### 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.

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

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

![Diagram of Wall Support Assembly (WS)](image)

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)**

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 circumstances should a horizontal support be secured with threaded suspension rods, since this will not prevent pipe sway.

**Fig. C-2b - Wall Bracket Detail**

**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.

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

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.

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

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 4 angle brackets. (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.

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

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".
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.

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

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

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-1 - Flat Flashing Roof Assembly (F)

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

*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.
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)

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 all 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

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

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

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.
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**

Wall Firestop (WFS)
Exterior wall
Insulation
Interior wall
Framing (by others)
Clearance see Table D-1
Insulator pipe section
Firestop (FS)
Wall Firestop (WFS)

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

Wall Firestop (WFS)
Wall opening (see Table D-1)
Wall Firestop (WFS)
Framing (by others)

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**

**Installation Instruction**

Section D

**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

---

See Boiler and Engine Exhaust catalog

Outside Dia. + 0.125"
RAIN CAP (RC)
Installed at the top of the chimney, it prevents entry of rain into the chimney. (See Fig.E-12 for assembly)

EXHAUST CONE (EC)
Installed at the top of 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).

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.

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.

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).

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.
Terminations, Starting Adapters/Relief Valve

Installation Instruction
Section E

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

STARTING SLEEVE (SS)
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
Terminations, Starting Adapters/Relief Valve

Installation Instruction
Section E

Termination use and application

<table>
<thead>
<tr>
<th>Termination</th>
<th>Model</th>
<th>Temperature from 0ºF to less than 1000ºF or 1000ºF to less than 1400ºF continuous or boiler applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rain Cap</td>
<td>ALL MODELS</td>
<td>6&quot; to 24&quot; diameter</td>
</tr>
<tr>
<td>Exhaust Cone</td>
<td>ALL MODELS</td>
<td>6&quot; to 48&quot; diameter</td>
</tr>
<tr>
<td>Rainshield</td>
<td>ALL MODELS</td>
<td>6&quot; to 16&quot; diameter</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Termination</th>
<th>Model</th>
<th>Temperature from 1000ºF to less than 1400ºF or 1400ºF continuous or boiler applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rain Cap</td>
<td>CBLA, CBL, CBL1F, CBL2F, CBL4F</td>
<td>6&quot; to 24&quot; diameter</td>
</tr>
<tr>
<td>Exhaust Cone</td>
<td>CBLA, CBL, CBL1F, CBL2F, CBL4F</td>
<td>6&quot; to 48&quot; diameter</td>
</tr>
<tr>
<td>Rainshield</td>
<td>CBLA, CBL, CBL1F, CBL2F, CBL4F</td>
<td>6&quot; to 16&quot; diameter</td>
</tr>
</tbody>
</table>

Fig. E-11 - Typical installation for Starting Adapter (SA) and Staring 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)
**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)

![Relief Valve (RV) with 45° Tee (T45) section](image1)

![Starting Adapter (SA)](image2)

![Muffler (by others)](image3)

![Flexible section (by others)](image4)

![Generator set (by others)](image5)

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

![No. 125 flange](image6)

![Plan View](image7)

![Elevation A-A](image8)

---

**Table E-1 - Relief Valve (RV) dimension**

<table>
<thead>
<tr>
<th>Inside Diameter (inches)</th>
<th>&quot;A&quot;</th>
<th>&quot;B&quot;</th>
<th>&quot;C&quot;</th>
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<td>6</td>
<td>9.625</td>
<td>11.000</td>
<td>10.750</td>
</tr>
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</tr>
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</table>

*Tolerance 1/32"*
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 or 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 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 fixed points. See Table F-1.

8. For engine or turbine exhaust systems requiring pressures up to 60 inches of water column, or with bellows Expansion Joint (EJ) shown to compensate for the axial expansion of the exhaust piping.

9. Low pressure systems, such as boilers (up to 6 inches of 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.

Ex.: Thermal Expansion for 100' of pipe at 1000 °F

\[
\Delta E (\text{in}) = \frac{EC (8,9) \times AT (\circ F) \times \text{Pipe Length (in.)}}{1000000}
\]

\[
\Delta E (\text{in}) = \frac{8.9 \times 1000 \times 1200}{1000000} = 10.0392 \text{ (in.)}
\]

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

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

\( \Delta T (\circ F) = 940 (\circ F) \)

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 require careful positioning of piping guides to avoid interference on thermal expansion.

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

5. Any piping system requiring low axial expansion forces, the bellows Expansion Joint (EJ) will deflect with minimum friction at a known “spring rate”. The values for spring rates given in the tables assume that the 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**

**Section F**

**Installation Instruction**

---

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

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

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**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 out er 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**

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<th>600º</th>
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Ex.: For a chimney run of 75’ at 1000º 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 70º F. Temperature rise for 1000ºF is 930º F.*
Thermal Expansion

Installation Instruction
Section F

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.)
### Marking

#### Section G

**CAUTION / AVERTISSEMENT**

"DO NOT ENCLOSE WITH COMBUSTIBLE MATERIALS. BUILDING HEATING APPLIANCE CHIMNEY FOR INSTALLATION AS REQUIRED FOR DOUBLE WALL METAL CHIMNEYS. FOLLOW INSTALLATION INSTRUCTIONS."

**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."

---

#### Minimum Air Space Clearance to Combustible Materials and Building Insulation for 1000°F and 1400°F Continuous Temperature Chimney Systems

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#### System Component

**MODEL CBIL**

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

RATED FOR USE AT MAXIMUM 60 INCH WATER COLUMN INTERNAL PRESSURE WHEN USED IN POSITIVE PRESSURE APPLICATIONS.

**MODEL CBIL2**

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

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Visit [www.cleaverbrooks.com](http://www.cleaverbrooks.com) for more information.
### Section G: Marking

#### CAUTION

"DO NOT ENCLOSE WITH COMBUSTIBLE MATERIALS. BUILDING HEATING APPLIANCE CHIMNEY FOR INSTALLATION AS REQUIRED FOR DOUBLE WALL METAL CHIMNEYS. FOLLOW INSTALLATION INSTRUCTIONS."

#### Minimum Air Space Clearance to Combustible Materials and Building Insulation for 1000°F and 1400°F Continuous Temperature Chimney Systems

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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."

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## Sample Drawings
### Boiler Exhaust

#### Installation Instruction
##### Section H

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### Sample Drawings

#### Boiler Exhaust

**Installation Instruction**

**Section H**

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