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Commercial Kitchen **Exhaust**

From

2003 IMC



Program Scope

- **2003 IMC**
 - *Types of Hoods and Ducts*
 - *Installation Requirements*
 - *Necessary Areas for:*
 - Clearance from combustibles
 - Clearance from other openings
 - Isolation of systems

What Is Being Considered

- **All Commercial Kitchen Ducts & Hoods**
 - *Shall be one of two types*
- **Hood:**
 - *An air-intake device used to capture by entrapment, impingement or similar means, grease and similar contaminants before they enter a duct system*
- **Type I**
 - *A Kitchen hood for collecting and removing grease vapors and smoke*
- **Type II**
 - *A general kitchen hood for collecting and removing steam, vapor, heat and odors*

Commercial Kitchen Hoods

- **General - Section 507.1**
 - *To be either Type I or Type II*
 - *Exceptions:*
 - **Factory built exhaust hood**
 - *Tested per UL 710 & Listed & Labeled per 304.1*
 - **Factory built commercial cooking recirculating systems**
 - *Tested per UL 197 & Listed & Labeled per 304.1*
 - **Net exhaust volumes permitted to be reduced**
 - *During no load cooking conditions*

How Does Chapter 5 **Look at it?**

- **507.2 Where Required**
 - *A Type I or Type II hood shall be installed at or above all commercial cooking appliances*
- **507.2.1 Type I Hoods**
 - *Shall be installed where cooking appliances produce grease or smoke*
 - *As will occur from:*
 - **Griddles, Fryers, Broilers, Ovens, Ranges & Wok Ranges**

Continuation

- **507.2.2 Type II Hoods**
 - *Shall be installed where cooking or dishwashing appliances produce heat or steam / with no production of grease or smoke*
 - **Steamers, Kettles, Pasta Cookers, Dish Washing Machines**
 - *Exceptions:*
 - **Under counter dishwashing machines**
 - **Dishwashers and pot washers with heat and water vapor exhaust systems**

What About Domestic & Solid Fuel?

- **507.2.3 Domestic Cooking Appliances Used For Commercial Purposes**
 - ***Shall be provided with***
 - **Type I or Type II hoods, as required**
- **507.2.4 Solid Fuel**
 - ***Type I over solid fuel cooking appliance***
 - **To be discharged to an independent exhaust system**

What Is Needed With A Type I Hood

- **We already know**
 - *Type I Hood to be used where grease and smoke exist / occur*
- **507.4 Type I Materials**
 - *If Steel*
 - **0.043” minimum thickness = (18 gage)**
 - *If Stainless*
 - **0.037” minimum thickness = (20 gage)**

Support, Joints, Penetrations

- **507.6 Supports**
 - ***For Type I Hoods***
 - **To secure in place with non-combustible supports**
- **507.7 Hood Joints, Seams & Penetrations**
 - ***Type I***
 - **Continuous external liquid tight weld or braze**
 - **Exceptions**
 - *Penetrations sealed by listed devices*
 - *Internal weld or braze when formed smooth or ground smooth*

Hidden Slide

Type I Hood Clearances

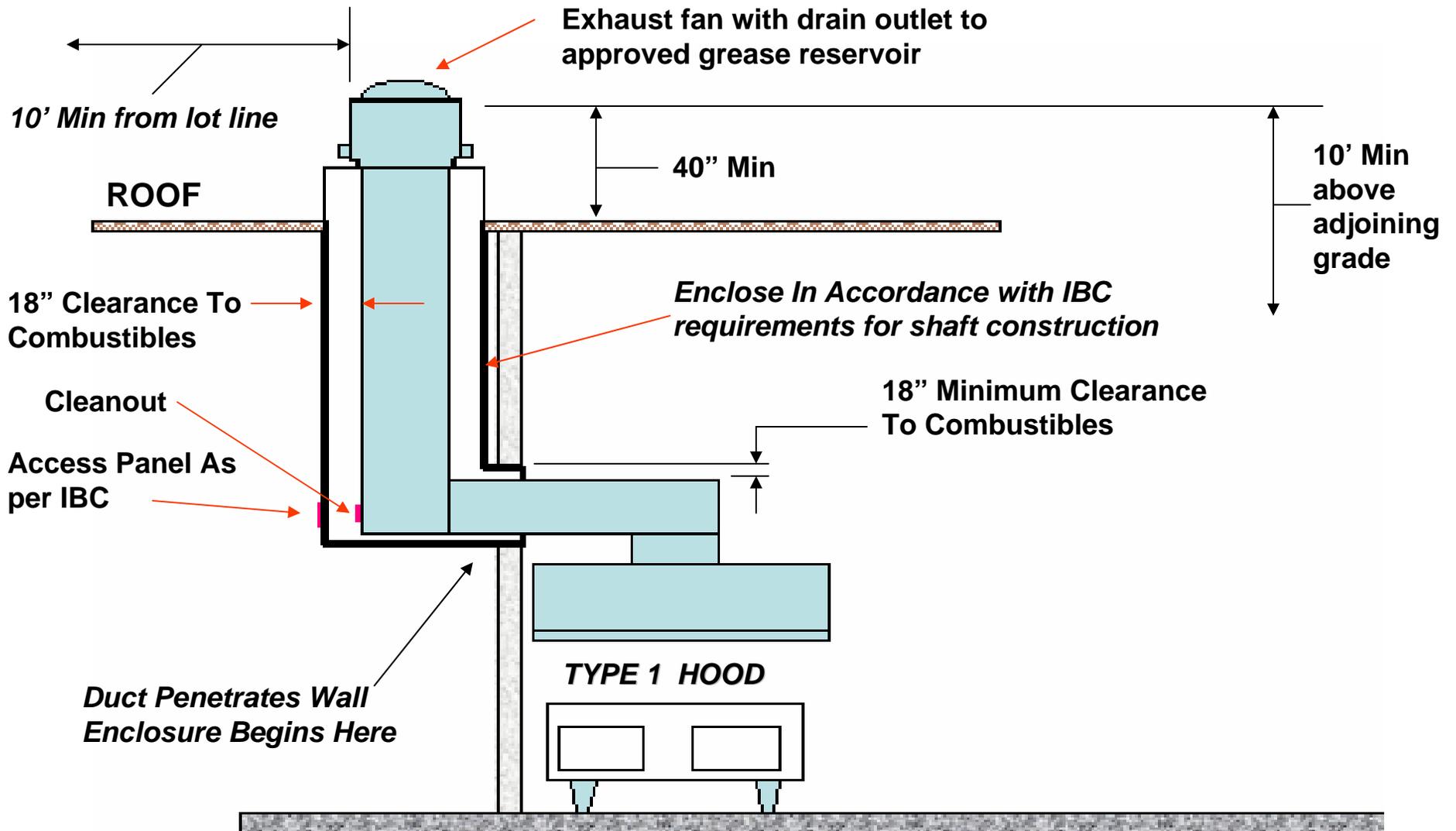
- **507.9 Clearances For Type I Hood**
 - ***Clearance to combustibles of***
 - **Not less than 18 inches**
 - ***Exception***
 - **Clearance not required from**
 - ***Gypsum Wallboard attached to non-combustible structure***
 - ***With smooth, cleanable, nonabsorbent – noncombustible material between hood and wallboard***



Ceiling Penetration

- **507.10 Hoods Penetrating A Ceiling**
 - ***Must meet all requirements of 506.3.10***
 - **Grease Duct Enclosure**
- **506.3.10 Grease Duct Enclosure**
 - ***Ceiling / Wall / Floor - penetration***
 - **Enclose from penetration to terminal outlet**
 - ***See Next Two Slides***

Figure 506.3.10(2) IMC Commentary

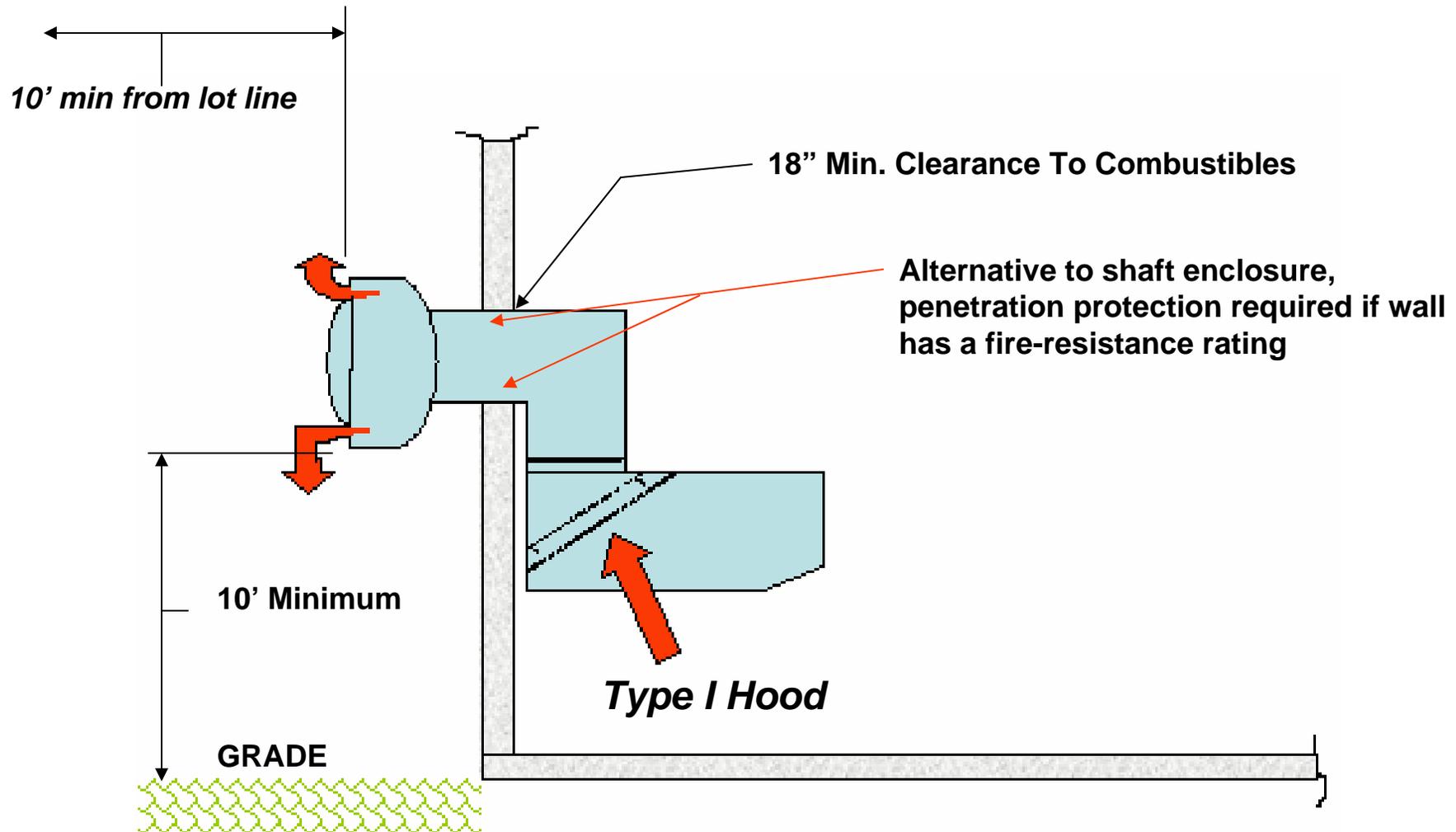


Exhaust Duct Penetrating A Wall

Exterior Wall Penetration

- **Ducts Shall Penetrate Exterior Walls**
 - ***Only @ locations where***
 - **Unprotected openings are permitted by the IBC**
 - ***Duct enclosures***
 - **As per IBC**
 - ***Sealed around duct @ point of penetration***
 - ***Vented to outside by weather proof openings***

Figure 506.3.10(3) IMC Commentary



Termination Through Exterior Wall

Enclosure Clearance

- **Duct Clearance**
 - ***Duct to interior surface of combustible construction***
 - **Not less than 18 inches**
 - ***Duct to interior surface of non-combustible construction***
 - **Or Gypsum wallboard attached to noncombustible structure**
 - ***Not less than 6 inches***

Exceptions

- **There Are Two Exceptions To Section 506.3.10**
 - **1. Shaft enclosure is not required**
 - **When penetration is protected as per**
 - *ASTM E 814*
 - *F & T rating equal to the fire resistance rating of the assembly being penetrated*
 - **2. Shaft enclosure is not required**
 - **For Grease duct penetrating a non-fire rated**
 - *Roof / ceiling assembly*

Duct Clearance

- **Section 506.3.6 Grease Duct Clearance**
 - ***Duct and exhaust equipment clearance to combustible***
 - **Not less than 18 inches**
 - ***To non-combustible & gypsum wallboard on non combustible***
 - **Not less than 3 inches**
 - ***Exception:***
 - **Listed and labeled factory built systems**

Clearance Reduction

- **Section 308.11 Kitchen Exhaust Ducts**
 - **Table 308.6 Clearance reduction table & methods**
 - **Shall not be used to reduce minimum clearance**

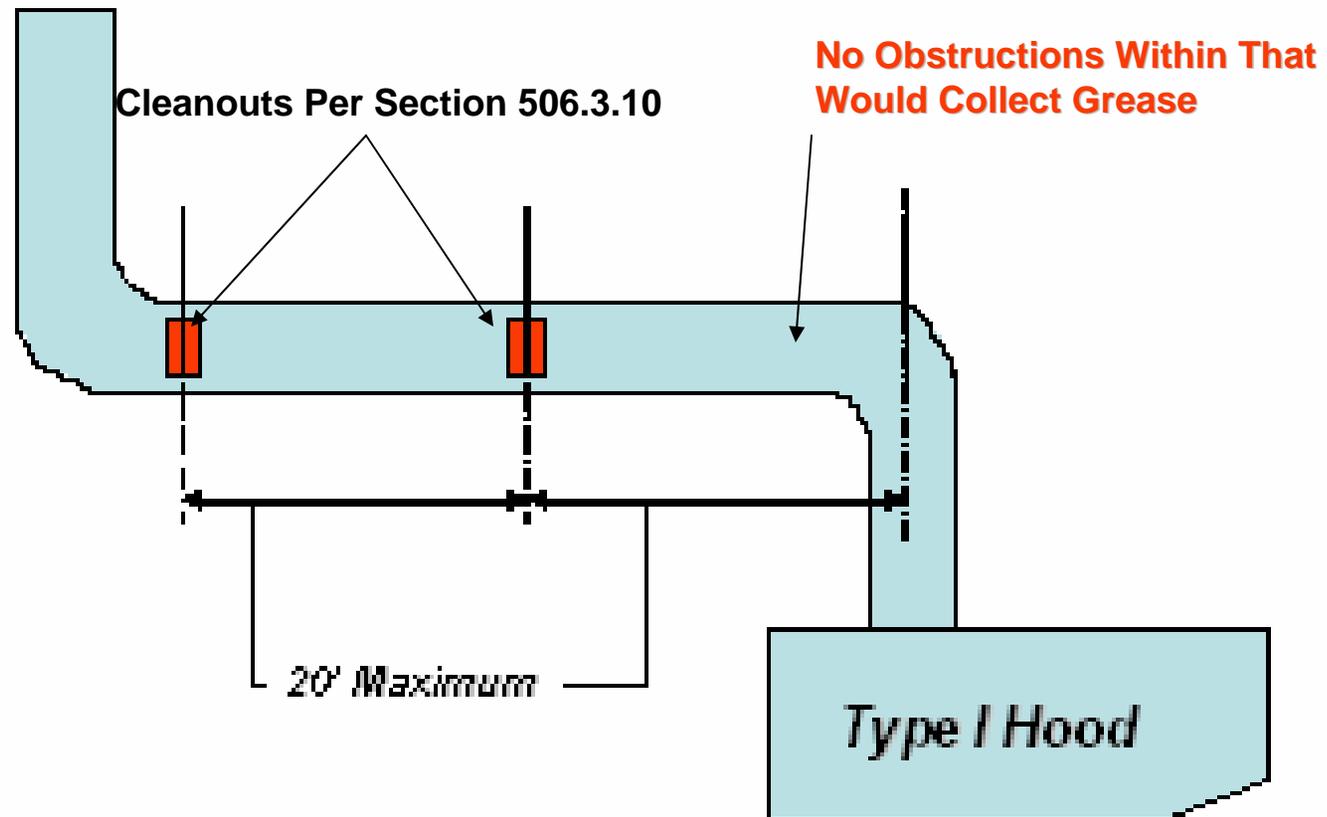
TABLE 308.6
CLEARANCE REDUCTION METHODS

TYPE OF PROTECTIVE ASSEMBLY ^a	REDUCED CLEARANCE WITH PROTECTION (inches) ^a							
	Horizontal combustible assemblies located above the heat source				Horizontal combustible assemblies located beneath the heat source and all vertical combustible assemblies			
	Required clearance to combustibles without protection (inches) ^a				Required clearance to combustible without protection (inches) ^a			
	36	18	9	6	36	18	9	6
Galvanized sheet metal, minimum nominal thickness of 0.024 inch (No. 24 Gage), mounted on 1-inch glass fiber or mineral wool batt reinforced with wire on the back, 1 inch off the combustible assembly	18	9	5	3	12	6	3	3

Cleaning

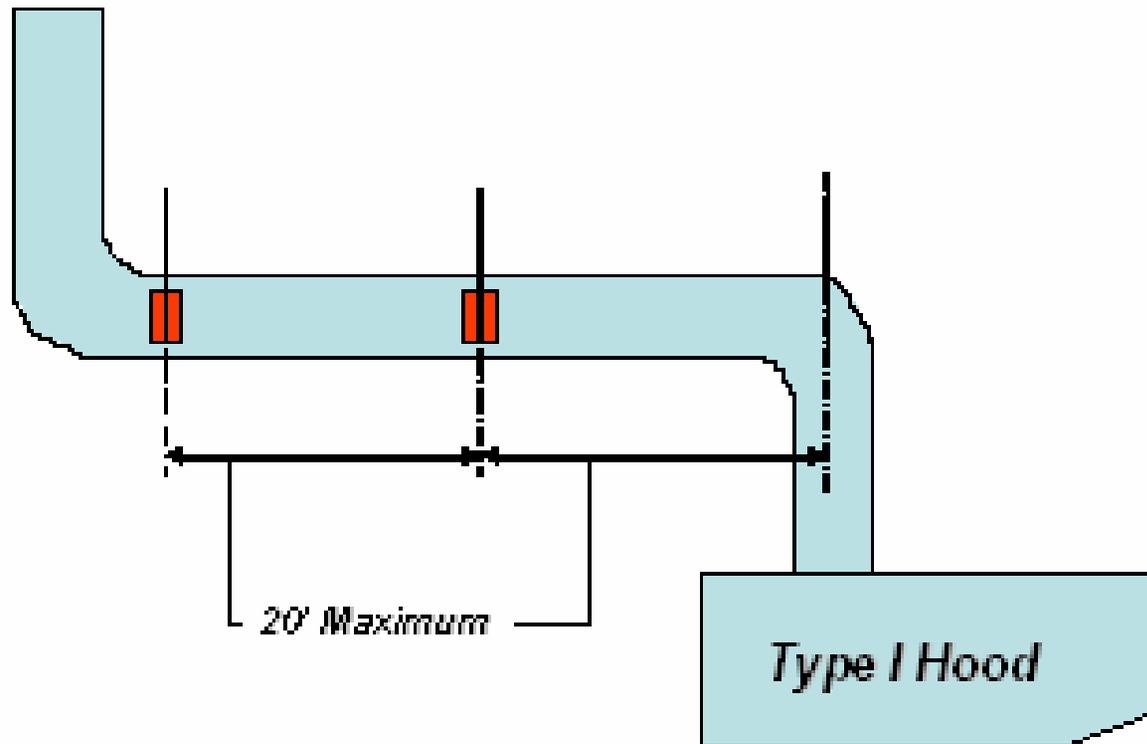
- **Section 507.8 Cleaning & Grease Gutters**
 - *Entire hood must be cleanable*
 - *Grease gutters to drain to approved collection receptacle*
- **Section 506.3.7 Prevention of Grease Accumulation In Grease Ducts**
 - *Construction and installation so grease cannot collect*
 - *Slope*
 - **Minimum of ¼ vertical in 12 horizontal**
 - **Toward hood or approved grease reservoir**

Figure 506.3.7 IMC Commentary



Prevention Of Grease Accumulation

- **NOTE:** Horizontal system $\leq 75'$ in length sloped $\geq \frac{1}{4}:12$ (2% slope) toward hood or approved grease reservoir
 - Horizontal system $\geq 75'$ in length sloped $\geq 1:12$ (8.3% slope) toward hood or approved grease reservoir

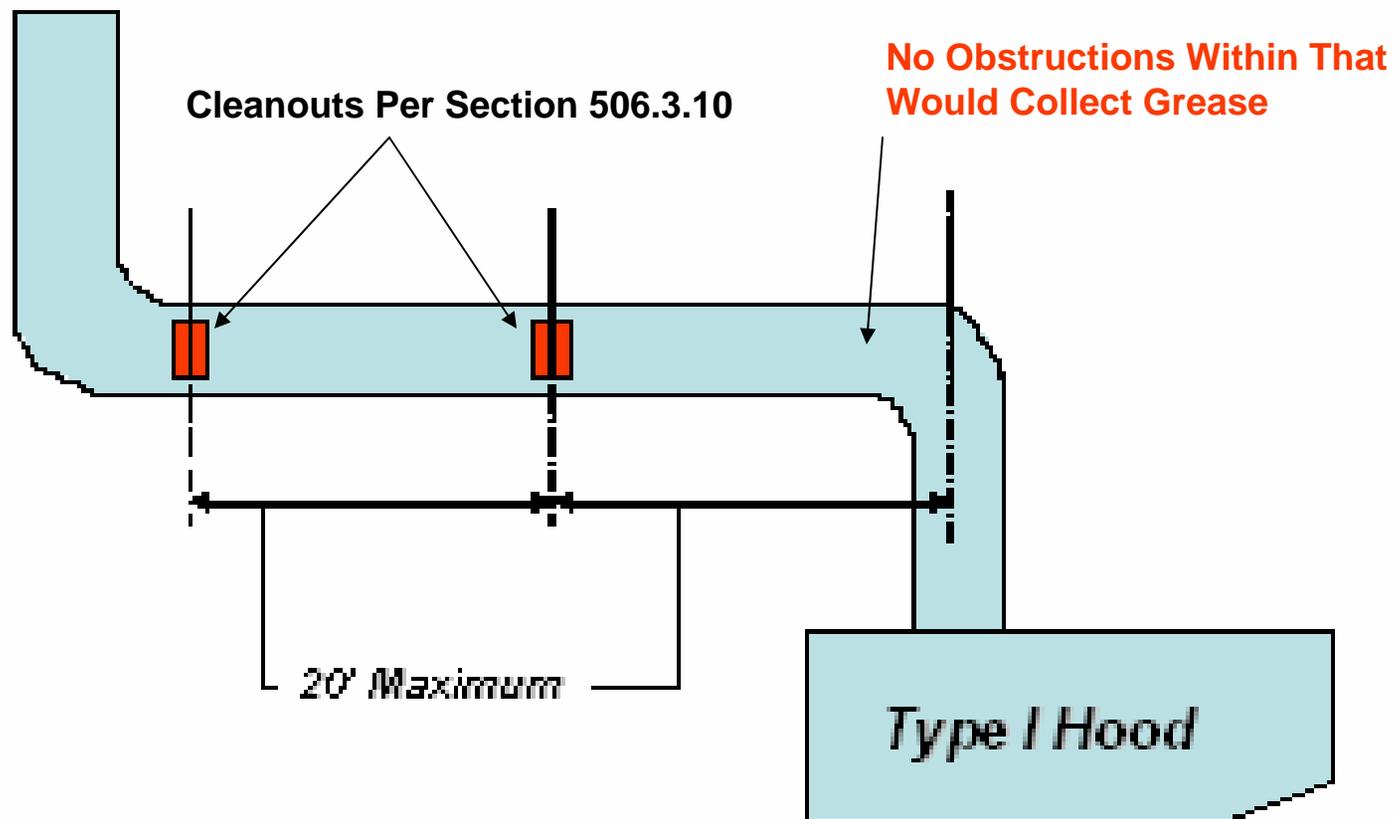


Duct Cleanouts

- **Section 506.3.8 Grease Duct Cleanouts & Other Openings**
 - ***Only required maintenance openings allowed***
 - **If no access, openings shall be provided**
 - ***Openings shall be provided with***
 - **Tight fitting doors with latching**
 - **Assembly to be approved for application**
 - **Listed and labeled assemblies**
 - ***Install per their listings***

- HIDE SLIDE
- INSTRUCTOR NOTES

Grease Duct Horizontal Cleanouts



Prevention Of Grease Accumulation

Horizontal Cleanouts

- **Section 506.3.9 Grease Duct Horizontal Cleanouts**

- **Spacing**

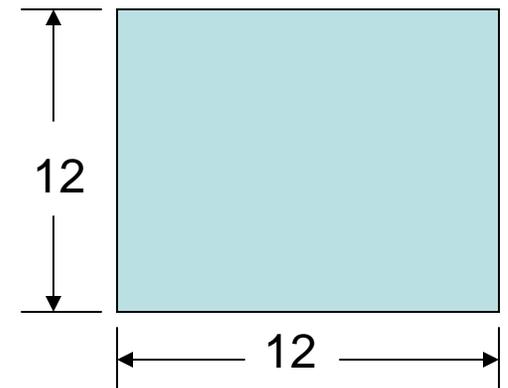
- Not greater than 20 feet apart
- On side of duct minimum 1.5 inches above bottom & 1 inch below top

- **Opening**

- Minimum of 12 inches each side

- **Side too small**

- Opening shall be on the top
 - Minimum 1 inch from edges



Filters

- **Section 507.11 Grease Filters**
 - *Filters to be listed and labeled*
 - **For the purpose**
 - *Access to be provided for cleaning*
 - *Lowest edge of filter*
 - **To meet specifications of Table 507.11**
-

TABLE 507.11
MINIMUM DISTANCE BETWEEN THE LOWEST EDGE OF A
GREASE FILTER AND THE COOKING SURFACE OR THE
HEATING SURFACE

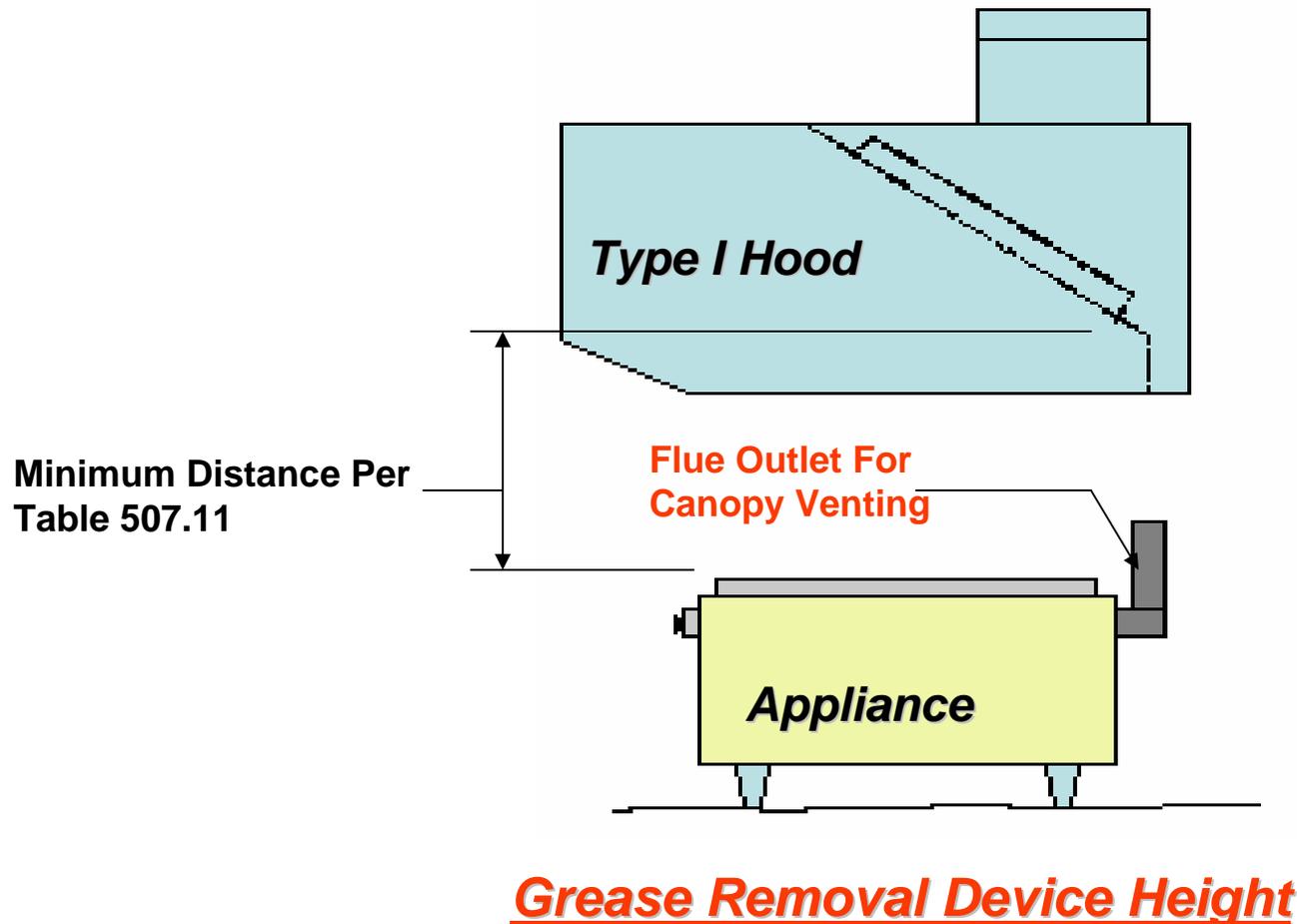
TYPE OF COOKING APPLIANCES	HEIGHT ABOVE COOKING SURFACE (feet)
Without exposed flame	0.5
Exposed flame and burners	2
Exposed charcoal and charcoal type	3.5







Figure 507.11 IMC Commentary



Filter Criteria

- **Section 507.11.1 Criteria**

- ***Filters shall be:***

- **Size, type & arrangement to permit**

- ***Required quantity of air to pass through as designed and approved***

- ***Installed***

- **In frames or holders and readily removable**

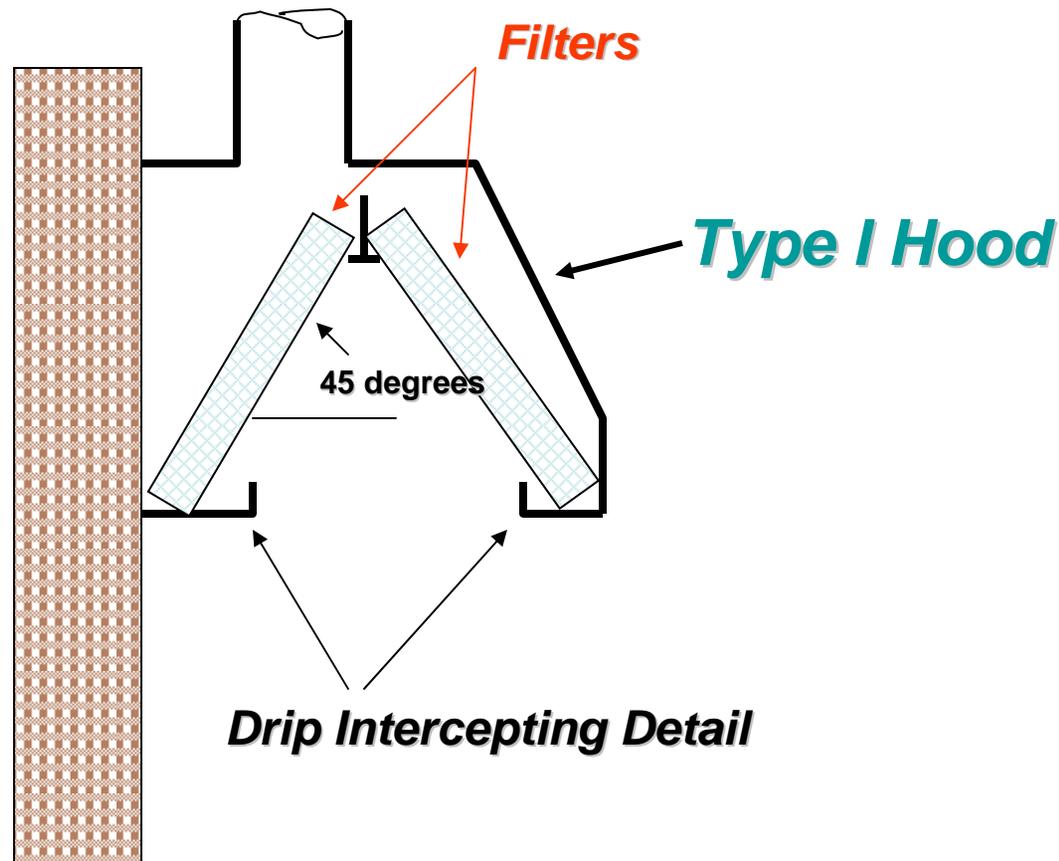
- ***Removable filter units***

- **To be size that will allow cleaning in a dishwashing machine or pot sink**

Mounting Position - 507.11.2

Angle not less than 45 degrees with drip tray

Figure 507.11.2 IMC Commentary



Minimum Angle Of Grease Filters

Notice Angle Of Filter Mounting!



Canopy

- **Section 507.12 Canopy Size & Location**

- **Commercial cooking hoods**

- **Lower edge to overhang / extend horizontally**

- *Not less than 6 inches beyond edge of cooking surface / on all sides*

- **Vertical distance between front lower lip**

- *To the cooking surface shall not exceed 4 feet*

- **Exception:**

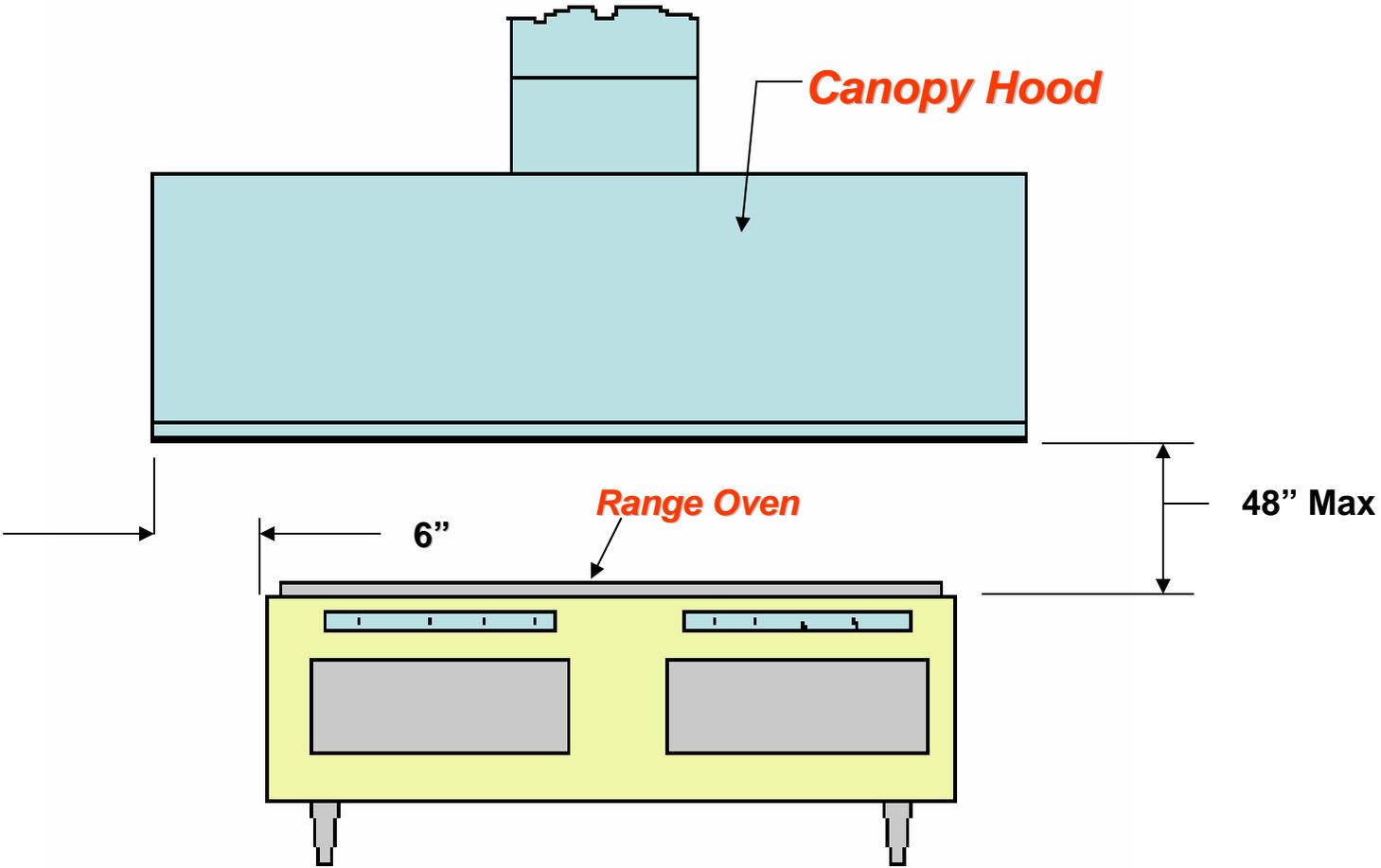
- **If hood is closed to appliance by**

- *Non combustible wall or panel*

- » **It may be flush with the outer edge**



Figure 507.12(1) IMC Commentary



Canopy Hood-Elevation

Figure 507.12(2) IMC Commentary

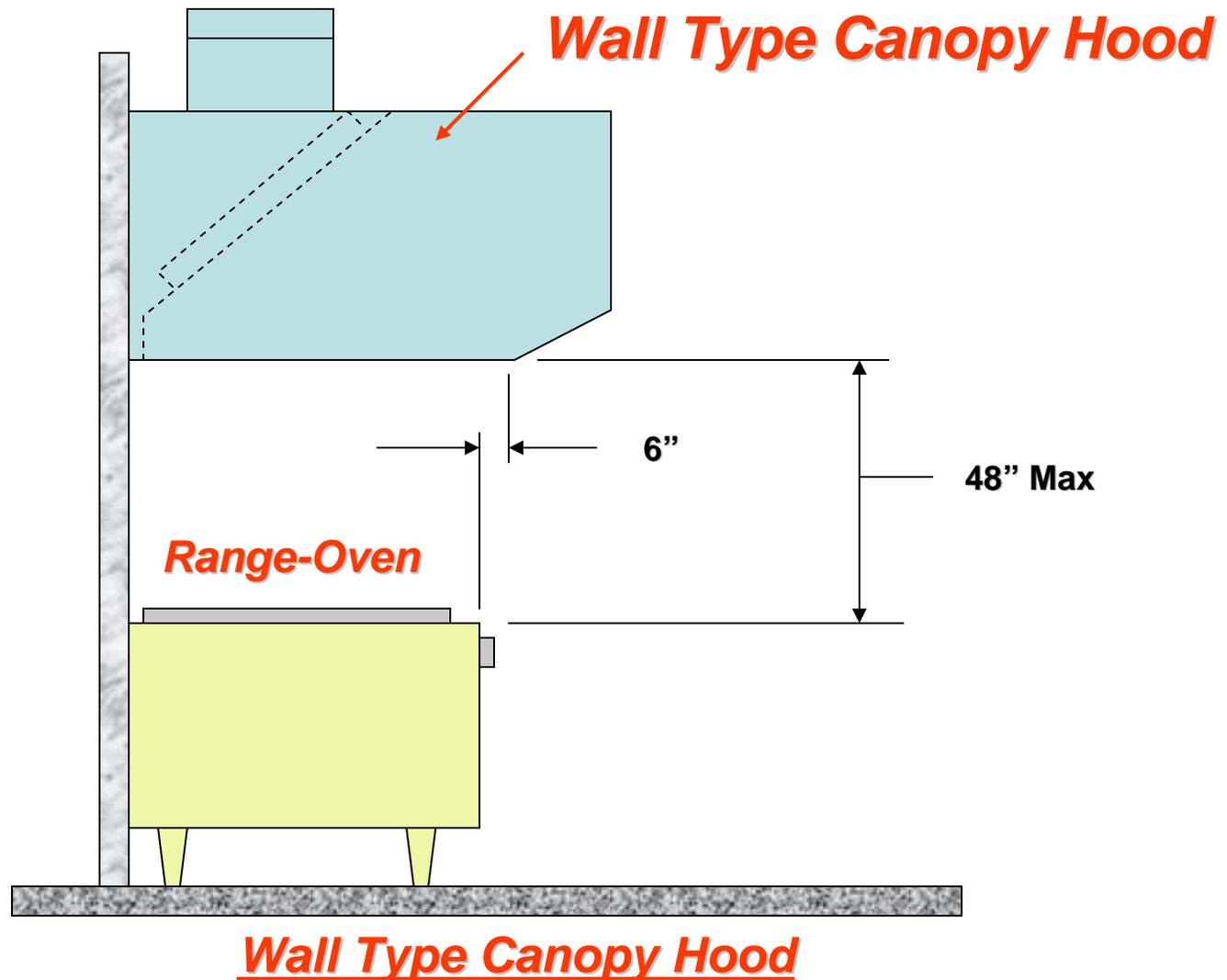




Figure 507.12(3) IMC Commentary

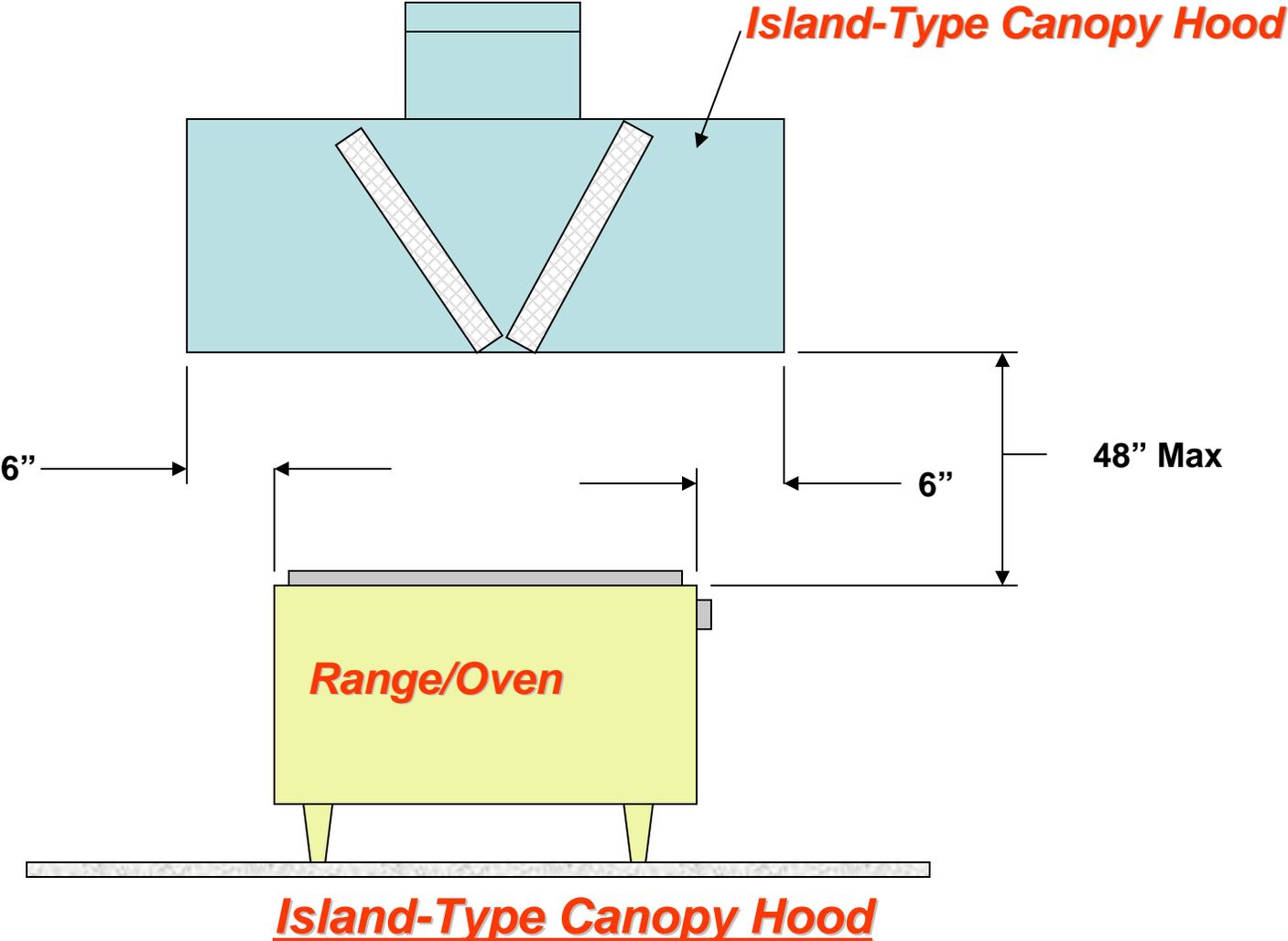
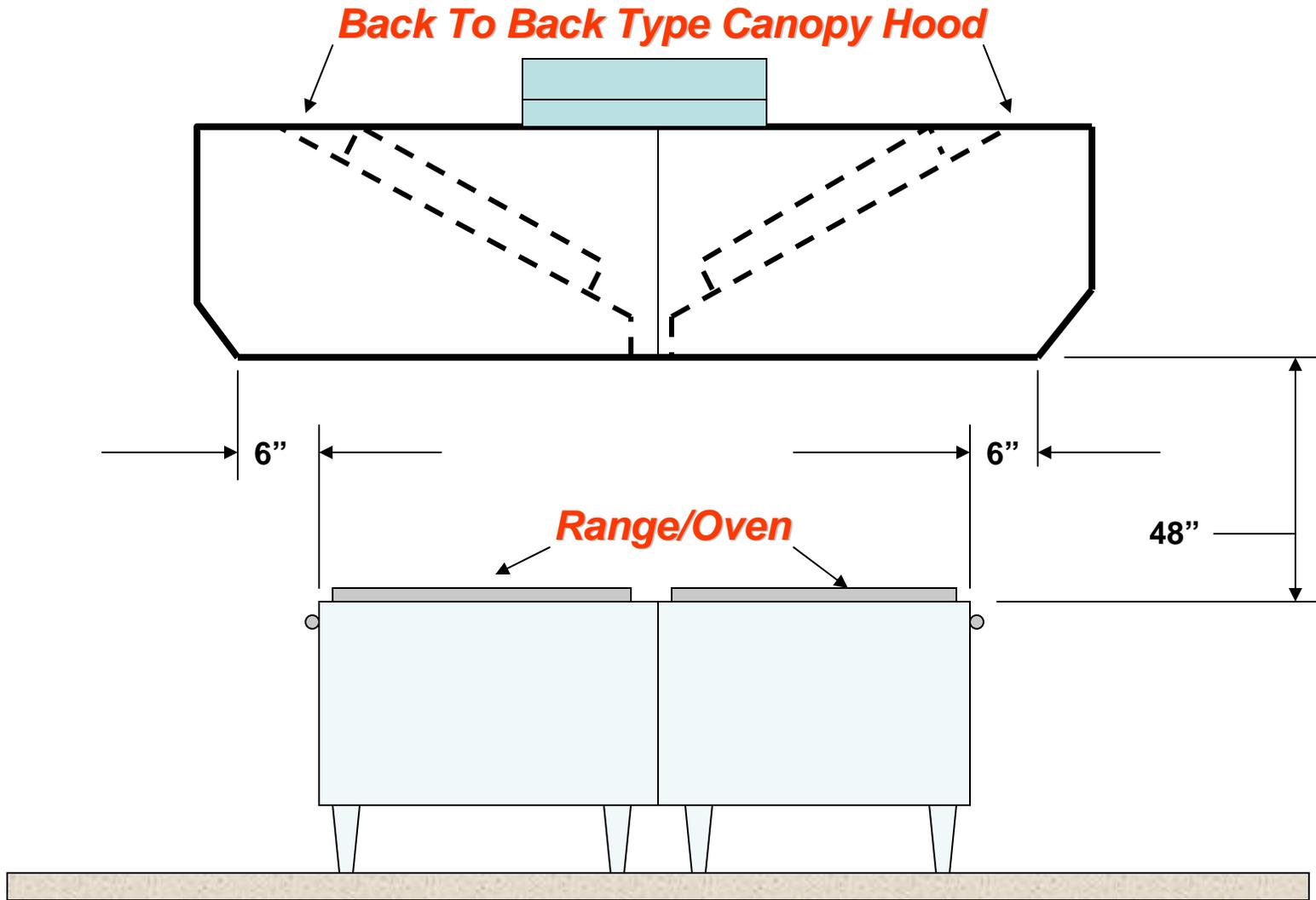




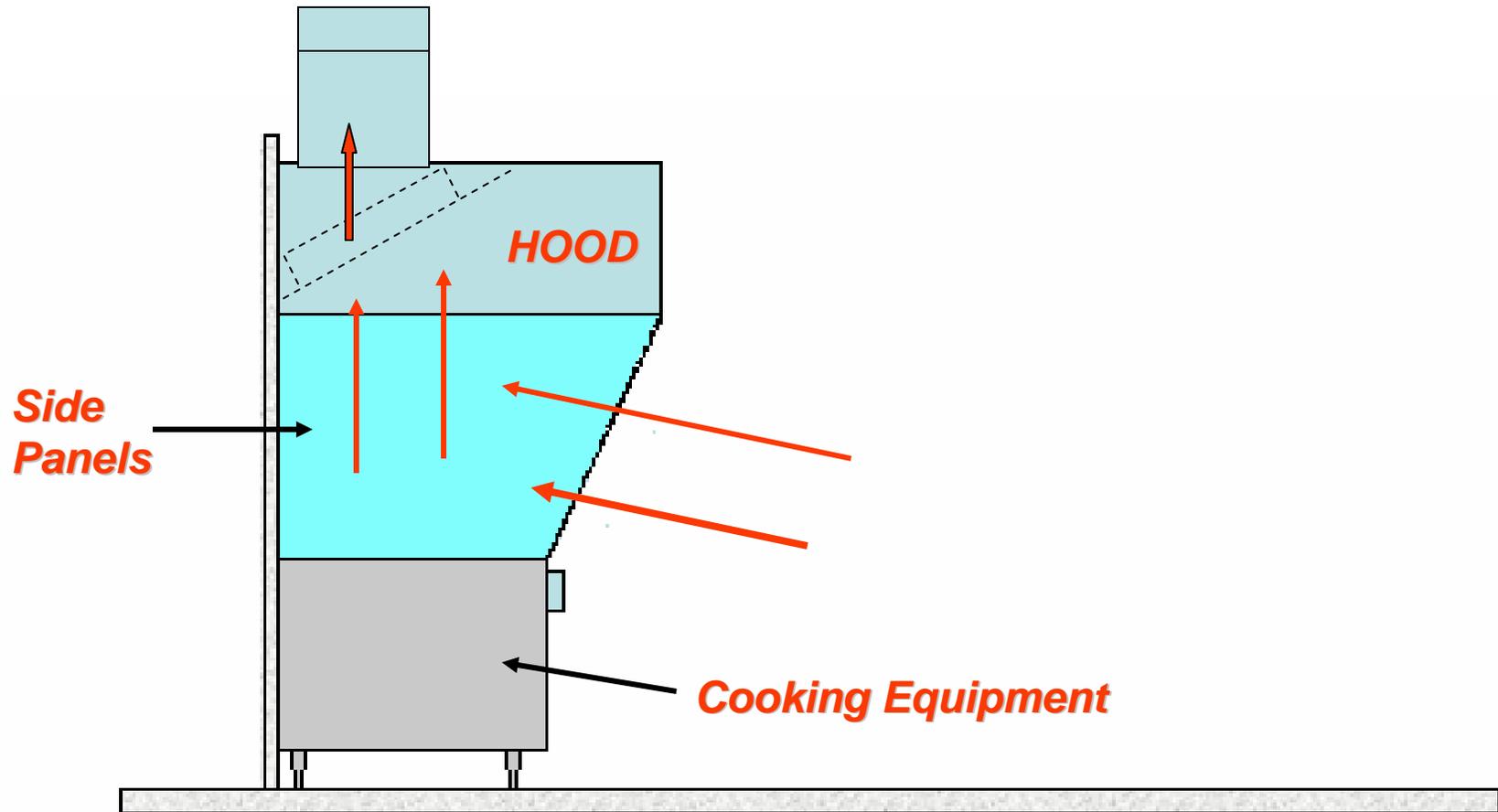
Figure 507.12(4) IMC Commentary



Back To Back (Double Island) Type Canopy Hood



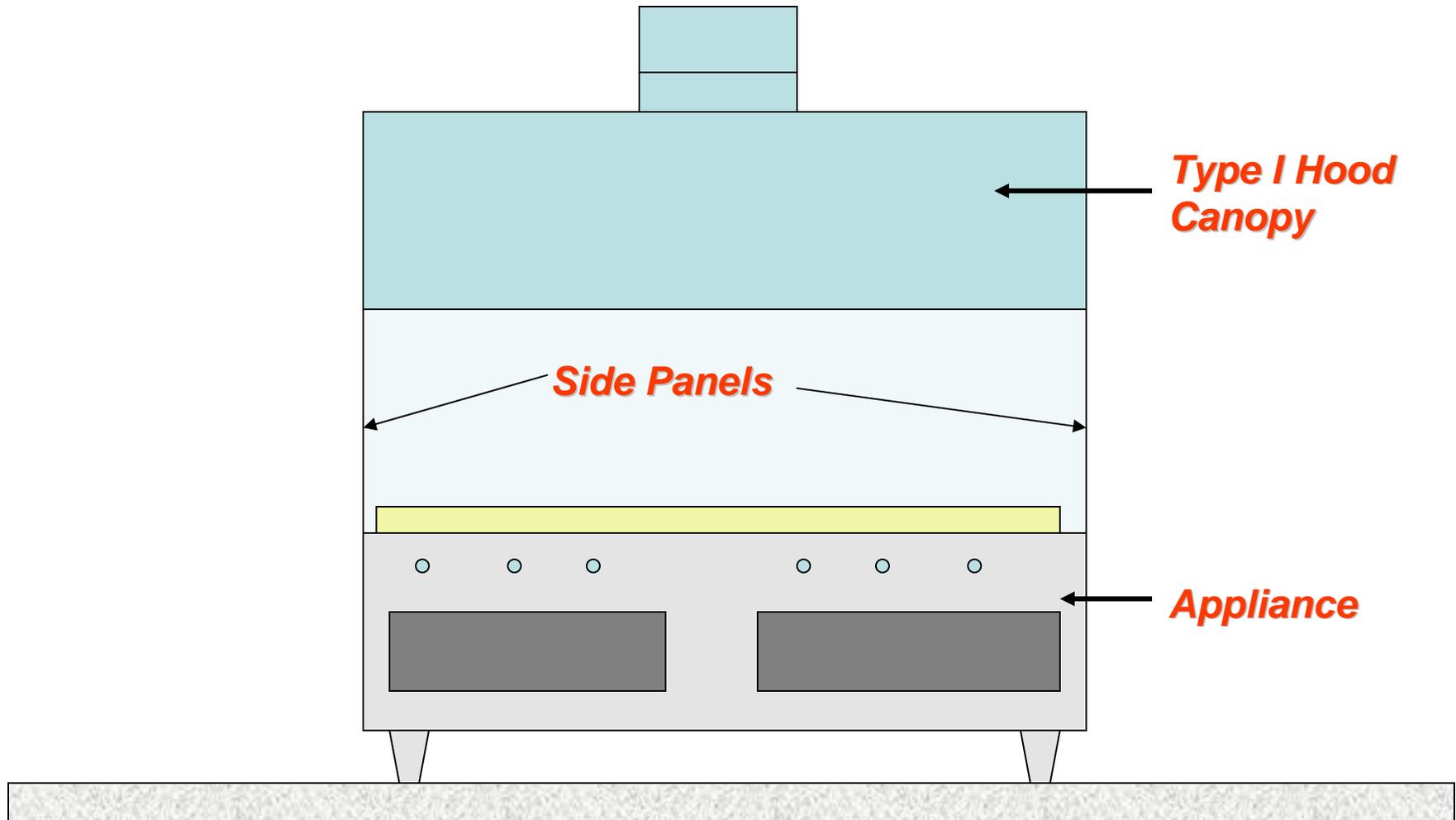
Figure 507.12(8) IMC Commentary



Canopy Hood With Side Panels – Side View



Figure 507.12(9) IMC Commentary



Canopy Hood With Side Panels - Elevation

Hood Capacity

- **Section 507.13 Capacity Of Hoods**
 - ***Commercial hoods shall exhaust***
 - ***A minimum net quantity of air***
 - ***Net quantity shall be calculated by***
 - ***Subtracting***
 - ***Airflow supplied directly to the hood***
 - ***From total exhaust flow rate***

Cooking Appliances

- **Extra-Heavy-Duty Cooking Appliances**
– **Section 507.13.1**

<u>Type Of Hood</u>	<u>CFM Per Linear Foot Of Hood</u>
<i>Wall mounted canopy</i>	<i>550</i>
<i>Single island canopy</i>	<i>700</i>
<i>Double island canopy (per side)</i>	<i>550</i>
<i>Back shelf/ pass-over</i>	<i>Not Allowed</i>
<i>Eyebrow</i>	<i>Not Allowed</i>

Cooking Appliances

- **Heavy Duty Cooking Appliances**
– **Section 507.13.2**

<u>Type Of Hood</u>	<u>CFM Per Linear Foot Of Hood</u>
<i>Wall mounted canopy</i>	<i>400</i>
<i>Single island canopy</i>	<i>600</i>
<i>Double island canopy (per side)</i>	<i>400</i>
<i>Back shelf/ pass-over</i>	<i>400</i>
<i>Eyebrow</i>	<i>Not Allowed</i>

Cooking Appliances

- **Medium Duty Cooking Appliances**
– **507.13.3**

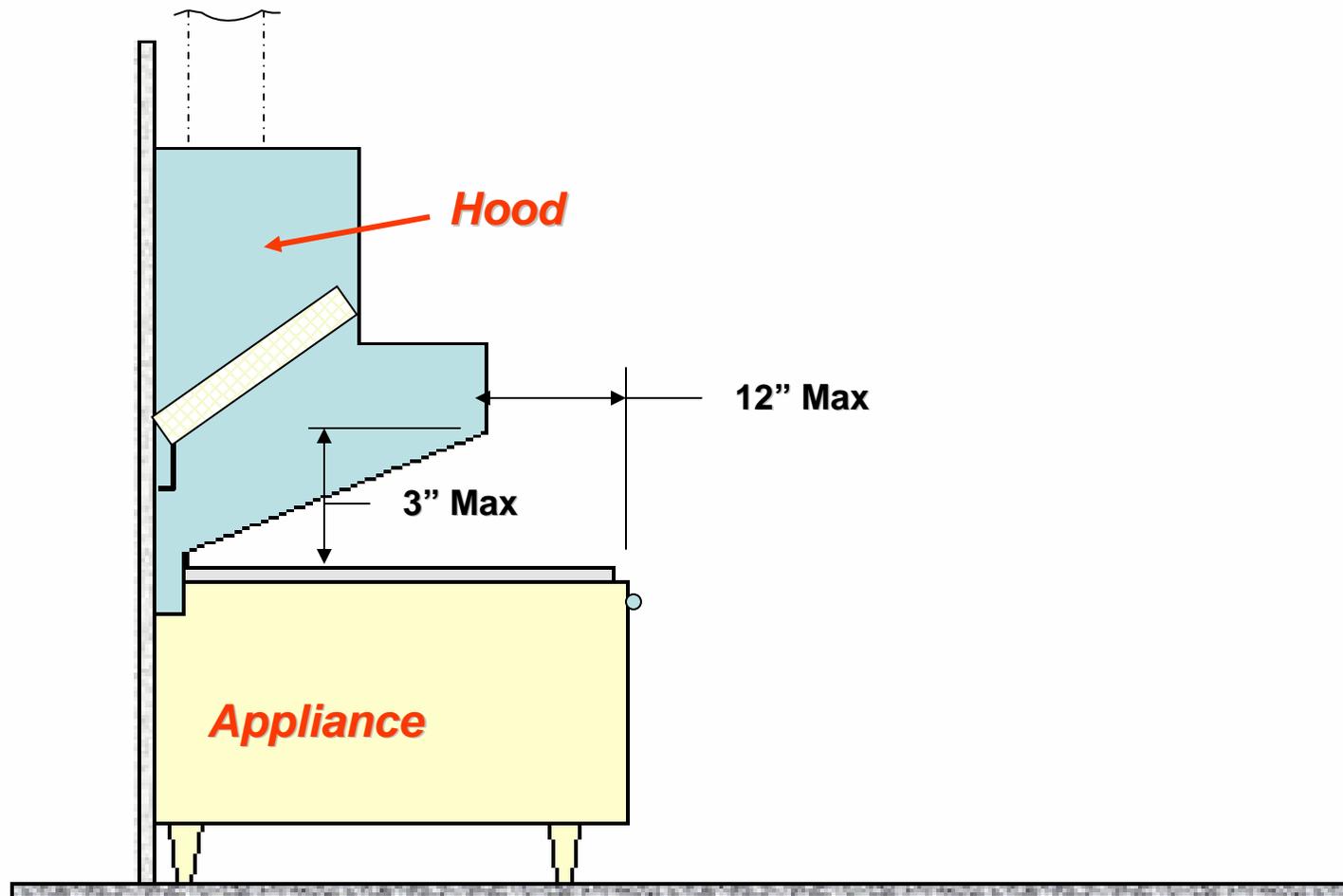
<u>Type Of Hood</u>	<u>CFM Per Linear Foot Of Hood</u>
<i>Wall mounted canopy</i>	<i>300</i>
<i>Single island canopy</i>	<i>500</i>
<i>Double island canopy (per side)</i>	<i>300</i>
<i>Back shelf / pass-over</i>	<i>300</i>
<i>Eyebrow</i>	<i>250</i>

Cooking Appliances

- **Light Duty Cooking Appliances**
– **507.13.4**

<u>Type Of Hood</u>	<u>CFM Per Linear Foot Of Hood</u>
<i>Wall mounted canopy</i>	<i>200</i>
<i>Single island canopy</i>	<i>400</i>
<i>Double island canopy (per side)</i>	<i>250</i>
<i>Back shelf / pass-over</i>	<i>250</i>
<i>Eyebrow</i>	<i>250</i>

Figure 507.14(1) IMC Commentary



Noncanopy-Type (Low-Wall or Back shelf Hood)

Outlets

- **Section 507.15 Exhaust Outlets**
 - *Shall be located*
 - **No outlet shall serve more than**
 - *A 12 foot section of hood*



Duct Independence

- **Section 506.3 Ducts Serving Type I Hoods**
 - *To be independent of all other exhaust systems*
 - **Except as per section 506.3.5**
- **Section 506.3.5 Separation Of Grease Duct System**
 - *Each system to have separate duct or meet all of following slide*

506.3.5

- **No separation necessary**
 - ***If All Of The Following Are Met For Interconnected Hoods***
 - **All in same story**
 - **All in the same room or adjoining room**
 - **No fire resistant assembly penetrations**
 - **Not serving solid fuel appliances**

Duct Construction

- **Section 506.3.1.1 Grease Duct Materials**
 - *Steel not less than 0.055 inch (#16 gage)*
 - *Stainless not less than 0.044inch (#18 gage)*
- **Section 506.3.2 Joints, Seams & Penetrations Of Grease Ducts**
 - *Continuous liquid tight weld or braze*
 - **On external surface**
 - *Note Exception*

Exception

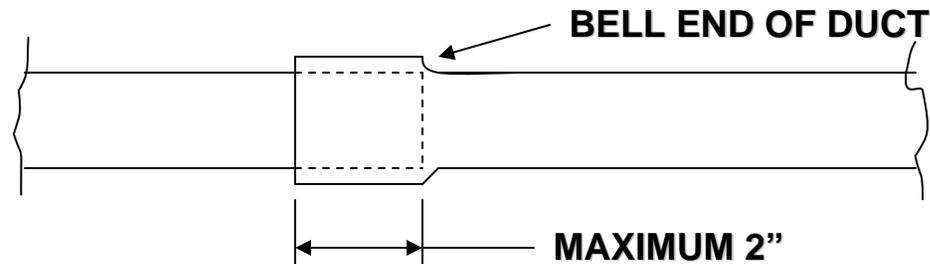
- **Exceptions to external surface weld**
 - ***Welds not required at penetrations***
 - **Where sealed by listed device for application**
 - ***Internal weld or braze / is not prohibited***
 - **When joint formed ground smooth and accessible for inspection**
 - ***Factory built kitchen grease duct***
 - **Listed and labeled**
 - ***Installed per section 304.1***

BUTT JOINT

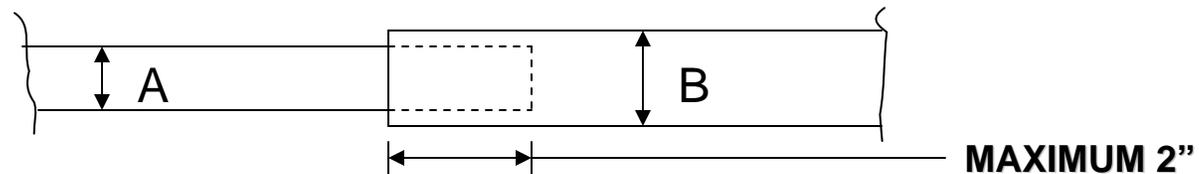


Ducts with identical outside diameter and inside diameter are abutted and joined with a full perimeter weld or braze

OVERLAPPING JOINT



TELESCOPING OVERLAP JOINT



Duct with larger inside diameter receives duct with smaller inside diameter

The difference between dimension "A" & "B" shall not exceed $\frac{1}{4}$ " for both the duct width and height dimensions

Testing

- **Section 507.16 Performance Test**
 - *To be conducted upon completion*
 - *Airflow rate*
 - **As required by 507.13**



Figure 508.1(1) IMC Commentary

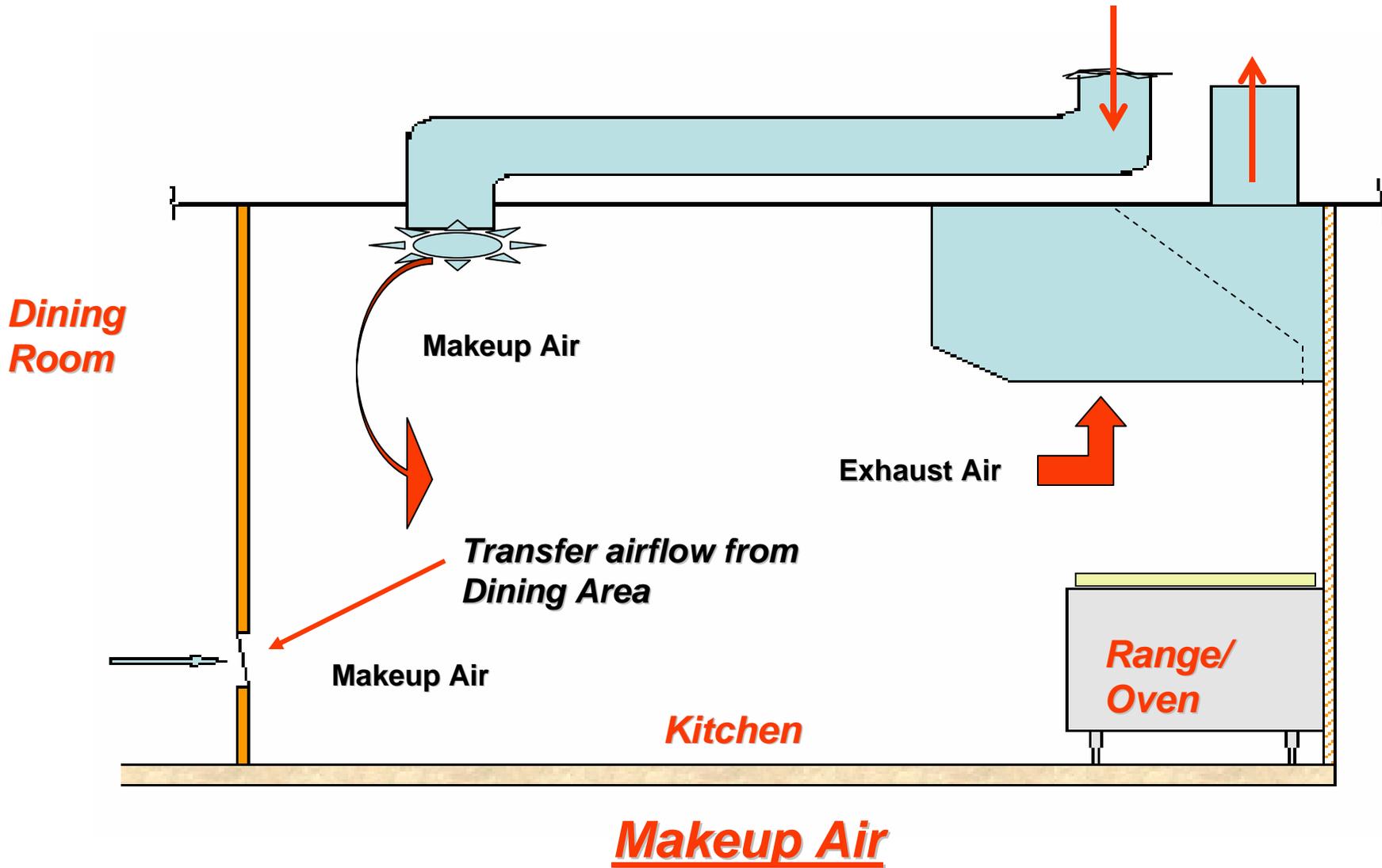


Figure 508.1(2) IMC Commentary

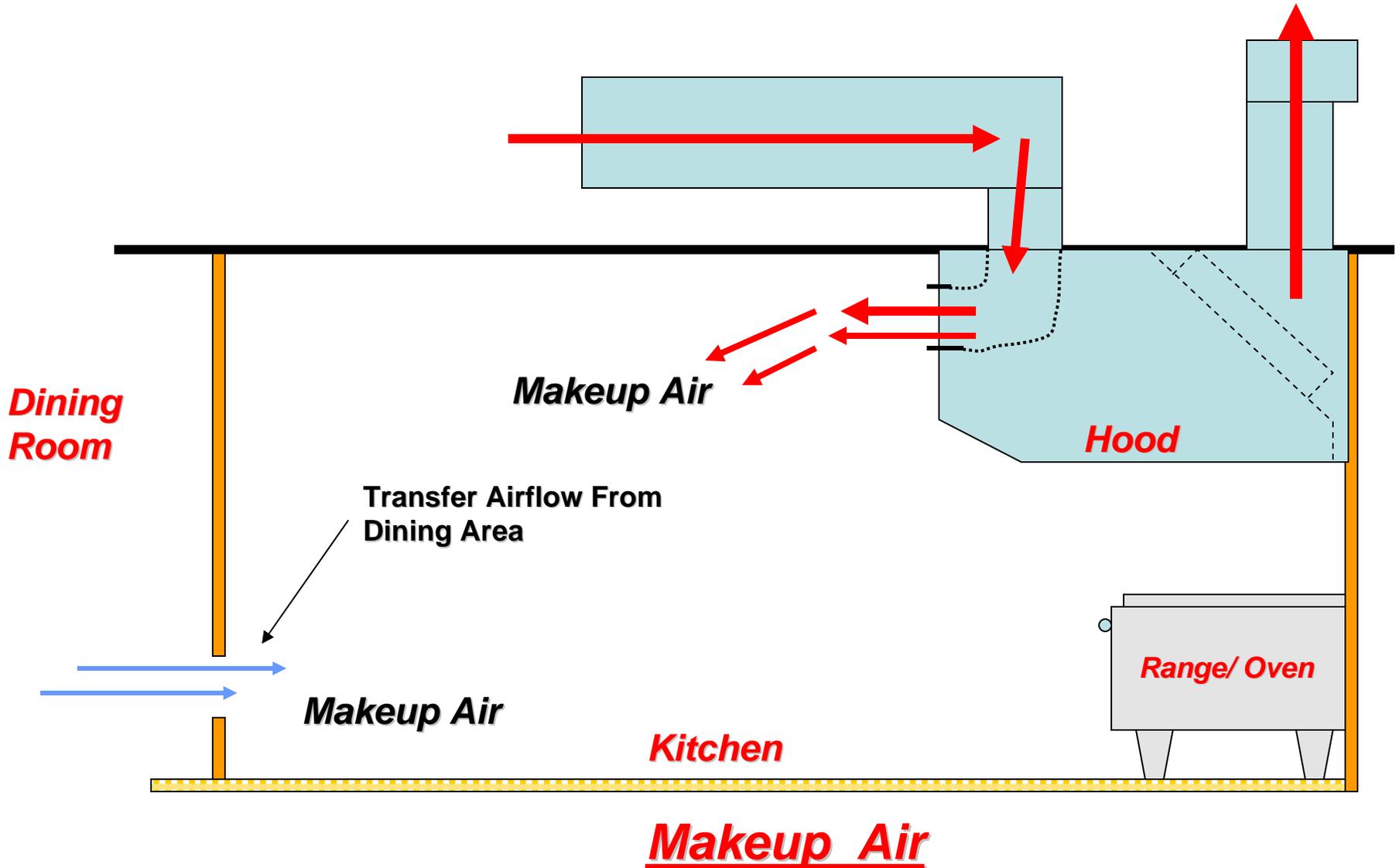
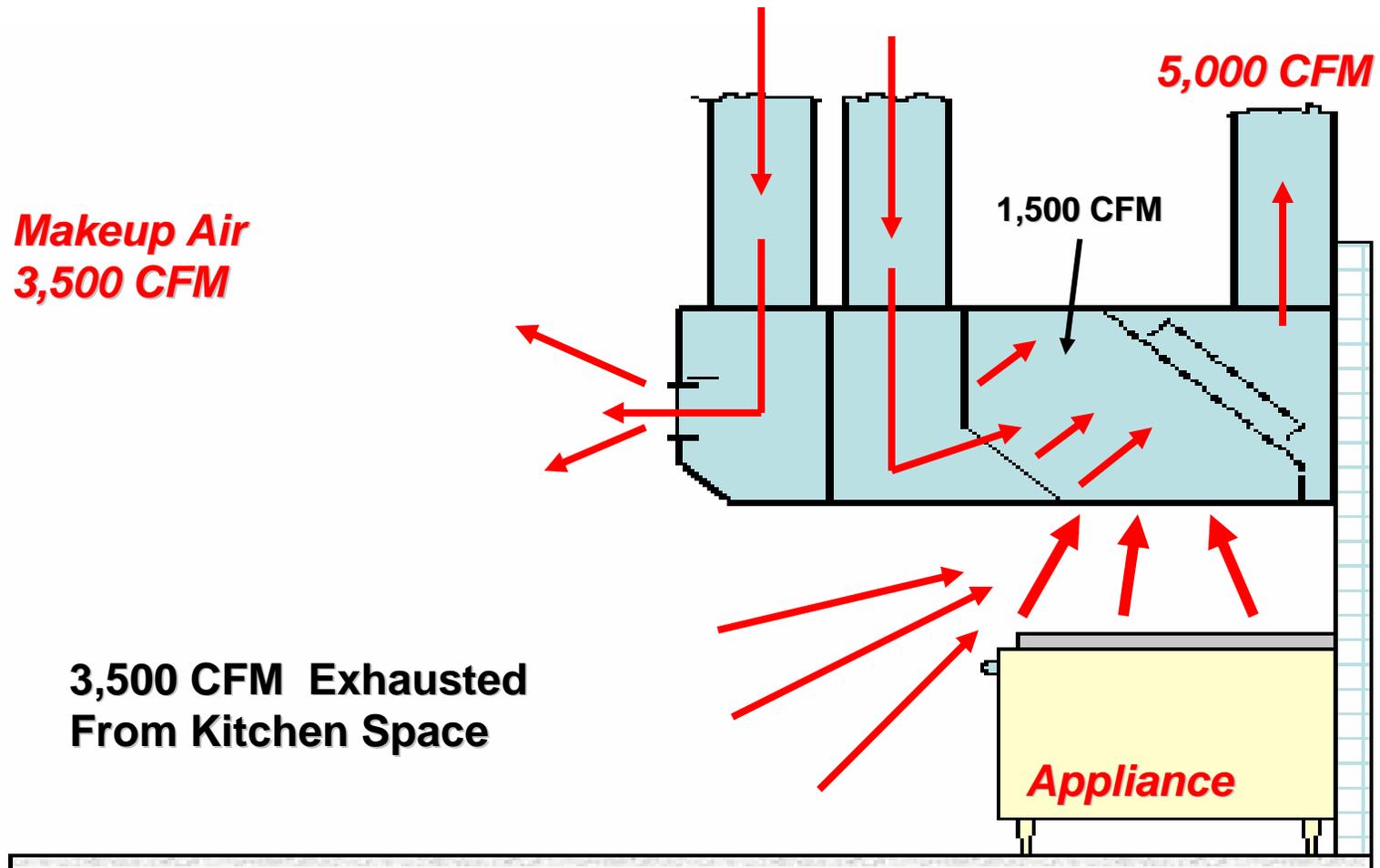


Figure 508.1(4) IMC Commentary



Makeup Air Supplied To Hood

Makeup Air

- **Section 508.1.1 Makeup Air Temperature**
 - ***Temperature difference***
 - **Between Makeup air and Conditioned Space ambient**
 - ***Not to exceed 10 degrees F***
 - ***Exceptions***
 - **Makeup air part of AC system**
 - **No difference/ decrease in comfort conditions**
- **Section 508.2 Compensating Hoods**
 - ***MFG to provide***
 - **Label with minimum exhaust flow rate**
 - **Label with maximum Makeup Air Flow**

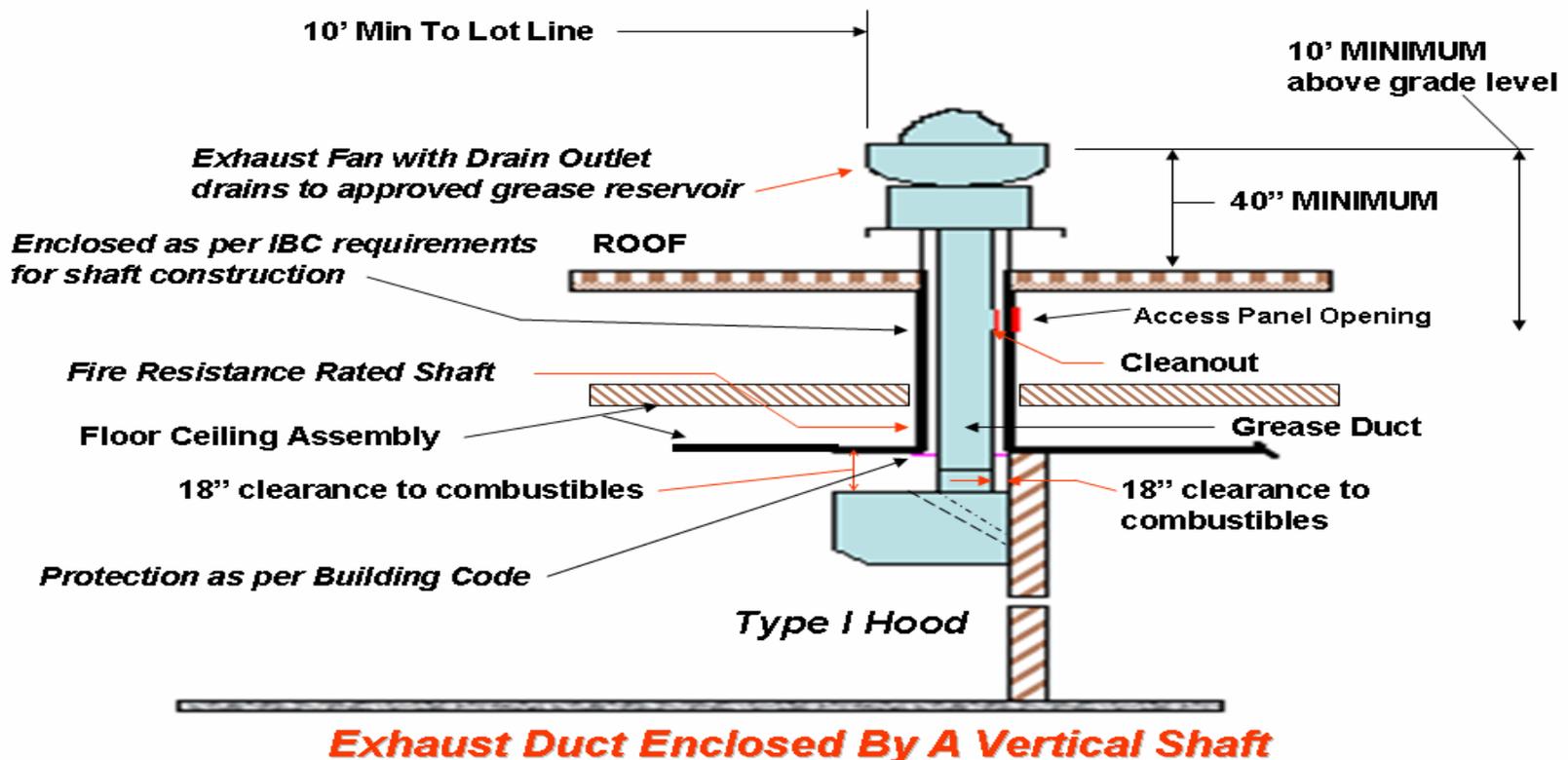
Makeup Air

- **Exhaust And Makeup Air**
 - *Electrically interlocked for dual operation*



Exhaust

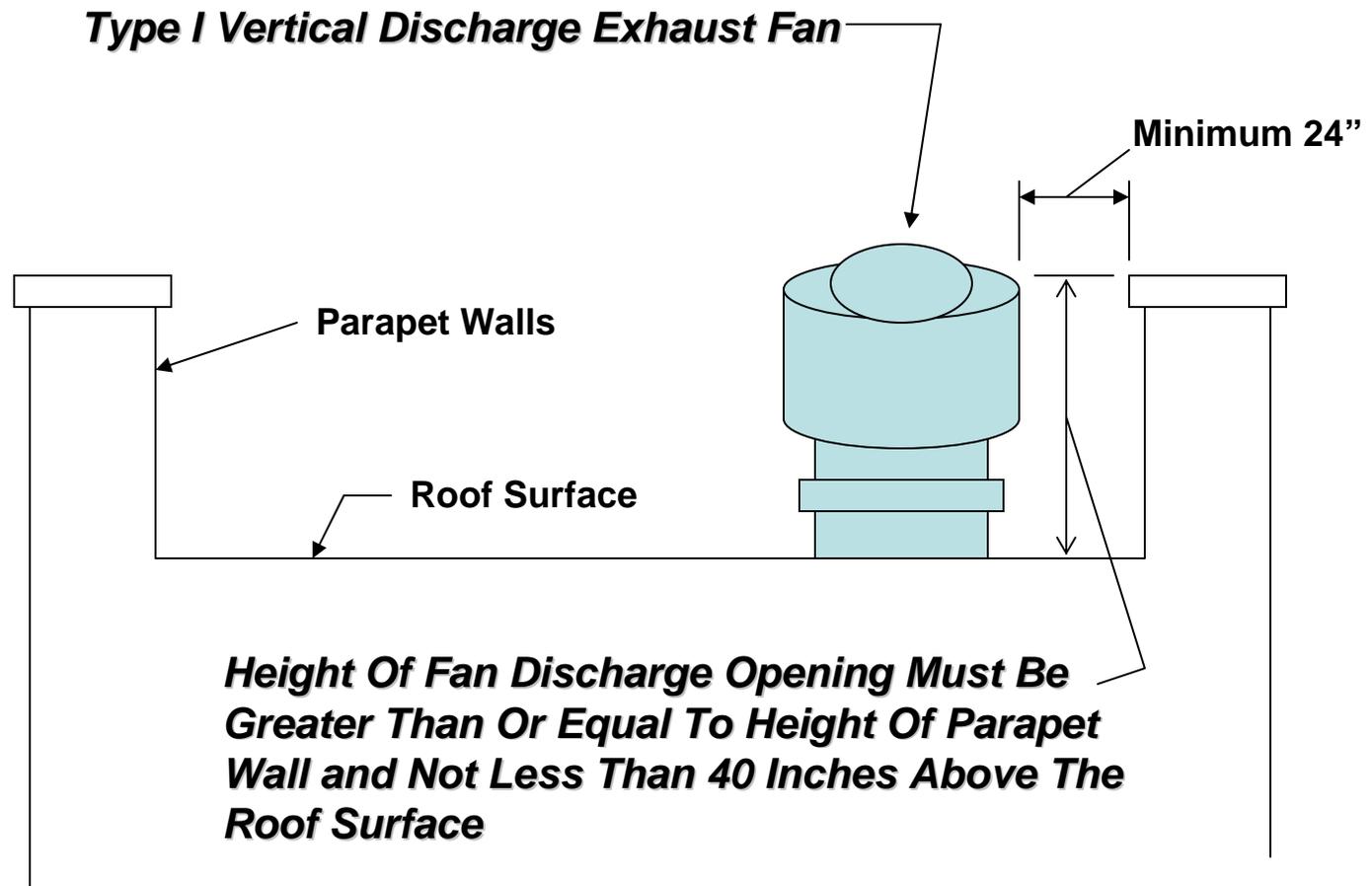
- **Section 506.3.12 Exhaust Outlets Serving Type I Hood**
 - **Termination Above The Roof - 506.3.12.1**
 - **Termination discharge opening**
 - **Not less than 40 inches above roof surface**



Problem? What Problem???



Figure 506.5.5 IMC Commentary



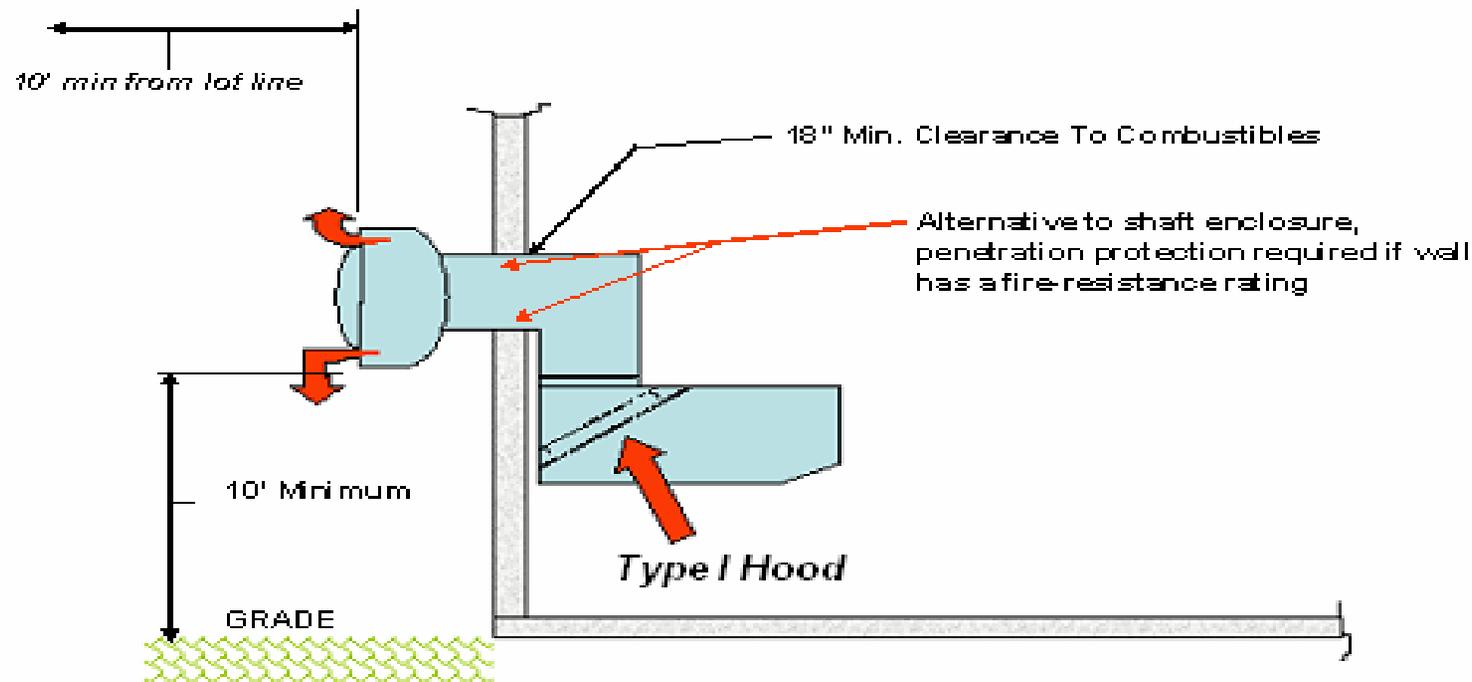
Exhaust Outlet Termination



- **Section 506.3.12.2 Termination Through An Exterior Wall**

- **Allowed if:**

- **Discharge does not create a public nuisance or fire hazard**
 - **No other openings within 3 feet**



Termination Through Exterior Wall

- **Section 506.3.12.3 Termination Location**

- **10' minimum**

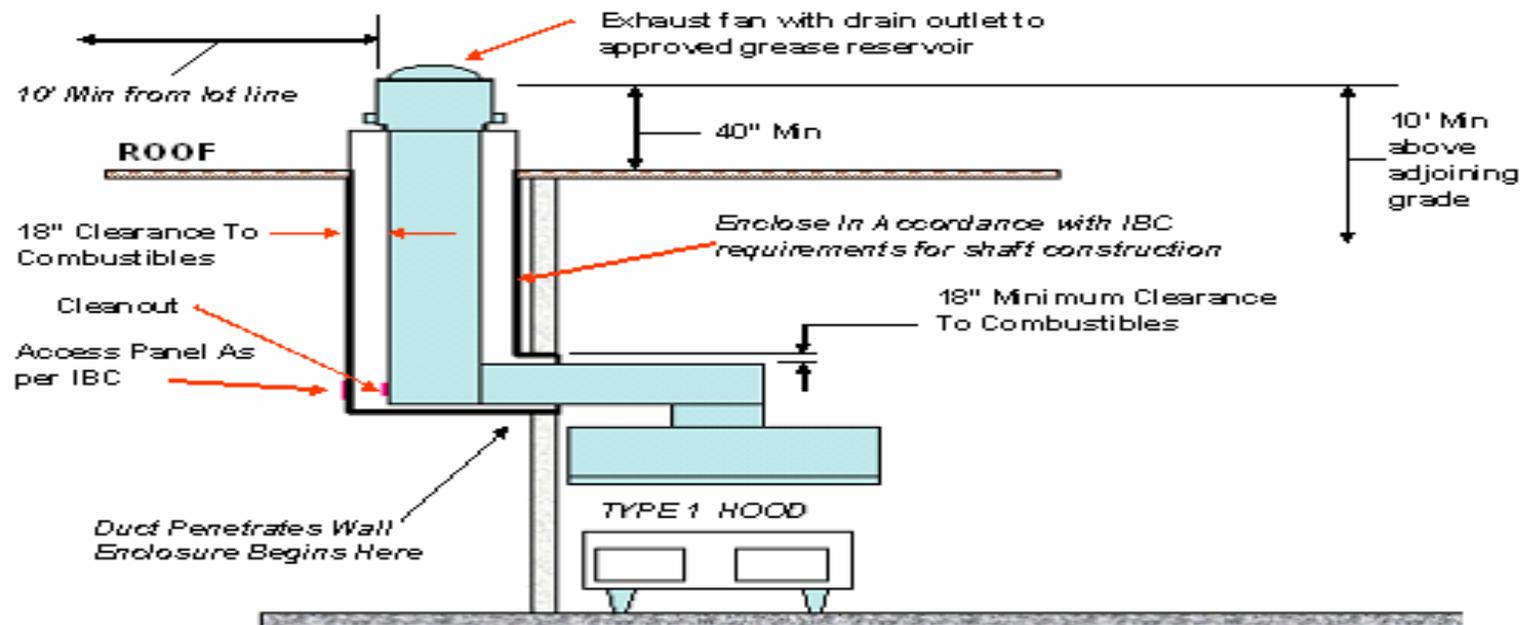
- **Above grade, from building / property lines**

- **Exception:**

- **Minimum 5' when**

- **Buildings, property lines**

- » **Exhaust discharges away from location**



Exhaust Duct Penetrating A Wall

Type II Ducts

- **Section 506.4 Ducts Serving Type II Hoods**
 - *Shall be independent*
 - **Exhaust Outlets - 506.4.1**
 - **To comply with section 401.5 (Opening Location)**
 - **To comply with section 401.5.2 (Exhaust Openings)**
 - **To have exterior wall openings**
 - *Protected from weather as per the IBC*
 - **Ducts - 506.4.2**
 - **Rigid metallic material**
 - **Construction, installation, support & bracing**
 - *To comply with Chapter 6*

Coffee Break

