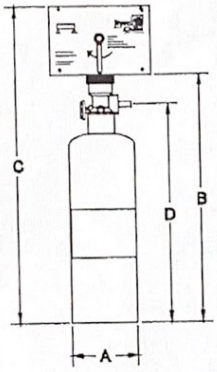
CYLINDERS & VALVE

The PYRO-CHEM KITCHEN KNIGHT II System has available four different size cylinders: Models PCL-160 (Part No. 553163), PCL-300 (Part No. 551194), PCL-460 (Part No. 551193), and PCL-600 (Part No. 551196). Cylinder sizes are expressed in terms of extinguishing agent capacity (i.e., the PCL-300 uses 3.0 gallons (11.4 L) of extinguishing agent). The cylinder is manufactured, tested, and meets DOT requirements. Cylinders come pre-filled with extinguishing agent and are charged with dry nitrogen to a pressure of 225 psig @ 70° F (15.5 bar @ 21 °C). Cylinder and valve assembly dimensions are shown in Figure 2-1.



Model No.	A in. (mm)	B in. (mm)	C in. (mm)	D in. (mm)	Max. Flow Point Capacity	Weight lb (kg)	Mounting Bracket Used
PCL-160	8.00 (203)	17.75 (451)	23.50 (597)	15.44 (392)	5	34 (15.4)	MB-15
PCL-300	8.00 (203)	25.06 (637)	30.81 (783)	22.75 (578)	10	53 (24.0)	MB-15
PCL-460	10.00 (254)	25.06 (637)	30.81 (783)	22.75 (578)	15	83 (37.6)	MB-15
PCL-600	10.00 (254)	35.81 (910)	41.56 (1056)	33.50 (851)	20	108 (49.0)	MB-1

FIGURE 2-1
002841PC

All cylinders utilize the same Wet Valve Assembly (Part No. 551175). The wet valve assembly is a pressure sealed poppet type valve designed to provide rapid actuation and discharge of agent. See Figure 2-2.

Item	Part No.	Description
1		Valve Body
2	550705	Conical Spring
3	550707	Piston
4	550716	Neck O-Ring
5	551236	Pressure Gauge
6	550028	Stem O-Ring
7	550802	Wet Valve Adaptor
8	550386	Shrader Valve Ass'y
9	550714	Valve Cap O-Ring
10	550715	Piston O-Ring
11	550989	Valve Stem
12	551256	Pressure Regulator
13	551261	Seal
14	17851	6-32x3/8 Screw

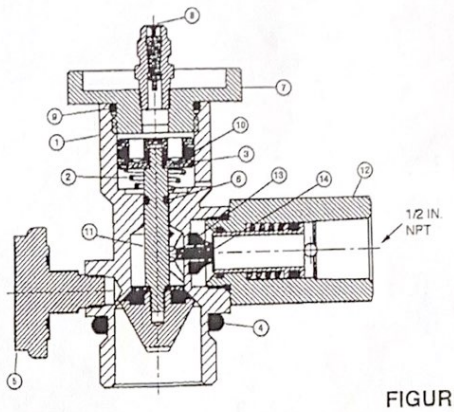


FIGURE 2-2
006212PC

WET VALVE REBUILDING EQUIPMENT

Wet Valve Seal Rebuilding Kit

After system discharge, the valve assembly must be rebuilt to ensure proper future operation. The Wet Valve Seal Rebuilding Kit (Part No. 550698) should be used. It includes all components necessary to properly rebuild the valve. See Figure 2-3.

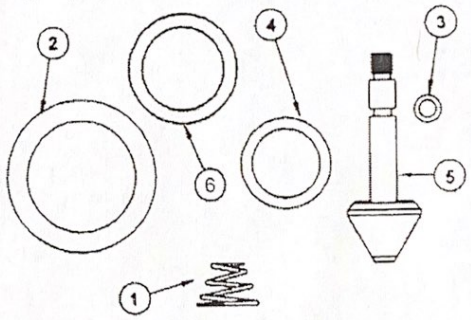


FIGURE 2-3
002906PC

Item	Part Number	Description
1	550705	Conical Spring
2	550716	Neck O-Ring
3	550028	Stem O-Ring
4	550715	Piston O-Ring
5	550989	Valve Stem
6	550714	Valve Cap O-Ring

Pressure Regulator Assembly

The pressure regulator assembly (Part No. 550985) is available if the complete regulator requires replacement (e.g. possible thread damage).

GENERAL

The KITCHEN KNIGHT II Restaurant Fire Suppression System may be used on a number of different types of restaurant cooking appliances and hood and duct configurations. The design information listed in this section deals with the limitations and parameters of this pre-engineered system. Those individuals responsible for the design of the KITCHEN KNIGHT II system must be trained and hold a current PYRO-CHEM certificate in a KITCHEN KNIGHT II training program.

NOZZLE COVERAGE AND PLACEMENT

This section will provide guidelines for determining nozzle type, positioning, and quantity for duct, plenum, and appliance protection.

Duct Protection

It is not required that the fan be shut down or the exhaust duct be dampered for the system to operate properly.

All duct protection is UL Listed without limitation of maximum duct length (unlimited length). This includes all varieties of ductworks both horizontal and vertical including ducts that run at angles to the horizontal and ducts with directional bends.

Duct protection requires that a nozzle be positioned to discharge into the duct. Two nozzles are available for duct protection.

The Model IL Duct Nozzle (Part No. 551026) is a one flow nozzle. A single IL nozzle is capable of protecting square or rectangular ducts with a maximum perimeter of 50 in. (1270 mm) (maximum side of 16 3/4 in. (425 mm)), with the diagonal being a maximum of 18 3/4 in. (476 mm). It can also protect a round duct with a maximum diameter of 16 in. (406 mm).

The Model 2D Duct Nozzle (Part No. 551038) is a two flow nozzle. A single 2D nozzle is capable of protecting square or rectangular ducts with a maximum perimeter of 100 in. (2540 mm), with the diagonal being a maximum of 37 3/8 in. (949 mm). It can also protect a round duct with a maximum diameter of 31 7/8 in. (809 mm).

When two 2D duct nozzles are used to protect a single duct, the cross sectional area of the duct must be divided into two equal symmetrical areas. The nozzle must then be installed on the centerline of the area it protects and aimed directly into the duct opening.

The nozzle(s) must be installed on the centerline of the duct, with the tip located 0 to 6 in. (0 to 152 mm) into the opening, and aimed directly into the duct opening. See Figure 3-1.

In installations where a UL listed damper assembly is employed, the duct nozzle can be installed beyond the 6 in. (152 mm) maximum, to a point just beyond the damper assembly that will not interfere with the damper. Exceeding the maximum of 6 in. (152 mm) in this way will not void the UL listing of the system.

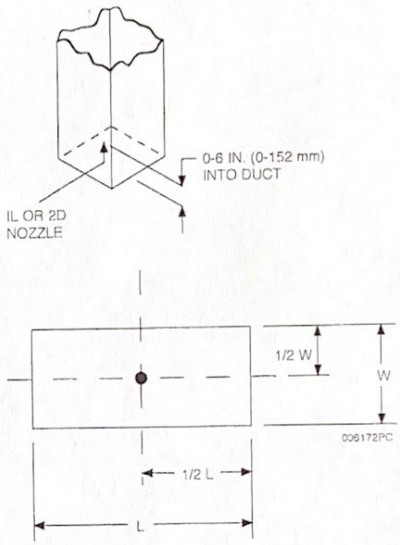


FIGURE 3-1

NOZZLE COVERAGE AND PLACEMENT (Continued)

Duct Protection (Continued)

Transition Ducts – The protection of non-standard ducts should be reviewed by the authority having jurisdiction. PYRO-CHEM KITCHEN KNIGHT II recommends that transition ducts be protected as follows:

a. Transition ducts – larger to smaller

In cases where the duct/plenum interface opening is larger than the final exhaust duct, measure the perimeter/diameter of the duct halfway between the largest and smallest section (or the average perimeter/diameter). The nozzle is to be located within 0 to 6 in. (0 to 152 mm) of the duct/plenum interface (not at the point where the measurement was taken), centered under the final exhaust duct opening. See Figure 3-3.

Note: Nozzles to protect ducts with a transition that is more than 4 ft (1.2 m) in height, will be required to be positioned in the opening of the transition from the hood 2 in. to 8 in. (51 mm to 203 mm) into the opening using standard duct nozzle design parameters.

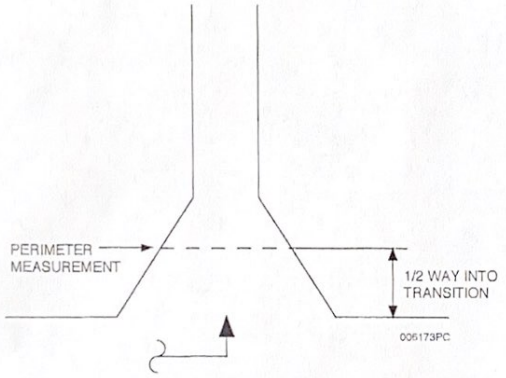


FIGURE 3-3

b. Transition ducts – smaller to larger

In cases where the duct/plenum interface opening is smaller than the final exhaust duct, measure the perimeter/diameter of the final exhaust duct. The nozzle(s) is to be located within 0 to 6 in. (0 to 152 mm) of the duct/plenum interface, centered in the opening. See Figure 3-4.

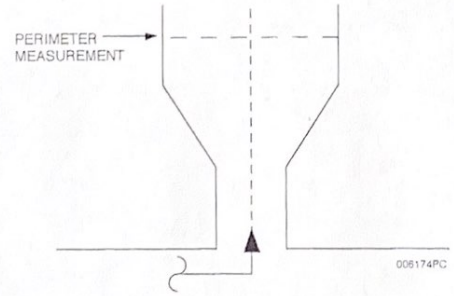


FIGURE 3-4

c. Multiple risers

In cases of multiple rises, each riser is protected as an individual duct. See Figure 3-5.

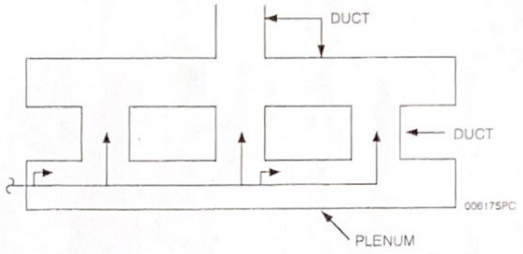


FIGURE 3-5

Electrostatic Precipitator – Ducts utilizing electrostatic precipitators must be protected above and below the unit. Standard duct nozzles are used in this application. See Figure 3-6.

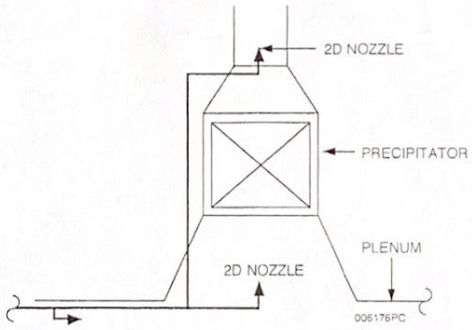


FIGURE 3-6

Plenum Protection

The Model 1H nozzle (Part No. 551029) is a one flow nozzle used for plenum protection. A single 1H nozzle can protect a plenum (with single or V-bank filters) 10 ft (3.0 m) long by 4 ft (1.2 m) wide. Dividing the length into sections equal to or less than 10 ft (3.0 m) in length and positioning a nozzle at the start of each section can be done to protect longer plenums.

On V-bank plenums, the nozzle(s) must be located at the center of the V-bank width, 1/3 of the vertical height of the filters. On single filter bank plenums, the nozzle must be located 2 in. (50 mm) from the back edge of the filter, 1/3 down from the vertical height. For either application, the nozzle must be located within 6 in. (152 mm) of the end of the plenum (or module) and aimed directly down the length of the plenum. The nozzles may point in the opposite directions as long as the entire plenum area is protected, and the 10 ft (3.0 m) limitation is not exceeded. See Figure 3-7.

NOZZLE COVERAGE AND PLACEMENT (Continued)

Appliance Protection (Continued)

1. **Fryers without Drip Board** (19 in. x 19 1/2 in. maximum) (482 mm x 495 mm)

   Two nozzles are available for fryer protection: High proximity and low proximity.

   The Model 2H nozzle is used for high proximity fryer protection. This nozzle is a two flow nozzle. The nozzle must be located **anywhere within the perimeter** of the hazard area, 24 in. to 48 in. (610 mm to 1219 mm) above the cooking surface of the appliance and aimed at the center of the cooking area. See Figure 3-8.

   The Model 2L nozzle is used for low proximity fryer protection. This nozzle is a two flow nozzle. The nozzle must be located **anywhere on the perimeter** of the hazard area, 13 in. to 24 in. (330 mm to 609 mm) above the cooking surface of the appliance and aimed at the center of the cooking area. See Figure 3-8.

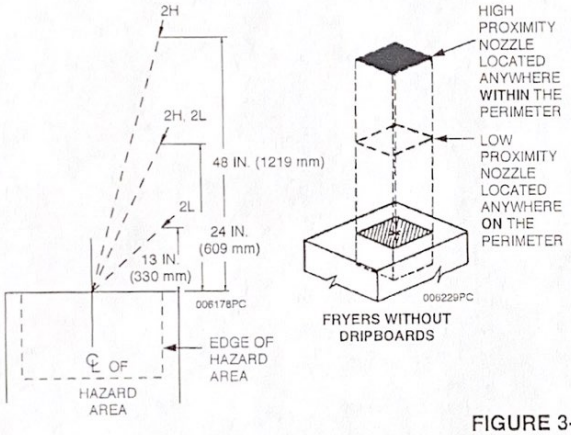


FIGURE 3-8

1a. Fryers with Drip Board

The maximum single nozzle protection dimensions depend on the dimensions of the fry pot only.

For fry pots with maximum dimensions of 18 in. (457 mm) on the longest side and 324 in.^{2} (20903 mm^2) max. area, use **overall** dimensions of 27 3/4 in. (704 mm) on the longest side and 500 in.^{2} (32258 mm^2) max. area.

For fry pots with maximum dimensions exceeding 18 in. x 324 in.^{2} (457 mm x 20903 mm^2), but no greater than 19 1/2 in. (495 mm) on the longest side and 371 in.^{2} (23935 mm^2) max area, use **overall** dimensions of 25 3/8 in. (644 mm) on the longest side and 495 in.^{2} (31935 mm^2) area.

Two nozzles are available for fryer protection: High proximity and low proximity.

The Model 2H Nozzle (Part No. 551028) is used for high proximity fryer protection. This nozzle is a two flow nozzle. The nozzle must be located **anywhere within the perimeter** of the hazard area, 24 in. to 48 in. (610 mm to 1219 mm) above the cooking surface of the appliance and aimed at the center of the cooking area. See Figure 3-9.

The Model 2L nozzle is used for low proximity fryer protection. This nozzle is a two flow nozzle. The nozzle must be located anywhere on the perimeter of the hazard area, 13 in. to 24 in. (330 mm to 609 mm) above the cooking surface of the appliance and aimed at the center of the cooking area. See Figure 3-9.

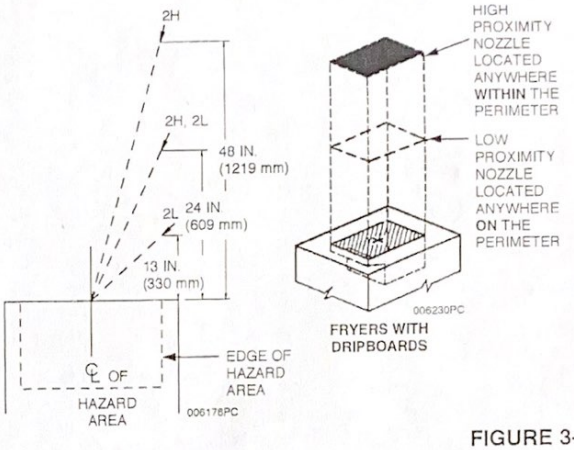


FIGURE 3-9

1.b Fryers – Multiple Nozzle Protection

Fryers exceeding the coverage of a single nozzle can be divided into modules. Each module must not exceed the maximum area allowed for a single nozzle. However, when utilizing multiple nozzle protection, the longest side allowed for a fryer with drip board can be used, regardless of whether the fryer has a drip board or not.

The maximum size fryer that can be modularized is 864 in.^{2} (55741 mm^2).

Design requirements for multiple nozzle fryers are broken down as follows:

1. If the fryer includes any dripboard areas, measure both the internal length (front to back) and width of the frypot portion. Then measure the internal length and width of the overall hazard area including any dripboard areas.

   Determine the area of both the frypot and the area of the overall vat by multiplying corresponding length and width dimensions.

2. Divide the frypot or overall vat into modules, each of which can be protected by a single nozzle, based on the maximum dimension and area coverage of the nozzle as specified in Table 3-2: Design.

   - If the module considered does not include any portion of the dripboard, use only the maximum frypot area and maximum dimension listed in Table 3-2: Design.
   - If the module considered includes any dripboard areas, use both the maximum frypot area and dimension listed in Table 3-2: Design, and the maximum overall area and dimension listed in Table 3-2: Design.

3. None of the maximum dimensions may be exceeded. If either the maximum frypot or the overall sizes are exceeded, the area divided into modules will need to be redefined with the possibility of an additional nozzle.

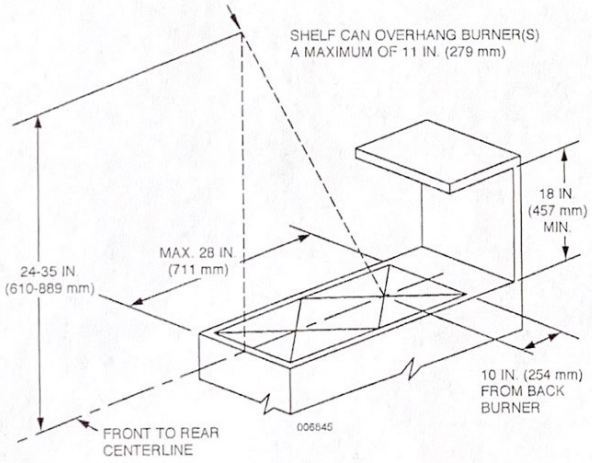
NOZZLE COVERAGE AND PLACEMENT (Continued)

Appliance Protection (Continued)

2a. **High-Proximity Backshelf Protection** – When using the 2L nozzle for range protection with high-proximity backshelf, the maximum length of burners being protected must not exceed 28 in. (711 mm) and the maximum area of the burners must not exceed 336 in.2 (21677 mm2). The backshelf must be a minimum of 18 in. (458 mm) above the top of the range and may overhang the burner by a maximum of 11 in. (279 mm).

Note: Although most shelves exceed 11 in. (279 mm) in overall depth, make sure the shelf does not exceed 11 in. (279 mm) overhang of the burner.

Nozzle must be located on the front edge of the front burner and aimed at a point 10 in. (254 mm) forward from the back edge of the back burner on the front-to-rear centerline. Nozzle must be mounted 24 in. to 35 in. (610 mm to 889 mm) above the hazard surface. See Figure 3-12.



HIGH PROXIMITY BACK SHELF PROTECTION WITH THE 2L NOZZLE. AREA OF PROTECTION PER NOZZLE: MAX. LENGTH OF BURNER GRATES 28 IN. (711 mm) AND MAX. AREA OF BURNER GRATES NOT TO EXCEED 336 IN. (21677 mm)

FIGURE 3-12

3. **Larger Burner Range** (784 in.^{2} (50580 mm^2) maximum, 28 in. (711 mm) longest side maximum)

One nozzle is available for large range protection: High proximity.

The Model 2L Nozzle (Part No. 551027) is used for high proximity large range protection. This nozzle is a two flow nozzle. **When using high proximity protection, the range cannot be under a backshelf.** This nozzle must be located 34 in. to 48 in. (864 mm to 1219 mm) above the cooking surface, and aimed directly down within the mounting area, based on the hazard size, as described in the Nozzle Positioning Chart. See Figure 3-13.

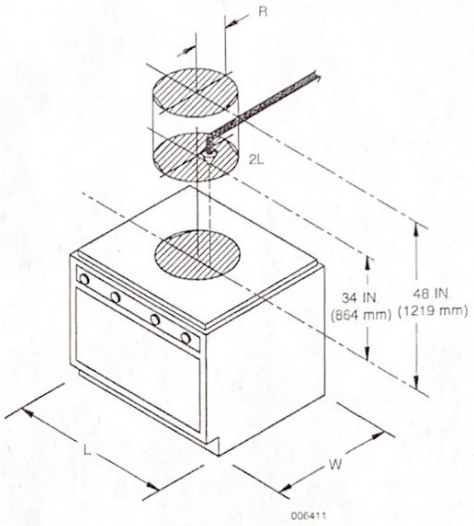


FIGURE 3-13

Example: A four burner range has a hazard size of 20 in. (508 mm) in length and 27 in. (685 mm) in width. Follow down the Range Length in Table 3-4: Nozzle Positioning until you come to 20 in. (508 mm). Continue down this column until the correct width appears in the width column. When the width of 27 in. (685 mm) is reached, read across to the radius column to determine the size of radius allowed, for positioning of the nozzle, from the hazard area centerline. In this example, the correct radius is 3 in. (76 mm). The nozzle can be aimed straight down anywhere within a 3 in. (76 mm) radius of the hazard area centerline.

TABLE 3-4: NOZZLE POSITIONING

Range Length - L		Range Width – W		Radius – R	
in.	(mm)	in.	(mm)	in.	(mm)
18	(457)	18	(457)	7 1/8	(180)
18	(457)	19	(482)	6 3/4	(171)
18	(457)	20	(508)	6 3/8	(161)
18	(457)	21	(533)	6	(152)
18	(457)	22	(558)	5 5/8	(142)
18	(457)	23	(584)	5 1/4	(133)
18	(457)	24	(609)	4 3/4	(120)
18	(457)	25	(635)	4 3/8	(111)
18	(457)	26	(660)	4	(101)
18	(457)	27	(685)	3 5/8	(92)
18	(457)	28	(711)	3 1/8	(79)

NOZZLE COVERAGE AND PLACEMENT (Continued)

Appliance Protection (Continued)

TABLE 3-4: NOZZLE POSITIONING (Continued)

Range Length - L		Range Width – W		Radius – R	
in.	(mm)	in.	(mm)	in.	(mm)
28	(711)	18	(457)	3 1/8	(79)
28	(711)	19	(482)	2 7/8	(73)
28	(711)	20	(508)	2 5/8	(66)
28	(711)	21	(533)	2 1/4	(57)
28	(711)	22	(558)	2	(50)
28	(711)	23	(584)	1 5/8	(41)
28	(711)	24	(609)	1 3/8	(34)
28	(711)	25	(635)	1	(25)
28	(711)	26	(660)	3/4	(19)
28	(711)	27	(685)	3/8	(9)
28	(711)	28	(711)	0	(0)

4. **Small Wok** (24 in. (609.6 mm) diameter x 6 in. (152 mm) depth maximum)

   Two nozzles are available for small wok protection: High proximity and low proximity.

   The 1H nozzle (Part No. 551029) is used for high proximity wok protection. This nozzle is a one flow nozzle. The nozzle must be located **anywhere on the perimeter** of the appliance, 24 in. to 48 in. (609.6 mm to 1219 mm) above the top edge of the wok and aimed at the center of the wok. See Figure 3-14.

   The 1L nozzle (Part No. 551026) is used for low proximity wok protection. This nozzle is a one flow nozzle. The nozzle must be located **anywhere on the perimeter** of the appliance, 13 in. to 24 in. (331 mm to 609.6 mm) above the top edge of the wok and aimed at the center of the wok. See Figure 3-14.

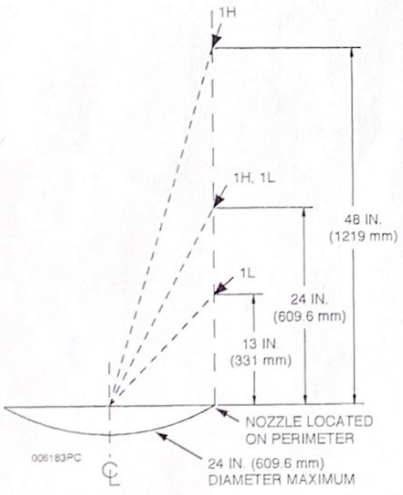


FIGURE 3-14

5. **Large Wok** (Greater than 24 in. to 30 in. (609.6 mm to 762 mm) diameter x 8 in. (203 mm) depth maximum)

   Two nozzles are available for large wok protection: High proximity and low proximity.

   The 2H nozzle (Part No. 551028) is used for high proximity wok protection. This nozzle is a two flow nozzle. The nozzle must be located **anywhere on the perimeter** of the appliance, 24 in. to 48 in. (609.6 mm to 1219 mm) above the top edge of the wok and aimed at the center of the wok. See Figure 3-15.

   The 2L nozzle (Part No. 551027) is used for low proximity wok protection. This nozzle is a two flow nozzle. The nozzle must be located **anywhere on the perimeter** of the appliance, 13 in. to 24 in. (331 mm to 609.6 mm) above the top edge of the wok and aimed at the center of the wok. See Figure 3-15.

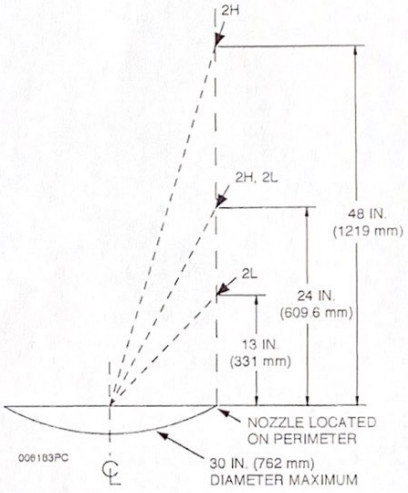


FIGURE 3-15

6. **Small Griddle** (1080 in.^{2} (69677 mm^2) x 36 in. (914 mm) longest side maximum)

   Two nozzles are available for small griddle protection: High proximity and low proximity.

   The 1H nozzle (Part No. 551029) is used for high proximity griddle protection. This nozzle is a one flow nozzle. The nozzle must be located above any corner of the hazard surface, 24 in. to 48 in. (609.6 mm to 1219 mm) above the cooking surface of the appliance and aimed at a point 12 in. (304 mm) over and 12 in. (304 mm) in from the corner below the nozzle. See Figure 3-16.

NOZZLE COVERAGE AND PLACEMENT (Continued)

Appliance Protection (Continued)

The 1L nozzle (Part No. 551026) is used for low proximity griddle protection. This nozzle is a one flow nozzle. The nozzle must be located **above any corner** of the hazard surface, 10 in. to 24 in. (254 mm to 609.6 mm) above the cooking surface of the appliance and aimed at a point 12 in. (304 mm) over and 12 in. (304 mm) in from the corner below the nozzle. See Figure 3-16.

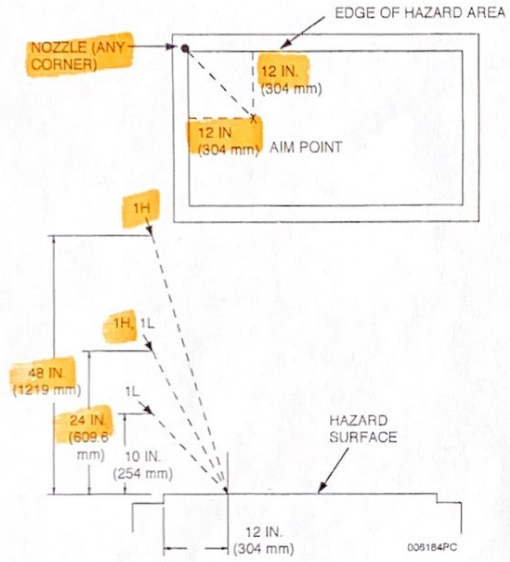


FIGURE 3-16

6a. **Small Griddle** (1080 in.2 (69677 mm2) x 36 in. (914 mm) longest side maximum) **Alternate Protection**

Two nozzles are available for small griddle **alternate protection:** High proximity and low proximity.

The 2H nozzle (Part No. 551028) is used for high proximity griddle protection. This nozzle is a two flow nozzle. The nozzle must be located 0 to 6 in. (0 to 152 mm) from short side of the hazard surface, 24 in. to 48 in. (609.6 mm to 1219 mm) above the cooking surface of the appliance and aimed at the center of the hazard area. See Figure 3-17.

The 2L nozzle (Part No. 551027) is used for low proximity griddle protection. This nozzle is a two flow nozzle. The nozzle must be located 0 to 6 in. (0 to 152 mm) from the short side of the hazard surface, 13 in. to 24 in. (331 mm to 609.6 mm) above the cooking surface of the appliance and aimed at the center of the hazard area. See Figure 3-17.

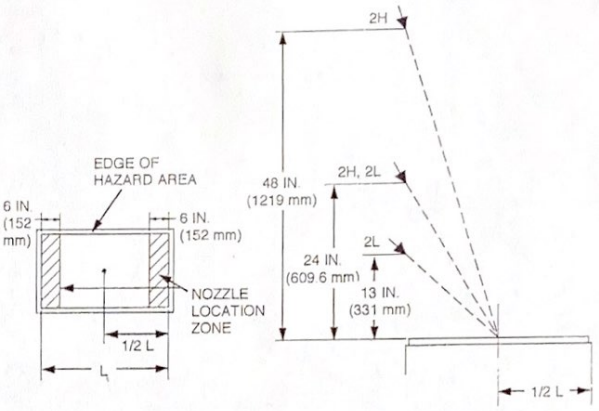


FIGURE 3-17

7. **Large Griddle** (1440 in.2 (92903 mm2) x 48 in. (1219 mm) longest side maximum)

Two nozzles are available for large griddle protection: High proximity and low proximity.

The 2H nozzle (Part No. 551028) is used for high proximity griddle protection. This nozzle is a two flow nozzle. The nozzle must be located **above any corner** of the hazard surface, 24 in. to 48 in. (609.6 mm to 1219 mm) above the cooking surface of the appliance and aimed at a point 12 in. (304 mm) over and 12 in. (304 mm) in from the corner below the nozzle. See Figure 3-18.

The 2L nozzle (Part No. 551027) is used for low proximity griddle protection. This nozzle is a two flow nozzle. The nozzle must be located **above any corner** of the hazard surface, 10 in. to 24 in. (254 mm to 609.6 mm) above the cooking surface of the appliance and aimed at a point 12 in. (304 mm) over and 12 in. (304 mm) in from the corner below the nozzle. See Figure 3-18.

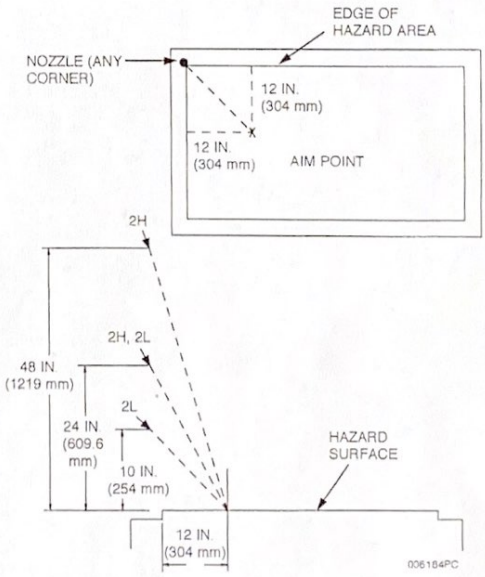


FIGURE 3-18

SPECIFIC APPLICATION BY MODEL (Continued)

Baker's Pride Broiler – Models CH6, CH8, CH10, XX6, XX8, XX10 (With Wood Smoker Box and Chip Holders)

Nozzle Type: 2H

Nozzle Quantity: Three

Nozzle Height: 33 in. (839 mm) to 35 in. (889 mm) above the hazard surface

Nozzle Location: Each nozzle is to protect 1/3 of the cooking area and located in the horizontal center of the respective cooking area; 1 in. (25 mm) forward of the longitudinal center line of the cooking area

See Figure 3-33

Nozzle Aiming Point: Horizontal center of the respective cooking area, 1 in. (25 mm) forward of the longitudinal center line of the cooking area

See Figure 3-33

Note: Smoker Box and Chip Holders cannot exceed logs 4 in. (101 mm) in diameter and a maximum allowable wood depth of 4 in. (101 mm).

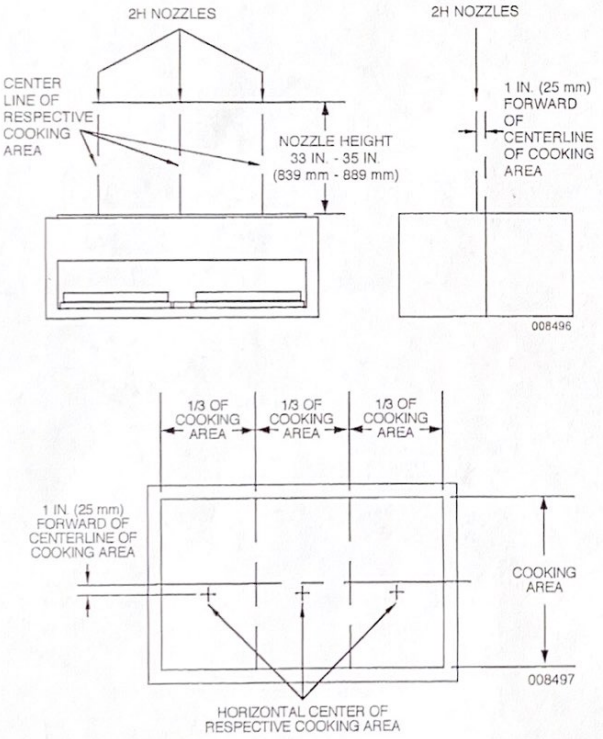


FIGURE 3-33

PIPING LIMITATIONS

Once the nozzle placement and quantity of tanks has been determined, it is necessary to determine the piping configurations between the tank and the nozzles. This section contains the guidelines and limitations for designing the distribution piping so that the wet chemical agent will discharge from the nozzles at a proper flow rate. These limitations must also be referred to when selecting the mounting location for the tanks.

The maximum pipe lengths are based on internal pipe volume. Each size tank is allowed a minimum and maximum total volume of piping, calculated in milliliters.

There is no need to distinguish between what portion of the piping is supply line and what portion is branch line. Only the total volume of the complete piping network has to be considered.

TABLE 3-5: VOLUME

1/4 in. pipe = 20.5 mls/ft
3/8 in. pipe = 37.5 mls/ft
1/2 in. pipe = 59.8 mls/ft
3/4 in. pipe = 105.0 mls/ft

Note: Agent Distribution hose equals 300 mls per hose.

TABLE 3-6: TANKS

Tank Size	Maximum Flow Numbers	Maximum Pipe Volume (milliliters)	Maximum Volume Allowed Between First Nozzle and Last Nozzle (milliliters)
1.6 Gallon PCL-160	5	1500	600
3.0 Gallon PCL-300	10	1910	1125
4.6 Gallon PCL-460	14	3400	3000
4.6 Gallon PCL-460	15	2600	2000
6.0 Gallon PCL-600	19	4215	1688 per side
6.0 Gallon PCL-600	20	3465	1313 per side

* All piping, including nozzle drops, must be included in the piping calculations.

Minimum Pipe Volumes for a Fryer, Range, and Wok		
Cylinder Size	Entire System	At or before appliance
PCL 160	239 ml - 1 Flow Pt	180 ml - 1 Flow Pt
PCL 300	300 ml - 4 Flow Pts	239 ml - 2 Flow Pts
PCL 460	660 ml - 10 Flow Pts	180 ml - 2 Flow Pts
PCL 600	960 ml - 14 Flow Pts	120 ml - 2 Flow Pts

Drawing for;
Napper Tandy's
27 S. Broad St. East
Angier, NC 27501

Drawing by;
Williamston Fire Extinguisher Service
201 E. Blvd.
P.O. Box 1022
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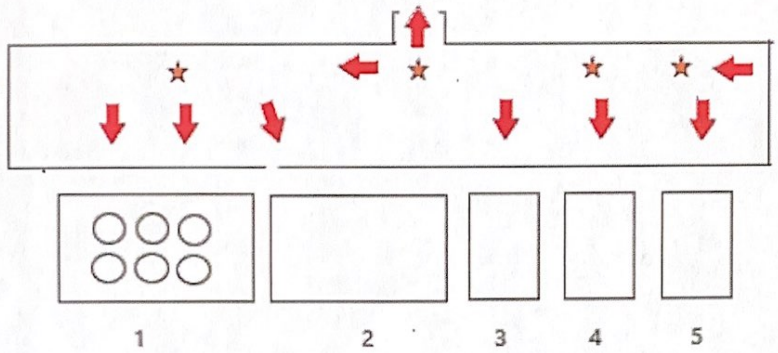
252-792-1560 (office)



System is a Pyro-Chem PCI-460, is UL300 listed, has 15 flow point and is using all 15 flows. The design above has the appliances number and a description of each is listed below with the nozzle number and height. Nozzles are shown as a red arrow. All appliances are gas and system has automatic fuel shut off. System to have automatic detection and manual release. Detectors are shown as an orange star. Hood is 12' long by 4' wide.
Please find enclosed a mfg cut sheet for each appliance and nozzle, as well as agent tank capacity flow points.
Duct is 16" round protected by one 2D nozzle
Plenum is 12' long x 18"' wide protected by two 1H nozzles
Appliance # 1 range 36" x 24" protected by two 2L nozzle, @ 34" - 48" with no back shelf
Appliance # 2 griddle 36" x 24" protected by one 1H nozzle @ 24" - 48" above a corner
Appliance # 3, 4, & 5 fryers 15" x 21" w/ drip board protected by one 2H nozzle each @ 24"- 48"
If you have any questions please contact Jeff @ 252-217-7940 (cell)