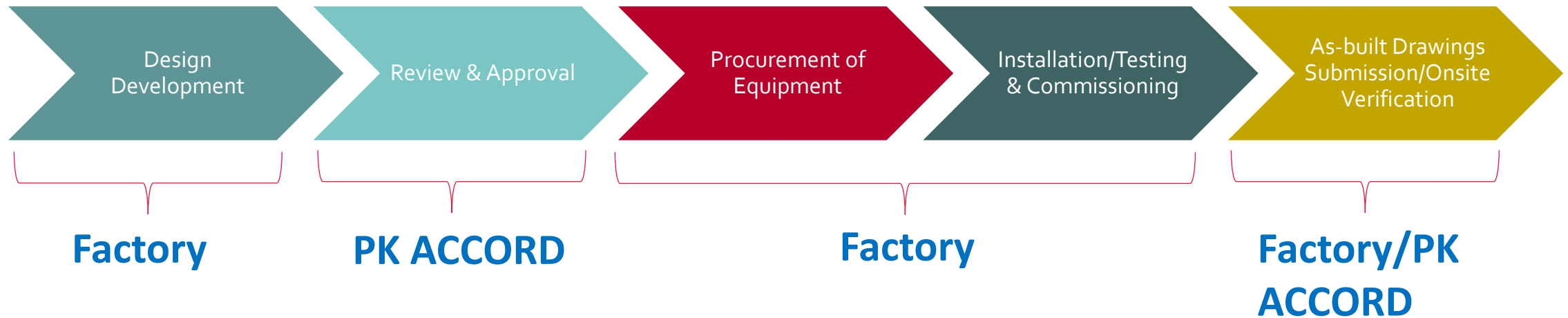




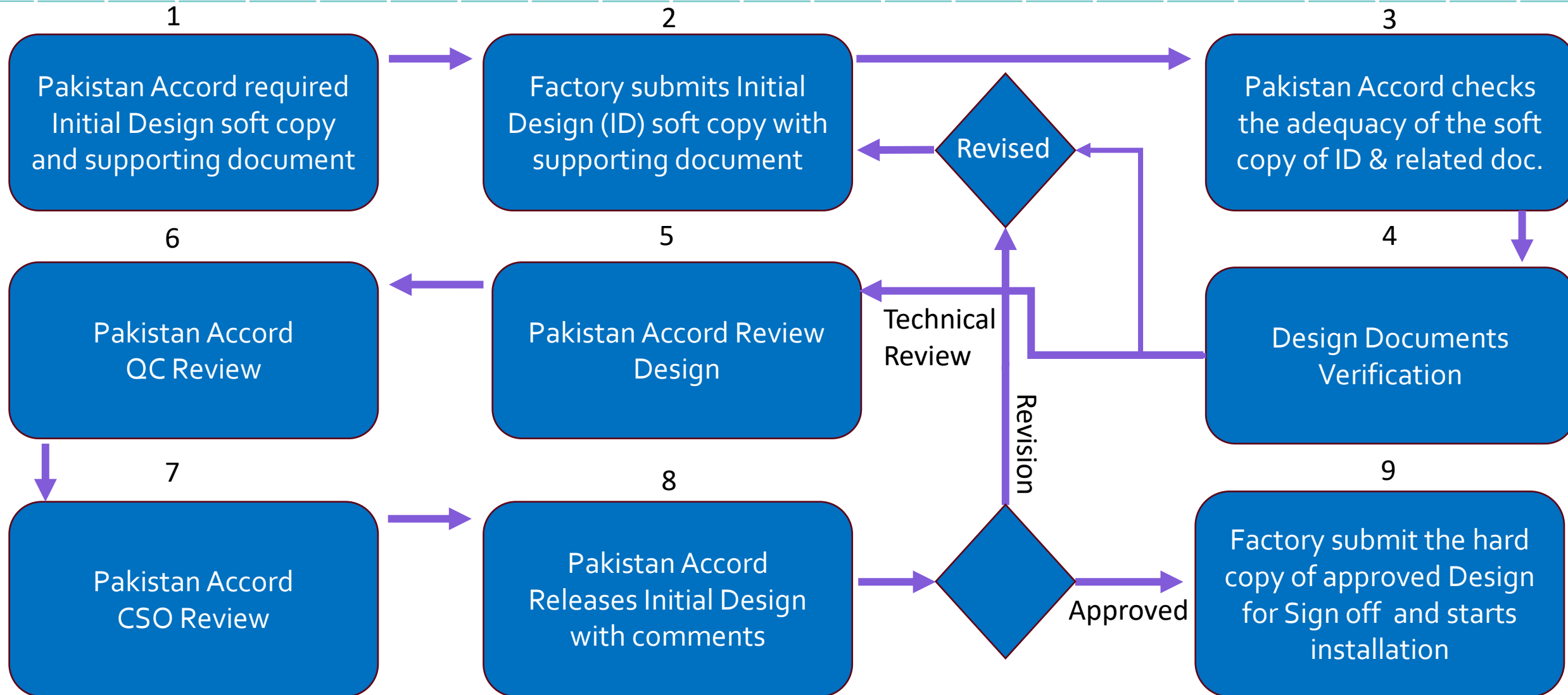
SUPS Initial Design Review Process

December 2024

SUPS Initial Design Review Process



SUPS Initial Design Review Process





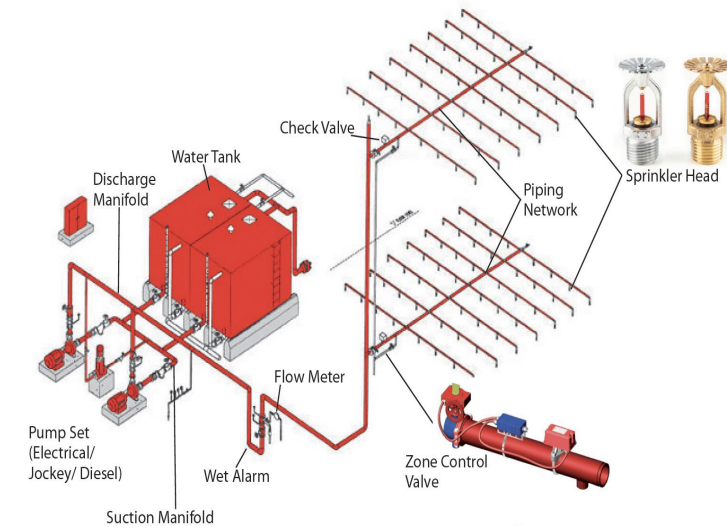
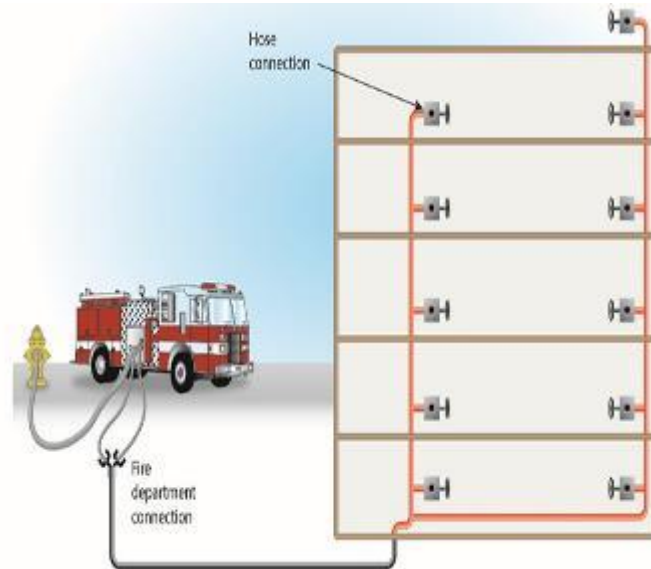
In this presentation, we have used **Fire Equipment** from various manufacturers to provide examples. However, this is not intended as an **Endorsement** of any specific manufacturer or product.

Water Based Fire Suppression System

Fire Pump

Standpipe System

Sprinkler System



Water Based Fire Suppression System

Design content

- Cover page
- List of drawings
- Site plan
- Master layout
- Concept design report & building information
- Equipment listing & technical specifications
- Standard details of all equipment
- Buildings elevations & section
- Floor plans of individual buildings
 - Standpipe System
 - Sprinklers System
- Roof floor plan
- Riser diagram
- Hydraulic calculations
- Fire Pumps Unit
- Fire Pump room plan
- Fire Pump room section
- Fire pump room construction
- Fire Pump room ventilation

Water Based Fire Suppression System

Cover page

Drawing type- Proposed
Type of System: Standpipe & Hose System
Factory name: XYZ Ltd
Distinctive ID: 10001
Factory owners' name: Mr. ABC
Address: Site Area, Karachi Sindh, Pakistan.
Consultant name: ABC Consultancy
Address: Karachi, Pakistan.
Submitted to: Pakistan Accord
Design submission date: November 18, 2024
Design submission number: 02
Seal & Signature of factory owners & consultant

PROPOSED DESIGN OF FIRE STANDPIPE & HOSE SYSTEM

Factory ID: 100001













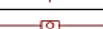






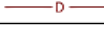

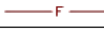
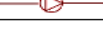



FACTORY	CONSULTANT	SUBMITTED TO
LTD. SITE AREA, KARACHI SINDH PAKISTAN	ABC LTD. OFFICE # 123, KARACHI SINDH PAKISTAN	XYZ LTD. KARACHI SINDH PAKISTAN

UPDATE : 18-NOV-2024

Revision : 02

Water Based Fire Suppression System

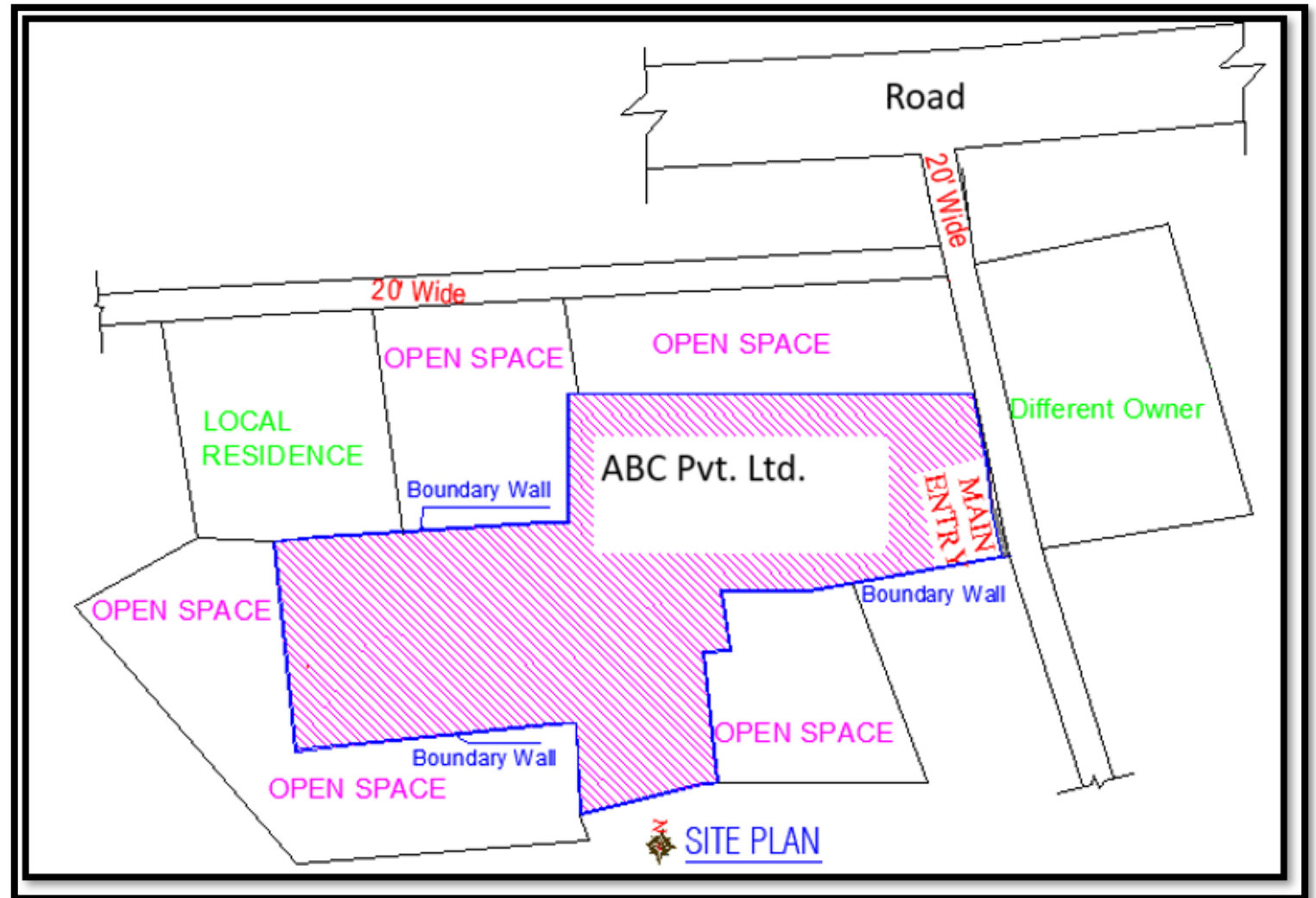
List of symbols & drawings:

FIRE PROTECTION SYSTEM SYMBOLS				LIST OF DRAWINGS	
LETTER SYMBOLS				DWG. NO.	DESCRIPTION
SYMBOLS	DESCRIPTION	SYMBOLS	DESCRIPTION	FP.001.D000	LIST OF DRAWINGS AND FIRE PROTECTION SYSTEM SYMBOLS
WR	WET RISER	F	FIRE PIPE	FP.002.D000	FIRE PROTECTION SYSTEM _ PRODUCT TECHNICAL DETAIL
D	DRAIN RISER	FP	FIRE PROTECTION SYSTEM	FP.002A.D000	FIRE PROTECTION SYSTEM _ TABLE WITH PRODUCT INFORMATIONS
T/A	TO ABOVE	DP	DIESEL ENGINE DRIVEN FIRE PUMP	FP.002B.D000	FIRE PROTECTION SYSTEM _ FIRE PUMP AND SPRINKLER DETAIL
T/B	TO BELOW	EP	ELECTRICAL MOTOR DRIVEN FIRE PUMP	FP.003.D000	FIRE PROTECTION SYSTEM _ TYPICAL INSTALLATION DETAIL
TYP.	TYPICAL	JP	JOCKEY PUMP	FP.004.D000	FIRE PROTECTION SYSTEM _ RISER DIAGRAM
U/G	UNDER GROUND	FS	FLOW SWITCH	FP.005.D000	FIRE PROTECTION SYSTEM _ SCHEMATIC DIAGRAM FOR PUMP
A/G	ABOVE GROUND	SV	SUPERVISORY VALVE	FP.006.D000	FIRE PROTECTION SYSTEM _ X-X SECTIONAL VIEW FOR SPRINKLER
VALVE & PIPING SYMBOLS		FIRE PROTECTION SYMBOLS			FIRE PROTECTION SYSTEM _ LAYOUT FOR DESIGN NOTES
SYMBOLS	DESCRIPTION	SYMBOLS	DESCRIPTION	FP.007.D000	FIRE PROTECTION SYSTEM _ LAYOUT FOR SITE PLAN
	OS & Y GATE VALVE		FIRE HYDRANT	FP.008.D000	FIRE PROTECTION SYSTEM _ LAYOUT FOR GROUND FLOOR PLAN
	CHECK VALVE		FIRE DEPARTMENT CONNECTION	FP.009.D000	FIRE PROTECTION SYSTEM _ LAYOUT FOR MEZZANINE FLOOR PLAN
	FLEXIBLE JOINT		HOSE VALVE	FP.010.D000	FIRE PROTECTION SYSTEM _ LAYOUT FOR 1ST FLOOR PLAN
	Y STRAINER		HOSE RACK CABINET , RECESSED MOUNT	FP.011.D000	FIRE PROTECTION SYSTEM _ LAYOUT FOR 2ND FLOOR PLAN
	BUTTERFLY VALVE		WET ALARM CHECK VALVE	FP.012.D000	FIRE PROTECTION SYSTEM _ LAYOUT FOR 3RD FLOOR PLAN
	BALL VALVE		UP-RIGHT SPRINKLER HEAD	FP.013.D000	FIRE PROTECTION SYSTEM _ LAYOUT FOR ROOF PLAN
	FLOW METER		PENDENT SPRINKLER HEAD , RECESSED TYPE	FP.014.D000	FIRE PROTECTION SYSTEM _ LAYOUT FOR GF TO 2ND FLOOR PLAN NEW BUILDING
	UNION		FLOW IN DIRECTION OF ARROW	FP.015.D000	FIRE PROTECTION SYSTEM _ LAYOUT FOR ROOF PLAN NEW BUILDING
	SIGHT GLASS		DRAIN PIPE		
	PRESSURE RELIEF VALVE		FIRE PROTECTION PIPE		
	FLOW SWITCH		MOTOR DRIVER FOR FIRE PUMP		
	AUTO AIR VENT		ENGINE DRIVER FOR FIRE PUMP		
	PS - PRESSURE SWITCH				
	PRESSURE GAUGE				
	PUMP				

Water Based Fire Suppression System

Site plan

1. Property proximity information
2. Fire Department Access Routes to the Premises

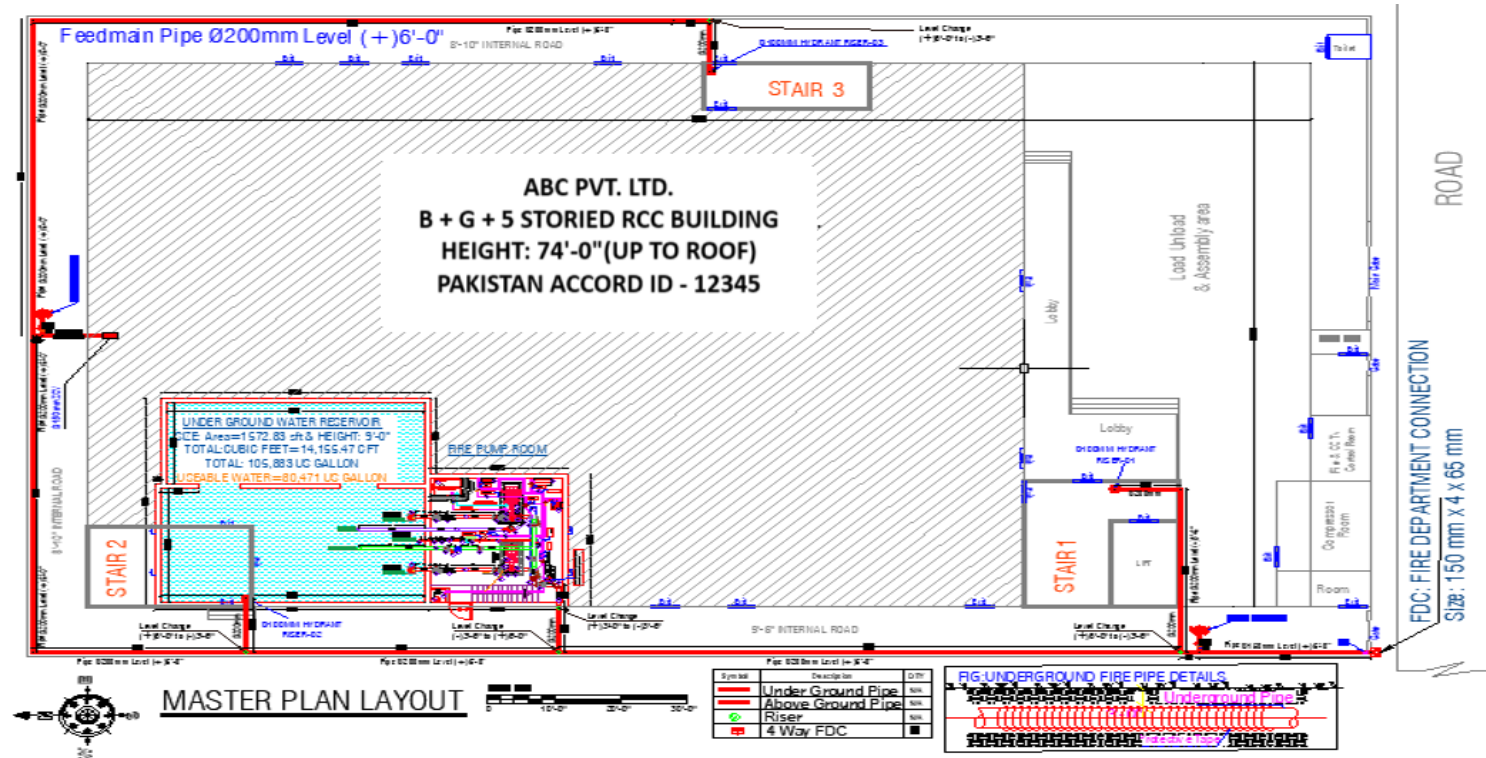


Water Based Fire Suppression System

Master layout

- ❑ Marking the individual building with-
 - Building ID
 - Number of stories
 - Building construction type (RCC or Steel)
 - Building area
 - Building Dimension
 - Stair ID
 - Building to Building distances

- ❑ Compass with indication of North
- ❑ Graphical scale (e.g. 1:10)
- ❑ Public road with width
- ❑ Factory internal road with width
- ❑ Factory boundary wall
- ❑ Pump room & Water reservoir location
- ❑ Piping network
- ❑ Riser's Location
- ❑ Feed main pipe location with elevation
- ❑ Fire brigade connection location
- ❑ Fire alarm control room location



Water Based Fire Suppression System

Concept design report & building information

Building general information

- Number of structure/buildings
- Individual building name
- Building area
- Building height
- Number of floors
- Number of basement
- Roof top occupied/unoccupied
- Stairs ID's
- Stair details
- Pump room location
- Fire command room location
- Number of lifts
- Utility information (Generator, Sub station etc.)

Building wise floor details

- Floor name
- Floor area
- Floor height
- Floor uses (Occupancy classification)
- Occupant load

Ancillary building information

- Building name
- Area
- Height
- Floor uses (Means occupancy)
- Occupant load
- Exit number & width

Water Based Fire Suppression System

Concept design report & building information

- System Type: Fire Standpipe
- Hazard Classification: Ordinary Hazard
- Occupancy Classification: Group - II
- Applicable standard in the system:
 - NFPA 13, Standard For The Installation Of Sprinkler Systems , Latest Edition
 - NFPA 14, Standard For The Installation Of Standpipe And Hose Systems, Latest Edition
 - NFPA 20, Standard For The Installation Of Stationary Pumps For Fire Protection, Latest Edition
 - NFPA 170 ,Standard For Fire Safety And Emergency Symbols, Latest Edition

1. Sprinkler System demand:

- Flow: Density/Area Method
- Pressure: Minimum 7 PSI
- Hose Stream Allowance (e.g. OH2- 250 GPM)

2. Standpipe system demand:

- 1250 (500+250+250+250) US GPM (Remote riser + Additional riser)
- Calculated Water Demand: 1250 US GPM @ 124.5 PSI
- Most remote Class I hose required pressure: 100 PSI

3. Pump selection:

- Total number of standpipe riser - 04 nos
- Selected pump capacity: 1250 USGPM
- Selected rated pressure : 150 PSI

4. Water tank capacity:

- Reservoir size: 61'-0" x 34'-10" x 15'-0"
- Usable water height: 6'-6"
- Water capacity: 103,329 US Gallon

5. Water supply duration: 30/60/90/120 minutes

6. Selected pump supply information:

- Brand, Model, Country of origin

7. Pipe & Fittings: ASTM A53, GR.B SCH 40

8. Pump suction: Positive suction head

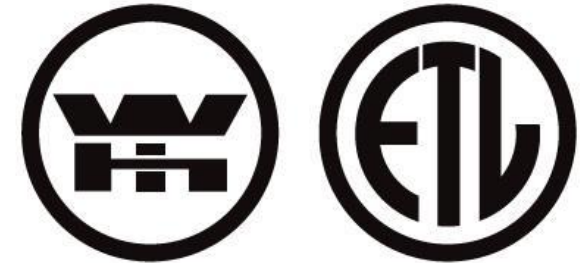
Water Based Fire Suppression System

Equipment listing & technical specifications of products

- Product name
- Manufacturer name
- Manufacturer country of origin
- Model
- Rated pressure
- Listing authority
- Listing file number
- Material
- Size
- Products design code
- Application
- Suitable temperature

Water Based Fire Suppression System

Some of listing bodies



Intertek

Water Based Fire Suppression System

Equipment listing & technical specifications of products

Source

- Equipment Datasheet
- Equipment Certificate
- Equipment Manual

DIESEL ENGINE DRIVEN FIRE PUMP:			
DIESEL ENGINE	Manufacturer : Pump Model : Listing authority : UL/FM Pump Type : Horizontal Split case Pump rated flow: 1000 US GPM Head Pressure : 150 PSI Max Net Pressure:152 PSI Max Positive Suction Pressure:68 PSI Suction size : 5 Inch Discharge size : 4 Inch Speed : 2900 RPM Impeller Dia: 265mm Pump HP: UL FILE NO: EX16127	CONTROLLER	Manufacturer : Product : Line Voltage: 208-240 Amperage:6 DC Voltage:24 Mfg Date:16-Jan-2017 Phase:1 Freq:50-60 Hz Maximum Pressure: 300 PSI Listing authority : UL File No- EX3971
			FUEL TANK

ELECTRIC ENGINE DRIVEN FIRE PUMP:			
MOTOR	Manufacturer : Model : Rated FL Speed : 2940 rpm Rated HP : 150 Rated Volts: 415V, Rated Hz: 50 Hz COO: Listing authority : UL UL FILE NO: EX27105 Rated FL Ampere:177.5	CONTROLLER	Manufacturer : Model : COO : Listing authority : UL/FM Product : Pump Type : Horizontal Split case Rated Capacity: 1000 US GPM Head : 149 PSI Max Positive Suction Pressure:67PSI Max Net Pressure:153 PSI Max Power:200HP Suction size : 5 Inch Discharge size : 4 Inch Speed : 2900 RPM Impeller Dia: 265mm UL FILE NO: EX16127
			Manufacturer : Product: Line Voltage:415 HP:150 FLA:218 LRA:1308 Phase: 3, Freq: 50 Hz Ctrl Voltage:415/24 Max PSI:300 COO : UAE Listing authority : UL Power: 150 HP File No-EX3971

Water Based Fire Suppression System

Equipment listing & technical specifications of products

SL. NO.	EQUIPMENT NAME	DETAILS INFORMATION	SL. NO.	EQUIPMENT NAME	DETAILS INFORMATION	SL. NO.	EQUIPMENT NAME	DETAILS INFORMATION
01	Fire Pump Relief Valve	Manufacturer : Cia-Val Model : 20508-4KG1 COO : USA Listing authority : UL/FM Rated Pressure : 300PSI Size : 4 Inch UL File No:EX2855	07	Air Release Valve	Manufacturer: Model : COO : USA Listing authority : UL/FM Rated Pressure : 175 PSI Size : 1/2 Inch UL File No:EX5148	13	Fire Department Connection	Manufacturer : Model : COO : Listing authority : Rated Pressure : 300PSI Size : 4-Way Listing No.:
02	Flow Meter	Manufacturer : Model : COO : Listing authority : FM Rated Pressure : 290 PSI Size : 6",Groove Type	08	Flow Switch	Manufacturer: Model : COO : Listing authority : UL/FM Rated Pressure : 300 PSI Size : 4 Inch UL File No: S309	14	Class I System	Manufacturer : Model : COO : Listing authority : Rated Pressure : 300 PSI Size : 2.5 Inch Listing No.:
03	OS & Y Gate Valve	Manufacturer : Model : COO : Listing authority : UL/FM Rated Pressure : 200 PSI Size : 2.5 ,4 ,6, 8 Inch UL File No:EX15667	09	Supervisory Switch	Manufacturer : Model : COO : Listing authority : UL/FM Size : 2.5, 4, 6, 8 Inch UL File No: S309	15	Sewing Check Valve	Manufacturer : Model : COO : Listing authority : UL Rated Pressure : 300 PSI Size : 6 Inch UL File No: EX16203
04	Butterfly Valve	Manufacturer : Model : COO : Listing authority : UL/FM Rated Pressure : 300 PSI Size : 4, 6 Inch UL File No:EX26413	10	Pressure Gauge	Manufacturer : Model : COO : Listing authority : UL Rated Pressure : 250 PSI/300 PSI Size : 3-1/2 Inch/ 4Inch UL File No:EX16217	16	TEST & DRAIN VALVE	Manufacturer : Model : COO : UK Listing authority : ULLISTED Rated Pressure : 175 PSI Size : 2" UL File No: EX16437
05	Y-Strainer	Manufacturer : Model : COO : Listing authority : UL Rated Pressure : 300 PSI Size : 2.5 ,8 Inch UL File No:EX16202	11	UPRIGHT SPRINKLER	Manufacturer : Model : K FACTOR: K- 8.0 Response type: Standard Orientation: Upright/Pendent Design for Hazard: Ordinary/Extra/Light Rated Pressure : 175 PSI Temperature:68°C Size : 3/4" COO : Listing authority : UL/FM UL File No: EX1085	17	FIRE PIPE & Fittings (ASTM A53 SCH40)	Manufacturer : Model : COO : Size: Listing/Third Party authority :
06	1.5 Inch angle valve, Rack, Hose Pipe & Nozzle (Class II System)	Manufacturer : Model : E0131 COO : USA Listing authority : UL Rated Pressure : 200 PSI Size : 1.5 Inch, 2.5 Inch UL File No: EX27634	12	Causing Relief Valve	Manufacturer : Model : Rated Pressure : 300 PSI Size : 3/4 inch COO : Listing authority : UL LISTED UL File No:EX5218			

Manufacturer :
Model :
COO :
Listing authority : UL
Rated Pressure : 300 PSI
Size : 6 Inch
UL File No: EX16203

Manufacturer :
Model :
K FACTOR:
Response type: Standard
Orientation: Upright/Pendent
Design for Hazard: Ordinary/Extra/Light
Rated Pressure : 175 PSI
Temperature:68°C
Size : 3/4"
COO :
Listing authority : UL
UL File No: EX1085

Water Based Fire Suppression System

Equipment listing & technical specifications of products

-][Top][2D Wireframe]

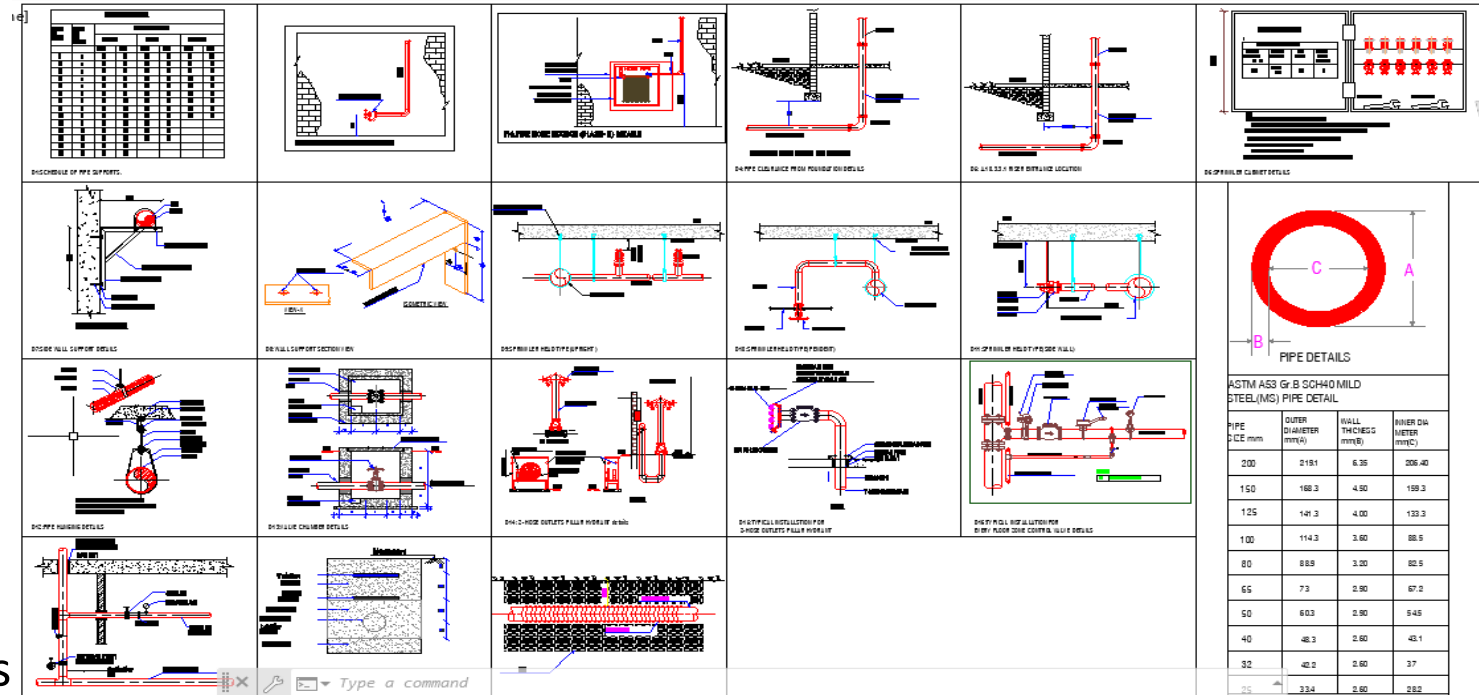
PRODUCT CHECKLIST

SL No	Equipment's Name	Manufacturer Name	Model No.	3rd Party Certification	Certification Number	SL No	Equipment's Name	Manufacturer Name	Model No.	3rd Party Certification	Certification Number	
1	Electric Motor Driven Pump	Pump	NAFFCO	NF-S 200-125	UL	11	Hose Nozzle 1.5"	SUNPOOL	N40	UL	EX26454	
		Motor	NATIONAL	NMCM502002PO	UL			EX26863	WILSON & COUSINS	HNL-206T	UL	EX5518
		Controller	NAFFCO	NFY-SDM1	UL			EX15064	BAN CHANG	A97H	UL	EX5160
2	Diesel Engine Driven Pump	Pump	NAFFCO	NF-S 200-125	UL	12	40mm Right Angle Valve	WILSON & COUSINS		IE25H	UL	EX5270
		Engine	FIRE DRIVER	FD 250 H	UL			EX15238		KILLFIRE	KV247-38A-UL	UL
		Controller	NAFFCO	NFY-DM1	UL			EX15064	13	65mm Landing Valve	RAPIDROP	HV005
3	Jockey Pump	Pump	NAFFCO	NF VLS-140	N/A	N/A	14	Air Vent			GALA	9712
		Controller	NAFFCO	NFY-JD01	UL	E309408			15	Fire Department Connection 2-way & 4-way	RAPIDROP	DC707
4	Y- Strainer	RAPIDROP	Fig-702	UL	EX15306	16	Supervisory Switch	WEFLO			WOSY-2	UL
5	OS & Y Gate Valve	RAPIDROP	Fig-103FF	UL	EX15305			RAPIDROP	RDOSYS-2	UL	S36347	
		LIFECO	3299-300-FLF	UL	EX6197	SYSTEM SENSOR	WFD40, WFD60	UL	S739			
		MECH	XZ41X	UL	EX15973		RAPIDROP	RDWFD R-2	UL	S36347		
6	Swing check valve	RAPIDROP	Fig-302	UL	EX15304	17	Flow Switch	RAPIDROP	Fig-221	UL	EX15412	
7	Pressure Gauge	WINTERS	PFE3935R1R11	UL	EX16217					18	Butterfly valve with supervisory switch	RAPIDROP
		RAPIDROP	PFE3935R1R11	UL	EX16217	19	Test & Drain Valve	RAPIDROP	Fig-802			UL
8	Pressure Relief Valve	CLA-VAL	2050B-4KG1	UL	EX2855			20	Sprinkler k-11.2	TYCO	TY5151	UL
9	Flow Meter	GVI	6"-1250-G	FM		21	Casing Relief valve			CLA-VAL	55L-60	UL
10	30 Meter Long Fire Hose Pipe	ASSOCIATED ENTERPRISES (AE)	Challenger 700	UL	EX26693			22	MS Seamless Pipe	CHINA	SCH40 ASTM A53	-
		KILLFIRE	KFH-15	UL	EX27159							

Water Based Fire Suppression System

Standard Details of all equipment

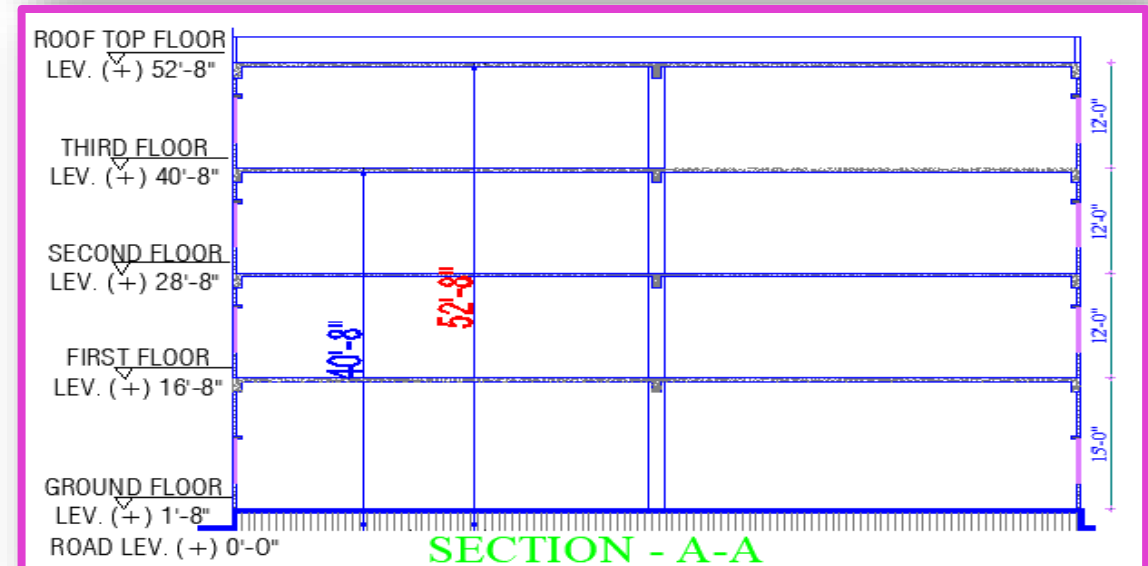
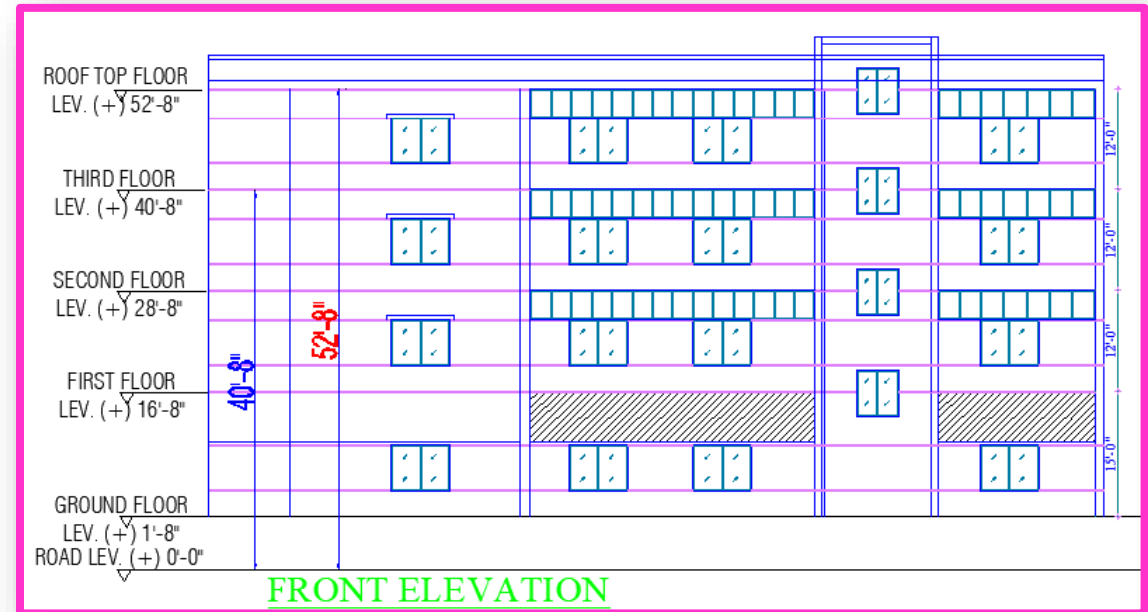
- Class I system
- Fire departments connection
- Underground piping
- Aboveground piping
- Pipe supports
- Sprinkler heads
- All usable valves in system
- Pressure gauge
- Floor control valve
- Flow meter
- Pressure relief valve
- Pipe type and schedule of wall thickness
- Fire pump installation details



Water Based Fire Suppression System

Building elevation & section

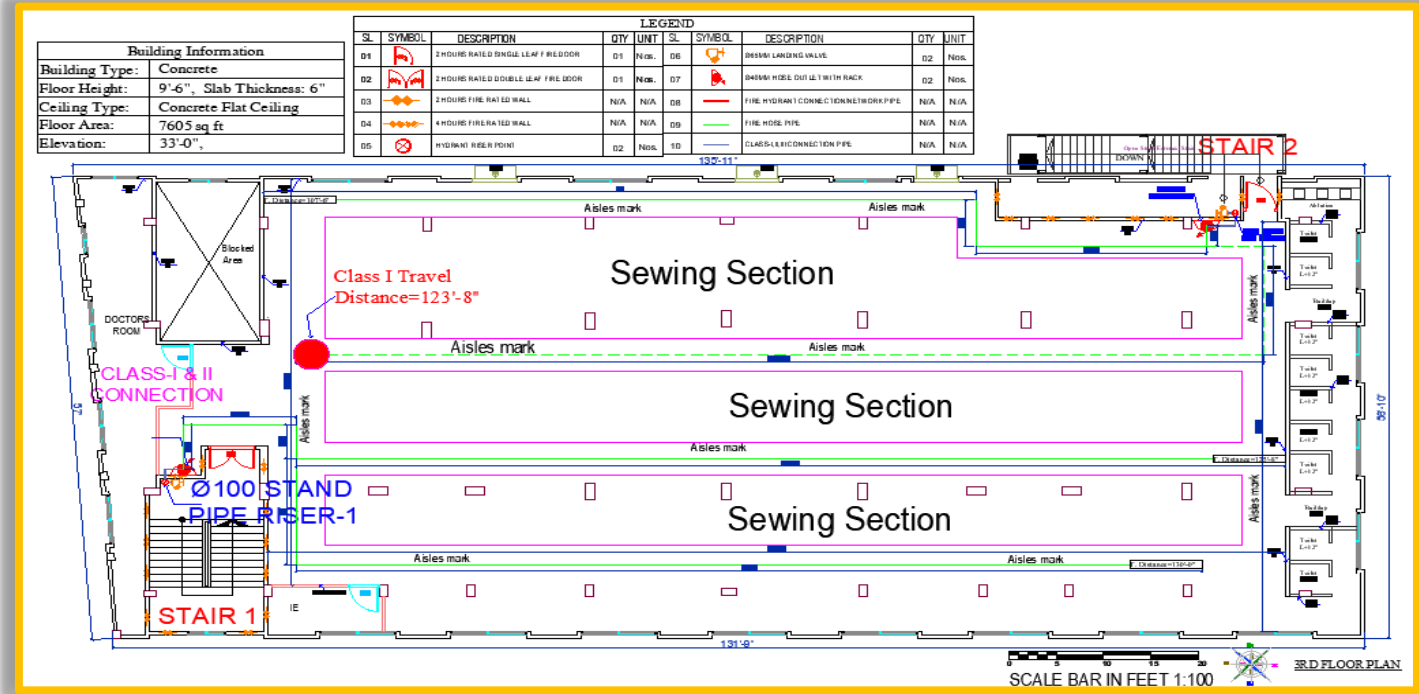
- Road level
- Plinth level
- Floor to floor measurement
- Slab thickness measurement
- Road level to Highest Occupiable floor level measurement
- Road level to highest floor measurement e.g. Top Roof
- Building elevation & section



Water Based Fire Suppression System

Floor plans - Standpipe System

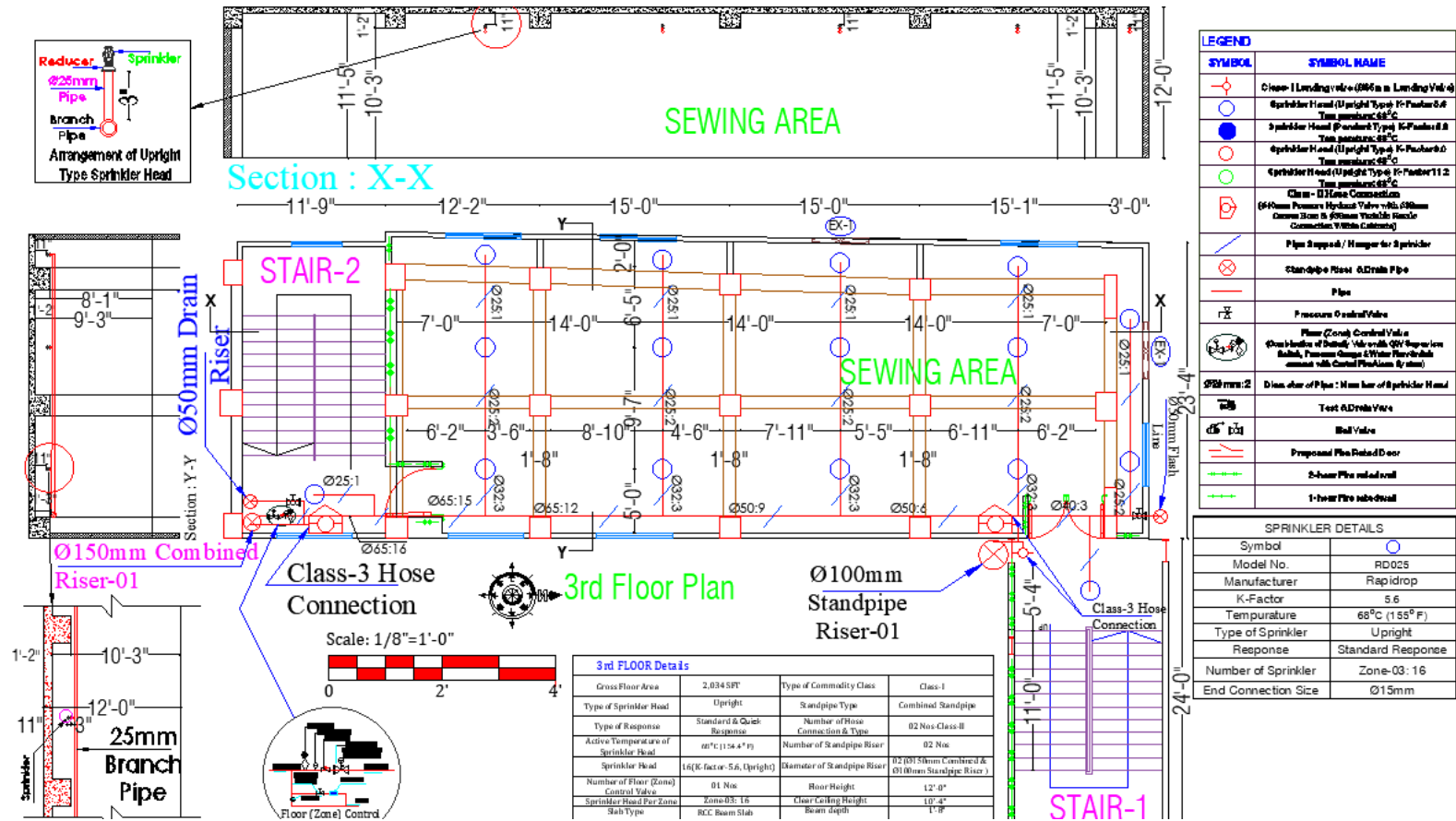
- Architectural layout
- Occupancy type
- Means of egress
- Exit stairways
- Riser Location
- Branch pipe size, length & elevation
- Standpipe coverage plan
- Fire rated wall
- Legend of usable components
- Quantity table
- Graphical scale
- North arrow
- Floor name
- Floor information (Area, Height, Occupancy)



Water Based Fire Suppression System

Floor Plan - Sprinkler System

- Architectural Layout
- Occupancy Type
- Means Of Egress
- Exit Stairways
- Protected Riser
- Class I System
- Floor Control Valve
- Flush Riser
- Branch Pipe Size, Length & Elevation
- Sprinkler Coverage Plan
- Fire Rated Wall & Separated Compartment
- Ceiling Type (Obstructed/Unobstructed)
- Beam Layout On Floor Plan
- Beam & Sub Beam Height, Measurement
- Floor Ceiling Geometry
- Legend Of Usable Components
- Quantity Table
- Graphical Scale
- North Arrow
- Floor Name
- Floor Information (Area, Height, Occupancy)



Water Based Fire Suppression System

Selection of Sprinkler system



Listing certificate must reflect some of the characteristics mentioned here

Should be clearly mentioned and marked in the drawing and datasheet

K-Factor

Orifice Size

Temp. rating

Response Type

Spray Pattern

Installation orientation

Selection of sprinkler based on the characteristics (Suitable for installation)

Requirement determination following Building Code

Selection of Design Philosophy

Determine the Design criteria (ESFR/CMDA/CMS A, etc.)

There is another step that is selecting the type of function- Wet, Dry, Pre-action, Deluge system

Design Occupancy selection as per NFPA-13



Check the datasheet, if sprinkler selected is appropriate to use in selected design occupancy



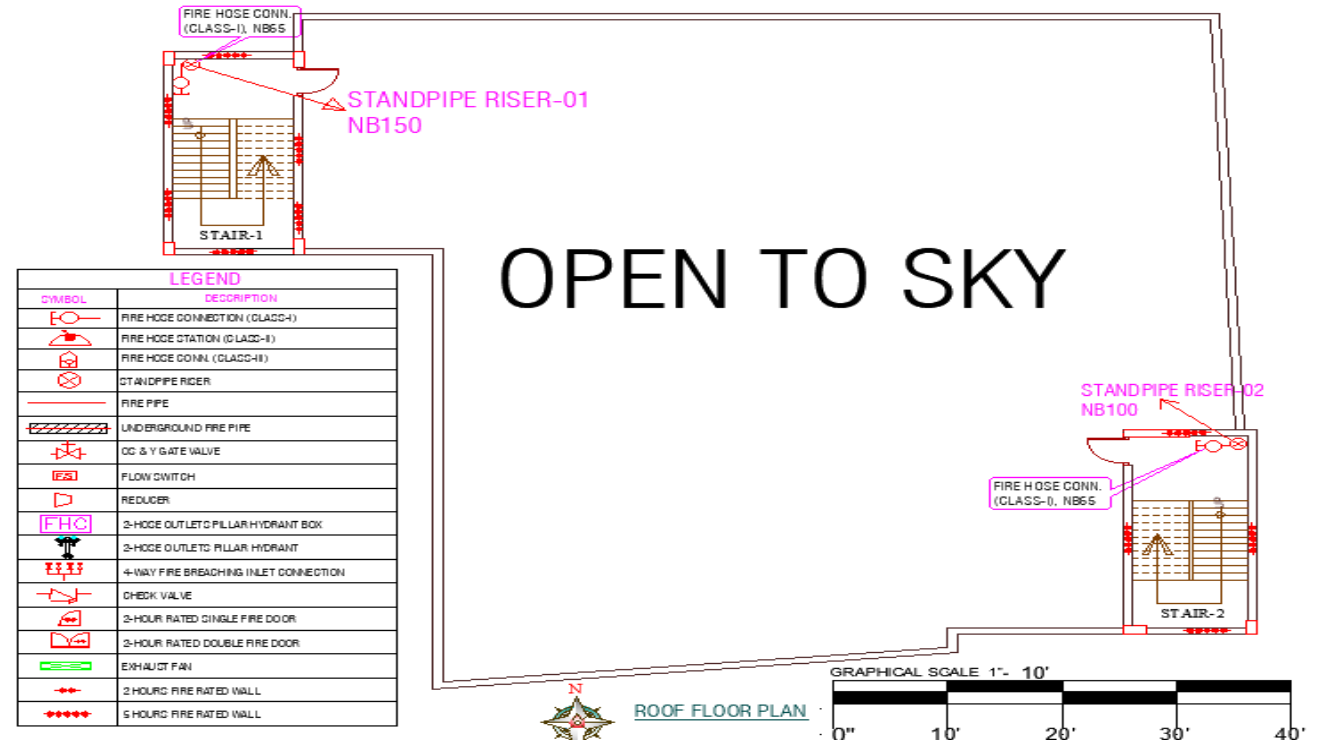
Design Notes:

- Check design occupancy
- Design hydraulic requirements
- Check ambient ceiling temp.
- Ceiling geometry

Water Based Fire Suppression System

Roof floor plan

- Architectural layout
- Occupancy type
- Means of egress
- Exit stairways
- Protected riser
- Class I system
- Riser pressure gauge & Air vent valve
- Branch pipe size, length & elevation
- Fire rated wall & separated compartment
- Legend of usable components
- Quantity table
- Graphical scale
- North arrow
- Floor name
- Floor information (Area, Height, Occupancy)
- Floor ceiling geometry



Water Based Fire Suppression System

Riser diagram

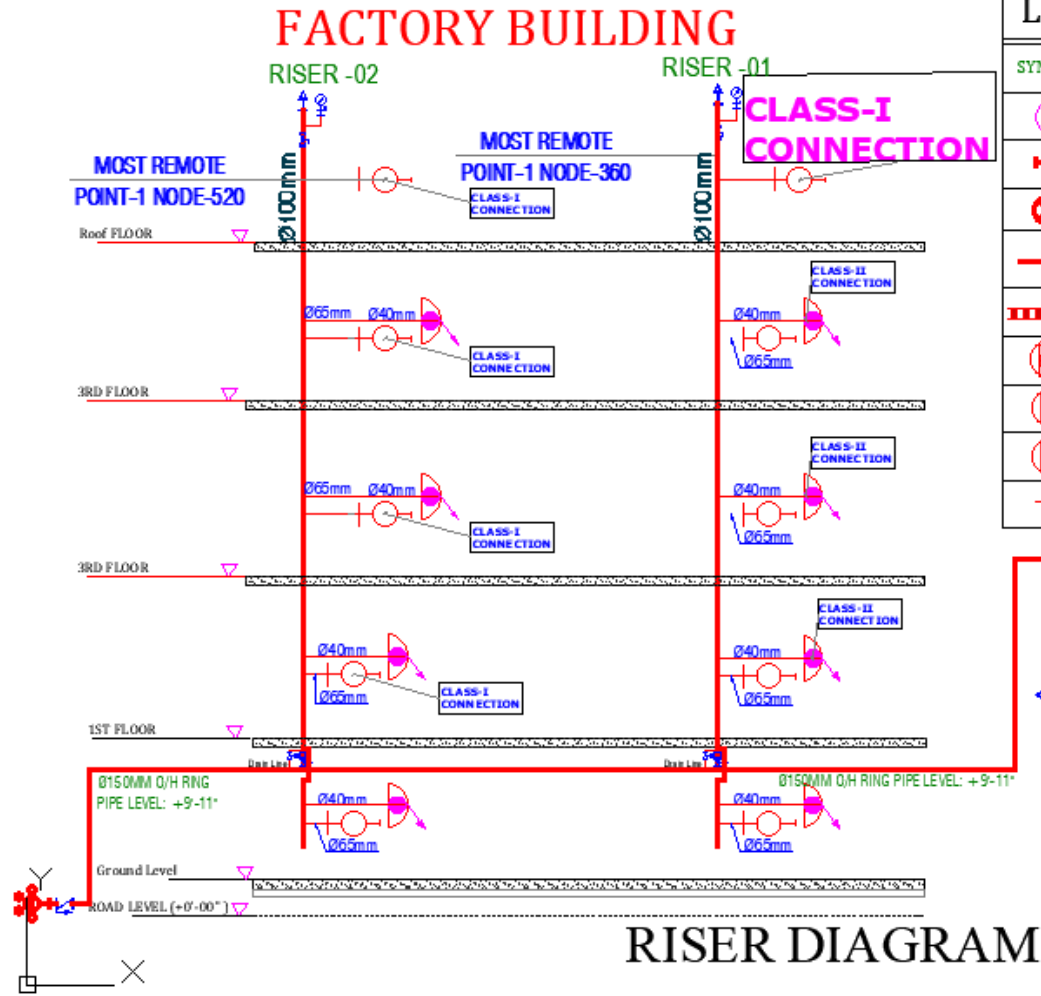
A riser diagram provides a clear visual guide for how fire protection systems like sprinkler systems, standpipe systems, fire pumps and other elements are arranged and interconnected throughout a building (Factory premises).

- Pump sets with elevation
- Pump suction & discharge piping
- Underground reservoir
- Riser with numbering
- Class I location
- Floor name
- Floor to floor measurement
- Most remote riser & class I marking

- Legend (Symbol of components with quantity)
- Pipe networking
- Pipe elevation
- Pipe size
- Valves
- Fire department connection
- All structures

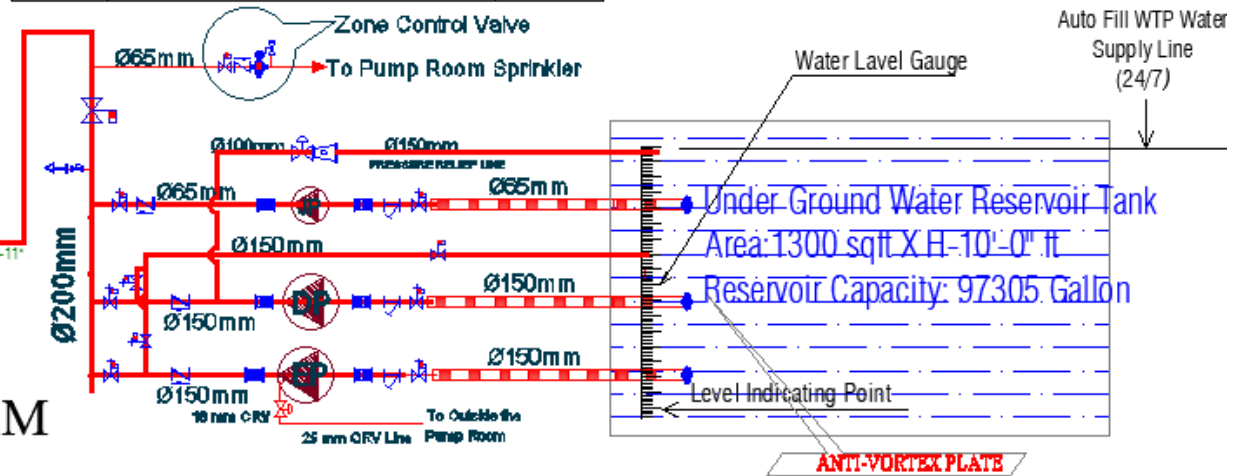
Water Based Fire Suppression System

-]Top][2D Wireframe]



LEGEND		
SYMBOL	DESCRIPTION	QTY
	SPRINKLER HEAD - UPRIGHT K-FACTOR - 11.2	07
	4-WAY FIRE BRIGADE CONNECTION	01
	STANDPIPE RISER POINT	02
	PIPE NETWORK	AS REQUIRED
	FIRE PUMP SUCTION PIPE	AS REQUIRED
	FIRE PUMP ELECTRIC MOTOR DRIVEN	01
	FIRE PUMP DIESEL ENGINE DRIVEN	01
	JOCKEY PUMP ELECTRIC MOTOR DRIVEN	01
	CLASS - II ; 40MM HOSE PIPE SET	14

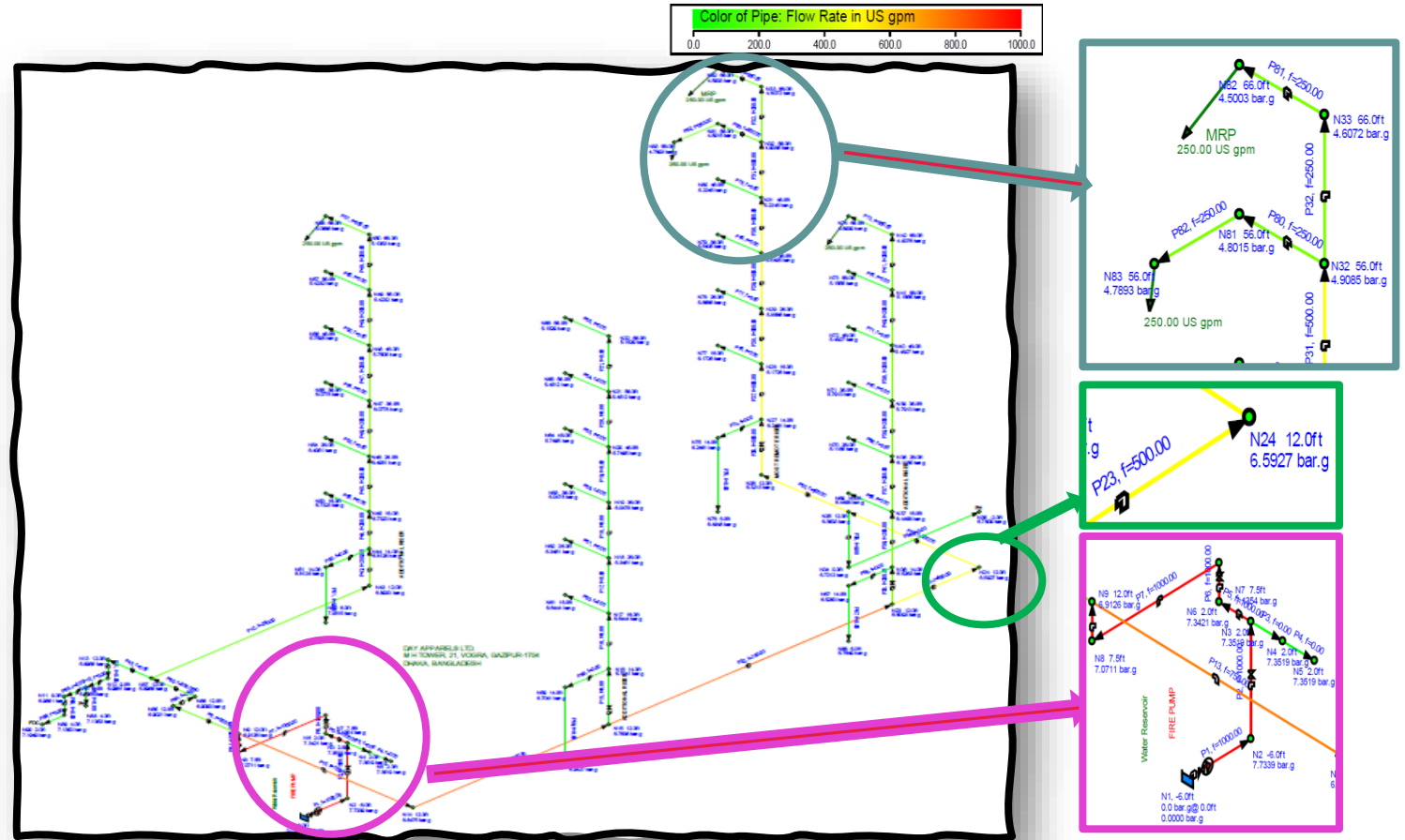
	FLOW METER	01
	OS&Y GATE VALVE	09
	SUPERVISORY/TEMPERATURE SWITCH	11
	AUTOMATIC AIR VENT	04
	FLOW SWITCH/FLOW DETECTOR	05
	PRESSURE RELIEF VALVE	01
	CASING RELIEF VALVE	01
	CLASS - I CONNECTION / LANDING VALVE	14
	PRESSURE GAGE	10
	CHECK VALVE	05



Water Based Fire Suppression System

Hydraulics Calculation

- Node tag for each specific point
- Elevation in ft (m) of each node tag
- Pressure in psi (bar) at the node
- Discharge in gpm (L/min) at the node
- Pipe size in inches (mm)
- Pipe lengths in ft (m), center-to-center of fittings
- Most remote Class I elevation



Water Based Fire Suppression System

HRS SYSTEMS, INC
4792 LAVISTA ROAD
TUCKER, GA 30084

HYDRAULIC CALCULATION FOR COMBINED SYSTEM

PROJECT :
CLIENT :
LOCATION :
CAL.NO : CJND-76
DATE : 04.04.2019
REV : 0

- DESIGN DATA -

SYSTEM : SPRINKLER SYSTEM

DESIGN STANDARD : NFPA-13

HAZARD AREA : CUTTING AREA
3rd FLOOR LEVEL

OCCUPANCY CLASSIFICATION : ORDINARY HAZARD (GROUP-I)

DESIGN DENSITY : 6.1 LPM/SQ.M

SPRINKLER K-FACTOR : K 8

AREA OF CALCULATION(TOTAL AREA) : 139 sq.m

NUMBER OF SPRINKLER CALCULATED : 16 Nos.

No.OF STANDPIPE CONSIDERED : 1 No.

No.OF LANDING VALVE CONSIDERED : 1 No. @ MOST REMOTE OUTLET
(EL.(+) 18.70 M) @ ROOF LVL

DISCHARGE PER LANDING VALVE : 946 Ltrs/Min @ 6.9 Bar

TOTAL DISCHARGE THROUGH ACTIVE SPRINKLERS : 2284.0 LPM

HOSE STREAM ALLOWANCES : 946.2 LPM (250 GPM)

FLOW & PRESSURE REQUIRED AT PUMPSET : 3230.0 LPM (853.40 GPM @ 10.36 BAR)

PROPOSED FIRE PUMPSET : 1000 GPM @ 11 BAR

PUMPSET LOCATED AT : 1st BASEMENT LEVEL

SPRINKLER SYSTEM HYDRAULIC ANALYSIS Page 2
DATE: 4/4/2019 LATION.EXP\DESKTOP\CJND-76-LV&SPK-RO\CJ-76-SPK & LV- RO.SDF
JOB TITLE: CKDL

WATER SUPPLY DATA

SOURCE	STATIC PRESS.	RESID. PRESS.	FLOW @	AVAIL. PRESS.	TOTAL DEMAND	REQ'D PRESS.
TAG	(BAR)	(BAR)	(LPM)	(BAR)	(LPM)	(BAR)
SOURCE	(N/A)	12.00	(N/A)	12.000	3230.0	10.362

AGGREGATE FLOW ANALYSIS:

TOTAL FLOW AT SOURCE 3230.0 LPM
TOTAL HOSE STREAM ALLOWANCE AT SOURCE 0.0 LPM
OTHER HOSE STREAM ALLOWANCES 946.0 LPM
TOTAL DISCHARGE FROM ACTIVE SPRINKLERS 2284.0 LPM

NODE ANALYSIS DATA

NODE TAG	ELEVATION (M)	NODE TYPE	PRESSURE (BAR)	DISCHARGE (L/MIN)
S1	17.05	K=115.00	0.749	99.5
S2	17.05	K=115.00	0.866	107.0
S3	17.05	K=115.00	1.433	137.7
S4	17.05	K=115.00	1.976	161.6
S5	17.05	K=115.00	0.829	104.7
14	5.11	- - - -	8.746	- - -
LV1	18.70	HOSE STREAM	6.900	946.0
15	18.70	- - - -	6.906	- - -
16	20.96	- - - -	6.810	- - -
SOURCE	-3.50	SOURCE	10.362	3230.0

Software Generated Hydraulic Calculation Analysis Report

SPRINKLER SYSTEM HYDRAULIC ANALYSIS Page 4
DATE: 4/4/2019 LATION.EXP\DESKTOP\CJND-76-LV&SPK-RO\CJ-76-SPK & LV- RO.SDF
JOB TITLE: CKDL

PIPE DATA

PIPE TAG	END	ELEV. (M)	NOZ. (K)	PT (BAR)	DISC. (LPM)	Q(LPM) VBL(MPS)	DIA(MM) HW(C) FL/M	LENGTH (M)	PRESS. SUM. (BAR)
Pipe: 1									
S1	17.05	115.0	0.749	99.5	2.51	-99.5	29.00 PL	3.02	PF 0.117
S2	17.05	115.0	0.866	107.0			120 FTG	3.63	E PE 0.000
Pipe: 50									
S2	-1.90	0.0	10.187	0.0	1.64	-3230.0	204.60 PL	1.60	PF 0.018
SOURCE	-3.50	SRCE	10.362	(N/A)			120 FTG	12.27	T PE 0.157
SOURCE -3.50 SRCE 10.362 (N/A) 0.0015 TL 12.27 PV									

SPRINKLER SYSTEM HYDRAULIC ANALYSIS Page 8
DATE: 4/4/2019 LATION.EXP\DESKTOP\CJND-76-LV&SPK-RO\CJ-76-SPK & LV- RO.SDF
JOB TITLE: CKDL

NOTES (HASS):

- Calculations were performed by the HASS 8.3 computer program under license no. 5003081910 granted by HRS Systems, Inc. 208 Southside Square Petersburg, TN 37144 (931) 659-9760
- The system has been calculated to provide an average imbalance at each node of 0.0119 lpm and a maximum imbalance at any node of 0.5809 lpm.
- Total pressure at each node is used in balancing the system. Maximum water velocity is 7.55 m/sec at pipe 22.
- Items listed in bold print on the cover sheet are automatically transferred from the calculation report.
- PIPE FITTINGS TABLE

Pipe Table Name: STANDARD.PIP

PAGE: A Diameter (mm)	MATERIAL: S40 HWC: 120 Equivalent Fitting Lengths in Meters									
	E	T	L	C	B	G	A	D	N	
29.00	0.61	1.52	0.61	1.52	1.83	0.30	3.05	3.05	3.05	1.52
36.00	0.91	1.83	0.61	2.13	1.83	0.30	3.05	3.05	3.05	1.83
47.00	1.22	2.44	0.61	2.74	1.83	0.30	3.05	3.05	3.05	2.44
54.00	1.52	3.05	0.91	3.35	1.83	0.30	3.05	3.05	3.05	3.05
69.00	1.83	3.66	1.22	4.27	2.13	0.30	3.05	3.05	3.05	3.66
84.00	2.13	4.57	1.52	4.88	3.05	0.30	3.96	3.96	3.96	4.57
106.00	3.05	6.10	1.83	6.71	3.66	0.61	6.10	6.10	6.10	6.10
154.00	4.27	9.14	2.74	9.75	3.05	0.91	8.53	8.53	8.53	9.14
204.60	5.49	10.67	3.96	13.72	3.66	1.22	9.45	9.45	9.45	10.67

Water Based Fire Suppression System



Hydraulic calculation software lists (not limited to):

- Pipenet by Sunrise systems limited
- Fire by Elite



Fire Pump Units



Water Based Fire Suppression System

Fire Pump: A pump that is a provider of liquid flow and pressure dedicated to fire protection system.

Major Types of Listed Fire Pump used in Pakistan

Horizontal Split Case



End Suction



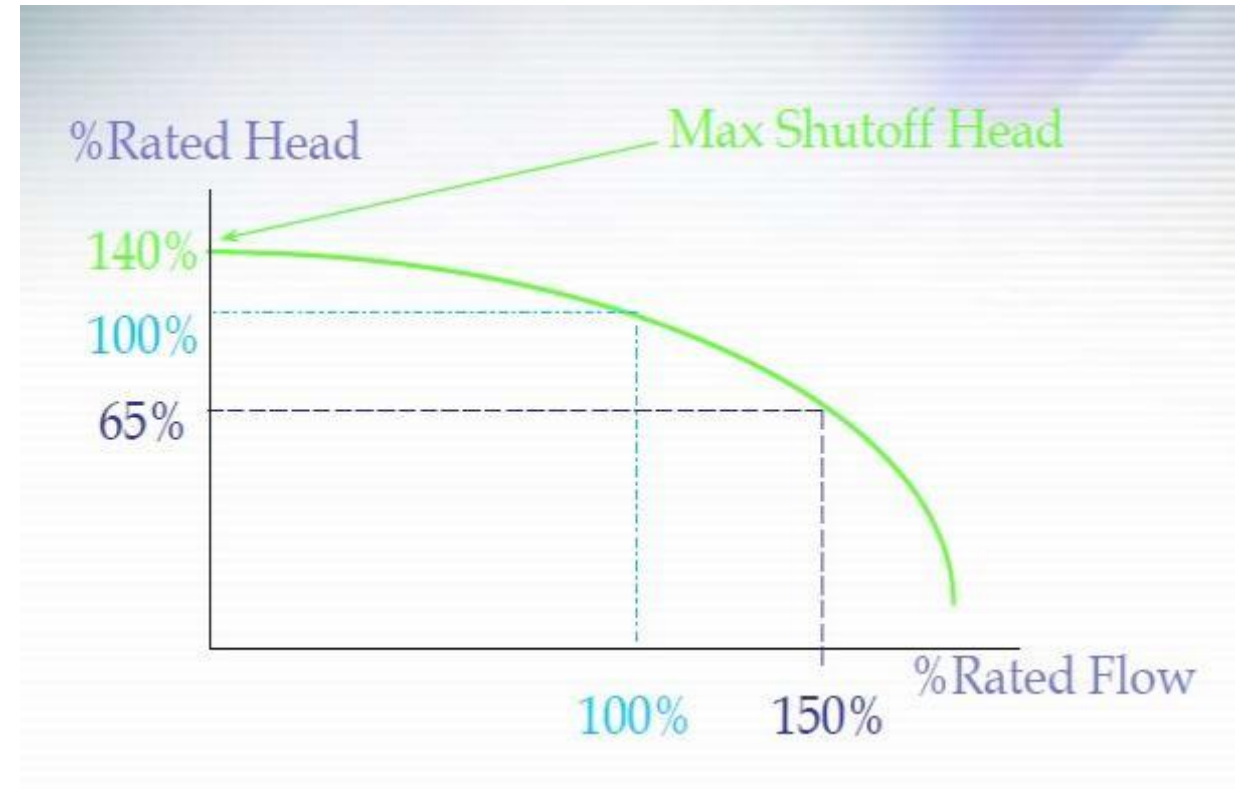
Vertical Turbine



Water Based Fire Suppression System

Pump Requirement

- ❑ Pumps shall furnish not less than 150% of rated capacity at not less than 65% of total rated head
- ❑ The shutoff head shall not exceed 140% of rated head for any type pump
- ❑ Fire pump selection shall be in the range of 90 to 140 % of its rated capacity
- ❑ Fire pumps with its components shall be listed for fire protection service



Water Based Fire Suppression System

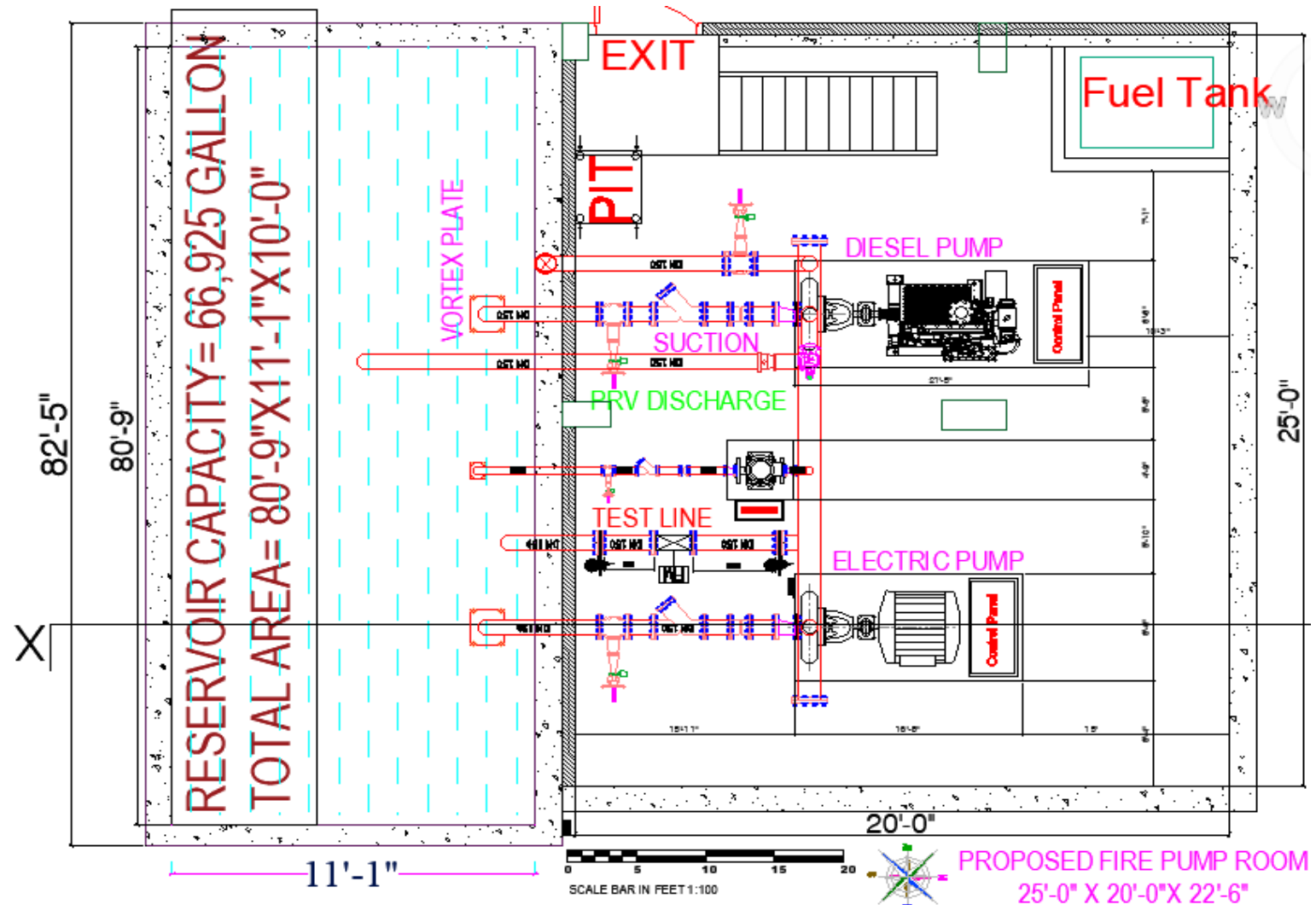
Main Components of Fire Pump (non-exhaustive);

- Diesel Driven Fire Pump
- Electric Driven Fire Pump
- Pressure Maintenance Pump (Jockey Pump)
- Diesel Engine
- Electric Motor
- Electric Driver for Jockey Pump
- Diesel Pump Control Panel
- Electric Pump Control Panel
- Jockey Pump Control panel
- Flow Meter
- Pressure Relief Valve (PRV)
- Check Valve (NRV)
- Control Valve (OS & Y Gate Valve)
- Diesel Tank
- Pressure Sensing Line
- Anti-Vortex Plate
- Circulation Relief Valve
- Pressure Gauge
- Fuel Line
- Air Release Valve
- Y-Strainer

Water Based Fire Suppression System

Fire Pump Room Plan

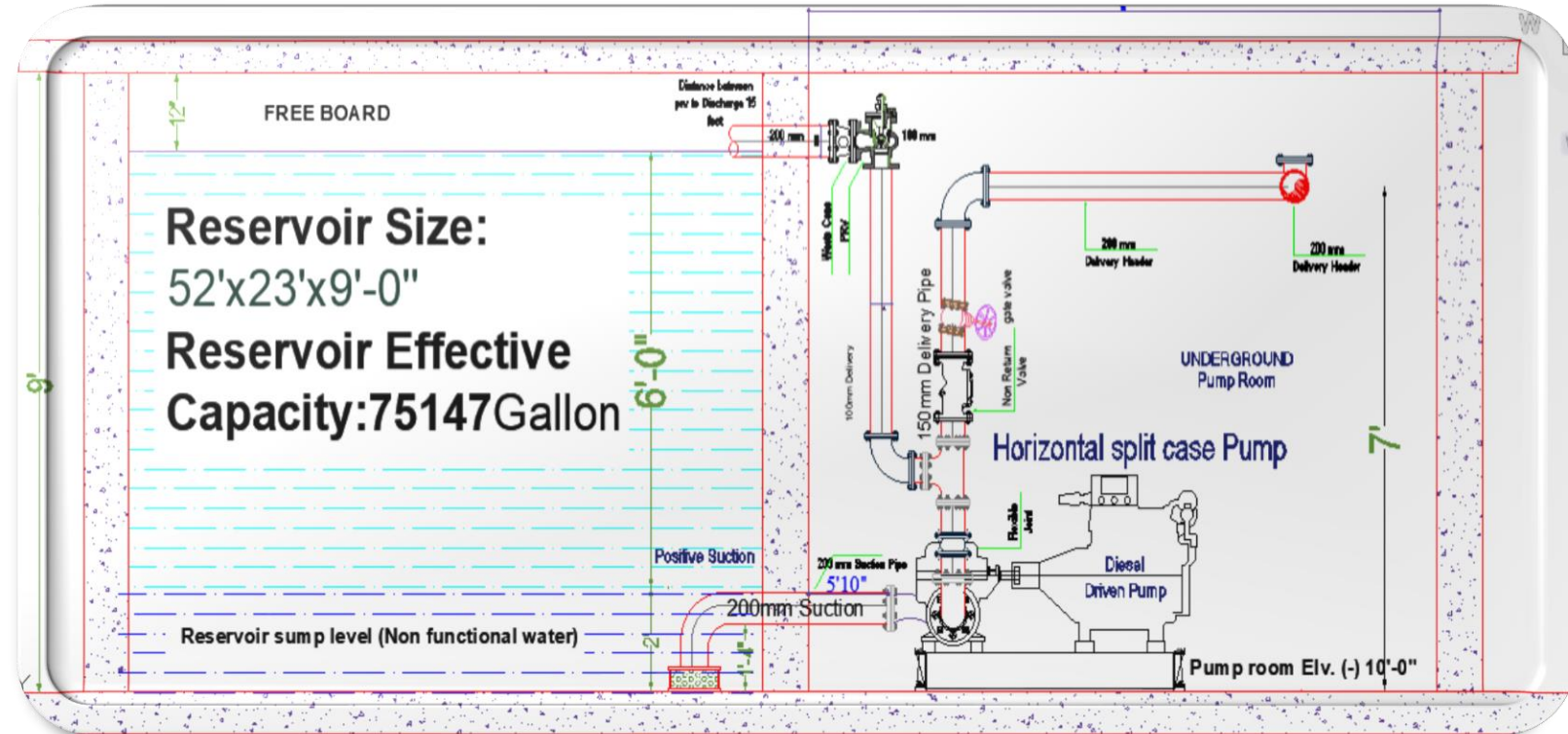
- Structural layout
- Reservoir layout
- Pump sets placement
- Ventilator location
- Adequate drainage with pit
- Pump controller's location
- Diesel engine day tank
- Exits location
- Anti vortex plate placement
- Clearance between a component and the wall for installation and maintenance
- Clearance between energized electrical equipment and other equipment in accordance with NFPA 70.



Water Based Fire Suppression System

Fire Pump Room Section

- Reservoir free board
- Non usable water level
- Usable water level
- Water level indicator
- Pump base depth
- Pump suction & discharge pipe elevation
- PRV, Flow meter, Discharge header elevation
- If PRV, Flow meter & Circulation relief valve discharge back into a tank then elevation of discharge pipe



Water Based Fire Suppression System

Fire Pump Room Construction

- ❑ Fire pump units serving high-rise buildings shall be protected from surrounding occupancies by a minimum of **2-hour fire-rated construction** or physically separated from the protected building by a minimum of **50 ft (15.3 m)**
- ❑ Indoor fire pump rooms in non-high-rise buildings or in separate fire pump buildings shall be physically separated or protected by fire-rated construction in accordance with NFPA 20 (Table 4.13.1.1.1)
- ❑ The location of and access to the fire pump room shall be preplanned with the fire department

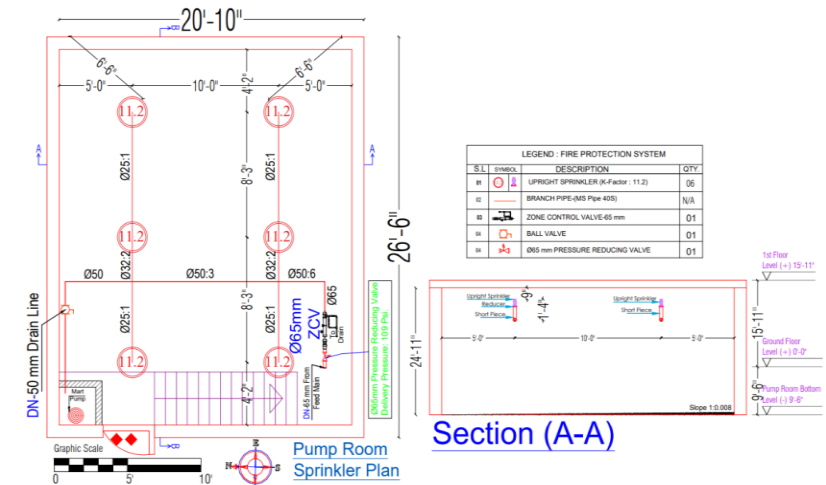


Water Based Fire Suppression System

Sprinkler at Fire Pump Room

❑ **Fire Pump Buildings or Rooms with Diesel Engines.** Fire pump buildings or rooms enclosing diesel engine pump drivers and day tanks shall be protected with an automatic sprinkler system installed in accordance with NFPA 13, Standard for the Installation of Sprinkler Systems. (Extra Hazard Group 2 occupancy) *NFPA 20 Section 4.12.1.3*

❑ **Fire Pump Buildings or Rooms with Electric Drivers.** For buildings that are required to be sprinklered, fire pump buildings or rooms enclosing electric fire pump drivers shall be protected with an automatic sprinkler system installed in accordance with NFPA 13 as an Ordinary Hazard Group 1 occupancy. *NFPA 20 Section 4.14.1.4*



Water Based Fire Suppression System

Pump room ventilation System

The ventilation system for a fire pump room is critical component that ensure the safe and efficient operation of the fire pump and associated equipment.

- Controls Maximum Temperature to 120° F (49° C) at Combustion Air Cleaner Inlet with Engine Running at Rated Load
- Supplies Air for Diesel Engine Combustion
- Removes Any Hazardous Vapors
- Supplies and Exhausts Air as Necessary for Radiator Cooling of the Diesel Engine when Required.

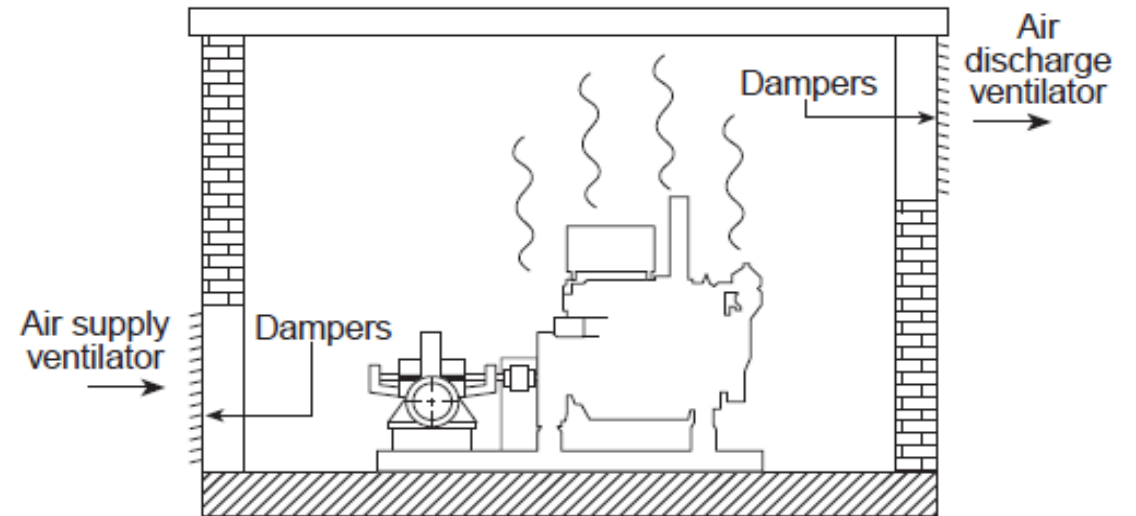


FIGURE A.11.3.2(a) *Typical Ventilation System for a Heat Exchanger–Cooled Diesel-Driven Pump.*

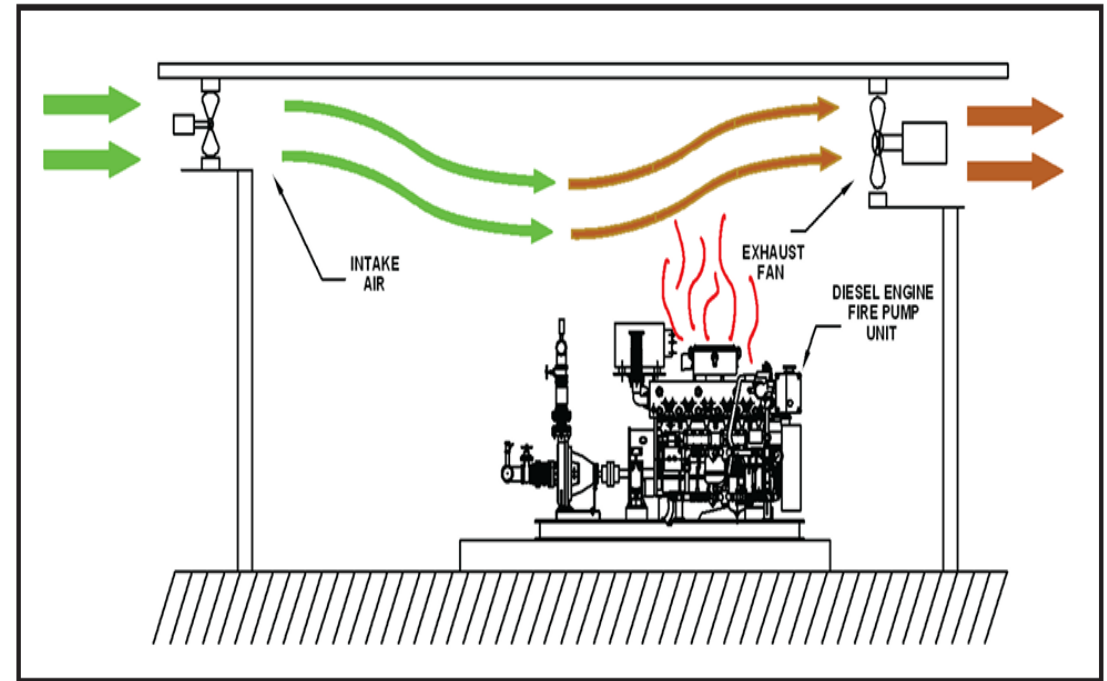
Water Based Fire Suppression System

Incorrect ventilation system design in fire pump room

The following drawing illustrates an incorrect method to vent engine room heat. Although the inlet duct has louvered to direct airflow towards the engine, rising heat will warm the cool air before it can reach the engine.

Disadvantage of Improper ventilation

- ❖ Poor fuel efficiency
- ❖ Poor performance of engine
- ❖ Failures of rubber components
- ❖ High exhaust temperature and related failures
- ❖ Unbearable working conditions due to higher room temperature.



Water Based Fire Suppression System

Fire pump room adequate drainage

- Sump Pit Location
- Pump Packing Gland Line
- Engine Cooling Wastewater Line
- Sensing Line Drain Water
- Circulation Relief Valve Wastewater





Fire Doors

Fire Door



Fire Door

Content

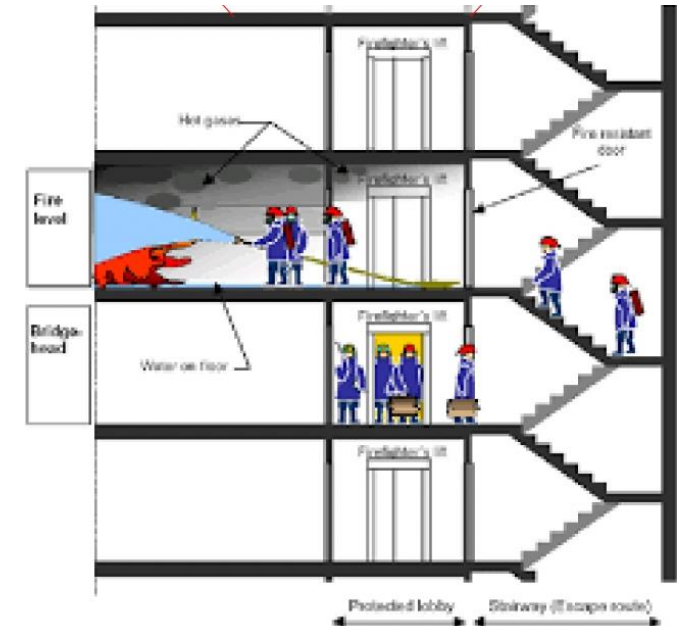
- ✓ Overview of Fire Door requirements
- ✓ What Are Listed Fire Door Accessories
- ✓ How to Check Listed Fire Door
- ✓ Data Required
- ✓ Q&A



Overview

Fire doors contain **Fire** and **Smoke**, protect escape routes, and limit fire spread.

- ✓ Stairwells
- ✓ Emergency Exits
- ✓ High-risk Areas
- ✓ Protection of Lift Shaft
- ✓ Basements and Underground Areas
- ✓ Utility and Service Areas



Listed Fire Door

Fire Door standards:

- All Fire Door assemblies shall conform to Building Code of Pakistan / NFPA standards for fire safety.

Listing:

- Any agency that is accredited by ISO for the listing of Fire Door Assemblies.(Internationally Accredited Listing Agencies).

Fire Door Assembly tests (example):

- A typical **UL** fire test consists of mounting the door assembly in masonry and is subjected to fire endurance test as per their rating.

For more details on testing, refer to UL standard for safety & fire tests of door assemblies.



Intertek

What are Fire Door Accessories

Accessories of a Listed Fire Doors

Fire Doors are made with several different parts and accessories. All the parts are tested and certified by a third-party certification authority. Fire Door parts are listed as below:

1. Door Leaf
2. Door Frame
3. Horizontal Push Bar
4. Vertical Push Bar
5. Automatic Flush Bolt
6. Manual Flush Bolt
7. Door Closer
8. Door Coordinator
9. Mortise Lock
10. Hinges
11. Anti-Smoke Seal
12. Glass/ Vision Panel
13. Automatic Drop Seal (Door Bottom)
14. Magnetic Door Holder

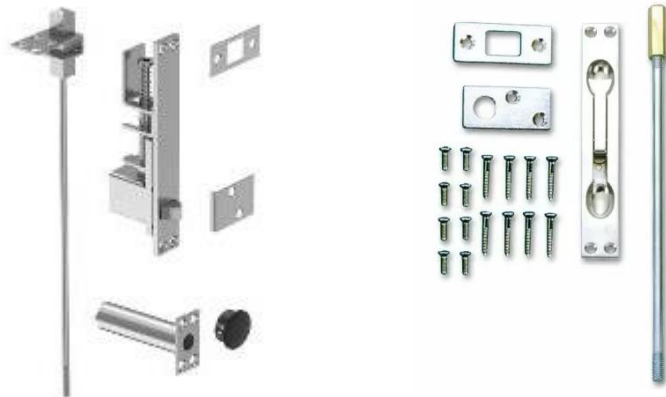


Accessories of a Listed Fire Doors

Fire Doors are made with several different parts and accessories.
All the parts are tested and certified by a third-party certification authority.



3. Horizontal Push Bar
4. Vertical Push Bar



5. Automatic Flush Bolt
6. Manual Flush Bolt



7. Door Closer



8. Door Coordinator



9. Mortise Lock



10. Hinges



11. Anti-Smoke Seal



12. Glass/ Vision Panel



13. Automatic Drop Seal (Door Bottom)



14. Magnetic Door Holder

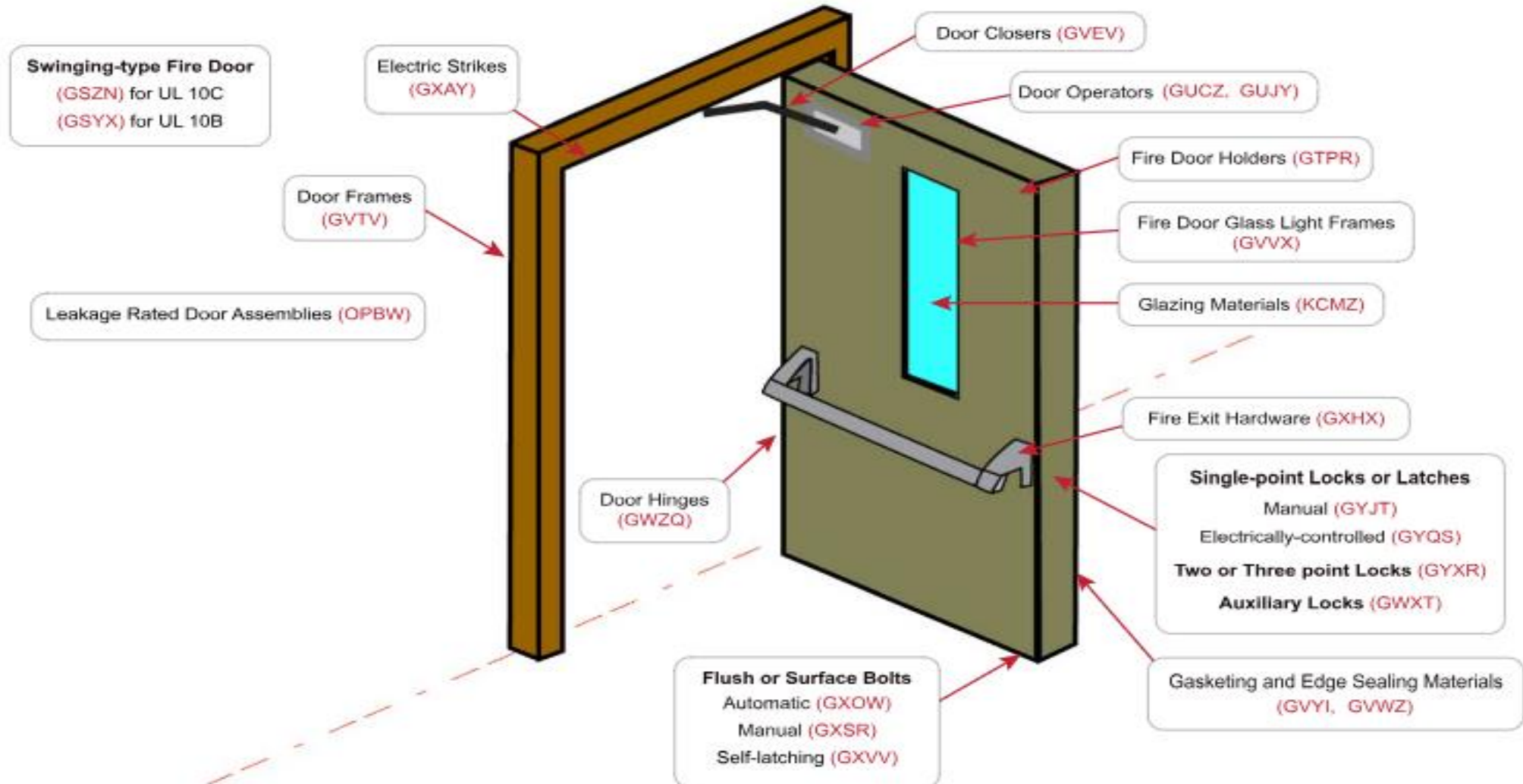
Identification of Fire Door Accessories

(Single Door)



Swinging-type Fire Door Illustration

Links to access product categories in the UL Product IQ™ database require registration.

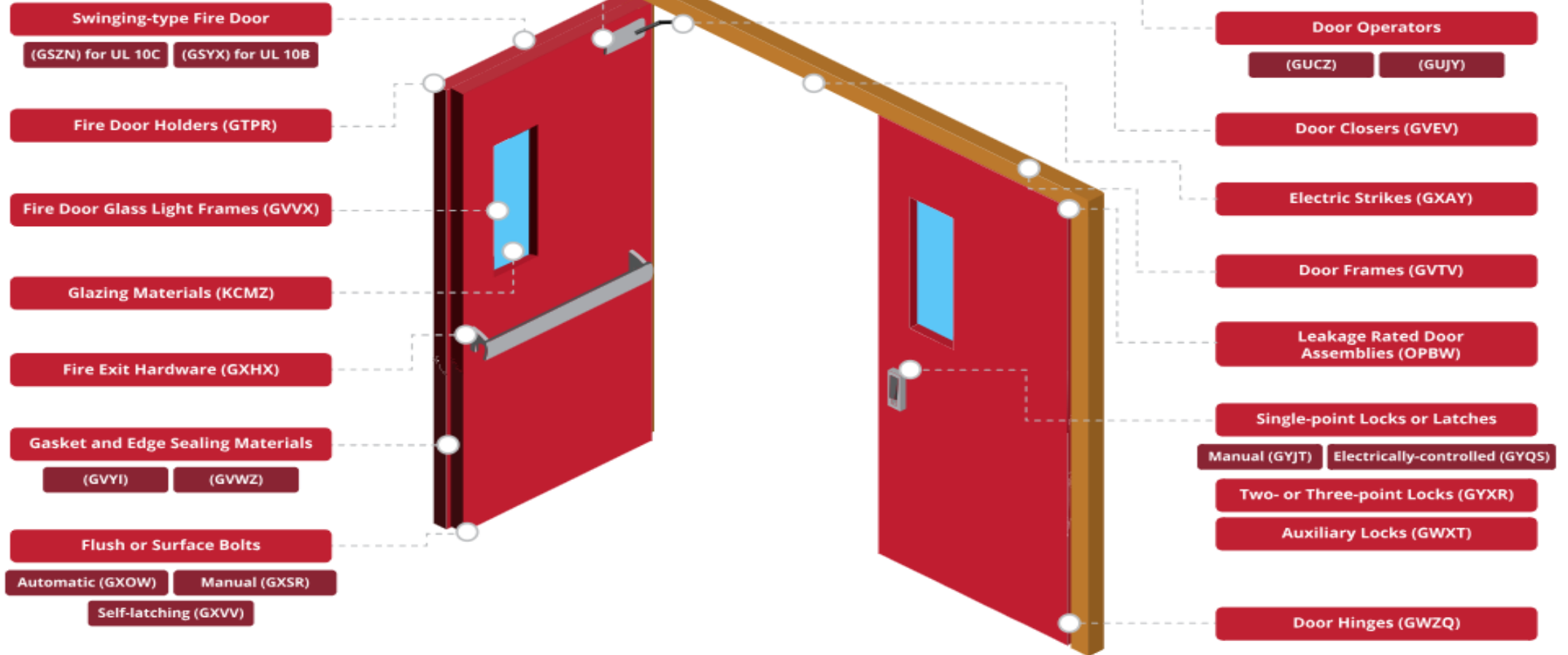


Identification of Fire Door Accessories

(Double Door)

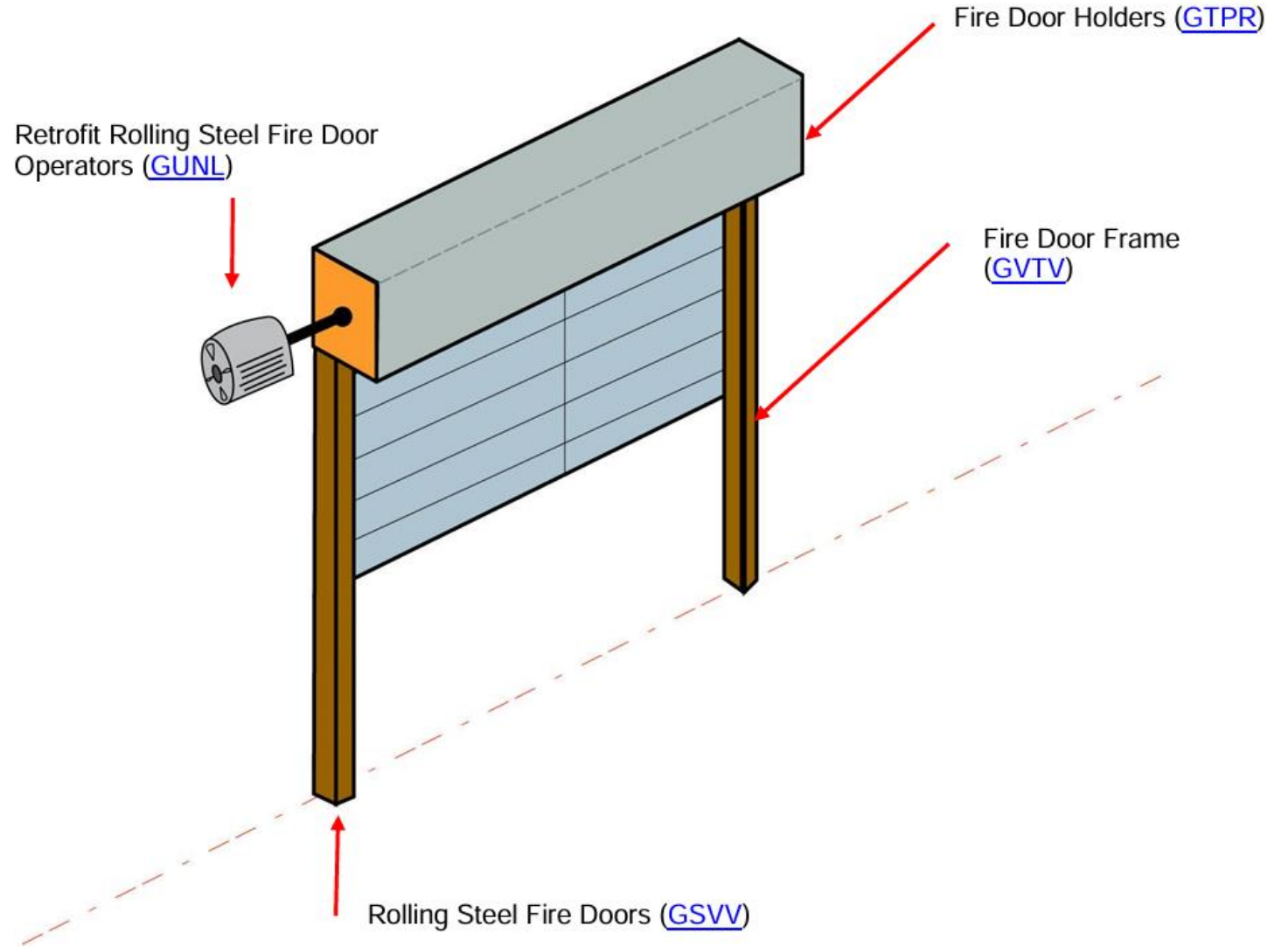
DOUBLE FIRE DOOR ILLUSTRATION

[Click to learn more](#)



Identification of Fire Door Accessories

(Rolling Steel Fire Door or Fire Curtain)



Lift Fire Door



Seal Doors



Fire Rated Doors

Other Options Lift Fire and Smoke Protection

Elevator's Fire and Smoke Curtain



How to Verify Listed Fire Doors Accessories

Parts Certification

Normally certification numbers are inscribed in the parts itself of a Fire Door. Some pictorial demonstration are presented as below:



1. Door Leaf

UL Product iQ[®]



Swinging-type Fire Doors

See General Information for Swinging-type Fire Doors

PCJ INDUSTRIES CO LTD

199/24-25 Vibhavadeerangsit Rd
Samsennai
Payathai, Bangkok 10400 THAILAND
Swinging doors may be provided as follows:



Max Rating	Opening Type	Hollow Metal Type Steel Stiffened	Steel Covered Composite Type Door
3 Hr	Single/Single Point Lock or Fire Exit Hardware	X	—
3 Hr	Single/Mortise Single Point Lock or Mortise/Rim Fire Exit Hardware	X	—
3 Hr	Pair With Astragal/Mortise Single Point Lock/Flush Bolts	X	—
3 Hr	Pair With Astragal/Mortise/Vertical Rod or Flush Bolts Fire Exit Hardware	X	—
3 Hr	Pair With Astragal/ Vertical Rod/Vertical Rod Fire Exit Hardware	X	—
3 HR	Single or Pair With Astragal/Single Point Lock or Rim Fire Exit Hardware With Max 100 sq in. of Glazing Material	X	—

Trademark and/or Tradename:  

Parts Certification

	SWINGING TYPE FIRE DOOR NO. <input type="text"/>	10-3-3S0037	MINIMUM LATCH THROW <input type="text"/> INCH
	FIRE RATING <input type="text"/> HR.		
	TEMP. RISE 30 MIN. <input type="text"/> F. MAXIMUM		

	SWINGING TYPE FIRE DOOR NO. <input type="text"/>	0010-03-01-S0011
	FIRE RATING <input type="text"/> HR.	
	TEMP. RISE 30 MIN. <input type="text"/> F. MAXIMUM	

Parts Certification

Normally certification numbers are inscribed in the parts itself of a Fire Door. Some pictorial demonstration are presented as below:



2. Door Frame

UL Product iQ®



Fire Door and Fire Window Frames

[See General information for Fire Door and Fire Window Frames](#)

MULTILINE INDUSTRIES LIMITED

DANGA INDUSTRIAL PARK (DIP), KAZIRCHOR

DANGA, POLASH

NARSHINGDI, BANGLADESH

Door Frames for use as a component in fire door assemblies that meet the requirements of ANSI/UL 10C (positive pressure):

Three-sided steel frame with or without transoms (pairs). These frames are also suitable for use in smoke door applications when used with Classified Swinging-type Fire Doors, Positive-pressure Tested (GSZN) bearing the "S" mark on the Classification Mark and Category H Smoke and Draft Control Gasketing. See Gasketing Materials for Fire Doors, Positive-pressure Tested (GVYI) for Listings of Category H Smoke and Draft Control Gaskets.

Door Frames for use as a component in fire door assemblies that meet the requirements of ANSI/UL 10B (neutral pressure):

Three-sided frames with or without transom bars (pairs).



Parts Certification



3. Push Bar

UL Product iQ®



Fire-exit Hardware

COMPANY

LAWRENCE HARDWARE INC
676 Petrolia Rd
North York On M3j 2v2
Canada
NORTH YORK, ON M3J 2V2 Canada

Trademark and/or Tradename: **LAWRENCE®
HARDWARE INC.**

Note: For additional marking information, refer to the [Guide Information Page](#).

View model for additional information:

Model(s): LH5510F ND, LH5530F ND, LH5530F ND LBR, LH8510F ND, LH8530F ND, LH8530F ND LBR, LH8550F ND, LH8550F ND LBR, LH8610F ND, LH8620F ND, LH8630F ND, LH8630F ND LBR, LH8650F ND, LH8650F ND LBR, LH8660F ND, LH8710F ND, LH8730F ND, LH8730F ND LBR, LH8750F ND, LH8750F ND LBR, LH8810F ND, LH8820F ND, LH8830F ND, LH8830F ND LBR, LH8850F ND, LH8850F ND LBR, LH8860F ND





4. Door Closer

UL Product iQ®



Note: We are enhancing our systems and you may notice duplicate entries/missing/outdated data. During this interim period, please contact our Customer Service at <https://www.ul.com/about/locations>.

Door Closers

COMPANY

SUZHOU FUERDA INDUSTRY CO LTD
No 1 OUJIANG ROAD, SHUANGFENG
TAICANG
SUZHOU, Jiangsu 215416 China



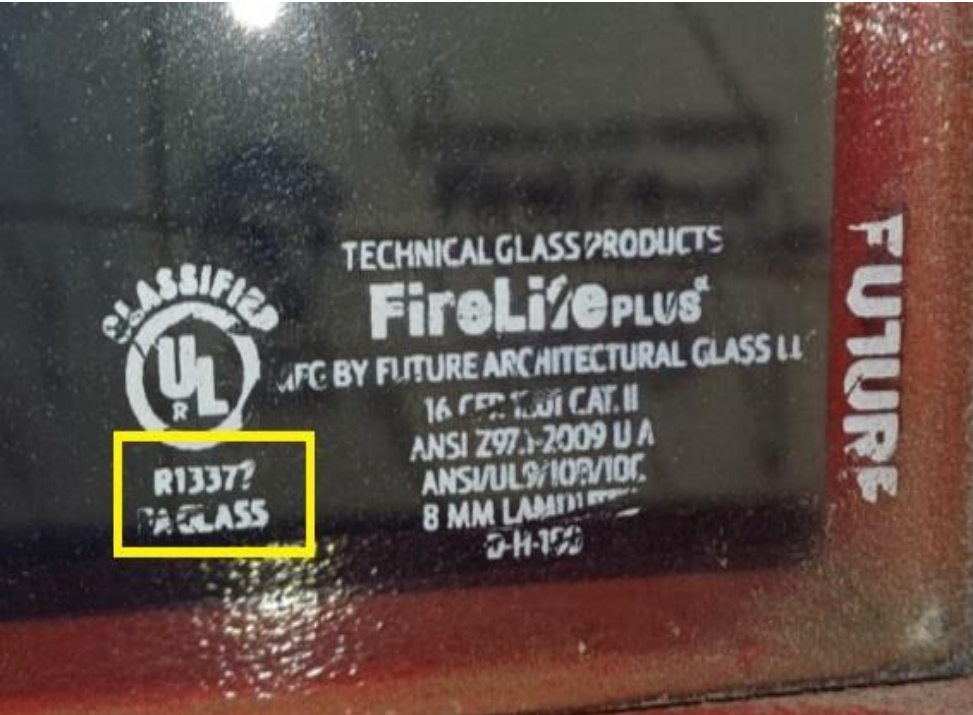
Trademark and/or Tradename: "FRD"

Note: For additional marking information, refer to the [Guide Information Page](#).

PT 1 grade 1 surface mounted door closers, Model(s): F1714(size 1-4), F1725BC(size 1-5), F1916 (size 1-6), F1916(size 1-6), F1916DA(size 1-6), F8300 (size 1-6), F8300(size 1-6), F8300DA(size 1-6), F8400(size 1-6), F8400DA(size 1-6), F8916BC (size 1-6), F8916BC(size 1-6)

PT 3 Grade 3 concealed in door closers, with backcheck, Model(s): C6000(size 2-4)

PT 5 Grade 1 overhead concealed closers, without backcheck, Model(s): C2013(size 1-3), C2014(size 2-4), C2035(size 3-5)



6. Vision Panel

UL Product iQ®



Fire-protection-rated Glazing Materials

COMPANY

TECHNICAL GLASS PRODUCTS
8107 BRACKEN PL SE
SNOQUALMIE, WA 98065-9258 United States



Vision Control Panels and Viulite Panels are insulating glass units which incorporate fire-resistance-rated glazing material on one side, non-rated glazing on the other side, and an operable louver or blind inside the unit.

Fire-protection-rated glazing materials

Product designation: Vision Control Panel or Viulite Panels

Thickness: Nominal 1-3/4 in. minimum

Glazing compound: "Norton" style closed cell PVC tape or Pemko FG-3000

Furnace pressure: Positive

How to Check Listed Fire Door

How to verify of Listed Products Online:

<https://iq.ulprospector.com>

Step 1. Register : <https://www.ul.com/software/product-sourcing-and-certifications-database>

Step 2. Login <https://iq.ulprospector.com/en>

Step 3. Enter Label Sr No.

The screenshot shows the UL Product iQ website. The browser address bar displays 'iq.ulprospector.com/en/'. The website header includes 'UL Product iQ®' on the left and navigation links 'SEARCH', 'MY SEARCHES', 'MY TAGS', 'MUHAMMAD', and 'UL Solutions' on the right. A central search bar prompts the user to 'Create a Search Now' and 'Enter a file number, CCN, model or other keyword'. Below the search bar, a message reads 'Find what you need faster with iQ Plus Search Tools!'. A sidebar on the left offers a 'Product iQ Tour'. A main content area titled 'IQ PLUS SEARCH TOOLS' lists 'Authorized Service Providers' and 'Building Materials, Systems and Installation Codes'. A 'Feedback' button is visible in the bottom right corner.

How to verify of Listed Products Online:

UL Product iQ SEARCH MY SEARCHES MY TAGS MUHAMMAD Solutions

REFINE RESULTS
Build or filter your results by keyword and/or adding criteria like document type, file number and country name.

Keyword R13377 Search

UL Category Control Number
Click to view and filter values

Company Name
Click to view and filter values

File Number
Click to view and filter values

Location
Click to view and filter values

Add Filter

Cancel Reset Save Search

Dashboard / Search

2 Results :: Keyword: R13377

Action Display: General

Document Name	Company Name	Notes	UL CCN Description
KCMZ.R13377	TECHNICAL GLASS PRODUCTS		Fire-protection-rated Glazing Materials
KCMZ7.R13377	TECHNICAL GLASS PRODUCTS		Fire-protection-rated Glazing Materials Certified for Canada

1 of 1

UL Product iQ R13377 Associated UL Category [KCMZ](#)

RESOURCES
[UL Confirmation Letter](#)
[Guide Info \(KCMZ\)](#)

TAGS
Add Tag

TECHNICAL GLASS PRODUCTS
8107 BRACKEN PL SE
SNOQUALMIE, WA 98065-9258 United States

Vision Control Panels and Viulite Panels are insulating glass units which incorporate fire-resistance-rated glazing material on one side, non-rated glazing on the other side, and an operable louver or blind inside the unit.

Fire-protection-rated glazing materials

Product designation: Vision Control Panel or Viulite Panels

Thickness: Nominal 1-3/4 in. minimum

Glazing compound: "Norton" style closed cell PVC tape or Pemko FG-3000

Furnace pressure: Positive

Rating	Application	Max Exposed Area of Glazing (sq in.)	Max Width of Exposed Glazing (in.)	Max Height of Exposed Glazing (in.)	Min Depth of Groove (in.)	Groove Width (in.)	Building Code Marking
3/4 h	Doors TGP Designer Series, Heat Barrier	3724	41-5/8	89-3/4	1-1/8	Panel thickness plus 1/8 in	D-H-45
3/4 h	Windows, Transoms or Sidelights	4500	95-1/4	95-1/4	1-1/8	Panel thickness plus 1/8 in	OH-45

Fire-protection-rated glazing materials

Product designation: Vision Control Panel or Viulite Panels

Thickness: Nominal 1-7/8 in. minimum

Glazing compound: "Norton" style closed cell PVC tape or Pemko FG-3000

Furnace pressure: Positive

Vision Panel
CLASSIFIED
UL
R
TECHNICAL GLASS PRODUCTS
FireLife PLUS
MFG BY FLITURE ARCHITECTURAL GLASS LLC
16 CFR 1020 CAT. II
ANSI Z97.1-2009 U A
8 MM LAMINATED
D-H-45
FUTURE

Data Required by Pakistan ACCORD

How to Fill PK ACCORD Data Sheet

Inspection Checklist of Fire Rated Door

Factory Name :	XYZ	Factory ID:	25xxx
Factory Address :	ABC		
Building Fire Door Located:	1 st Floor	Location (Building No Including Floor Le	Building A 1 st Floor



Sl. No.	Door Assemblies	Label Serial Number / Product Unique Number	MFR's Name on the Label (If appears)	Listing File Number/ Certification Number	Fire Rating (hr.)	Manufacturer Name (MFR)	Location of the Label(s) on the Door	Certification Body	Picture
1	Door Leaf								
2	Door Frame								
3	Hinges								
4	Door Closers								
5	Lock and Latch								
6	Panic Bar/Exit Hardware								
7	Vision Panel (IF Available)	R13377	Technical Glass Products	R1337	¾ h (45 minutes)	Technical Glass Products	1 st Floor, Stitching Room 02, / Door No 4	UL Certified	
8	Hold Open Devices (If available, Only required if the doors are required to be kept open for functional / operational reason)								
9	Door Co-ordinator (Required incase of double leaf door)								
10	Smoke Seals (If required as additional accessory)								
11	Others								

UL Product iQ®

Fire-protection-rated Glazing Materials

COMPANY
TECHNICAL GLASS PRODUCTS
8007 BRACON PLACE
SNOQUAM E, WA 98065-5259 United States

Name: Control Panels and Vision Panels are during glass units which incorporate fire-rated glazing material on one side, non-rated glazing on the other side, and are suitable for use on fire-rated doors.

Fire-protection-rated glazing materials

Product designation: Vision Control Panels and Vision Panels

Thickness: Nominal 3/4" minimum

Glazing compound: "Mortar" style closed cell PVC foam or Pemko FG-3000

Pressure pressure: Positive

Question and Answer



THANK YOU