Notes:

Designers of valve locations, ladders, stairways, walkways, hatches, guardrails, and control rooms in other types of facilities may find the contents of this document helpful. However, it is important to keep in mind that this document was developed for designing water and wastewater facilities for the San Francisco Public Utilities Commission. Some of the requirements are internal agency requirements that go above and beyond Cal/OSHA requirements.

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San Francisco Water Power Sewer

Services of the San Francisco Public Utilities Commission

CITY AND COUNTY OF SAN FRANCISCO

SAN FRANCISCO PUBLIC UTILITIES COMMISSION

HEALTH AND SAFETY PROGRAM

SAFE DESIGN GUIDELINES

MARCH 2012

VERSION 2.0

SAFE DESIGN GUIDELINES INDEX

CAL/OSHA REGULATION	
OTHER REGULATION	
SFPUC GUIDELINE	

CITY AND COUNTY OF SAN FRANCISCO
PUBLIC UTILITIES COMMISSION
HEALTH AND SAFETY PROGRAM

SAFE DESIGN GUIDELINES

INDEX

FIGURE
SDG-00

MARCH 2012

ABBREVIATIONS

ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE
ASHRAE	AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS
CAL/OSHA	CALIFORNIA DEPARTMENT OF INDUSTRIAL RELATIONS, DIVISION OF OCCUPATIONAL SAFETY AND HEALTH
CBC	CALIFORNIA BUILDING CODE
CSO	CAL/OSHA CONSTRUCTION SAFETY ORDERS, TITLE 8, CALIFORNIA CODE OF REGULATIONS
GISO	CAL/OSHA GENERAL INDUSTRY SAFETY ORDERS, TITLE 8, CALIFORNIA CODE OF REGULATIONS
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
PUC H&S	SFPUC HEALTH AND SAFETY PROGRAM
DSOD	CALIFORNIA DEPARTMENT OF WATER RESOURCES, DIVISION OF SAFETY OF DAMS

GENERAL NOTES

1. IN SOME CASES THE CBC REQUIREMENTS AND THE CAL/OSHA REGULATIONS DIFFER. PUC H&S HAS ATTEMPTED TO EVALUATE THE REQUIREMENTS AND PROVIDE A PRUDENT RECOMMENDATION FOR INDUSTRIAL WORKPLACES. IN PUBLIC BUILDINGS, THE CBC REQUIREMENTS PREVAIL.

2. THE SAFE DESIGN GUIDELINES ASSUME THAT MOST VALVE VAULTS ARE NOT DEFINED AS "BUILDINGS" UNDER THE CBC.

3. QUESTIONS, COMMENTS, AND CORRECTIONS TO THESE SAFE DESIGN GUIDELINES SHOULD BE SUBMITTED TO THE SFPUC HEALTH AND SAFETY PROGRAM, CONTACT CAROLYN JONES AT (415) 550-3577, OR CJONES@SFWATER.ORG, OR (415) 550-3585.

4. THE INTENT OF THESE SAFE DESIGN GUIDELINES IS TO PROVIDE MINIMUM RECOMMENDATIONS, DESIGNERS ARE ULTIMATELY RESPONSIBLE FOR THEIR DESIGN EFFORTS, AND THIS RESPONSIBILITY IN NO WAY IS DILUTED OR ABSOLVED BY THESE GUIDELINES.

CAL/OSHA REGULATION	
OTHER REGULATION	
SFPUC GUIDELINE	

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HEALTH AND SAFETY PROGRAM

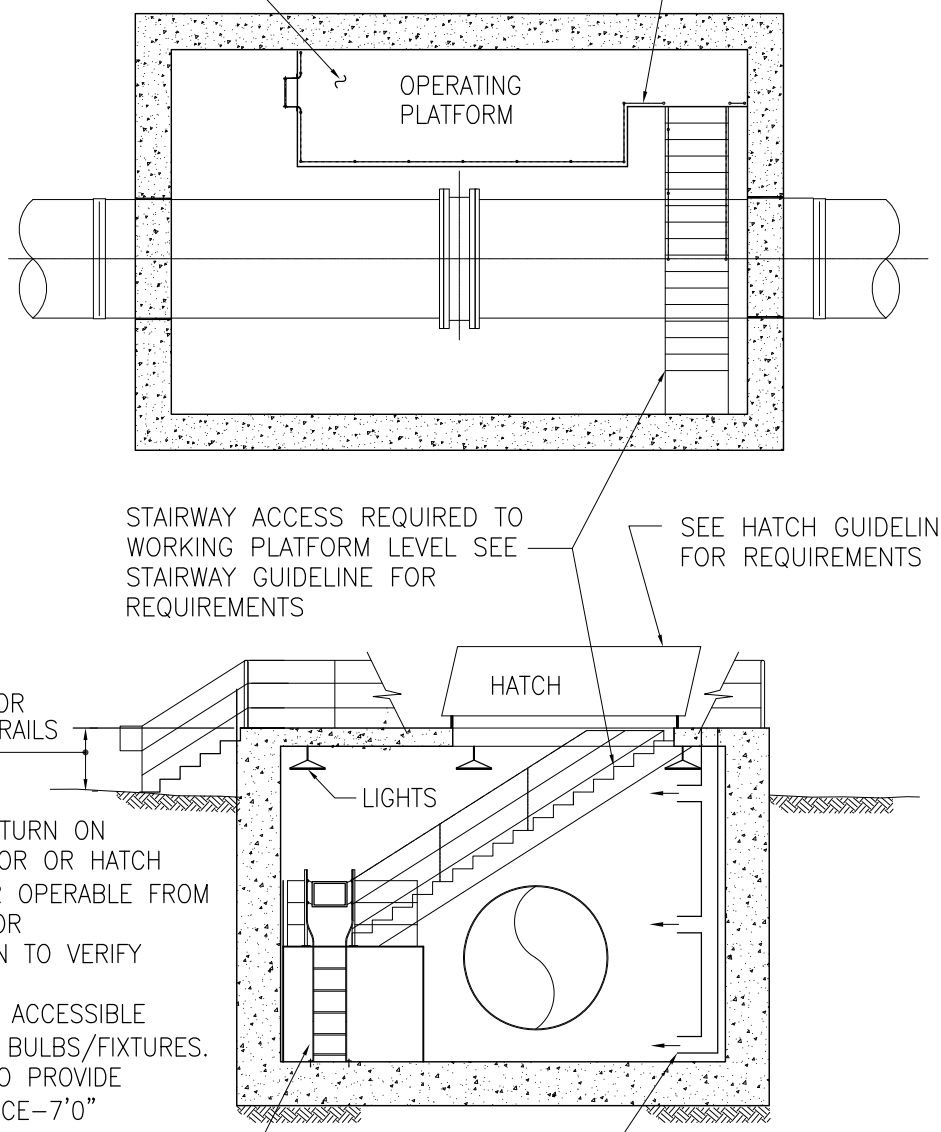
SAFE DESIGN GUIDELINES

ABBREVIATIONS AND GENERAL NOTES

FIGURE

SDG-000

MARCH 2012



NOTES:

1. LIGHTS AND VENTILATION TURN ON AUTOMATICALLY WHEN DOOR OR HATCH OPENED (PREFERRED) OR OPERABLE FROM EXTERIOR SWITCH BY DOOR
2. INCLUDE INSTRUMENTATION TO VERIFY VENTILATION IS WORKING
3. LOCATE LIGHTS IN EASILY ACCESSIBLE LOCATION FOR CHANGING BULBS/FIXTURES.
4. HATCH MUST BE SIZED TO PROVIDE ADEQUATE HEAD CLEARANCE–7'0" RECOMMENDED, 6'6" MINIMUM.
5. PIPELINE RISERS AND OTHER INFREQUENTLY ACCESSED, SMALL CONFINED SPACES MAY HAVE LADDER ACCESS ONLY.
6. BRING VALVE ACTUATOR ABOVE VAULT TO ELIMINATE NEED FOR ENTRY, IF VAULT CANNOT BE MADE A NON–PERMIT CONFINED SPACE.

OTHER RELATED GUIDELINES:

SDG–9	GUARDRAILS
SDG–10	LADDERS
SDG–11	HATCHES
SDG–16	PLATFORMS
SDG–18	STAIRWAYS

CAL/OSHA REGULATION	GISO SECTION 3234
OTHER REGULATION	
SFPUC GUIDELINE	RECOMMENDED PRACTICE

CITY AND COUNTY OF SAN FRANCISCO

PUBLIC UTILITIES COMMISSION

HEALTH AND SAFETY PROGRAM

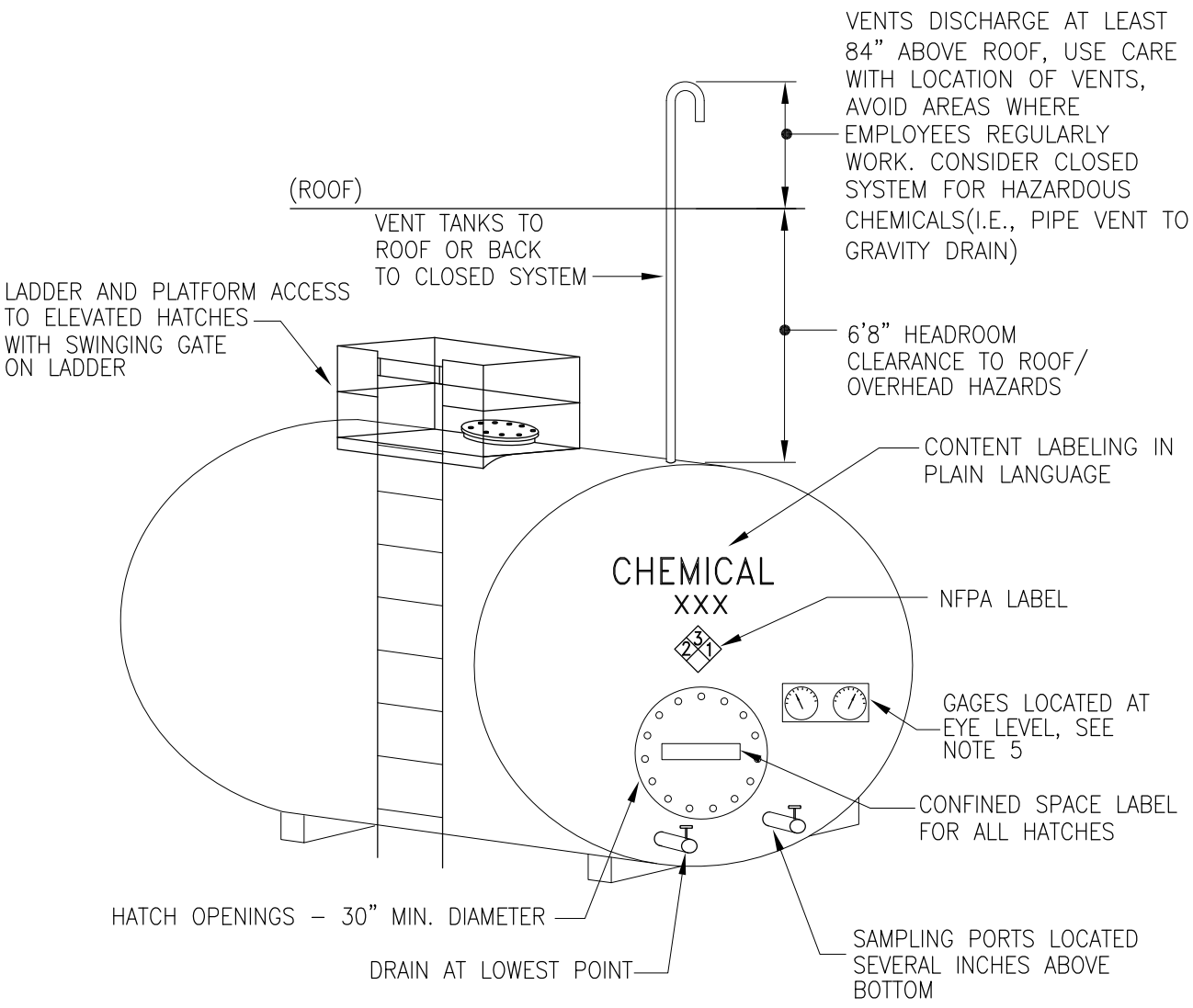
SAFE DESIGN GUIDELINES

VALVE VAULTS (WATER SYSTEM ONLY)

FIGURE

SDG-1

MARCH 2012



NOTES:

1. SIDE ACCESS REQUIRED IN ADDITION TO TOP ACCESS.
2. TANKS MUST BE PROPERLY SECURED.
3. CONTAINMENT REQUIRED FOR ALL TANKS – CONTAINMENT VOLUME > 110% OF THE LARGEST TANK CAPACITY. CONTAINMENT(S) MUST KEEP INCOMPATIBLE MATERIALS SEPARATE. CONSIDER ADDITIONAL CONTAINMENT CAPACITY FOR RAINFALL, FIRE SPRINKLER FLOW AND/OR TANKS MANIFOLDED TOGETHER.
4. HAVE SPILL KIT & PPE CABINETS NEARBY.
5. WWE STANDARD FOR CHEMICAL TANK LEVEL MONITOR IS PRESSURE–INDICATING TRANSMITTER (PIT), WITH BACK UP BASIC OR REVERSE LEVEL SIGHT GAGE.
6. INSTALL FLUSH OUT VALVE BETWEEN TANKS AND PUMPS TO PERMIT FLUSHING OF LINES FOR MAINTENANCE.

OTHER RELATED GUIDELINES:

SDG–3	EYEWASH/SHOWER
SDG–9	GUARDRAILS
SDG–10	LADDERS
SDG–11	HATCHES
SDG–14	SIGNAGE

CAL/OSHA REGULATION	GISO SECTION 5194
OTHER REGULATION	
SFPUC GUIDELINE	RECOMMENDED PRACTICE

CITY AND COUNTY OF SAN FRANCISCO

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HEALTH AND SAFETY PROGRAM

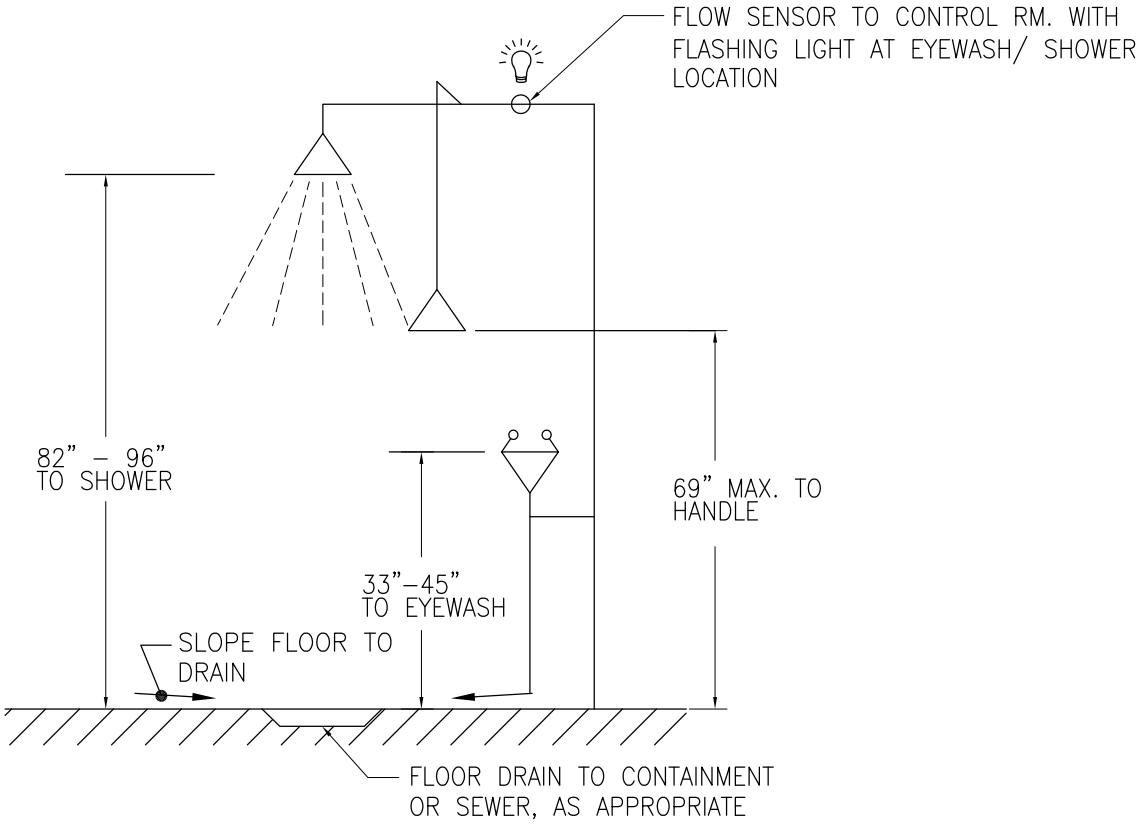
SAFE DESIGN GUIDELINES

CHEMICAL TANKS

FIGURE

SDG-2

MARCH 2012



REQUIREMENTS

1 – COMBINATION EMERGENCY EYEWASH/SHOWER IS REQUIRED.

2 – LOCATION MUST BE ON SAME LEVEL AS HAZARD; PATH OF TRAVEL MUST BE FREE OF OBSTRUCTIONS (INCLUDING CONTAINMENT WALLS); AND LOCATION MUST REQUIRE NO MORE THAN 10 SECONDS TO REACH. (ONE PER STORAGE ROOM MINIMUM)

3 – FOR STRONG ACID OR CAUSTIC, EYEWASH MUST BE IMMEDIATELY ADJACENT TO HAZARD.

4 – NO ELECTRICAL APPARATUS IS ALLOWED WITHIN 18" RADIUS OF EYEWASH/SHOWER.

5 – DELIVERED WATER TEMPERATURE SHALL BE TEPID (80°F, RANGE 60 –100°F).

6 – MUST HAVE SUFFICIENT POTABLE WATER FOR COMBINED USAGE; AT INLET SUPPLY PRESSURE SHALL BE NOT LESS THAN 30 psi.
SHOWER HEAD – 20 GALLONS PER MINUTE FOR 15 MINUTES
EYEWASH – 0.4 GALLONS PER MINUTE FOR 15 MINUTES

7 – "HANDS–FREE" PADDLE REQUIRED FOR EYEWASH. FLOW MUST REMAIN ON WITHOUT REQUIRING CONTINUED USE OF OPERATOR'S HANDS.

8 – HIGH VISIBILITY SIGNS REQUIRED TO IDENTIFY EACH EMERGENCY EYEWASH/SHOWER LOCATION.

USEFUL WEBSITE: WWW.HAWSCO.COM

CAL/OSHA REGULATION	GISO SECTION 5162
OTHER REGULATION	
SFPUC GUIDELINE	ANSI Z358.1–2004 OR MOST RECENT

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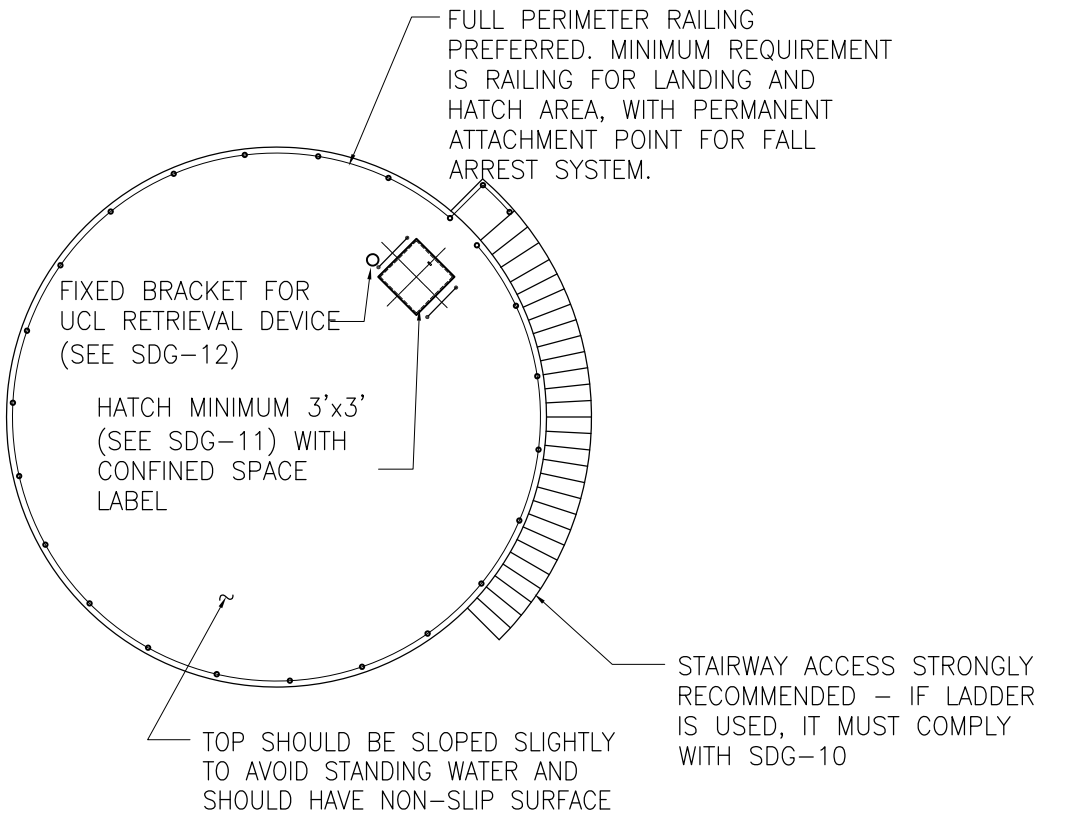
SAFE DESIGN GUIDELINES

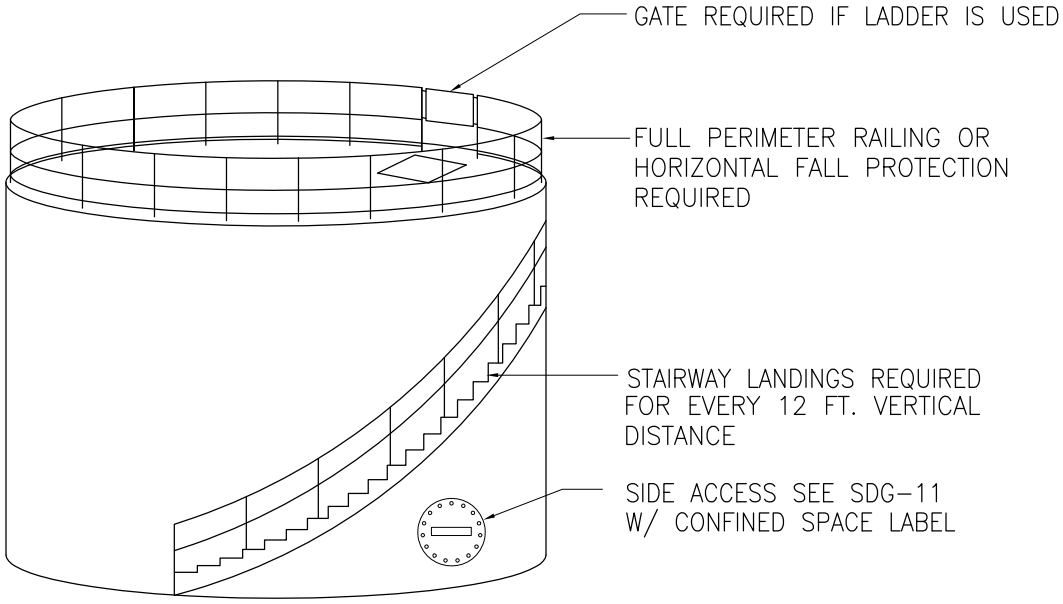
EMERGENCY EYEWASH AND SHOWERS

FIGURE

SDG-3

MARCH 2012





OTHER RELATED GUIDELINES

SDG-9	GUARDRAILS
SDG-10	LADDERS
SDG-11	HATCHES
SDG-18	STAIRWAYS

CAL/OSHA REGULATION	GISO SECTION 3212, 3234
OTHER REGULATION	
SFPUC GUIDELINE	RECOMMENDED PRACTICE

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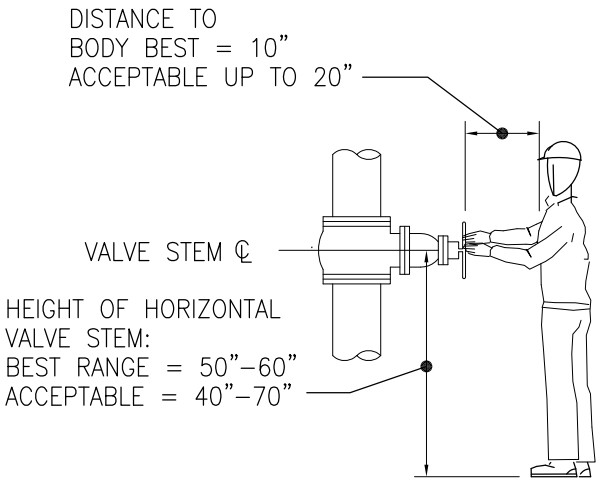
SAFE DESIGN GUIDELINES

WATER TANKS (AND SIMILARLY CONSTRUCTED TANKS)

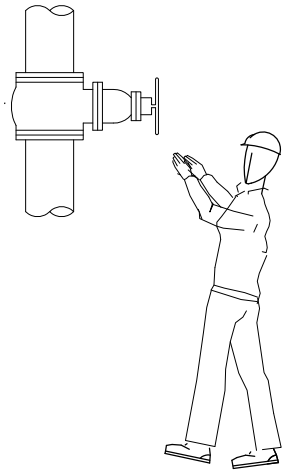
FIGURE

SDG-4

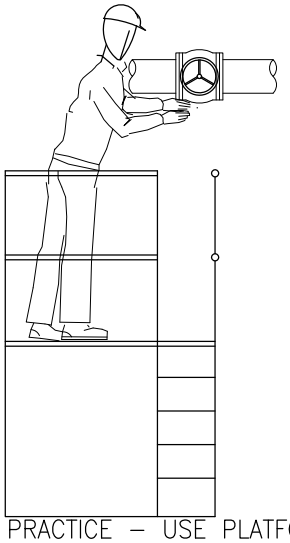
MARCH 2012



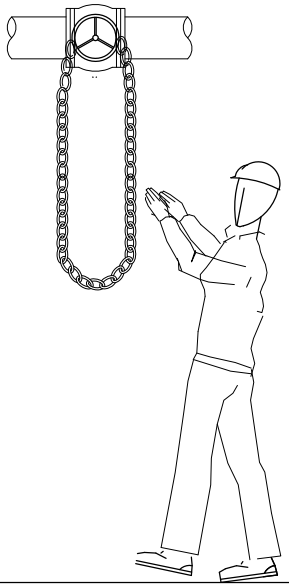
LOCATION OF VALVE FOR HORIZONTAL VALVE STEM

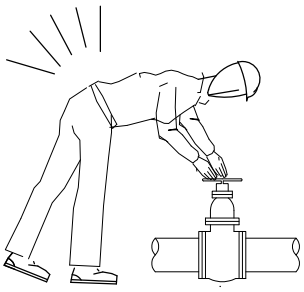


POOR PRACTICE – TOO HIGH

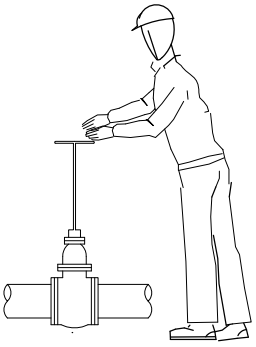


GOOD PRACTICE – USE PLATFORM (PREFERRED) OR CHAIN WHEEL





POOR PRACTICE – TOO LOW



GOOD PRACTICE – EXTEND STEM

OTHER RELATED GUIDELINES
SDG–6 VALVES – VERTICAL VALVE STEM

CAL/OSHA REGULATION	
OTHER REGULATION	
SFPUC GUIDELINE	GOOD ERGONOMIC PRACTICE

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HEALTH AND SAFETY PROGRAM

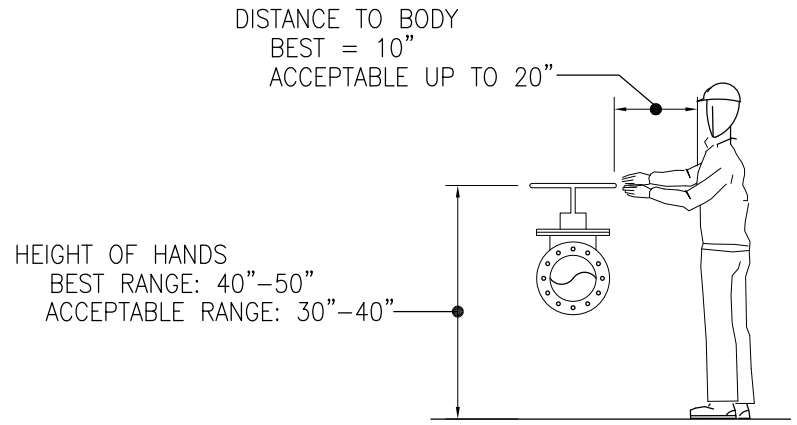
SAFE DESIGN GUIDELINES

VALVES
HORIZONTAL VALVE STEM

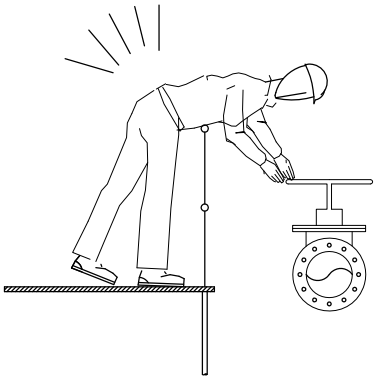
FIGURE

SDG-5

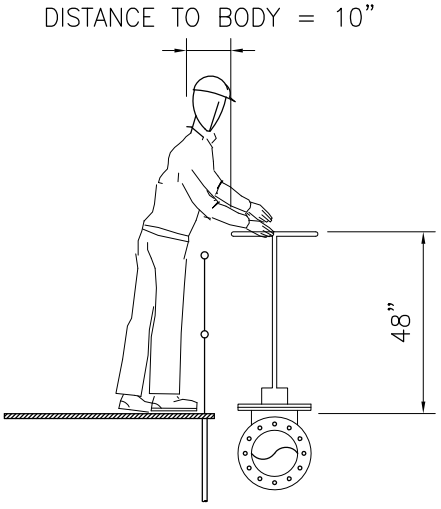
MARCH 2012



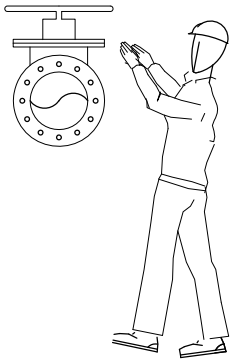
LOCATION OF VALVE FOR VERTICAL VALVE STEM



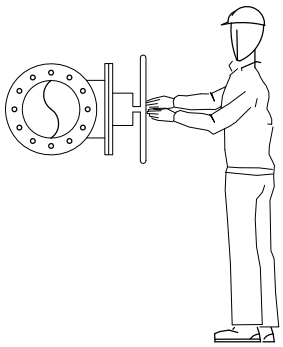
POOR PRACTICE – REACH OVER RAILING IS TOO FAR AND TOO LOW



GOOD PRACTICE – REACH OVER RAILING EXTEND STEM, BRING PLATFORM AND RAILING CLOSER TO VALVE



POOR PRACTICE – TOO HIGH



GOOD PRACTICE – ROTATE VALVE

OTHER RELATED GUIDELINES

SDG–5 VALVES HORIZONTAL VALVE STEMS

CAL/OSHA REGULATION	
OTHER REGULATION	
SFPUC GUIDELINE	GOOD ERGONOMIC PRACTICE

CITY AND COUNTY OF SAN FRANCISCO

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SAFE DESIGN GUIDELINES

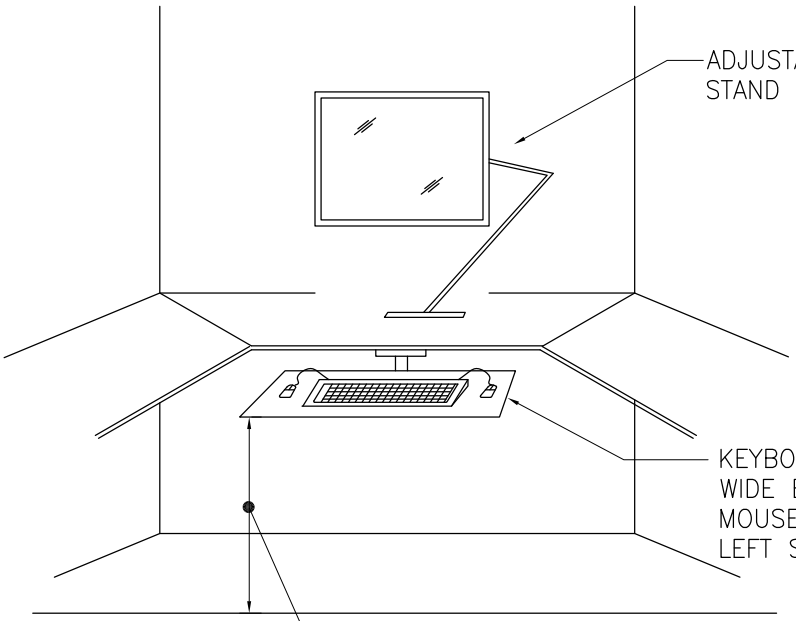
VALVES
VERTICAL VALVE STEM

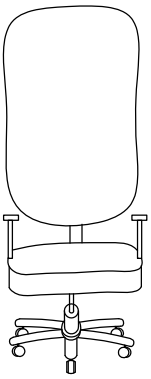
FIGURE

SDG-6

MARCH 2012

NOTE: DESIGN LIGHTING TYPE AND PLACEMENT TO REDUCE GLARE ON COMPUTER MONITORS.





CHAIRS: SPECIFY "24/7" OR MULTI–SHIFT CAPACITY ERGONOMIC CHAIRS FOR CONTROL ROOMS, SEE WWW.OFFICEMASTER.COM

NOTES: THESE REQUIREMENTS ARE FOR COMPUTER WORKSTATIONS THAT WILL BE SHARED BY MULTIPLE OPERATORS.

CAL/OSHA REGULATION	GISO SECTION 5510
OTHER REGULATION	CCSF VDT ORDINANCE
SFPUC GUIDELINE	GOOD ERGONOMIC PRACTICE

CITY AND COUNTY OF SAN FRANCISCO

PUBLIC UTILITIES COMMISSION

HEALTH AND SAFETY PROGRAM

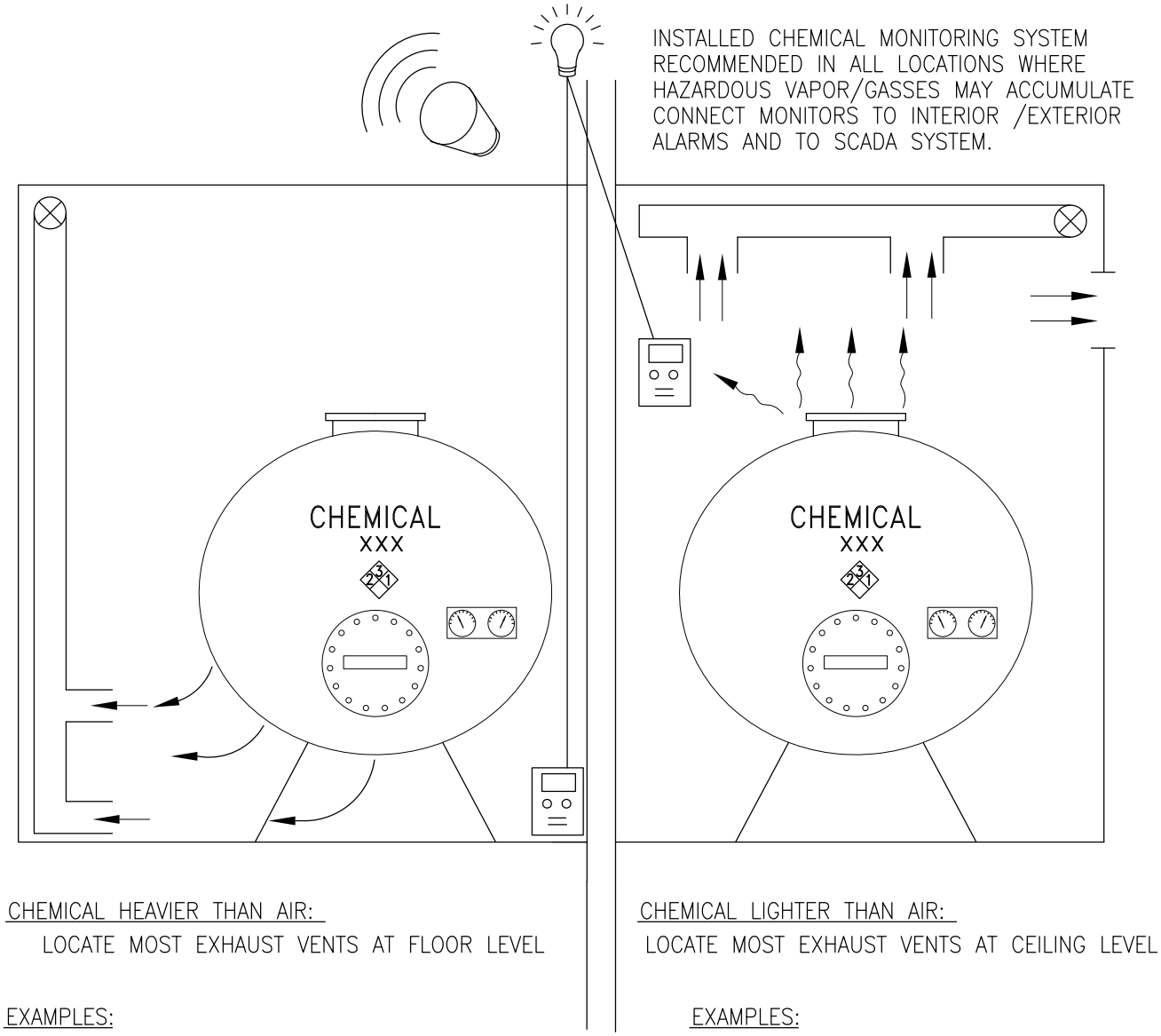
SAFE DESIGN GUIDELINES

CONTROL ROOM COMPUTER WORKSTATIONS

FIGURE

SDG-7

MARCH 2012



CHEMICAL HEAVIER THAN AIR:

LOCATE MOST EXHAUST VENTS AT FLOOR LEVEL

EXAMPLES:

SODIUM HYPOCHLORITE, FERRIC CHLORIDE, CO_2, GASOLINE, H_2S, SODIUM BISULFITE, PROPANE, BUTANE, DIGESTER GAS (MIXTURE OF METHANE AND CO_2)

CHEMICAL LIGHTER THAN AIR:

LOCATE MOST EXHAUST VENTS AT CEILING LEVEL

EXAMPLES:

METHANE, NATURAL GAS, AMMONIA

CHEMICALS WITH A DENSITY CLOSE TO AMBIENT AIR REQUIRE EVENLY DISTRIBUTED EXHAUST VENTS.
EXAMPLES: CARBON MONOXIDE, ETHANE, ETHYLENE, ACETYLENE

NOTE: ALL CHEMICALS CAN MIX WITH AMBIENT AIR CURRENTS – INCLUDE SOME EXHAUST VENTS AT ADDITIONAL LEVELS.

CAL/OSHA REGULATION	
OTHER REGULATION	
SFPUC GUIDELINE	RECOMMENDED PRACTICE

CITY AND COUNTY OF SAN FRANCISCO

PUBLIC UTILITIES COMMISSION

HEALTH AND SAFETY PROGRAM

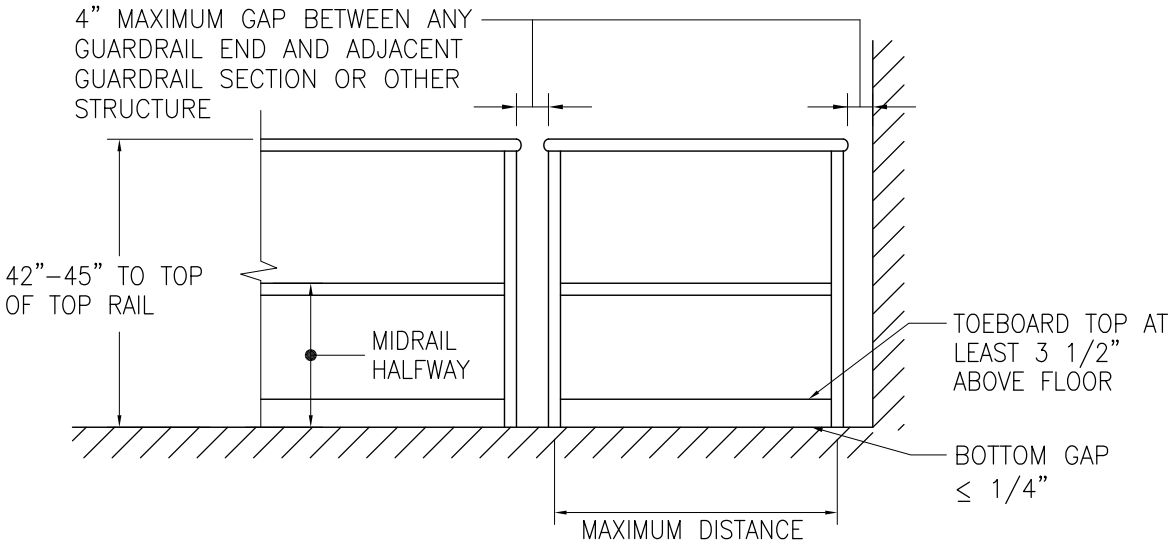
SAFE DESIGN GUIDELINES

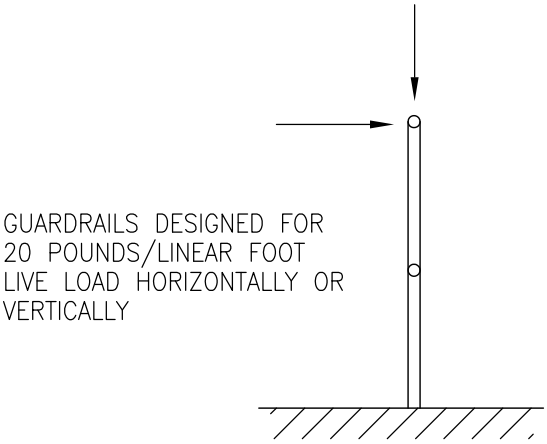
CHEMICAL STORAGE AREAS-EXHAUST VENTILATION

FIGURE

SDG-8

MARCH 2012





NOTES:

1. CAL/OSHA REGULATIONS HAVE ADDITIONAL SPECIFICATIONS –REFER TO REGULATIONS FOR DETAILS.
2. TOEBOARD REQUIRED WHERE PLATFORM IS 6 FT. OR MORE ABOVE PLACES WHERE EMPLOYEES WORK OR PASS AND THERE IS A HAZARD OF FALLING OBJECTS.
3. CBC RAILING DIMENSIONS FOR PUBLIC ACCESS AREAS ARE MORE STRINGENT. REFER TO CBC FOR DETAILS.
4. GAPS BETWEEN GUARDAIL COMPONENTS CANNOT EXCEED 4 INCHES

OTHER RELATED GUIDELINES

SDG–10	LADDERS, FIXED
SDG–13	PERIMETER FALL PROTECTION

CAL/OSHA REGULATION	GISO SECTION 3209, 3210
OTHER REGULATION	
SFPUC GUIDELINE	

CITY AND COUNTY OF SAN FRANCISCO

PUBLIC UTILITIES COMMISSION

HEALTH AND SAFETY PROGRAM

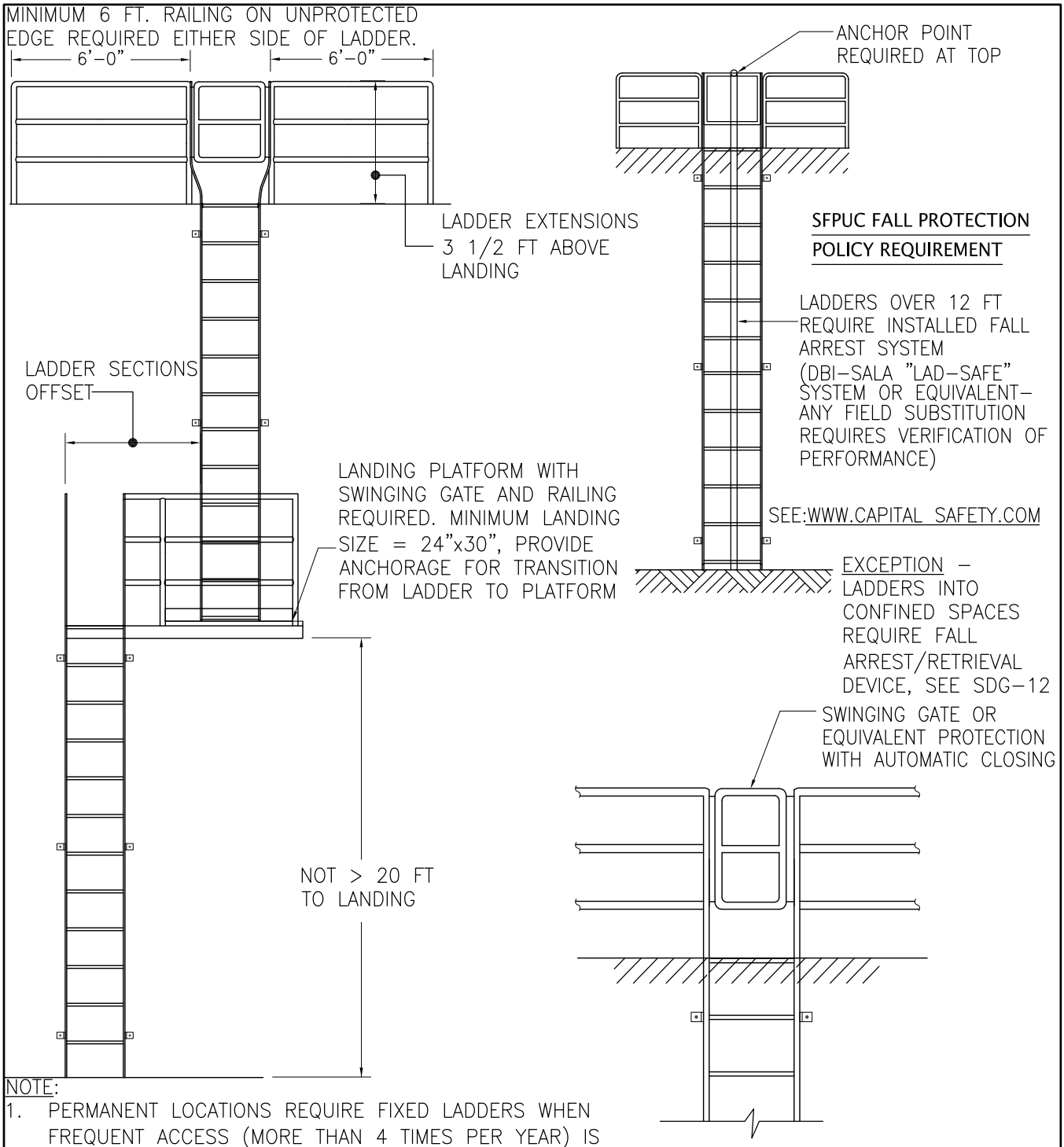
SAFE DESIGN GUIDELINES

GUARDRAILS

FIGURE

SDG-9

JULY 2012



NOTE:

1. PERMANENT LOCATIONS REQUIRE FIXED LADDERS WHEN FREQUENT ACCESS (MORE THAN 4 TIMES PER YEAR) IS NEEDED FOR REPAIR, SERVICE AND/OR OPERATIONS TASKS.
2. SEE CAL/OSHA STD. FOR ADDITIONAL DESIGN SPECIFICATIONS FOR LADDER DIMENSIONS.

SEE: WWW.INTREPIDINDUSTRIES.COM
WWW.SAFETYGATE.COM
WWW.PSDOORS.COM

OTHER RELATED GUIDELINES
SDG-9 GUARDRAILS
SDG-12 HATCHES-RETRIEVAL DEVICES
SDG-13 PERIMETER FALL PROTECTION
SDG-19 ROOF PERIMETER FALL PROTECTION

CAL/OSHA REGULATION	GISO SECTION 3276-3277, 3212, 3270
OTHER REGULATION	
SFPUC GUIDELINE	RECOMMENDED PRACTICE

CITY AND COUNTY OF SAN FRANCISCO
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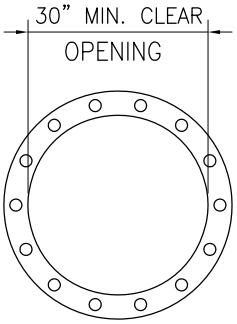
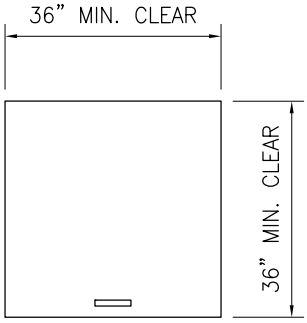
SAFE DESIGN GUIDELINES

LADDERS - FIXED

FIGURE
SDG-10
MARCH 2012



ACCESS MANHOLES
FOR TANKS OR VESSELS



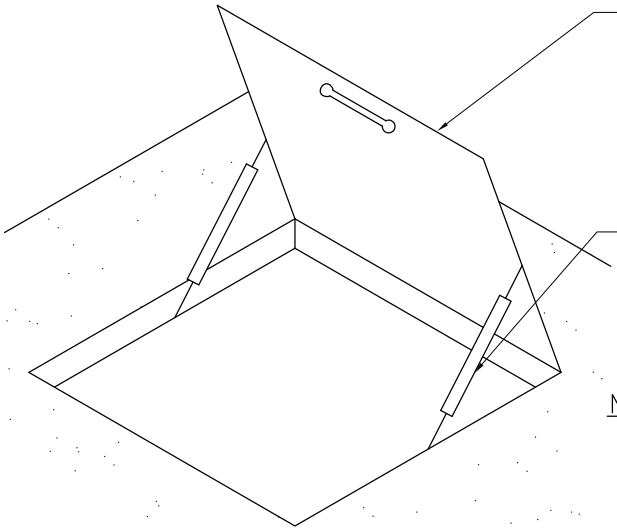
SQUARE/RECTANGULAR
ROOF OR FLOOR HATCHES

OPENING SIZE

ALL HATCHES AND FLOOR GRATINGS MUST BE LABELED: TOTAL LIVE LOAD CAPACITY IS (SPECIFY)

NOTES:

PIPELINE MANHOLES MUST BE 24" MIN. CLEAR OPENING.



NON-SLIP SURFACE ON HATCH COVERS, SUCH AS DIAMOND PLATE. COAT WITH NON-SKID EPOXY OR "SLIP-NOT" GRIP PLATE IN OUTDOOR PEDESTRIAN AREAS

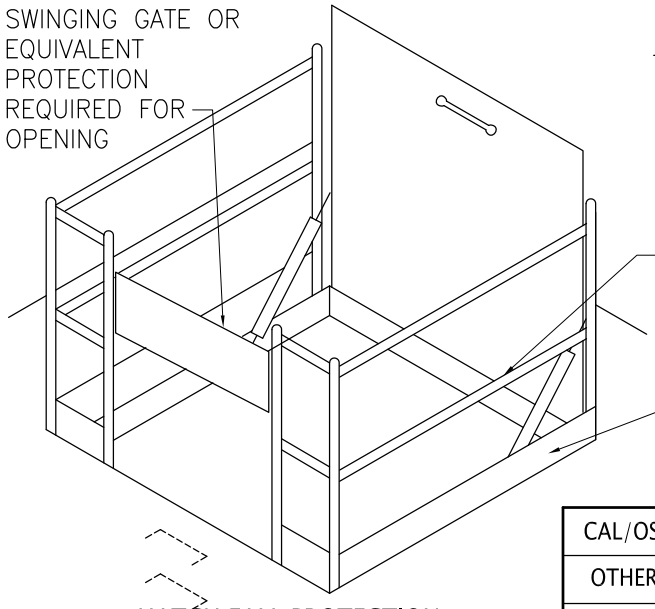
SEE WWW.SLIPNOT.COM

GAS SPRINGS OR EQUIVALENT TO COUNTER BALANCE DOOR WEIGHT-MAXIMUM 30 LBS. LIFTING FORCE TO OPEN, GRAVITY CLOSING. MUST HAVE AUTOMATIC HOLD-OPEN DEVICE.

NOTES:

PLEASE SEE "PUC STANDARD SECURITY VAULT CONSTRUCTION DETAILS" FOR ADDITIONAL SECURITY REQUIREMENTS.

HATCH COVERS



NOTES:

FOR TRAFFIC AREAS WHERE GUARDRAILS ARE NOT FEASIBLE INSTALL BILCO "LADDER UP" GRAB BAR OR EQUIVALENT FOR FIXED LADDERS SEE WWW.BILCO.COM

GUARDRAILS OR REMOVABLE RAILINGS REQUIRED FOR ALL OPEN ROOF OR FLOOR OPENINGS > 12" PER CAL/OSHA REGULATION

TOEBOARDS REQUIRED WHERE PEOPLE PASS BELOW.

HATCH FALL PROTECTION

CAL/OSHA REGULATION	GISO SECTION 3212
OTHER REGULATION	
SFPUC GUIDELINE	RECOMMENDED PRACTICE

CITY AND COUNTY OF SAN FRANCISCO

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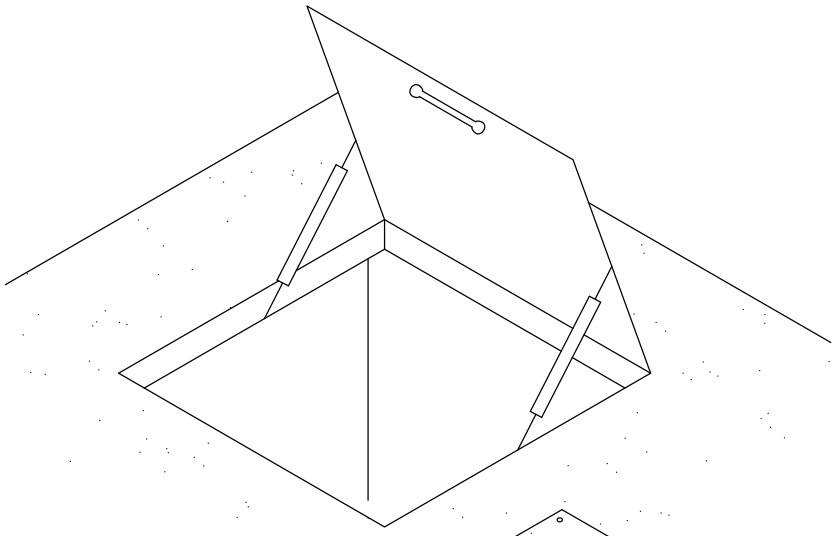
SAFE DESIGN GUIDELINES

HATCHES & OTHER OPENINGS - SIZE, LABELS COVERS, FALL PROTECTION

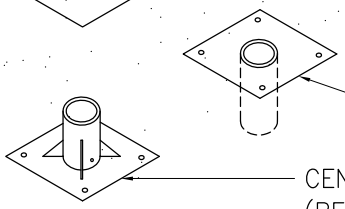
FIGURE

SDG-11

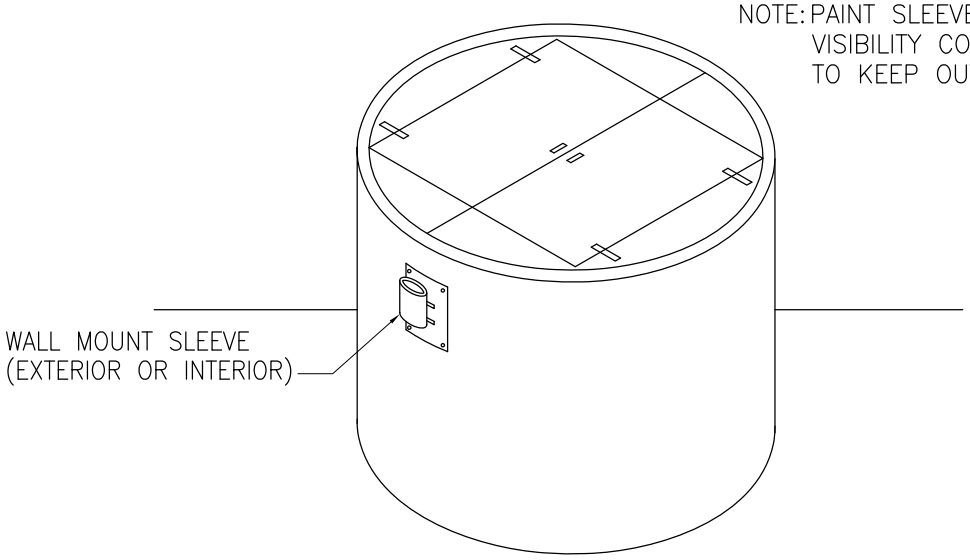
MARCH 2012



HATCH EXAMPLE (FALL PROTECTION NOT SHOWN – SEE SDG–11)



NOTE: PAINT SLEEVE WITH HIGH VISIBILITY COLOR, AND CAP TO KEEP OUT WATER OR DEBRIS



RISER EXAMPLE

RETRIEVAL DEVICES REQUIRED FOR ALL HATCHES INTO PERMIT REQUIRED CONFINED SPACES. VARIOUS MOUNTING OPTIONS EXIST FOR FOR UCL DAVIT ARM. SEE WWW.CAPITALSAFETY.COM

OTHER RELATED GUIDELINES
SDG–11 HATCHES

CAL/OSHA REGULATION	
OTHER REGULATION	
SFPUC GUIDELINE	RECOMMENDED PRACTICE

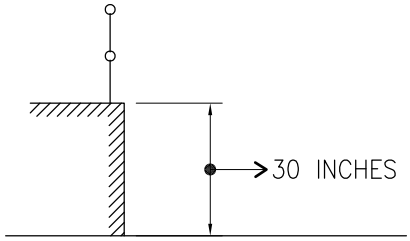
CITY AND COUNTY OF SAN FRANCISCO
PUBLIC UTILITIES COMMISSION
HEALTH AND SAFETY PROGRAM

SAFE DESIGN GUIDELINES

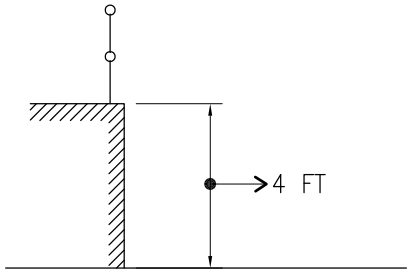
HATCHES - RETRIEVAL DEVICES

FIGURE
SDG-12
MARCH 2012

ABOVE–GRADE LOCATIONS



BUILDINGS: GUARDRAILS SHALL BE PROVIDED ON OPEN SIDES OF MORE THAN 30 INCHES ABOVE FLOOR, GROUND, OR SURROUNDING GRADE



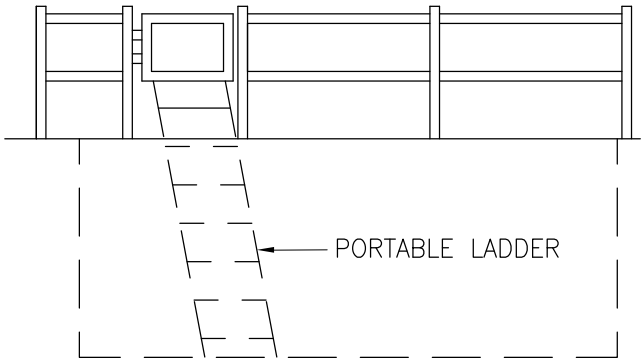
ELEVATED WORK LOCATIONS THAT ARE NOT BUILDINGS OR BUILDING STRUCTURES:
GUARDRAILS REQUIRED IF MORE THAN 4 FT FALL HAZARD

EXCEPTION – ELEVATED LOCATIONS USED INFREQUENTLY (NOT MORE THAN 4 TIMES PER YEAR) IF EMPLOYEES ARE PROTECTED BY FALL RESTRAINT/FALL ARREST SYSTEM, ATTACHED TO ACCEPTABLE ANCHOR POINTS.

OTHER RELATED GUIDELINES

SDG–9	GUARDRAILS
SDG–10	LADDERS, FIXED
SDG–12	HATCHES–RETRIEVAL DEVICES

BELOW–GRADE LOCATION
(EXAMPLE – PITS, SEDIMENTATION TANKS)(TOE BOARDS NOT SHOWN)



ALL SIDES OF BELOW–GRADE LOCATIONS REQUIRE GUARDRAIL, IF NOT GUARDED BY A COVER.

NOTES:
1. FOR LOCATIONS THAT REQUIRE EMPLOYEE ENTRY FOR MAINTENANCE, CONSIDER PROVIDING SWINGING GATE ACCESS POINT(S) FOR PORTABLE LADDER INSTALLATION.
2. PROVIDE INSTALLED SLEEVE FOR RETRIEVAL DEVICE ADJACENT TO PIT/TANK ACCESS POINT IF SPACE IS > 5FT. DEEP. (SEE SDG–12 FOR INFORMATION)

CAL/OSHA REGULATION	GISO SECTION 3210, 3212
OTHER REGULATION	
SFPUC GUIDELINE	RECOMMENDED PRACTICE

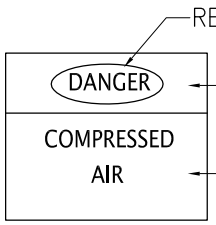
CITY AND COUNTY OF SAN FRANCISCO
PUBLIC UTILITIES COMMISSION
HEALTH AND SAFETY PROGRAM

SAFE DESIGN GUIDELINES

PERIMETER FALL PROTECTION (NON ROOF LOCATIONS)

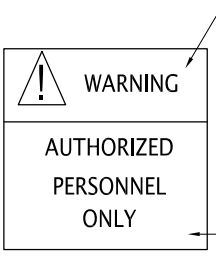
FIGURE
SDG-13
MARCH 2012

CAL/OSHA SIGNS



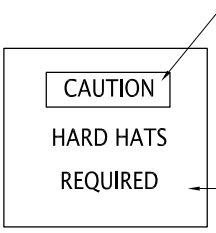
DANGER – WHERE AN IMMEDIATE HAZARD EXISTS

COLORS – RED, BLACK, WHITE ONLY



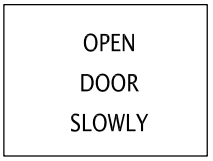
WARNING – INDICATES A POTENTIAL HAZARDOUS SITUATION THAT COULD RESULT IN DEATH OR SERIOUS INJURY

COLORS – ORANGE AND BLACK



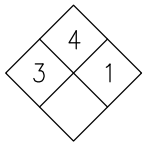
CAUTION – WARNS AGAINST POTENTIAL HAZARDOUS OR UNSAFE PRACTICES

COLORS – YELLOW AND BLACK



GENERAL – GENERAL SAFETY INFORMATION

COLORS – GREEN, WHITE, BLACK LETTERS



CHEMICAL HAZARDS – SEE NFPA STANDARD 704, WWW.NFPA.ORG

SIGNS REQUIRED FOR: *

- EMERGENCY EYEWASH/SHOWERS
- FIRST AID KITS
- FIRE EXTINGUISHERS
- NO SMOKING AREAS
- FIRE PROTECTION SYSTEMS (CO_2, HALON, ETC)
- CONFINED SPACES ("DANGER – PERMIT REQUIRED CONFINED SPACE, DO NOT ENTER" OR SIMILAR)
- NO IGNITION SOURCES
- TELEPHONE
- NOISE HAZARD AREAS
- HIGH VOLTAGE/ARC FLASH
- CHEMICAL TANKS – CHEMICAL CONTENT AND NFPA LABEL, PROMINENTLY DISPLAYED
- PPE–USE AREAS (HARD HATS, ETC)
- OVERHEAD HAZARDS
- EXITS
- "NOT AN EXIT", WHERE APPLICABLE
- FLOOR HATCHES

* ADDITIONAL SIGNS MAY BE REQUIRED

NOTE: SEE CBC FOR ADA AND EXIT SIGN REQUIREMENTS.

OTHER RELATED GUIDELINES

SDG–23 PIPING – LABELING

SDG–11 HATCHES

CAL/OSHA REGULATION	GISO SECTIONS 3340, 5157, 5194, 3212, 3235
OTHER REGULATION	NFPA 704, NFPA 70E, ANSI Z535
SFPUC GUIDELINE	

CITY AND COUNTY OF SAN FRANCISCO

PUBLIC UTILITIES COMMISSION

HEALTH AND SAFETY PROGRAM

SAFE DESIGN GUIDELINES

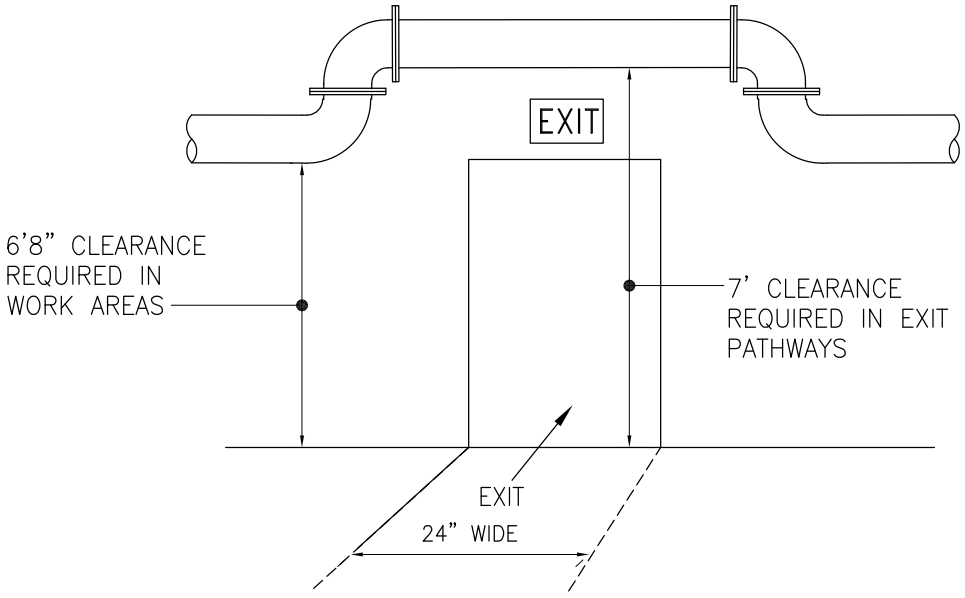
SIGNAGE

FIGURE

SDG-14

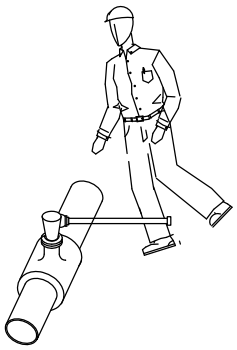
MARCH 2012

OVERHEAD & WIDTH CLEARANCE



EXIT WALKWAYS AND PATHWAYS BETWEEN EQUIPMENT MUST BE 24" WIDE, MIN. IN INDUSTRIAL LOCATIONS (NOT APPLICABLE STANDARD IN HIGH OCCUPANCY SITUATIONS, OFFICE BUILDINGS, TRAINING ROOMS, ETC.)

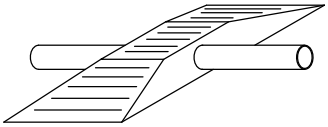
WALKWAY HAZARDS



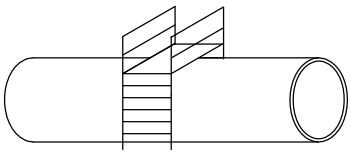
AVOID: DANGEROUS PROJECTIONS OR OBSTRUCTIONS SUCH AS VALVE STEMS; CHANGES IN WALKWAY ELEVATION ON EXIT PATHWAYS (>12" CHANGE REQUIRES A RAMP)

NON–SLIP: WET OR SLIPPERY AREAS REQUIRE MATS, GRATES, CLEATS, OR NON–SLIP SURFACES, EX. "SLIP–NOT"

SEE WWW.SLIPNOT.COM



ACCESS: WHERE ACCESS IS REQUIRED ACROSS PIPES/EQUIPMENT, A "BRIDGE", RAMP OR OTHER CROSS–OVER MEANS IS REQUIRED. RAMP DESIGN SHALL BE APPROPRIATE FOR LOAD (I.E. PEDESTRIANS, CARTS, VEHICLES ETC.) RAMP DESIGN–CHECKERED STEEL PLATE, PAINTED SAFETY YELLOW, MAXIMUM PITCH OF 2:12.



CAL/OSHA REGULATION	GISO SECTIONS 3224, 3272, 3273
OTHER REGULATION	
SFPUC GUIDELINE	RECOMMENDED PRACTICE

CITY AND COUNTY OF SAN FRANCISCO

PUBLIC UTILITIES COMMISSION

HEALTH AND SAFETY PROGRAM

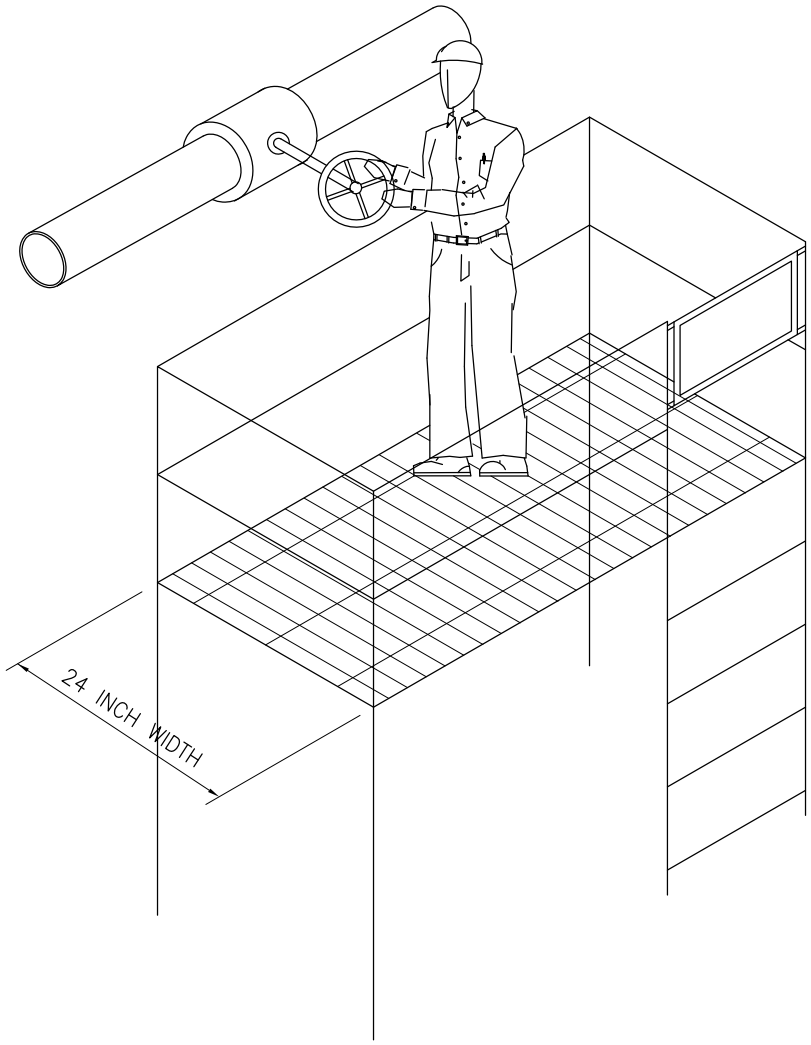
SAFE DESIGN GUIDELINES

WALKWAYS

FIGURE

SDG-15

MARCH 2012



- PLATFORMS REQUIRED WHERE EQUIPMENT (VALVE, GAGE, ETC.) CAN NOT BE ACCESSED SAFELY WHILE STANDING ON FLOOR
- PLATFORM MUST BE AT LEAST 24" WIDE, IF ≥ 30" ABOVE FLOOR
- MUST HAVE 6'6" CLEAR HEADROOM
- CATWALKS MUST BE AT LEAST 18" WIDE WITH 6'6" CLEAR HEADROOM
- APPROPRIATE GUARDRAILS REQUIRED FOR PLATFORMS OR CATWALKS
- REMOVABLE PLATFORM GRATES MUST BE DESIGNED SO THAT RE-INSTALLED PLATFORM GRATE SEATS PROPERLY, CONSIDER HINGED GRATES.
- IF PLATFORM IS INSIDE A CONFINED SPACE, A RETRIEVAL DEVICE MAY BE REQUIRED AT LADDERS TO LOWER LEVELS.

OTHER RELATED GUIDELINES
SDG-9 GUARDRAILS
SDG-10 LADDERS
SDG-12 HATCHES, RETRIEVAL DEVICES
SDG-13 PERIMETER FALL PROTECTION

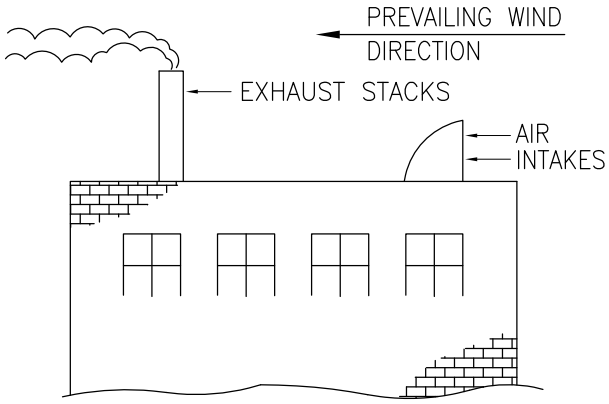
CAL/OSHA REGULATION	GISO SECTION 3210, 3273, 3274
OTHER REGULATION	
SFPUC GUIDELINE	

CITY AND COUNTY OF SAN FRANCISCO
PUBLIC UTILITIES COMMISSION
HEALTH AND SAFETY PROGRAM

SAFE DESIGN GUIDELINES

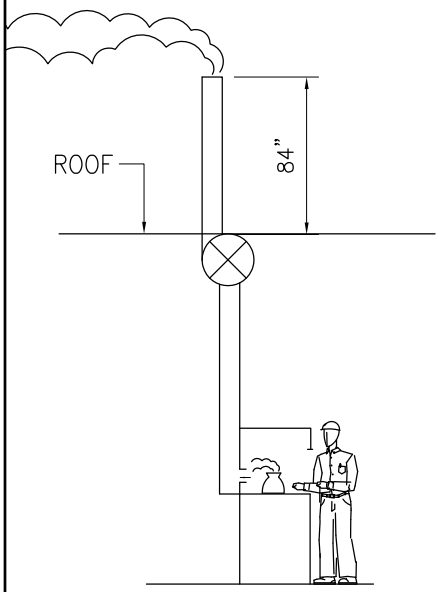
PLATFORMS

FIGURE
SDG-16
MARCH 2012



DESIGN OF AIR SUPPLY/ EXHAUST SYSTEMS REQUIRES CAREFUL PLANNING TO PREVENT CROSS–CONTAMINATION OR RE–ENTRAINMENT OF EXHAUST AIR INTO BUILDING HVAC SYSTEM. CONSIDERATIONS INCLUDE:

- MAKE ROOFTOP EXHAUST OUTLETS TALLER THAN INTAKES
- LOCATION (GROUND LEVEL AND/OR ROOF TOP) OF EXHAUST SOURCES SUCH AS BOILERS, INCINERATORS, VEHICLES (IDLING, TRAFFIC), COOLING TOWERS, EMERGENCY GENERATORS, LAB FUME HOODS, VENTS FOR CHEMICAL TANKS, OTHER BUILDINGS, SHAPE OF BUILDING, STACK
- DISCHARGE VELOCITY.
- PREVAILING WIND DIRECTION
- SOURCE STRENGTH OF HAZARDOUS SUBSTANCE BEING EXHAUSTED ELECTRICAL CODE REQUIREMENTS FOR EXHAUSTING
- FLAMMABLE/COMBUSTIBLE SUBSTANCES.
- EXHAUST STACK DISPERSION/DISCHARGE DIRECTION



LABORATORY FUME HOODS

EXHAUST STACKS FOR LABORATORY HOODS MUST BE LOCATED TO PROTECT EMPLOYEES ON ROOF. USE CHEMICAL TREATMENT, DILUTION OR EXHAUST STACKS EXTENDING AT LEAST 84" ABOVE ROOF AND DISCHARGING UPWARD (SEE CAL/OSHA REGULATIONS, SECTION 5154.1 FOR FURTHER INFORMATION)

NOTES:

1. DESIGN EXHAUST OPENINGS TO PREVENT RAINWATER ENTRY
2. CHEMICAL TREATMENT SYSTEM MUST BE ACCESSIBLE FOR MAINTENANCE
3. LABEL EXHAUST STACK WITH HAZARD ALERT FOR HOODS USING PICRIC ACID OR OTHER EXPLOSIVE SUBSTANCES.

CAL/OSHA REGULATION	GISO SECTION 5154.1
OTHER REGULATION	ASHRAE, ANSI/ASHRAE Z9.5
SFPUC GUIDELINE	RECOMMENDED PRACTICE

CITY AND COUNTY OF SAN FRANCISCO

PUBLIC UTILITIES COMMISSION

HEALTH AND SAFETY PROGRAM

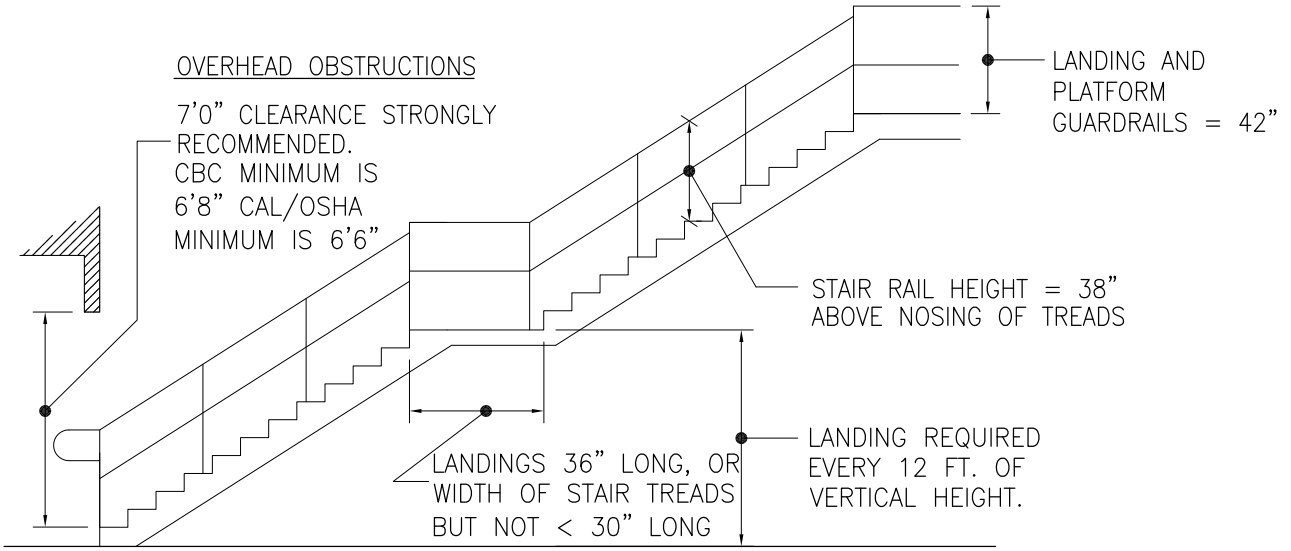
SAFE DESIGN GUIDELINES

ROOF SUPPLY / EXHAUST VENTILATION LOCATION

FIGURE

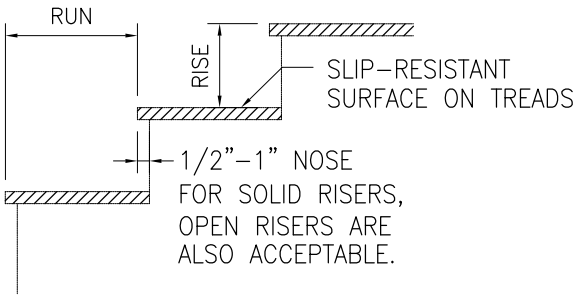
SDG-17

MARCH 2012



NOTES:

1. THIS GUIDELINE APPLIES TO INTERIOR AND EXTERIOR STAIRWAYS USED FOR ACCESS TO MACHINERY, TANKS, AND OTHER EQUIPMENT, AND STAIRS LEADING TO OR FROM FLOORS, PLATFORMS, OR PITS. IT DOES NOT APPLY TO STAIRS USED FOR REQUIRED EXIT PURPOSES FROM BUILDINGS
2. CLEAR WIDTH = 36" MINIMUM EXCEPT STAIRWAYS SERVING OCCUPANT LOAD<10 MAY BE 30" WIDE
3. LANDINGS ARE REQUIRED AT TOP AND BOTTOM OF STAIRWAYS
4. STAIR RAIL(S)/GUARDRAILS REQUIRED ON OPEN SIDE(S) OF STAIRWAY, PLATFORM AND LANDINGS.
5. HAND RAIL REQUIRED ON RIGHT WALL SIDE (DESCENDING). HEIGHT = 38"
6. HAND RAIL: 1.5" O.D, WALL TO RAIL OPEN CLEARANCE 1.5"



TREADS

RISE/RUN =8"/9" OR SEE CAL/OSHA SECTION 3234 FOR OTHER ACCEPTABLE CONFIGURATIONS, MAXIMUM VARIANCE OF RISE OR RUN = 1/4" BETWEEN STEPS IN ANY ONE FLIGHT.

OTHER RELATED GUIDELINES
SDDG-9 GUARDRAILS

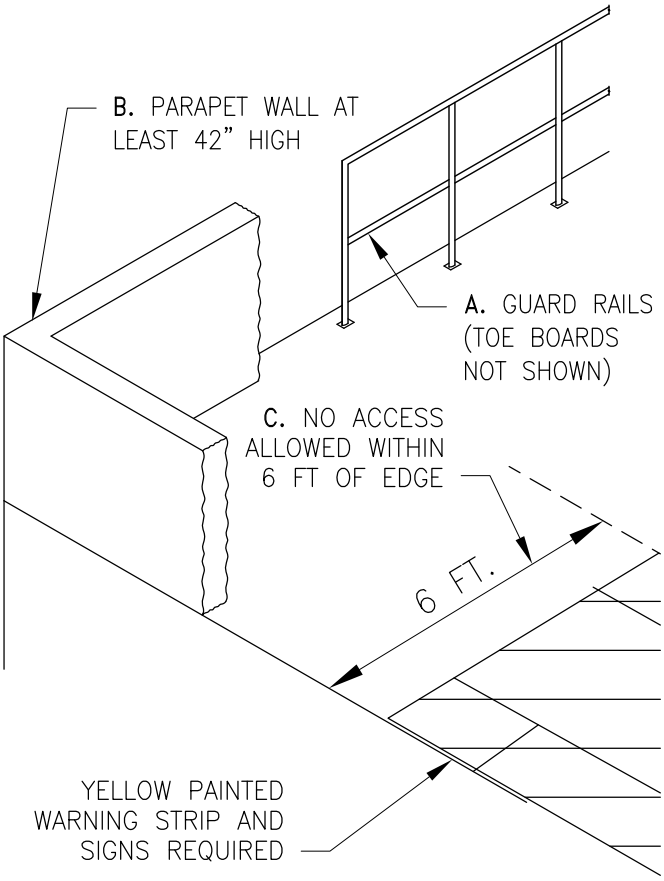
CAL/OSHA REGULATION	GISO SECTION 3214, 3231, 3234
OTHER REGULATION	CBC
SFPUC GUIDELINE	RECOMMENDED PRACTICE

CITY AND COUNTY OF SAN FRANCISCO
PUBLIC UTILITIES COMMISSION
HEALTH AND SAFETY PROGRAM

SAFE DESIGN GUIDELINES

STAIRWAYS - INDUSTRIAL FACILITIES

FIGURE
SDG-18
MARCH 2012



FALL PROTECTION OPTIONS WHERE EMPLOYEES MUST ACCESS ROOF FOR MAINTENANCE, SERVICE, ETC.

RECOMMENDED OPTIONS:

A. GUARDRAILS
B. PARAPET WALLS

ALLOWABLE BUT NOT RECOMMENDED:

C. NO EMPLOYEE ACCESS PERMITTED OR REQUIRED WITHIN 6 FT. OF ROOF EDGE AND CLEAR WARNING METHOD IN PLACE TO ALERT WORKERS OF RESTRICTION ZONE.
D. IF ROOF ACCESS IS ONLY INFREQUENT (NOT MORE THAN 4 TIMES/YEARS), INSTALL ENGINEERED FALL ARREST SYSTEM ATTACHED TO ACCEPTABLE ANCHOR POINT.

NOTES:

1. ROOF–TOP EQUIPMENT LOCATIONS REQUIRE PERMANENT MEANS OF ACCESS WHEN FREQUENT ACCESS (> 4 TIMES/YEAR) IS NEEDED FOR REPAIR, SERVICE AND/OR OPERATIONS TASKS, OPTIONS INCLUDE STAIRS, OR FIXED INTERNAL OR EXTERNAL LADDERS.
2. FOR ACCESSIBLE ROOFS WITHOUT PERMANENT MEANS OF ACCESS, CONSIDER A DESIGNATED LOCATION FOR PORTABLE LADDER ACCESS, WITH 6 FT. GUARDRAIL PROTECTION ON EITHER SIDE.
3. CBC 2010 REQUIREMENT–EQUIPMENT OR HATCHES WITHIN 10 FT. OF ROOF EDGE REQUIRE GUARDS (I.E, RAILING) TO PREVENT FALL HAZARD.
4. VEGETATIVE ROOFS ("GREEN" OR "LIVING" ROOFS) MUST MEET THESE FALL PROTECTION REQUIREMENTS.
5. STEEP SLOPE ROOFS (SLOPE > 4:12) WITH UNPROTECTED SIDES OR EDGES 6 FEET OR MORE ABOVE LOWER LEVEL SHALL BE PROTECTED BY GUARD RAIL SYSTEM WITH TOE BOARDS, SAFETY NET SYSTEM, OR PERSONAL FALL ARREST SYSTEM WHEN EMPLOYEES ACCESS ROOF.

OTHER RELATED GUIDELINES

SDG–9 GUARDRAILS
SDG–10 LADDERS, FIXED
SDG–21 SKYLIGHTS

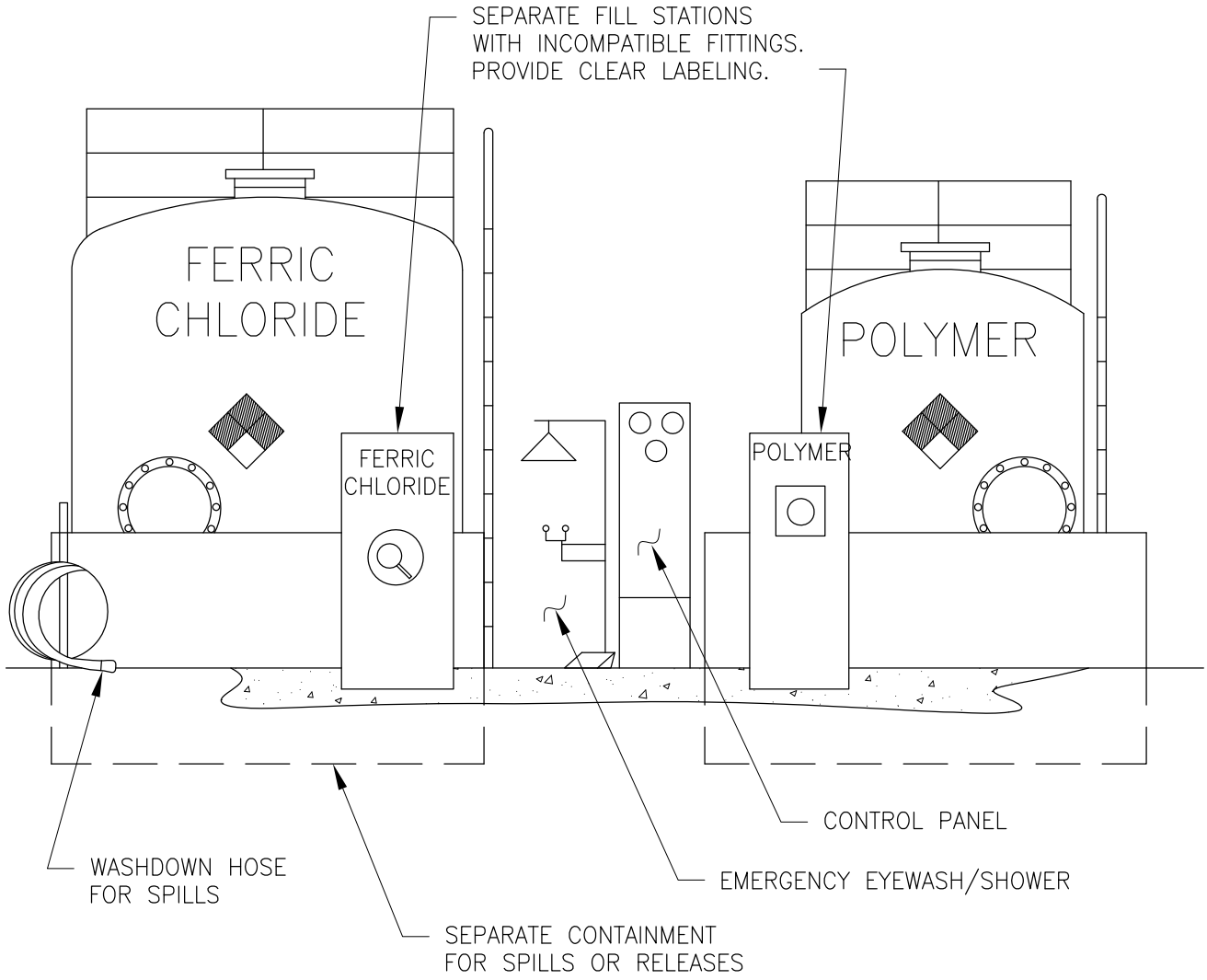
CAL/OSHA REGULATION	GISO SECTION 3210, 3212
OTHER REGULATION	CBC 2010 SECTION 1013
SFPUC GUIDELINE	RECOMMENDED PRACTICE

CITY AND COUNTY OF SAN FRANCISCO
PUBLIC UTILITIES COMMISSION
HEALTH AND SAFETY PROGRAM

SAFE DESIGN GUIDELINES

ROOF PERIMETER FALL PROTECTION

FIGURE
SDG-19
MARCH 2012



NOTES:

1. TRUCKS SHOULD HAVE A CLEAR 1–WAY DRIVE–THRU PATH OF TRAVEL.
2. CONTROL PANEL FOR WWE FACILITIES–INCLUDE LEAK/HIGH TANK LEVEL ALARM AND HIGH/LOW LEVEL INDICATORS, WITH REMOTE INDICATION AND ALARM.
3. CONSIDER PROVIDING A COMPRESSED AIR SOURCE FOR TRUCK DRIVER USE DURING OFF–LOADING, IF LOCATION WHERE TRUCK SHOULD NOT BE KEPT RUNNING.
4. REVIEW PATH OF TRAVEL FOR SPILLS/RELEASES DURING OFF–LOADING. ENSURE RUNOFF WILL NOT IMPACT SENSITIVE RECEPTORS. CHECK WITH LOCAL JURISDICTION FOR REQUIREMENTS FOR CONTROLLING SPILLS OUTSIDE CONTAINMENT AREA.
5. WWE FACILITY WASHDOWN WATER–WATER THAT COULD GO OFFSITE SHOULD BE AT LEAST #2 WATER. WITHIN FACILITY, #3 OR BETTER WATER IS ACCEPTABLE FOR WASHDOWN.

OTHER RELATED GUIDELINES

SDG–2 CHEMICAL TANKS
SDG–3 EMERGENCY EYEWASH AND SHOWERS
SDG–14 SIGNAGE

CAL/OSHA REGULATION	GISO SECTION 5162
OTHER REGULATION	
SFPUC GUIDELINE	RECOMMENDED PRACTICE

CITY AND COUNTY OF SAN FRANCISCO

PUBLIC UTILITIES COMMISSION

HEALTH AND SAFETY PROGRAM

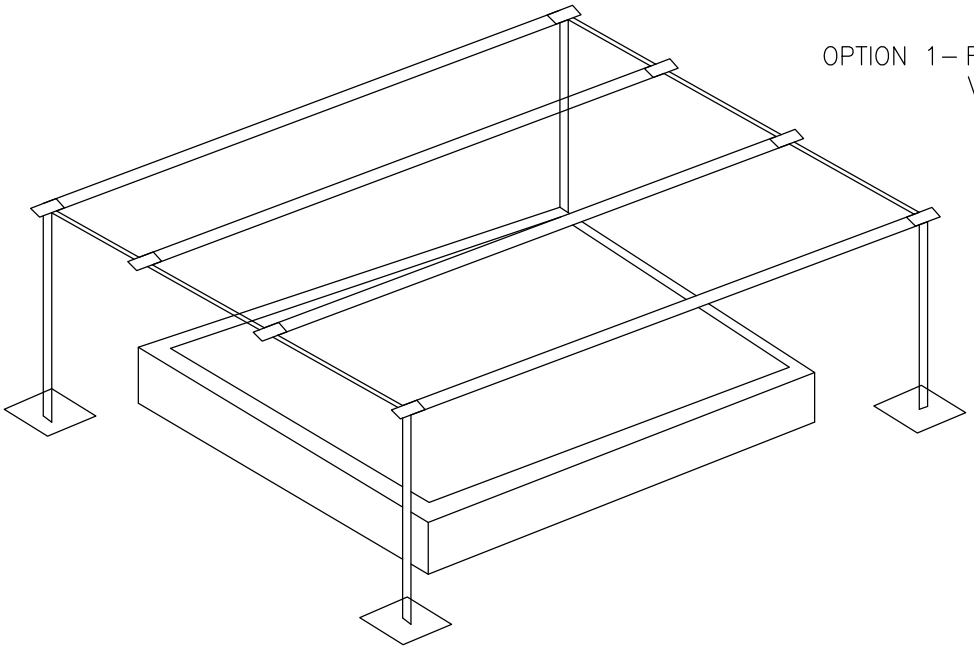
SAFE DESIGN GUIDELINES

CHEMICAL FILL STATIONS

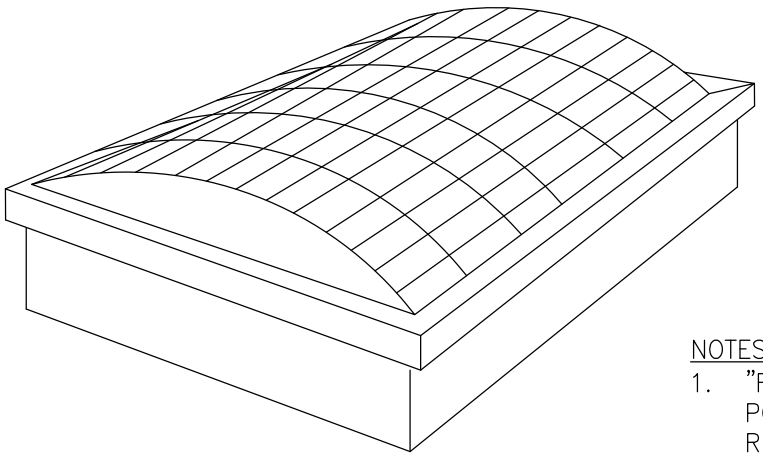
FIGURE

SDG-20

MARCH 2012



OPTION 1– FREE–STANDING, GUARD, VARIOUS STYLES AVAILABLE



OPTION 2– INSTALLED SKYLIGHT SCREEN OR GUARD, VARIOUS STYLES AVAILABLE INCLUDING BUILT–IN GRATE/GRID

NOTES:

1. "FALL–PROTECTION" RATED POLYCARBONATE PLASTIC SKYLIGHTS STILL REQUIRE OPTION 1 OR 2 STYLE GUARD.
2. GUARDS SHALL BE CAPABLE OF SUPPORTING THE GREATER OF 400 POUNDS OR TWICE THE WEIGHT OF EMPLOYEES, EQUIPMENT AND MATERIALS THAT MAYBE IMPOSED ON ANY ONE FOOT SQUARE AREA OF COVER.

USEFUL WEBSITES:
WWW.SIMPLIFIEDSAFETY.COM
WWW.RAILGUARD.NET
WWW.KALWALL.COM

CAL/OSHA REGULATION	GISO 3212
OTHER REGULATION	
SFPUC GUIDELINE	

CITY AND COUNTY OF SAN FRANCISCO

PUBLIC UTILITIES COMMISSION

HEALTH AND SAFETY PROGRAM

SAFE DESIGN GUIDELINES

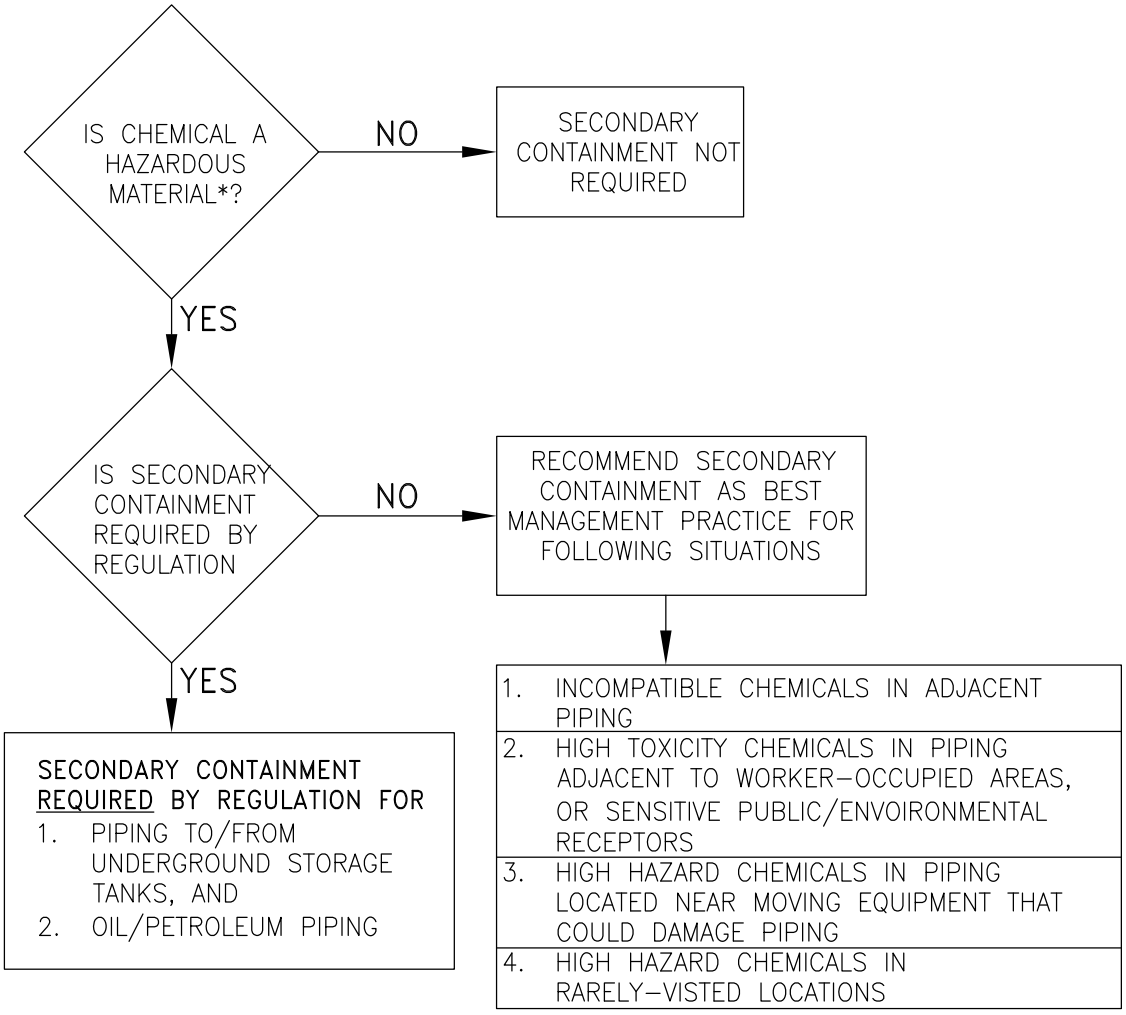
SKYLIGHT PROTECTION

FIGURE

SDG-21

MARCH 2012

IS DOUBLE CONTAINMENT REQUIRED FOR CHEMICAL PIPING?



*TOXIC, FLAMMABLE, CORROSIVE, OR REACTIVE

NOTES

1. DOUBLE CONTAINMENT INCLUDES DOUBLE–WALLED PIPING AND/OR SECONDARY CONTAINMENT STRUCTURES AROUND PIPING.
2. THIS FLOW CHART IS PROVIDED TO ASSIST THE DESIGN ENGINEER TO EVALUATE REQUIREMENTS. HOWEVER, THE ENGINEER HAS FINAL RESPONSIBILITY FOR COMPLYING WITH REGULATORY REQUIREMENTS.
3. ON A DAM EMBANKMENT, DSOD REQUIRES DOUBLE CONTAINMENT FOR ALL CONTINUOUSLY PRESSURIZED LINES, INCLUDING WATER PIPES.

CAL/OSHA REGULATION	
OTHER REGULATION	40 CFR PARTS 112, 40 CFR PARTS 280, 281, DSOD
SFPUC GUIDELINE	RECOMMENDED PRACTICE

CITY AND COUNTY OF SAN FRANCISCO

PUBLIC UTILITIES COMMISSION

HEALTH AND SAFETY PROGRAM

SAFE DESIGN GUIDELINES

PIPING-DOUBLE CONTAINMENT

FIGURE

SDG-22

MARCH 2012

PIPE MARKING LABELS MUST:

1. CLEARLY IDENTIFY CONTENTS IN PLAIN LANGUAGE, AT REGULAR INTERVALS ALONG PIPE.
2. GIVE ADDITIONAL DETAIL IF SPECIAL HAZARDS, SUCH AS EXTREME TEMPERATURE OR PRESSURE.
3. SHOW FLOW DIRECTION WITH ARROWS.
4. BE POSITIONED ON PIPE SO THEY CAN BE EASILY READ BY WORKERS.
5. COMPLY WITH COLOR SCHEME BASED ON HAZARDS IN TABLE 1, OR BE CONSISTENT WITH FACILITY COLOR SYSTEM.
6. COMPLY WITH TABLE 2, SIZE OF LEGEND LETTERS.

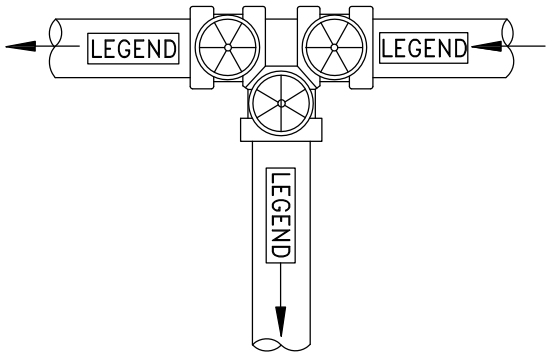


TABLE 1: DESIGNATION OF PIPE COLOR OR COLOR BANDS AT REGULAR INTERVALS		
FLUID SERVICE	BACKGROUND COLOR	LETTER COLOR
FIRE QUENCHING FLUIDS	SAFETY RED	WHITE
TOXIC AND CORROSIVE FLUIDS	SAFETY ORANGE	BLACK
FLAMMABLE FLUIDS	SAFETY YELLOW	BLACK
COMBUSTIBLE FLUIDS	SAFETY BROWN	WHITE
POTABLE, COOLING, BOILER FEED, AND OTHER WATER	SAFETY GREEN	WHITE
COMPRESSED AIR	SAFETY BLUE	WHITE
TO BE DEFINED BY THE USER	SAFETY PURPLE	WHITE
TO BE DEFINED BY THE USER	SAFETY WHITE	BLACK
TO BE DEFINED BY THE USER	SAFETY GRAY	WHITE
TO BE DEFINED BY THE USER	SAFETY BLACK	WHITE

TABLE 2: SIZE OF LEGEND LETTERS		
OUTSIDE DIAMETER OF PIPE COVERING IN. (MM)	LENGTH OF COLOR FIELD IN. (MM)	SIZE OF LETTERS, IN. (MM)
3/4 TO 1 1/4 (19 TO 32)	8 (200)	1/2 (13)
1 1/2 TO 2 (38 TO 51)	8 (200)	3/4 (19)
2 1/2 TO 6 (64 TO 150)	12 (300)	1 1/4 (32)
8 TO 10 (200 TO 500)	24 (600)	2 1/2 (64)
OVER 10 (OVER 250)	32 (800)	3 1/2 (89)

OTHER RELATED GUIDELINES

SDG–14 SIGNAGE

CAL/OSHA REGULATION	GISO 3321, 5194
OTHER REGULATION	ANSI/ASME A13./2007
SFPUC GUIDELINE	

CITY AND COUNTY OF SAN FRANCISCO

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HEALTH AND SAFETY PROGRAM

SAFE DESIGN GUIDELINES

PIPING-LABELING

FIGURE

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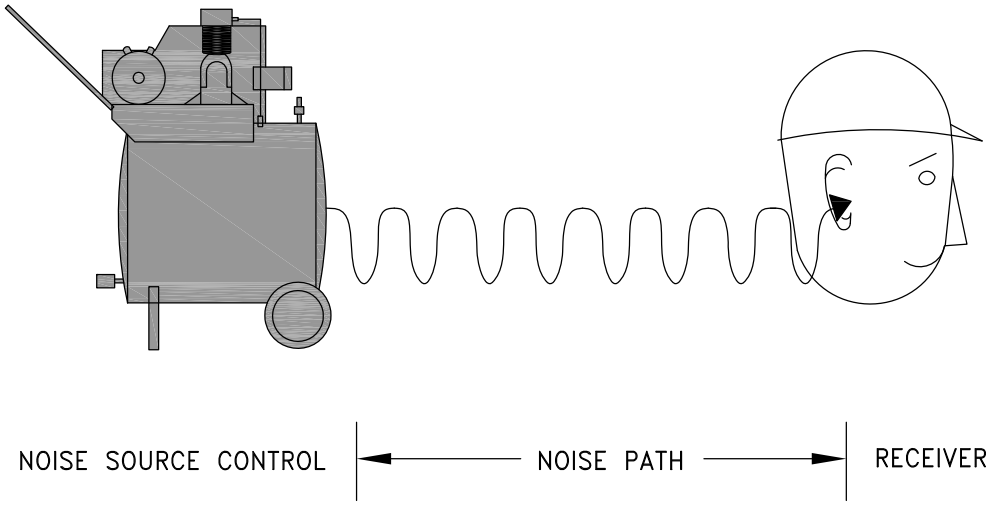
CONTROL WORKPLACE NOISE EXPOSURES AT SOURCE, PATH, AND/OR RECEIVER



NOISE SOURCE CONTROL

1. CONSIDER NOISE EMISSION WHEN PURCHASING EQUIPMENT THAT IS EXPECTED TO GENERATE SOUND PRESSURE LEVEL OF 80 DBA OR HIGHER TO OPERATOR OR OTHER WORKERS IN AREA–SPECIFY QUIETER EQUIPMENT.
2. CONSIDER CONTROLS ON MECHANICAL NOISE, AIR OR FLUID FLOW NOISE, AND/OR METHODS FOR FOR VIBRATION ISOLATION AND DAMPING, INCLUDING AT INSTALLATION OR EQUIPMENT CONNECTION POINTS.

NOISE PATH CONTROL

1. LOCATE NOISE SOURCE WITHIN AN ACOUSTIC ENCLOSURE.
2. LIMIT DIRECT NOISE TRANSMISSION WITH BARRIERS AND/OR REVERBERANT NOISE WITH ACOUSTIC ABSORBERS.

RECEIVER CONTROL

1. LOCATE OPERATOR WORK AREAS AND CONTROL ROOMS AWAY FROM NOISE SOURCES.
2. INCLUDE NOISE DAMPENING FEATURES IN OPERATORS'S CONTROL ROOM, AS WARRANTED.
3. DO NOT PLACE ELECTRICAL PANELS IN OPERATOR'S CONTROL ROOM DUE TO CONTINUAL AGGRAVATING NOISE FROM PANELS

NOTE:

REFER TO COMMUNITY NOISE, REGULATIONS FOR PUBLIC NOISE CONTROL REQUIREMENTS.

CAL/OSHA REGULATION	
OTHER REGULATION	
SFPUC GUIDELINE	RECOMMENDED PRACTICE

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SAFE DESIGN GUIDELINES

NOISE CONTROL

FIGURE

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