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

SAFE DESIGN GUIDELINES

MARCH 2012

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SDG-23. PIPING - LABELLING
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CAL/OSHA REGULATION
OTHER REGULATION
SFPUC GUIDELINE

CITY AND COUNTY OF SAN FRANCISCO
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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.

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SAFE DESIGN GUIDELINES
ABBREVIATIONS AND GENERAL NOTES

FIGURE
SDG-000
MARCH 2012
PLATF0RM MUST PROVIDE ADEQUATE WORK SPACE TO OPERATE AND MAINTAIN EQUIPMENT—CONTACT OPERATING DIVISION FOR SPECIFIC REQUIREMENTS

RAILINGS REQUIRED, SEE GUIDELINE

OPERATING PLATFORM

STAIRWAY ACCESS REQUIRED TO WORKING PLATFORM LEVEL SEE STAIRWAY GUIDELINE FOR REQUIREMENTS

HEIGHT < 30" OR PROVIDE GUARDRAILS OR TERRACE

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

VENTILATION PROVIDED AT MULTIPLE LEVELS FOR SUFFICIENT MIXING AND FRESH AIR SUPPLY. VENTILATION RATE DEPENDS ON MULTIPLE FACTORS—DISCUSS WITH PUC H&S

RECOMMEND STAIR ACCESS TO BOTTOM OF VAULT. LADDER ACCESS PERMITTED WHERE STAIRS NOT FEASIBLE.

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SAFE DESIGN GUIDELINES
VALVE VAULTS
(WATER SYSTEM ONLY)

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

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

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HEALTH AND SAFETY PROGRAM

SAFE DESIGN GUIDELINES
CHEMICAL TANKS

FIGURE
SDG-2
MARCH 2012
FLOW SENSOR TO CONTROL RM. WITH FLASHING LIGHT AT EYEWASH/ SHOWER LOCATION

82” - 86” TO SHOWER

33”-45” TO EYEWASH

SLOPE FLOOR TO DRAIN

69” MAX. TO HANDLE

FLOOR DRAIN TO CONTAINMENT OR SEWER, AS APPROPRIATE

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 TEPIID (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
FULL PERIMETER RAILING PREFERRED. MINIMUM REQUIREMENT IS RAILING FOR LANDING AND HATCH AREA, WITH PERMANENT ATTACHMENT POINT FOR FALL ARREST SYSTEM.

FIXED BRACKET FOR UCL RETRIEVAL DEVICE (SEE SDG-12)

HATCH MINIMUM 3'x3' (SEE SDG-11) WITH CONFINED SPACE LABEL

STAIRWAY ACCESS STRONGLY RECOMMENDED — IF LADDER IS USED, IT MUST COMPLY WITH SDG-10

TOP SHOULD BE SLOPED SLIGHTLY TO AVOID STANDING WATER AND SHOULD HAVE NON-SLIP SURFACE

GATE REQUIRED IF LADDER IS USED

FULL PERIMETER RAILING OR HORIZONTAL FALL PROTECTION REQUIRED

STAIRWAY LANDINGS REQUIRED FOR EVERY 12 FT. VERTICAL DISTANCE

SIDE ACCESS SEE SDG-11 W/ CONFINED SPACE LABEL

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

CITY AND COUNTY OF SAN FRANCISCO
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SAFE DESIGN GUIDELINES
WATER TANKS (AND SIMILARLY CONSTRUCTED TANKS)

FIGURE SDG-4
MARCH 2012
DISTANCE TO BODY
BEST = 10"  
ACCEPTABLE UP TO 20"

LOCATION OF VALVE FOR VERTICAL VALVE STEM

HEIGHT OF HANDS
BEST RANGE: 40"–50"  
ACCEPTABLE RANGE: 30"–40"

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

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HEALTH AND SAFETY PROGRAM

SAFE DESIGN GUIDELINES

FIGURE

SDG-6
MARCH 2012
NOTE: DESIGN LIGHTING TYPE AND PLACEMENT TO REDUCE GLARE ON COMPUTER MONITORS.

ADJUSTABLE ARM OR STAND FOR MONITOR

KEYBOARD TRAYS MUST BE WIDE ENOUGH TO HOLD MOUSE ON EITHER RIGHT OR LEFT SIDE

KEYBOARD TRAY ADJUSTABLE FROM 29”-42” OR SIT/STAND CAPABILITY SIMILAR TO ELECTRIC WORKRITE HEIGHT ADJUSTABLE WORKCENTERS, SEE WWW.WORKRITEERGO.COM

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.

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CONTROL ROOM
COMPUTER WORKSTATIONS

SAFE DESIGN GUIDELINES

FIGURE SDG-7
MARCH 2012
CHEMICAL HEAVIER THAN AIR:
LOCATE MOST EXHAUST VENTS AT FLOOR LEVEL

EXAMPLES:
SODIUM HYPOCHLORITE, FERRIC CHLORIDE, CO₂, GASOLINE, H₂S, SODIUM BISULFITE, PROpane, BUTANE, DIGESTER GAS (MIXTURE OF METHANE AND CO₂)

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.
4" MAXIMUM GAP BETWEEN ANY GUARDRAIL END AND ADJACENT GUARDRAIL SECTION OR OTHER STRUCTURE

42"-45" TO TOP OF TOP RAIL

MIDRAIL HALFWAY

MAXIMUM DISTANCE BETWEEN POSTS
= 6 FT FOR WOOD
= 8 FT FOR PIPE
= 8 FT FOR STRUCTURAL STEEL

TOEBOARD TOP AT LEAST 3 1/2" ABOVE FLOOR

BOTTOM GAP ≤ 1/4"

GUARDRAILS DESIGNED FOR 20 POUNDS/LINEAR FOOT LIVE LOAD HORIZONTALLY OR VERTICALLY

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 GUARDRAIL 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

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SAFE DESIGN GUIDELINES

GUARDRAILS

FIGURE SDG-9

JULY 2012
MINIMUM 6 FT. RAILING ON UNPROTECTED EDGE REQUIRED EITHER SIDE OF LADDER.

LADDER SECTIONS OFFSET

LANDING PLATFORM WITH SWINGING GATE AND RAILING REQUIRED. MINIMUM LANDING SIZE = 24"x30", PROVIDE ANCHORAGE FOR TRANSITION FROM LADDER TO PLATFORM

NOT > 20 FT TO LANDING

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.

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

SAFE DESIGN GUIDELINES
LADDERS - FIXED

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MARCH 2012
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.

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

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.

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HEALTH AND SAFETY PROGRAM

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)

CENTER MOUNTING SLEEVE (BEWARE OF TRIP HAZARD)

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

WALL MOUNT SLEEVE (EXTERIOR OR INTERIOR)

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
AFTER-GRADLE 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.

BELOW-GRADLE LOCATION
(EXAMPLE - PITS, SEDIMENTATION TANKS) (TOE BOARDS NOT SHOWN)

ALL SIDES OF BELOW-GRADLE 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)

OTHER RELATED GUIDELINES
SDG-9 GUARDRAILS
SDG-10 LADDERS, FIXED
SDG-12 HATCHES—RETRIEVAL DEVICES

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

SAFE DESIGN GUIDELINES
PERIMETER FALL PROTECTION (NON ROOF LOCATIONS)

CITY AND COUNTY OF SAN FRANCISCO
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FIGURE SDG-13
MARCH 2012
CAL/OSHA SIGNS

DANGER

COMPRESSED AIR

Colors - Red, Black, White Only

WARNING

AUTHORIZED PERSONNEL ONLY

Colors - Orange and Black

CAUTION

HARD HATS REQUIRED

Colors - Yellow and Black

GENERAL

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 (CO₂, HALON, ETC)
- CONFINED SPACES ("DANGER - PERMIT REQUIRED
  CONFINED SPACE, DO NOT ENTER" OR SIMILAR)
- NO IGNITION SOURCES
- TELEPHONE
- NOISE HAZARD AREAS

* ADDEDITIONAL SIGNS MAY BE REQUIRED

OTHER RELATED GUIDELINES

SDG-23 PIPING - LABELING
SDG-11 HATCHES

HIGH VOLTAGE/ARC FLASH

CHEMICAL TANKS - CHEMICAL CONTENT
  AND NFPA LABEL, PROMINENTLY DISPLAYED

PIPE-USE AREAS (HARD HATS, ETC)

OVERHEAD HAZARDS

EXITS

"NOT AN EXIT", WHERE APPLICABLE

FLOOR HATCHES

NOTE: SEE CBC FOR ADA AND EXIT SIGN REQUIREMENTS.

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CITY AND COUNTY OF SAN FRANCISCO
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HEALTH AND SAFETY PROGRAM

SAFE DESIGN GUIDELINES

FIGURE

SDG-14

MARCH 2012
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

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

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

SAFE DESIGN GUIDELINES
PLATORMS

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.

<table>
<thead>
<tr>
<th>CAL/OSHA REGULATION</th>
<th>GISO SECTION 5154.1</th>
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<tr>
<td>OTHER REGULATION</td>
<td>ASHRAE, ANSI/ASHRAE Z9.5</td>
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<tr>
<td>SFPUC GUIDELINE</td>
<td>RECOMMENDED PRACTICE</td>
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CITY AND COUNTY OF SAN FRANCISCO
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HEALTH AND SAFETY PROGRAM

SAFE DESIGN GUIDELINES
ROOF SUPPLY / EXHAUST VENTILATION LOCATION

FIGURE
SDG-17
MARCH 2012
OVERHEAD OBSTRUCTIONS
7/0" CLEARANCE STRONGLY
RECOMMENDED.
CBC MINIMUM IS
6'8" CAL/OSHA
MINIMUM IS 6'6"

STAIR RAIL HEIGHT = .38" 
ABOVE NOSING OF TREADS

LANDINGS 36" LONG, OR 
WIDTH OF STAIR TREADS 
BUT NOT < 30" LONG

LANDING REQUIRED 
EVERY 12 FT. OF 
VERTICAL HEIGHT.

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, PLATFOMS, 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"

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

OTHER RELATED GUIDELINES
SDDG-9 GUARDRAILS

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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/YEAR), 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

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| SAFE DESIGN GUIDELINES |
| ROOF PERIMETER FALL PROTECTION |

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

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

<table>
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<tr>
<td>OTHER REGULATION</td>
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</tbody>
</table>

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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 MAY BE 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?

IS CHEMICAL A HAZARDOUS MATERIAL? NO

SECONDARY CONTAINMENT NOT REQUIRED

IS SECONDARY CONTAINMENT REQUIRED BY REGULATION? NO

RECOMMEND SECONDARY CONTAINMENT AS BEST MANAGEMENT PRACTICE FOR FOLLOWING SITUATIONS

YES

SECONDARY CONTAINMENT REQUIRED BY REGULATION FOR
1. PIPING TO/FROM UNDERGROUND STORAGE TANKS, AND
2. OIL/PETROLEUM PIPING

1. INCOMPATIBLE CHEMICALS IN ADJACENT PIPING
2. HIGH TOXICITY CHEMICALS IN PIPING ADJACENT TO WORKER–OCCUPIED AREAS, OR SENSITIVE PUBLIC/ENVIRONMENTAL RECEPTORS
3. HIGH HAZARD CHEMICALS IN PIPING LOCATED NEAR MOVING EQUIPMENT THAT COULD DAMAGE PIPING
4. HIGH HAZARD CHEMICALS IN RARELY–VISTED LOCATIONS

*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.
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

<table>
<thead>
<tr>
<th>FLUID SERVICE</th>
<th>BACKGROUND COLOR</th>
<th>LETTER COLOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRE QUENCHING FLUIDS</td>
<td>SAFETY RED</td>
<td>WHITE</td>
</tr>
<tr>
<td>TOXIC AND CORROSIVE FLUIDS</td>
<td>SAFETY ORANGE</td>
<td>BLACK</td>
</tr>
<tr>
<td>FLAMMABLE FLUIDS</td>
<td>SAFETY YELLOW</td>
<td>BLACK</td>
</tr>
<tr>
<td>COMBUSTIBLE FLUIDS</td>
<td>SAFETY BROWN</td>
<td>WHITE</td>
</tr>
<tr>
<td>POTABLE, COOLING, BOILER FEED, AND OTHER WATER</td>
<td>SAFETY GREEN</td>
<td>WHITE</td>
</tr>
<tr>
<td>COMPRESSED AIR</td>
<td>SAFETY BLUE</td>
<td>WHITE</td>
</tr>
<tr>
<td>TO BE DEFINED BY THE USER</td>
<td>SAFETY PIGE</td>
<td>WHITE</td>
</tr>
<tr>
<td>TO BE DEFINED BY THE USER</td>
<td>SAFETY WHITE</td>
<td>BLACK</td>
</tr>
<tr>
<td>TO BE DEFINED BY THE USER</td>
<td>SAFETY GRAY</td>
<td>WHITE</td>
</tr>
<tr>
<td>TO BE DEFINED BY THE USER</td>
<td>SAFETY BLACK</td>
<td>WHITE</td>
</tr>
</tbody>
</table>

### TABLE 2: SIZE OF LEGEND LETTERS

<table>
<thead>
<tr>
<th>OUTSIDE DIAMETER OF PIPE COVERING IN. (MM)</th>
<th>LENGTH OF COLOR FIELD IN. (MM)</th>
<th>SIZE OF LETTERS, IN. (MM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/4 TO 1 1/4 (19 TO 32)</td>
<td>8 (200)</td>
<td>1/2 (13)</td>
</tr>
<tr>
<td>1 1/2 TO 2 (38 TO 51)</td>
<td>8 (200)</td>
<td>3/4 (19)</td>
</tr>
<tr>
<td>2 1/2 TO 6 (64 TO 150)</td>
<td>12 (300)</td>
<td>1 1/4 (32)</td>
</tr>
<tr>
<td>8 TO 10 (200 TO 500)</td>
<td>24 (600)</td>
<td>2 1/2 (64)</td>
</tr>
<tr>
<td>OVER 10 (OVER 250)</td>
<td>32 (800)</td>
<td>3 1/2 (89)</td>
</tr>
</tbody>
</table>

OTHER RELATED GUIDELINES

SDG-14 SIGNAGE

CAL/OSHA REGULATION
GISO 3321, 5194

OTHER REGULATION

SFPUC GUIDELINE

CITY AND COUNTY OF SAN FRANCISCO
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HEALTH AND SAFETY PROGRAM

SAFE DESIGN GUIDELINES

PIPING-LABELING

FIGURE
SDG-23
MARCH 2012
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 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 operator’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.

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<tr>
<th>CAL/OSHA REGULATION</th>
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<tr>
<td>Safe Design Guidelines</td>
<td>Recommended Practice</td>
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NOISE CONTROL

FIGURE
SDG-24

MARCH 2012