

Solids Treatment Processes

820-24

FIRE PROTECTION IN WASTEWATER TREATMENT AND COLLECTION FACILITIES

Δ Table 6.2.2(a) Solids Treatment Processes

Row ^a	Line ^a	Location and Function	Fire and Explosion Hazard	Ventilation ^{b,c,d}	Extent of Classified Location	NEC Hazardous Location Classification (All Class I, Group D) ^d	Materials of Construction ^e	Fire Protection Measures
1		COARSE AND FINE SCREENINGS-HANDLING BUILDINGS Storage, conveying, or dewatering of screenings (no exposed flow of wastewater through building or area)	N/A	NR	N/A	Unclassified	NC, LC, or LFS	H, FE, and FAS
2		GRIT-HANDLING BUILDING Storage, conveying, and dewatering of heavy small screenings and grit (no exposed flow of wastewater through building or area)	N/A	NR	N/A	Unclassified	NC, LC, or LFS	H, FE, and FAS
3	a	SCUM-HANDLING BUILDING OR AREA	Possible grease or flammable liquids carryover	A	Enclosed space	Division 2	NC, LC, or LFS	H and FE; CGD if enclosed in building
	b	Holding, dewatering, or storage		B	Enclosed space	Unclassified	NC, LC, or LFS	H and FE; CGD if enclosed in building
	c			Not enclosed, open to atmosphere	N/A	Unclassified	NC, LC, or LFS	H and FE
4	a	SCUM PITS	Buildup of vapors from flammable or combustible liquids	A	Enclosed — entire space	Division 1	NC	H and FE; CGD if enclosed in building
	b	B		Enclosed — entire space	Division 2	NC, LC, or LFS	H and FE; CGD if enclosed in building	
	c	Not enclosed, open to atmosphere		Within a 3 m (10 ft) envelope around equipment and open channel ^f	Division 2	NC, LC, or LFS	H and FE	
	d	NR		N/A	Unclassified if process is preceded by primary treatment with skimming	NC, LC, or LFS	H and FE	
5	a	SCUM-PUMPING AREAS	Buildup of vapors from flammable or combustible liquids	A	Enclosed — entire space	Division 1	NC	H and FE; CGD if enclosed in building
	b	Pumping of scum, wet side of pumping station		B	Enclosed — entire space	Division 2	NC, LC, or LFS	H and FE; CGD if enclosed in building
	c			Not enclosed, open to atmosphere	Within a 3 m (10 ft) envelope around equipment and open channel ^f	Division 2	NC, LC, or LFS	H and FE

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Δ Table 6.2.2(a) Continued

Row ^a	Line ^a	Location and Function	Fire and Explosion Hazard	Ventilation ^{b,c,d}	Extent of Classified Location	NEC Hazardous Location Classification (All Class I, Group D) ^e	Materials of Construction ^f	Fire Protection Measures
6	a	SCUM-PUMPING AREAS	Buildup of vapors from flammable and combustible liquids	D	Enclosed space	Division 2	NC, LC, or LFS	H and FE
	b	Pumping of scum, dry side of pumping station		C	Enclosed space	Unclassified	NC, LC, or LFS	H and FE
	c			Not enclosed, open to atmosphere	N/A	Unclassified	NC, LC, or LFS	H and FE
7		SCUM INCINERATORS ^g Elimination of scum through burning	Firebox explosion from possible carryover of flammable scum	NR	Incinerator area if separated from scum storage	Unclassified	NC, LC, or LFS	FAS and FSS (if indoors), H, and FE
8	a	SLUDGE THICKENER Sludge concentration and removal, gravity, or dissolved air flotation	Possible generation of methane from sludge; carryover of floating flammable liquids	A	Enclosed — entire space	Division 1	NC	H and FE; CGD if enclosed in building
	B			Enclosed — entire space	Division 2	NC, LC, or LFS	H and FE; CGD if enclosed in building	
	C			Enclosed — entire space	Unclassified if process is preceded by primary treatment with skimming	NC	H and FE	
	d			Not enclosed, open to atmosphere	Envelope 0.46 m (18 in.) above water surface and 3 m (10 ft) horizontally from wetted walls ^h	Division 2	NC, LC, or LFS	H and FE
9	a	SLUDGE PUMPING STATION DRY WELLS	Buildup of methane gas or flammable vapors	D	Entire dry well when physically separated from a wet well or separate structures	Division 2	NC, LC, or LFS	H and FE
	b	Dry side of a sludge pumping station		C	Entire dry well when physically separated from a wet well or separate structures	Unclassified	NC, LC, or LFS	H and FE
10	a	SLUDGE STORAGE WET WELLS, PTTS, AND HOLDING TANKS	Possible generation of methane gas in explosive concentrations; carryover of floating flammable liquids	A	Enclosed — entire space	Division 1	NC	CGD, H, and FE if tank enclosed in building
	b	Retaining of sludge		B	Enclosed — entire space	Division 2	NC, LC, or LFS	CGD, H, and FE if tank enclosed in building
	c			Not enclosed, open to atmosphere	Envelope 0.46 m (18 in.) above water surface and 3 m (10 ft) horizontally from wetted walls ^h	Division 2	NC, LC, or LFS	NR

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Δ Table 6.2.2(a) *Continued*

Row*	Line*	Location and Function	Fire and Explosion Hazard	Ventilation ^{b,c,d}	Extent of Classified Location	NEC Hazardous Location Classification (All Class I, Group D) ^e	Materials of Construction ^f	Fire Protection Measures
11	a	SLUDGE-BLENDING TANKS AND HOLDING WELLS	Possible generation of methane gas in explosive concentrations; carryover of floating flammable liquids	A	Enclosed — entire space	Division 1	NC	H, FE, and CGD if tank enclosed in building
	b	Retaining of sludge with some agitation		B	Enclosed — entire space	Division 2	NC, LC, or LFS	H, FE, and CGD if tank enclosed in building
	c			Not enclosed, open to atmosphere	Envelope 0.46 m (18 in.) above water surface and 3 m (10 ft) horizontally from wetted walls ^e	Division 2	NC, LC, or LFS	NR
12	a	DEWATERING BUILDINGS CONTAINING CENTRIFUGES, GRAVITY BELT THICKENERS, BELT AND VACUUM FILTERS, AND FILTER PRESSES	Accumulation of methane gas	C	Entire room	Unclassified	NC, LC, or LFS	H, FE, and FAS
	b	Removal of water from sludge and the conveyance of sludge cake		D	Entire room	Division 2	NC, LC, or LFS	H, FE, and FAS
13	a	ENCLOSED SLUDGE CAKE STORAGE	Accumulation of methane gas	C	Entire room	Unclassified	NC, LC, or LFS	H, FE, and FAS
	b	Storage of dewatered sludge cake and conveyance of sludge cake		D	Entire room	Division 2	NC, LC, or LFS	H, FE, and FAS
14		INCINERATORS ^g AND INCINERATOR BUILDINGS Conveying and burning of sludge cake	Firebox explosion	NR	N/A	Unclassified	NC, LC, or LFS	FAS and FSS (if indoors), H, and FE
15		HEAT TREATMENT UNITS, LOW-OR HIGH-PRESSURE OXIDATION UNITS Closed oxidation of sludge	None, other than in high-pressure systems	NR	N/A	Unclassified	NC, LC, or LFS	H and FE

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Δ Table 6.2.2(a) Continued

Row ^a	Line ^a	Location and Function	Fire and Explosion Hazard	Ventilation ^{b,c,d}	Extent of Classified Location	NEC Hazardous Location Classification (All Class I, Group D) ^d	Materials of Construction ^e	Fire Protection Measures
16	a	ANAEROBIC DIGESTERS, BOTH FIXED ROOF AND FLOATING COVER Generation of sludge gas from digesting sludge	Leakage of gas from cover, piping, emergency relief valves, and appurtenances	Not enclosed, open to atmosphere	Tank interior; areas above and around digester cover; envelope 3 m (10 ft) above the highest point of cover, when cover is at its maximum elevation, and 1.5 m (5 ft) from any wall	Division 1	NC	H and FE
	b			Not enclosed, open to atmosphere	Envelope 4.6 m (15 ft) above Division 1 area over cover and 1.5 m (5 ft) beyond Division 1 area around tank walls	Division 2	NC	H and FE
	c			A	For digester tanks enclosed in a building; tank interior; entire area inside building	Division 1	NC	CGD if enclosed in building
	d			B	For digester tanks enclosed in a building; tank interior; areas above and around digester cover; envelope 3 m (10 ft) above highest point of cover, when cover is at its maximum elevation, and 1.5 m (5 ft) from any wall of digester tank	Division 1	NC	CGD if enclosed in building
	e			B	Remaining space in enclosed area	Division 2	NC, LC, or LFS	CGD if enclosed in building
17	a	ANAEROBIC DIGESTER CONTROL BUILDING	Leaking and ignition of sludge gas	A	Entire building	Division 1	NC	CGD, H, and FE
	b	Storage, handling, or burning of sludge gas		B	Enclosed areas that contain gas-handling equipment	Division 2	NC, LC, or LFS	CGD, H, and FE
	c			C	Physically separated from gas-handling equipment	Unclassified	NC, LC, or LFS	CGD, H, and FE
18	a	DIGESTER GAS-PROCESSING ROOMS	Sludge gas ignition	A	Entire room	Division 1	NC	CGD, H, and FE
	b	Gas compression, handling, and processing		B	Within 1.5 m (5 ft) of equipment	Division 1	NC, LC, or LFS	CGD, H, and FE
	c			B	Entire room	Division 2	NC, LC, or LFS	CGD, H, and FE
19		ANAEROBIC DIGESTER GAS STORAGE Storage of sludge gas	Gas storage piping and handling	NNV	Within a 3 m (10 ft) envelope of tanks, valves, and appurtenances	Division 1	NC, LC, or LFS	H and FE; CGD if enclosed in building

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Δ Table 6.2.2(a) Continued

Row ^a	Line ^a	Location and Function	Fire and Explosion Hazard	Ventilation ^{b,c,d}	Extent of Classified Location	NEC Hazardous Location Classification (All Class I, Group D) ^d	Materials of Construction ^e	Fire Protection Measures
20	a	WASTE GAS BURNERS Combusting excess gas	Gas piping and appurtenances	N/A	Within 3 m (10 ft) envelope of all fixtures, appurtenances, and housing	Division 1	NC	NR
	Envelope 4.6 m (15 ft) above Division 1 envelope and 1.5 m (5 ft) on all sides				Division 2	NC	NR	
21		CHLORINE OXIDATION UNITS Chlorine reaction with sludge	Chlorine is a very strong oxidizing agent	NR	N/A	Unclassified	NR (These unit processes use corrosive chemicals that require the use of specific materials of construction. Special consideration should be given to such materials of construction.)	H and FE
22	a	UNDERGROUND (PIPING) TUNNELS CONTAINING NATURAL GAS PIPING OR SLUDGE GAS PIPING	Ignition of natural gas or sludge gases	D	Within 3 m (10 ft) of valves and appurtenances	Division 1	NC, LC, or LFS	CGD, FDS, and FE
	b	Transmission of gas, sludge, water, air, and steam via piping; also might contain power cable and conduit		D	Entire tunnel	Division 2	NC, LC, or LFS	CGD, FDS, and FE
	c			C	Areas within 3 m (10 ft) of valves, meters, gas check valves, condensate traps, and other piping appurtenances	Division 2	NC, LC, or LFS	CGD, FDS, and FE
	d			C	Areas beyond 3 m (10 ft)	Unclassified	NC, LC, or LFS	CGD, FDS, and FE
23		UNDERGROUND (PIPING) TUNNELS NOT CONTAINING NATURAL GAS PIPING OR SLUDGE GAS PIPING Transmission of sludge, water, air, and steam piping; also might contain power cable and conduit	N/A	NR	N/A	Unclassified	NC, LC, or LFS	FDS and FE
24	a	COMPOSTING PILES	Liberation of ammonia and toxic gas (composting materials can self-ignite)	D	Enclosed area	Division 2	NC, LC, or LFS	
	b	Aerobic sludge reduction		C	Enclosed area	Unclassified	NC, LC, or LFS	H, FAS, and FSS
25	a	IN-VESSEL COMPOSTING Aerobic sludge reduction	Liberation of ammonia and toxic gas (composting materials can self-ignite)	As required by process	If enclosed, interior of reactor vessel plus a 3 m (10 ft) envelope around reactor vessel	Division 2	NC	H, FAS, and FSS
	b			As required by process	Areas beyond 3 m (10 ft)	Unclassified	NC	H

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Δ Table 6.2.2(a) Continued

Row ^a	Line ^a	Location and Function	Fire and Explosion Hazard	Ventilation ^{b,c,d}	Extent of Classified Location	NEC Hazardous Location Classification (All Class I, Group D) ^e	Materials of Construction ^f	Fire Protection Measures
26		ODOR-CONTROL AND VENTILATION SYSTEMS SERVING CLASSIFIED LOCATIONS (See Table 4.2.2)						
27		PUMPING OF DRAINAGE FROM DIGESTED SLUDGE-DEWATERING PROCESSES Pumping of centrate, filtrate, leachate, drying beds, and so forth	N/A	NR	N/A	Unclassified	NC, LC, or LFS	H

Note: The following codes are used in this table:

A: No ventilation or ventilated at less than 12 air changes per hour

B: Continuously ventilated at 12 air changes per hour in accordance with Chapter 9

C: Continuously ventilated at six air changes per hour in accordance with Chapter 9

CGD: Combustible gas detection system

D: No ventilation or ventilated at less than six air changes per hour

FAS: Fire alarm system

FE: Portable fire extinguisher

FSS: Fire suppression system (e.g., automatic sprinkler, water spray, foam, gaseous, or dry chemical)

H: Hydrant protection in accordance with 7.2.4

LC: Limited-combustible material

LFS: Low flame spread index material

N/A: Not applicable

NC: Noncombustible material

NEC: In accordance with NFPA 70

NNV: Not normally ventilated

NR: No requirement

^aThe "Row" and "Line" columns are used to refer to specific figures in A.6.2 and specific requirements for each location and function.

^bThis column indicates the ventilation requirements for processes. Additional ventilation requirements are provided in Chapter 9. Ventilation signaling and alarm requirements are provided in Chapter 7.

^cThe area beyond the envelope is unclassified.

^dThese unit processes use corrosive chemicals that can have a deteriorating effect on conductors and equipment. Electrical equipment should be identified for use in the operating environment.

^eThis column indicates the materials of construction for processes. Materials of construction for buildings in which these processes are housed are in accordance with the applicable building code and construction requirements provided in Chapter 8.

^fSee NFPA 54, NFPA 82, and NFPA 85.

Δ Table 6.2.2(b) Solids Treatment Processes — Sludge Drying

Row	Line	Location and Function	Fire and Explosion Hazard	Ventilation ^{a,b}	Extent of Classified Location	NEC Hazardous Location Classification (All Class II, Group G) ^c	Materials of Construction ^d	Fire Protection Measures
1	a	SLUDGE-DRYING PROCESSES ^e	Potential for ignition of dust	NR	If exposed to combustible particulate solids, entire room ^f	Division 1	NC (Construction in accordance with NFPA 30, NFPA 68, NFPA 69, NFPA 499, and NFPA 654)	H, FAS, and FSS (See NFPA 30, NFPA 61, NFPA 69, NFPA 85, NFPA 499, and NFPA 654)
	b			NR	Areas within equipment processing combustible particulate solids	Division 1	NC (Construction in accordance with NFPA 30, NFPA 68, NFPA 69, NFPA 499, and NFPA 654)	H, FAS, and FSS (See NFPA 30, NFPA 61, NFPA 69, NFPA 85, NFPA 499, and NFPA 654)
	c			NR	Areas within 3 m (10 ft) of equipment processing combustible particulate solids	Division 2	NC (Construction in accordance with NFPA 30, NFPA 68, NFPA 69, NFPA 499, and NFPA 654)	H, FAS, and FSS (See NFPA 30, NFPA 61, NFPA 69, NFPA 85, NFPA 499, and NFPA 654)
	d			NR	Areas beyond 3 m (10 ft) of equipment processing combustible particulate solids	Unclassified	NC (Construction in accordance with NFPA 30, NFPA 68, NFPA 69, NFPA 499, and NFPA 654)	H, FAS, and FSS (See NFPA 30, NFPA 61, NFPA 69, NFPA 85, NFPA 499, and NFPA 654)
2	a	DRIED SLUDGE STORAGE AREAS, IF ENCLOSED	Potential for ignition of dust	NR	If exposed to dried sludge, entire room ^f	Division 1	NC (Construction in accordance with NFPA 68 and NFPA 69, NFPA 499, and NFPA 654)	H, FAS (See NFPA 61, NFPA 69, NFPA 497, and NFPA 654)
	b			NR	Areas within tanks storing dried sludge	Division 1	NC (Construction in accordance with NFPA 68, NFPA 69, NFPA 499, and NFPA 654)	H and FAS (See NFPA 61, NFPA 69, NFPA 497, and NFPA 654)
	c			NR	Areas within 3 m (10 ft) of tanks storing dried sludge	Division 2	NC (Construction in accordance with NFPA 68, NFPA 69, NFPA 499, and NFPA 654)	H and FAS (See NFPA 61, NFPA 69, NFPA 497, and NFPA 654)
	d			NR	Areas beyond 3 m (10 ft) of tanks storing dried sludge	Unclassified	NC (Construction in accordance with NFPA 68, NFPA 69, NFPA 499, and NFPA 654)	H and FAS (See NFPA 61, NFPA 69, NFPA 497, and NFPA 654)

Note: The following codes are used in this table:

FAS: Fire alarm system

FSS: Fire suppression system (e.g., automatic sprinkler, water spray, foam, gaseous, or dry chemical)

H: Hydrant protection in accordance with 7.2.4

NC: Noncombustible material

NEC: In accordance with NFPA 70

NR: No requirement

^aThis column indicates the ventilation requirements for processes. Additional ventilation requirements are provided in Chapter 9. Ventilation signaling and alarm requirements are provided in Chapter 7.

^bFor sludge-drying processes that use flammable or combustible liquids, ventilate in accordance with NFPA 30.

^cOr if acceptable to the authority having jurisdiction with classification in NFPA 499.

^dThis column indicates the materials of construction for processes. Materials of construction for buildings in which these processes are housed are in accordance with the applicable building code and construction requirements provided in Chapter 8.

^eSee NFPA 54, NFPA 85, NFPA 499, and NFPA 654. For sludge-drying processes that use flammable or combustible liquids, see NFPA 30.

^fThe area beyond the envelope is unclassified.