



**Policy Title: Directive 15H-10**

**Responsible Office: Design & Construction**

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**DIRECTIVE 15H-10**

**PIPING TYPES AND MATERIALS**

**Issue date: April 2021**

<b>Steam &amp; Condensate Piping</b>					
<b>Service &amp; Location</b>	<b>Pipe Size</b>	<b>Pipe Material &amp; Weight</b>	<b>Joint Type (*B)(*E)</b>	<b>Fitting Material</b>	<b>Insulation Material</b>
<b>Low Pressure Steam (15 psig or less) (*C)(*D)</b>					
Inside Building	2" or smaller	Steel, Schedule 40, Grade B, ASTM A53 (Type E or S), ASTM A106	Threaded or Welded	Steel	Fiberglass w/ all service jacket
	2-1/2" or larger	Steel, Schedule 40, Grade B, ASTM A53 (Type E or S), ASTM A106	Welded	Steel	Fiberglass w/ all service jacket
Inside Tunnel	All sizes	Steel, Schedule 40, Grade B, ASTM A53 (Type E or S), ASTM A106	Welded	Steel	Mineral Wool w/ metal jacket
Direct Bury (*A)	All sizes	See SUCF Direct Bury Spec			
<b>High Pressure Steam (16 psig to 250 psig) (*C)(*D)(*M)</b>					
Inside Building	All sizes	Steel, Schedule 40, Grade B, ASTM A53 (Type E or S), ASTM A106	Welded	Steel	Mineral Wool w/ metal jacket
Inside Tunnel	All sizes	Steel, Schedule 40, Grade B, ASTM A53 (Type E or S), ASTM A106	Welded	Steel	Mineral Wool w/ metal jacket
Direct Bury (*A)	All sizes	See SUCF Direct Bury Spec			
<b>Low Pressure Condensate (15 psig or less) (*C)(*D)</b>					
Inside Building	2" or smaller	Steel, Schedule 80, Grade B, ASTM A53 (Type E or S), ASTM A106	Threaded or Welded	Steel	Fiberglass w/ all service jacket
	2-1/2" or larger	Steel, Schedule 80, Grade B, ASTM A53 (Type E or S), ASTM A106	Welded	Steel	Fiberglass w/ all service jacket

Inside Tunnel	All sizes	Steel, Schedule 80, Grade B, ASTM A53 (Type E or S), ASTM A106	Welded	Steel	Mineral Wool w/ metal jacket
Direct Bury (*A)	All sizes	See SUCF Direct Bury Spec			
<b>High Pressure Condensate (16 psig to 250 psig) (*C)(*D)(*M)</b>					
Inside Building	All sizes	Steel, Schedule 80, Grade B, ASTM A53 (Type E or S), ASTM A106	Welded	Steel	Mineral Wool w/ metal jacket
Inside Tunnel	All sizes	Steel, Schedule 80, Grade B, ASTM A53 (Type E or S), ASTM A106	Welded	Steel	Mineral Wool w/ metal jacket
Direct Bury (*A)	All sizes	See SUCF Direct Bury Spec			

\* Refer to the footnotes at the end of this document.

<b>Hydronic Piping – Hot Water</b>					
<b>Service &amp; Location</b>	<b>Pipe Size</b>	<b>Pipe Material &amp; Weight</b>	<b>Joint Type (*B)(*E)</b>	<b>Fitting Material</b>	<b>Insulation Material</b>
<b>Hot Water (&lt;250°F) (*C)(*D)</b>					
Inside Building	2" or smaller	Copper, Type L, Drawn, ASTM B88	Soldered	Copper or Copper Alloy	Fiberglass w/ all service jacket
		Steel, Schedule 40, Grade A or B, ASTM A53 (Type E or S), ASTM A106	Threaded (*K)	Steel	Fiberglass w/ all service jacket
	2-1/2" or larger	Steel, Schedule 40, Grade A or B, ASTM A53 (Type E or S), ASTM A106	Welded (*K)	Steel	Fiberglass w/ all service jacket
Inside Tunnel	All sizes	Steel, Schedule 40, Grade A or B, ASTM A53 (Type E or S), ASTM A106	Welded	Steel	Mineral Wool w/ metal jacket
Direct Bury (*A)	All sizes	Copper, Type K, Drawn, ASTM B88	Brazed	Copper or Copper Alloy	Pre-insulated w/ Polyurethane Foam and HDPE jacket
		Steel, Schedule 40, Grade A or B,	Welded	Steel	

		ASTM A53 (Type E or S), ASTM A106			
<b>Medium Temperature Water (≥250°F) (*C)(*D)(*F) (*M)</b>					
Inside Building or Tunnel	All sizes	Steel, Schedule 40, Grade B, ASTM A53 (Type E or S), ASTM A106	Welded	Steel	Mineral Wool w/ metal jacket
Direct Bury (*A)	All sizes	See SUCF Direct Bury Spec			
<b>High Temperature Water (≥350°F) (*C)(*D)(*F) (*M)</b>					
Inside Building or Tunnel	All sizes	Steel, Schedule 40, Grade B, ASTM A53, Type E or S, ASTM A106	Welded	Steel	Mineral Wool w/ metal jacket
Direct Bury (*A)	All sizes	See SUCF Direct Bury Spec			

\* Refer to the footnotes at the end of this document.

<b>Hydronic Piping – Chilled and Condenser Water</b>					
<b>Service &amp; Location</b>	<b>Pipe Size</b>	<b>Pipe Material &amp; Weight</b>	<b>Joint Type (*B)(*E)</b>	<b>Fitting Material</b>	<b>Insulation Material</b>
<b>Chilled Water (*C)(*D)</b>					
Inside Building	2" or smaller	Copper, Type L, Drawn, ASTM B88	Soldered (*K)	Copper or Copper Alloy	Fiberglass w/ all service jacket and vapor barrier
		Steel, Schedule 40, Grade A or B, ASTM A53 (Type E or S), ASTM A106	Threaded (*K)	Steel	Fiberglass w/ all service jacket and vapor barrier
	2-1/2" or larger	Steel, Schedule 40, Grade A or B, ASTM A53 (Type E or S), ASTM A106	Welded (*K)	Steel	Fiberglass w/ all service jacket and vapor barrier
Inside Tunnel	All sizes	Steel, Schedule 40, Grade A or B, ASTM A53 (Type E or S), ASTM A106	Welded	Steel	Mineral Wool w/ Metal Jacket and vapor barrier
Direct Bury (*A)	All sizes	Copper, Type K, Drawn, ASTM B88	Brazed	Copper or Copper Alloy	Pre-insulated w/ Polyurethane Foam and HDPE jacket
		Steel, Schedule 40, Grade A or B, ASTM A53 (Type E or S), ASTM A106	Welded	Steel	
<b>Condenser Water (*C)(*D)(*G)(*L)</b>					
Inside Building or Tunnel	2" or smaller	Copper, Type L, Drawn, ASTM B88	Soldered (*K)	Copper or Copper Alloy	None
		Steel, Schedule 40, Grade A or B, ASTM A53 (Type E or S), ASTM A106	Threaded (*K)	Steel	None
		PVC, Schedule 40, Pressure Pipe, ASTM D1785	Solvent Welded	PVC	None

	2-1/2" or larger	Steel, Schedule 40, Grade A or B, ASTM A53 (Type E or S), ASTM A106	Welded <b>(*K)</b>	Steel	None
		PVC, Schedule 40, Pressure Pipe, ASTM D1785	Solvent Welded	PVC	None
Direct Bury <b>(*A)</b>	All sizes	Steel, Schedule 40, Grade A or B, ASTM A53 (Type E or S), ASTM A106	Welded	Steel	Pre-insulated w/ Polyurethane Foam and HDPE jacket
		PVC, Schedule 40, Pressure Pipe, ASTM D1785	Solvent Welded	PVC	None

**\* Refer to the footnotes at the end of this document.**

<b>Fire Protection Piping</b>					
<b>Service &amp; Location</b>	<b>Pipe Size</b>	<b>Pipe Material &amp; Weight</b>	<b>Joint Type <b>(*B)(*E)</b></b>	<b>Fitting Material</b>	<b>Insulation Material</b>
<b>Fire Protection <b>(*C)(*D)</b></b>					
Inside Building Wet Piping System	All sizes	Steel, Schedule 40, Grade A, ASTM A53 (Type E or S), ASTM A106	Threaded, Welded or Groove Joint	Cast Steel, Steel or Ductile Iron	None
Inside Building Dry Piping System	All sizes	Steel or Galvanized Steel, Schedule 40, Grade A, ASTM A53 (Type E or S), ASTM A106	Threaded, Welded or Groove Joint	Cast Steel, Steel or Ductile Iron	None
Beneath Floor Slab	All sizes	Ductile Iron, Class 52, Cement Lined Asphaltic Coating, AWWA C151	Mechanical Joint Lock w/ thrust blocks	Ductile Iron	None
		PVC, Schedule 40, Pressure Pipe, AWWA C900 or C905	Bell & Spigot w/ thrust blocks	PVC	None

**\* Refer to the footnotes at the end of this document.**

<b>Plumbing Piping - Domestic Water, Sanitary, Storm, Waste, Vent</b>					
<b>Service &amp; Location</b>	<b>Pipe Size</b>	<b>Pipe Material &amp; Weight</b>	<b>Joint Type (*B)(*E)</b>	<b>Fitting Material</b>	<b>Insulation Material</b>
<b>Domestic Cold Water (*C)(*D)</b>					
Inside Building	All sizes	Copper, Type L, Drawn, ASTM B88	Soldered (*K)	Copper or Copper Alloy	Fiberglass w/ all service jacket and vapor barrier
	3" or larger	Copper, Type L, Drawn, ASTM B88	Soldered (*K)	Copper or Copper Alloy	Fiberglass w/ all service jacket and vapor barrier
		Ductile Iron, Class 52 AWWA C115, AWWA C151	Flanged joint, Mechanical Joint	Ductile Iron	Fiberglass w/ all service jacket and vapor barrier
Beneath Floor Slab	2" or smaller	Copper, Type K, Soft Annealed Coils, ASTM B88	None (*H)	None	None
	2-1/2" or larger	Ductile Iron, Class 52, Cement Lined Asphaltic Coating, AWWA C151	Mechanical Joint Lock w/ thrust blocks	Ductile Iron	None
		PVC, Schedule 40, Pressure Pipe, ASTM D1785	Bell & Spigot w/ thrust blocks	PVC	None
<b>Domestic Hot Water (*C)(*D)</b>					
Inside Building	All sizes	Copper, Type L, Drawn, ASTM B88	Soldered	Copper or Copper Alloy	Fiberglass w/ all service jacket
	3" or larger	Copper, Type L, Drawn, ASTM B88	Soldered (*K)	Copper or Copper Alloy	Fiberglass w/ all service jacket
		Ductile Iron, Class 52 AWWA C115, AWWA C151	Flanged joint, Mechanical Joint	Ductile Iron	Fiberglass w/ all service jacket
Beneath Floor Slab	All sizes	Copper, Type K, Drawn, ASTM B88	Soldered	Copper or Copper Alloy	Pre-insulated w/ Polyurethane Foam and HDPE jacket
<b>Sanitary, Storm, Waste, and Vent (*C)(*D)(*L)</b>					
Inside Building	All sizes	Copper, Type DWV, ASTM B306	Soldered	Copper or Copper Alloy	Fiberglass w/ all service jacket <u>on Storm Piping Only</u>
		PVC, Schedule 40, Type DWV, ASTM D2665 or D2949	Solvent Welded	PVC	Fiberglass w/ all service jacket

		Cast Iron, Asphaltic Coating, Service Weight, ASTM A74	Bell & Spigot or No Hub w/ heavy duty SS clamp	Cast Iron	<u>on Storm Piping Only</u> Fiberglass w/ all service jacket <u>on Storm Piping Only</u>
Beneath Floor Slab	All Sizes	Copper, Type DWV, ASTM B306	Soldered	Copper or Copper Alloy	None
		PVC, Schedule 40, Type DWV, ASTM D2665 or D2949	Solvent Welded	PVC	None
		Cast Iron, Asphaltic Coating, Service Weight, ASTM A74	Bell & Spigot	Cast Iron	None
<b>Cooling Coil Condensate</b>					
Inside Building	All sizes	Copper, Type DWV, ASTM B306	Soldered <b>(*K)</b>	Copper or Copper Alloy	Fiberglass w/ all service jacket & vapor barrier - OR - elastomeric
		PVC, Schedule 40, Type DWV, ASTM D2665 or D2949	Solvent Welded	PVC	Fiberglass w/ all service jacket & vapor barrier – OR - elastomeric

\* Refer to the footnotes at the end of this document.

<b>Miscellaneous Piping</b>					
<b>Service &amp; Location</b>	<b>Pipe Size</b>	<b>Pipe Material &amp; Weight</b>	<b>Joint Type <b>(*B)(*E)</b></b>	<b>Fitting Material</b>	<b>Insulation Material</b>
<b>Natural Gas <b>(*C)(*D)</b></b>					
Above Ground <b>(*I)</b>	2" or smaller	Steel, Schedule 40, Grade A, ASTM A53 (Type E or S), ASTM A106	Threaded or Welded	Malleable Iron or Steel	None
	2-1/2" or larger	Steel, Schedule 40, Grade A, ASTM A53 (Type E or S), ASTM A106	Welded	Steel	None
<b>Fuel Oil <b>(*C)(*D)</b></b>					
Above Ground	2" or smaller	Copper, Type L, Drawn, ASTM B88	Brazed	Copper or Copper Alloy	None
		Steel, Schedule 40, Grade A,	Welded	Steel	None

		ASTM A53 (Type E or S), ASTM A106			
	2-1/2" or larger	Steel, Schedule 40, Grade A, ASTM A53 (Type E or S), ASTM A106	Welded	Steel	None
Direct Bury (Double Containment)	All Sizes	Copper, Type K, Annealed, ASTM B88 Primary Piping w/ PE, FRP or PVC Containment Pipe	Brazed	Copper or Copper Alloy	None
		Steel, Schedule 40, Grade A, ASTM A53, Type E or S Primary Piping w/ PE, FRP or PVC Containment Pipe	Welded	Steel	None
<b>Refrigerant</b>					
Inside Building	All Sizes	Copper, Type ACR, Drawn, ASTM B280	Brazed	Copper or Copper Alloy	Flexible Elastomeric
Outside Building	All Sizes	Copper, Type ACR, Drawn, ASTM B280	Brazed	Copper or Copper Alloy	Flexible Elastomeric with PVC jacket containing UV Inhibitor
<b>Compressed Air (*C)</b>					
Inside or Outside Building Above Ground	All sizes	Copper, Type L, Drawn, ASTM B88	Soldered	Copper or Copper Alloy	None
Inside or Outside Building Direct Bury	All sizes	Copper, Type K, Soft Annealed Coils, ASTM B88	None (*H)	None	None

\* Refer to the footnotes at the end of this document.

<b>Laboratory Piping (*J)</b>					
<b>Service &amp; Location</b>	<b>Pipe Size</b>	<b>Pipe Material &amp; Weight</b>	<b>Joint Type (*B)(*E)</b>	<b>Fitting Material</b>	<b>Insulation Material</b>
<b>Air, Gas &amp; Vacuum</b>					
Inside Building	All Sizes	Copper, Type L , Drawn ASTM B 88	Brazed	Copper or Copper Alloy	None
<b>Acid Waste (*C)(*L)</b>					



Inside Building  <u>Note:</u> PP & PVDF Require Continuous Support Pipe Hangers	All sizes	PP (Polypropylene), ASTM F1412, Flame Retardant	Heat Fusion	PP	None
		PVDF (Polyvinylidene Fluoride), ASTM F1673	Heat Fusion	PVDF	None
		CPVC (Chlorinated Polyvinyl Chloride), ASTM D1784/F2618 Schedule 40, NSF CW-SE Certified	Solvent Welded, ASTM F493	CPVC	None
		Borosilicate Glass, ASTM C1053	SS Compression Coupling, TFE Seal	Borosilicate Glass	None
		Silicon Iron, ASTM A518/A861	Bell & Spigot & Acid Resistant Sealant	Cast Iron	None
Direct Bury (Double Containment)	All sizes	PP (Polypropylene), ASTM F1412, Flame Retardant	Heat Fusion	PP	None
		PVDF (Polyvinylidene Fluoride), ASTM F1673	Heat Fusion	PVDF	None
<b>Quality Water (RO &amp; DI) (*L)</b>					
Inside Building  <u>Note:</u> PP & PVDF Require Continuous Support Pipe Hangers	All sizes	PP (Polypropylene), ASTM D4101	Electrofusion	PP	None
		PVDF (Polyvinylidene Fluoride) ASTM D3222	Electrofusion	PVDF	None
		Stainless Steel	Threaded	Stainless Steel	None

**\* Refer to the footnotes at the end of this document.**

**FOOTNOTES:**

**(\*A)** Requires Prior SUCF Approval

**(\*B)** Valve and equipment connections shall be made with unions (for threaded or soldered piping); or flanges (for welded piping).

**(\*C)** Protect piping that passes through or beneath footings or foundation walls per PCNYS.

- (\*D) See Directive 2-3 “Site Utilities” for more information on site piping requirements.
- (\*E) Weld-o-lets and thread-o-lets are permitted for steel branch connections 2 or more sizes smaller than the main. Holes for weld-o-lets and thread-o-lets shall be machined (torch cutting not acceptable). Copper branch connections shall be made with tee fittings (mechanically extracted collars not acceptable).
- (\*F) See Directive 15H-6 “High and Medium Temperature Water Systems” for more information
- (\*G) Insulation is not required for condenser water service.
- (\*H) Piping beneath floor slabs shall be installed with no fittings or joints.
- (\*I) Gas piping greater than 5 psig shall be welded regardless of size.
- (\*J) Piping used in medical capacity or hospital - material as outlined in NFPA 99
- (\*K) Hot water, chilled water, domestic cold water and condenser water piping located in mechanical spaces with floor drains or outdoors may be grooved joint.
- (\*L) Plastic piping located in air distribution plenums shall have a Flame spread index < 25 and Smoke developed index < 50 per ASTM E84, as required by the BCNYS.
- (\*M) Radiographic inspection (RT) of 100% of welds inside buildings and walkable tunnels is required. Piping in non-walkable tunnels or direct bury require a successful 10% sample of RT testing. See language in SUCF Direct Bury specification for additional information.