**Note to users: items shown in red indicated edits / selections that need to be made to tailor the specification for the application.**

Retain and edit "Delegated-Design Submittal" Paragraph 1.h below if design services have been delegated to the contractor. The delegated design may be completed entirely by the contractor or may also involve the equipment manufacturer. Typically, the contractor would be responsible for the means and methods to attach anchors and guides to the structure, and field-fabrication of anchors. Expansion joint manufacturers may be involved in the piping analysis and selection of expansion joints and placement of anchors and guides.

**Metraloops with carbon steel or stainless-steel fittings.**

Product Specifications

1. General
	1. Provide flexible hose expansion loop(s) as indicated on the contract drawings or as required to accommodate any thermal expansion, contraction, or seismic movement of the piping system.
	2. Flexible hose expansion loops shall be manufactured complete with two parallel sections of corrugated metal house, compatible braid, 180⁰ return bend, with inlet and outlet connections. Field fabricated loops shall not be acceptable.
	3. Flexible loops shall be capable of movement in the ±X, ±Y, and ±Z planes.
	4. Flexible hose expansion loops shall impart no thrust loads to system support, anchors or building structure.
	5. For flammable liquid or gas service up to 4”, flexible expansion loops shall be CSA / AGA certified.
	6. All flexible hose expansion loops shall be manufactured in accordance with the documented manufacturers weld procedure specifications in accordance with ASME Section IX.
	7. All flexible hose expansion loops shall be manufactured in accordance with ASME / ANSI B31.1
	8. Delegated-Design Submittal: Provide analysis signed and sealed by a qualified professional engineer. Submittal shall include [edit as required for project]:
		1. Design Calculations: Calculate requirements for thermal expansion of piping systems and criteria for selecting and designing expansion joints, hard-pipe loops, and swing connections.
		2. Schedule and drawings: Indicate type, manufacturer's number, size, material, pressure rating, end connections, and locations for each expansion joint, anchor and guide.
		3. Anchor Details: Detail fabrication of each anchor indicated. Show dimensions, methods of assembly, and attachment to building structure.
		4. Alignment Guide Details: Detail field assembly and attachment to building structure.
2. Products
	1. Flexible hose expansion loops to be "**Metraloop**®” as manufactured by The Metraflex Company®, Chicago, IL.
	2. Corrugated Hose
		1. Stainless Steel
			1. Type 321 (recommended)
			2. Type 304
			3. Type 316
		2. Braid
			1. 304 Stainless Steel braid shall be used for any series 300 stainless steel hose.
			2. Layers (pressure / service dependent)
				1. Single layer
				2. Double layer
	3. Fittings Materials of construction
		1. Carbon steel
			1. Standard weight / Sch 40 ASTM A 234 WPB
			2. Extra heavy / Sch 80 ASTM A 234 WPB
		2. End fittings shall match fittings material.
			1. Carbon Steel
				1. Weld end in accordance with ASME B16.9
				2. MPT in accordance with ASME B1.20.1
				3. Plate flange with 150 lb. drilling.
				4. Raised Face Slip on Flange in accordance with ASME B16.5
				5. Weld neck flanges in accordance with ASME B16.5
				6. Grooved ends in accordance with ANSI C-606
		3. Stainless steel
			1. Sch 10 S Type 304 Stainless in accordance with ASTM A240
			2. Sch 40 S Type 304 Stainless in accordance with ASTM A240
			3. Sch 10 S Type 316 Stainless in accordance with ASTM A240
			4. Sch 40 S Type 316 Stainless in accordance with ASTM A240
		4. End fittings shall match fitting material.
			* 1. Weld end in accordance with ASME B16.9
				2. MPT in accordance with ASME B1.20.1
				3. Plate flange with 150 lb. drilling.
				4. Raised Face Slip on Flange in accordance with ASME B16.5
				5. Weld neck flanges in accordance with ASME B16.5
				6. Grooved ends in accordance with ANSI C-606
	4. Flexible hose expansion loops shall have a factory supplied; hanger / support lug located at the bottom of the 180⁰ return.
	5. Flexible hose expansion loop(s) shall be furnished with a plugged FPT to be used for a drain or air release vent.
	6. Flexible hose expansion loop(s) shall be rated with an operating pressure in accordance with manufacturer’s documentation. The operating pressure shall be based on burst pressure with a 4 to 1 safety factor. For steam applications, the operating pressure shall be based on burst pressure with an 8 to 1 safety factor.
3. Execution
	1. Install and guide per manufacturers’ installation instructions and Mechanical Contractors Association of America “Guidelines for Quality Piping Installations”.
	2. Flexible hose expansion loop return fitting shall be supported to allow movement.