**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.i 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.

**UPC Listed Metraloops copper 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. All flexible hose expansion loops shall be UPC listed.
	6. Flexible hose loops shall be certified to be in conformance with NSF 61and NSF 372.
	7. All flexible hose expansion loops shall be certified to be in compliance with IAPMO IGC 327.
	8. All flexible hose expansion loops shall be manufactured in accordance with the documented manufacturers weld procedure specifications in accordance with ASME Section IX.
	9. All flexible hose expansion loops shall be manufactured in accordance with ASME / ANSI B31.1
	10. 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 "**UPC** **Metraloop** ®” as manufactured by The Metraflex Company®, Chicago, IL.
	2. Corrugated Bronze Hose
		1. Flexible hose shall be Bronze in accordance with alloy UNS 19400, in accordance with ASTM B-465 for sizes up to 2”.
		2. Flexible hose shall be Bronze in accordance with alloy UNS 51000, in accordance with ASTM B-103 for 2.5” and larger.
	3. Braid shall be Bronze in accordance with UNS 50700 bronze wire in accordance with ASTM B105 (C507).
	4. End Fittings
		1. Press Fit Connections in accordance with IAPMO PS117.
		2. Wrought Copper and Copper Alloy Solder Joint Pressure fittings in accordance with ASME B16.22.
		3. Copper tube end shall comply with ASTM B88.
	5. 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.
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.