Problems with GI Piping in Water Supply

1. GI is just not suitable for use in a food industry to convey treated water, as usually this treated water is often combined with the final food product, or with some intermediate used in the manufacture of the food product. The Material of Construction for (MOC) in the food industry must Stainless Steel (either SS 304 or, better still SS 316). Treated water tends to quickly absorb any thing from a GI pipe as all treated water tends to be "aggressive" in nature. Mild steel (MS) is even more unsuitable for transporting treated water, as both these MOCs can rust when water is stopped and then, when water is pumped through the pipe, it will carry the rust to the product with which it is mixed/comes into contact with.

Source: http://www.indiawaterportal.org/ask/5631

2. Galvanised steel can reasonably be used only in flowing waters with fairly high mineral contents, that are aerated and tend to be calcifying, and have a pH greater than 6.5, together with a minimum concentration of bicarbonate ions. These conclusions have been confirmed by numerous experimental studies performed in Germany over a period of several years, leading to the definition of empirical corrosion rate formulae allowing for :
1- the nature of the water
2- the quality of the installation

Source: Corrosion resistance of common metals and stainless steels in water
J. Lédion, Ecole Nationale Supérieure d'Arts et Métiers, Paris

3. Japanese housing is multi-unit, consisting of both shared and private spaces. The report suggests that piping systems in shared areas be considered part of the whole "skeleton" of the residential structure. This concept uses stainless steel, because of their durability, which reduces the need for repairs and expanding the life of the entire piping system.

Another advantage to longer-lasting housing will be a reduction in carbon dioxide emissions. Dismantling and rebuilding structures call for the production and transportation of pipes, valves and other materials, which in turn causes carbon dioxide emissions. The shift toward durable piping, and away from continuous replacement, will inevitably create a reduction in those emissions, as well as in overall energy consumption.

Source: Extending the Life of Japanese Apartments, Nickel Institute

4. Short Life Spans: GI Pipes have short lifespan as compared to the life of the building. The pipes need to be repaired/ replaced in time periods as varying as 5-20 years depending upon the local water quality. This involves huge expanses on replacement and interiors. As an example:

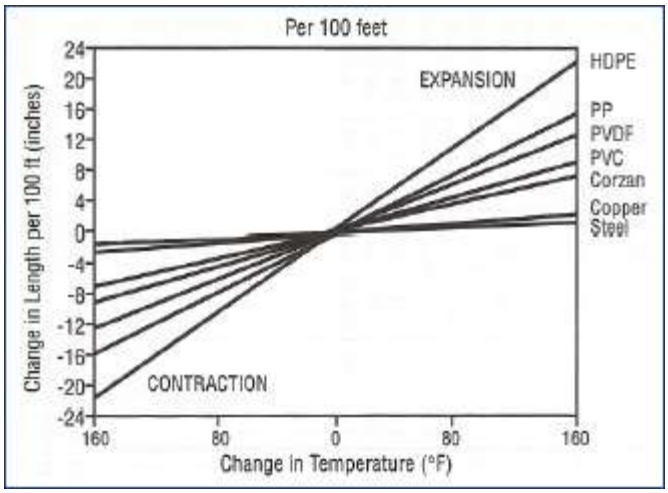
Cost	GI	SS
• Material Cost	4,000	10,000
• Labor Cost	8,000	6,000
• Total Cost	12,000	18,000
• Average Life	10 years	50 years
– Repairs	1 times	Nil
• Cost of Repair (5 times)	20,000	0
– Replacement	4 times	Nil
• Cost of Replacement	80,000	0
• Cost of Interiors	60,000	0
• **Total Lifecycle Costs**	**172,000**	**16,000**

5. **Thermal Expansion and Thermal Stresses :** It is important to consider thermal expansion when designing a system with plastic pipes. Most thermoplastics have a coefficient of thermal expansion which is significantly higher than those of metals. The thermal expansion of a piping system subject to a temperature change can therefore be significant, and may need compensation in the system design. The coefficient of thermal expansion of steel is five times lower than that of CPVC, dimensional changes due to thermal expansion will be five times less

The thermal expansion and contraction of CPVC and other piping materials is displayed below.

- The fractional change in a length of a specimen due to a unit change in temperature. (ASTM D-6960 Test Method) (in./in./°F x 10^{-5}) The lower the number, the lower the expansion rate.

PVC	3.0
CPVC	3.8
PE	7.8



6. Uniform Plumbing Code of India 2008 - Page 119

605.11 Galvanized Iron. Water pipe and fittings made of galvanized iron shall not be recommended in piping systems used to convey potable water.

7. **Composition of Various Grades of Stainless Steel**

Element	Unit	304	316L	439	J4 (204)
Ni	%	8 – 10.5	10 -14	0.5	1 – 2
Cr	%	17.5 – 19.5	16 – 18	17-19	15 – 16.5
C	% (max)	0.08	0.08	0.03	0.10
Mn	% (max)	2	2	1.0	8.5 – 10
Mo	%	-	2 – 3		
Cu	%	-			1.5 - 2.0
Si	% (max)	*< 1*			
P	% (max)	*< 0.045*			
S	% (max)	*< 0.030*			
Fe	%	*Balance*			

8. **<u>Physical Properties</u>**

UTS	Mpa	515	485	415	650
YS	Mpa	205	170	220	325
Hardness	HRB (max)	92	95	92	100

5. Ad by Delhi Jal Board: