

Stainless Steel in Plumbing Systems

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August 21, 2010

ISSDA Workshop, Ahmedabad

Stainless Steel in Water Applications

- **Antibacterial and Hygienic:** Recommended for Food products
- **Handling of drinking water:** Does not change the taste of the water
- **Surfaces are smooth, hard and homogenous.**
 - difficult for Bacteria and Fungi to adhere.
 - deposits are minimal.
- Stainless Steel is not affected by **vandalism and graffiti.**

Source: EuroInox: The stainless steel lining of drinking water reservoirs –Initial erection and refurbishment

Stainless Steel in Water Applications

- **Low Surface roughness** (only 0.15 to 0.25 μm)
 - a. Reduces deposits and film formation
 - b. Facilitates Cleaning
 - c. Makes chemical cleansers redundant
- **Strong material:** Not easily damaged by use in Public Buildings.
- **Wear resistant:**
 - Remarkable for its abrasion and erosion resistance.

Source: EuroInox: The stainless steel lining of drinking water reservoirs –Initial erection and refurbishment

Extending building life to 200 years



- A new Concept for Japanese High Rises
- An 'all-stainless-steel' piping system aims to extend the life of residential high-rises.

According to the report titled 200 Years Housing Vision, the average apartment building in Japan lasts only 30 years, compared with 55 years for American homes and 77 for English ones. The short lifespan is an economic burden for residents as well as a hindrance to conservation efforts.

Global References



Taipei Financial Center



Petronas Towers, Malaysia



Aurora Residential Towers,
Australia

304 grade SS Press Fitting type piping
To accommodate High Pressures and Vibration.
Fire protection
Hot and Cold Water Supply

Source: High pressure Urban water Distribution Nickel Vol20, number 2, March 2005

Global References



Lightweight Bridge to carry drinking water in Tokyo.

- Lightweight bridges are used to carry potable water and pedestrians across river spans up to 632 m in Japan
 - 85% Type 304
 - 10% Type 316
 - Some 2205 near the coast
- No repainting
- 40% cheaper over 30 years
- First one built: 1983
- Max pipe diameter: 0.8 m
- There are now ~3000 such bridges in Japan

Mettur Dam, Tamil Nadu

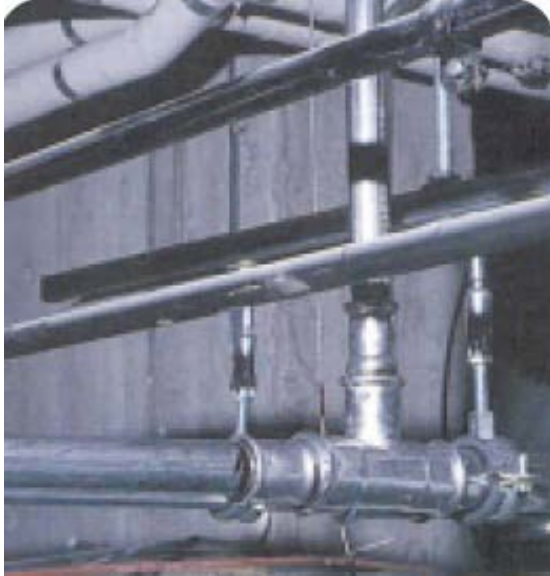


- Raw water handing in Mettur Dam, Cauvery River
- First stainless steel raw water pipe in India (1998)
- Lightweight meant easy installation in hilly country
- >50 year life expected (2 replacements of cast iron in that time)
- Smooth bore meant sustained low pumping costs
- LCC analysis: 60% saving over 50 years

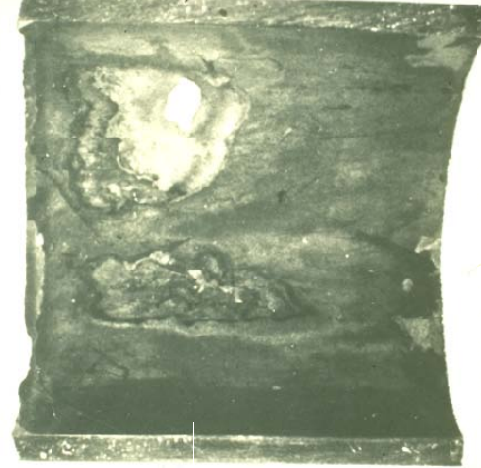
SS Plumbing

- No general corrosion so no need for corrosion allowance
- No Threading required, hence thinner – 1/3rd the weight of GI pipe
- No need for protective coating
- No need to control water chemistry- suitable for both Soft as well as Hard Waters
- Water purity is maintained
- Lightweight
- Easy to Install
- Equipment is durable with Low Life Cycle Cost

Applications in Hospitals



As per "Scottish Health Technical Memorandum 04-01:"
11.8 The materials generally used for the conveyance of water in healthcare premises are **stainless steel** or plastics. ***Copper is only used in exceptional circumstances*** such as, an extension to existing premises with short life expectancy, or very small stand alone premises.

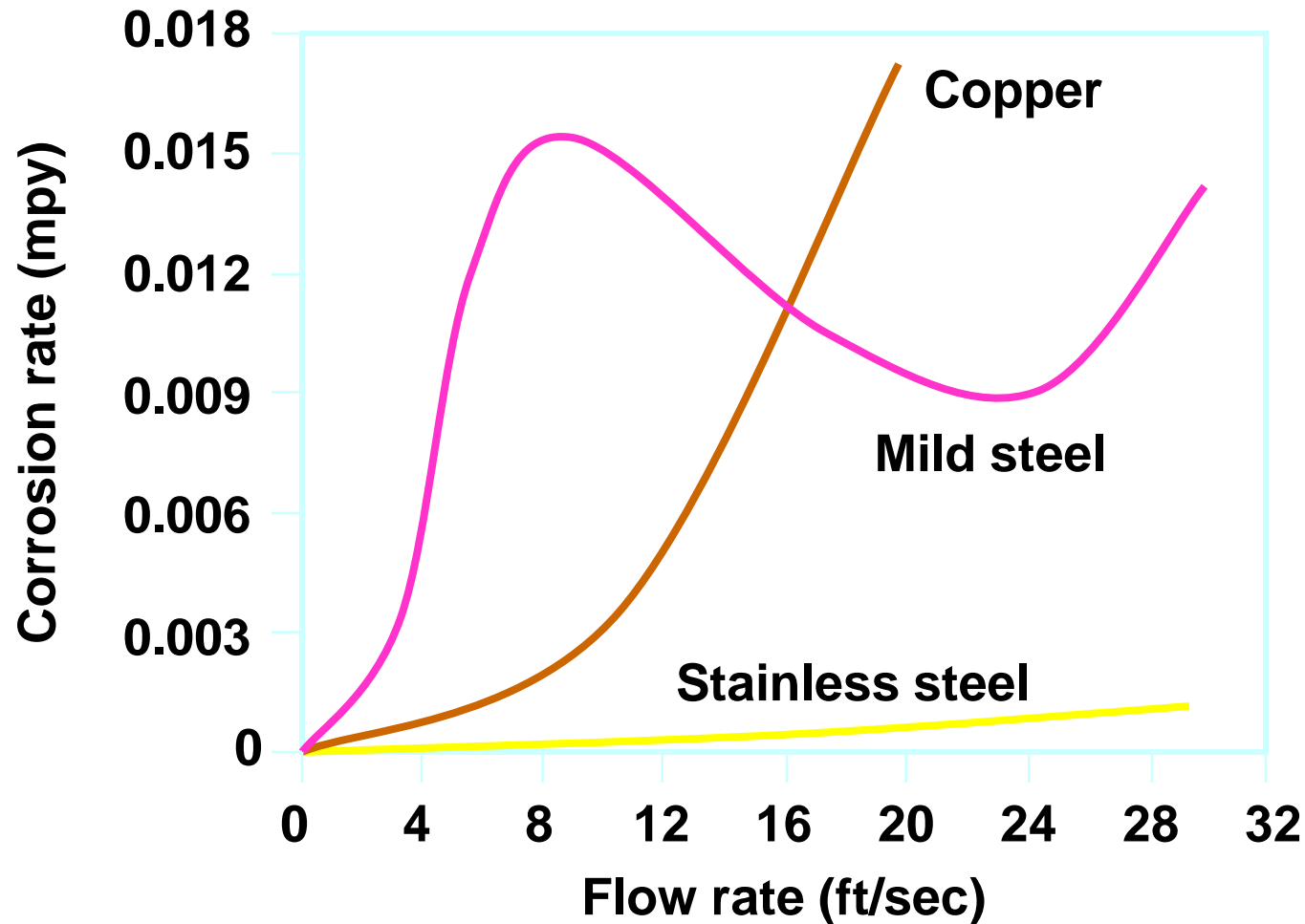


**Erosion in
Copper Pipes**

System can be pressure tested up to 25 Bar

Source: Bright Future for SS Plumbing, Association of Plumbing and Heating contractors

Effect of water velocity on corrosion rate



Differences between traditional materials and stainless steels in potable water

| | Steel, iron copper alloys | Stainless steel |
|--------------------------------|--------------------------------------|---|
| Water contamination | Fe, Cu, Pb, Zn | Almost nil after system stabilises |
| Velocity | < 2 m/sec | Up to 40 m/sec |
| Water chemistry | Limited | Unlimited within range of potable waters |
| Durability | 20 – 40 years | 100 years |

View of environmental load reduction

Formation of a long-life life

If environment is chosen correctly, it is considered that stainless steel pipe would have semi-permanent life, and the usual life of stainless steel piping under use of hot water of 80°C, is set up as “at least 40 years” by JSSA, considering the life rubber packing used for mechanical joints.

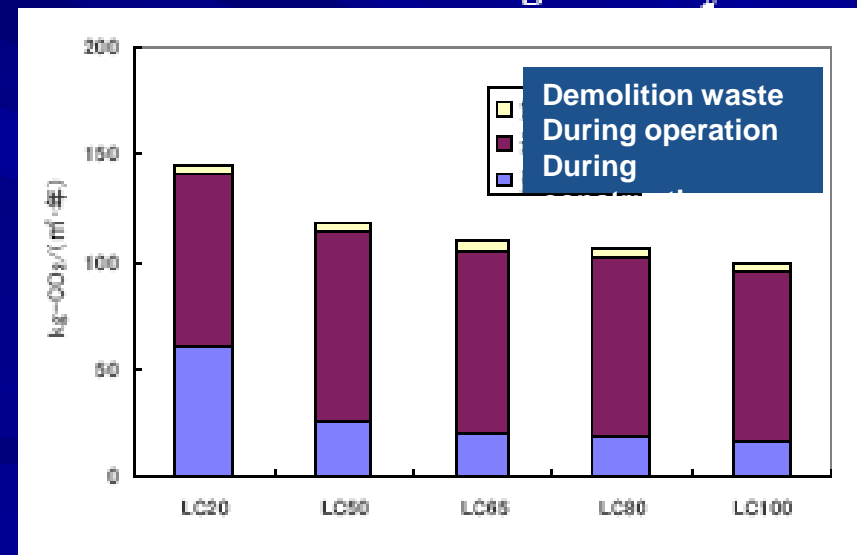
It is also possible to set up as “more than 100 years” under use in normal temperature of 25°C.

| Temp | 80°C | 70°C | 25°C |
|-------|-----------|-----------|--------|
| Life | 40yrs | 80yrs | 100yrs |
| Usage | Hot Water | Hot Water | Water |

Source: Stainless steel piping guide 2002

Edited by Japan Stainless Steel Association

Formation of a long-life life of a building, and the annual average LCCO₂



source: — air-conditioning and sanitary engineering meeting: — environmental load reduction measure

Durability Tests in Japan



Toilet sewage piping 26 years After construction

If life prediction is performed from the maximum penetration depth, it will have been 135 years for part of mother material Pipe, and 60 years for part of lap joint..

The observation shows actual life becomes longer than these result, since corrosion speed gets slower year by year.

Application in Fire Fighting Systems

The examples of Fire Department Stand Pipe



125A



100A 65A



100A 65A



Water Supply Pipe 40Su



Office building



Apartment



150A

Approvals to use stainless steels

- National approvals in EU Member States will be replaced by European Acceptance Scheme
- USA:
 - specified grades approved for public water supply without restriction under ANSI/NSF 61
 - approved under International Building Code
 - approved under International Residential Code
- National approvals in Australia/New Zealand, China, Malaysia
- India

Plumbing Code – India

- 2008 Uniform Plumbing Code – India
 - Page No. 119, Clause 605.11
 - Galvanised Iron:
 - Water Pipes & Fittings made of galvanised iron **shall not be recommended** in piping systems used to convey potable water

Product

- Pipe – SS Grade (AISI 304 grade)
- Fittings – Innovative Press Fit Design (AISI 304 grade)
 - Sealing Ring
:CIIR/EPDM
- Press fitting Tools
 - Manual / Hydraulic
 - Battery Operated



A collection of various stainless steel pipe fittings and components arranged on a white surface. The items include:

- Seven T-junction fittings (tees) of different sizes and configurations, some with threaded ends.
- Three 90-degree elbow fittings.
- Two straight connector fittings.
- One long straight pipe section with a hex nut and washer attached.
- One small straight connector with a flared end.
- One larger straight pipe section.
- One small flanged fitting.
- One clamp or bracket with two screws.
- One long, curved pipe section.
- One 90-degree elbow with a threaded end.
- One T-junction fitting with a threaded end.
- One small flanged fitting.
- One 90-degree elbow with a threaded end.
- One cross-shaped bracket or support piece.

Pressing / Cutting Tools



Pipe Cutter



Manual Pressing Tool

Joining Systems

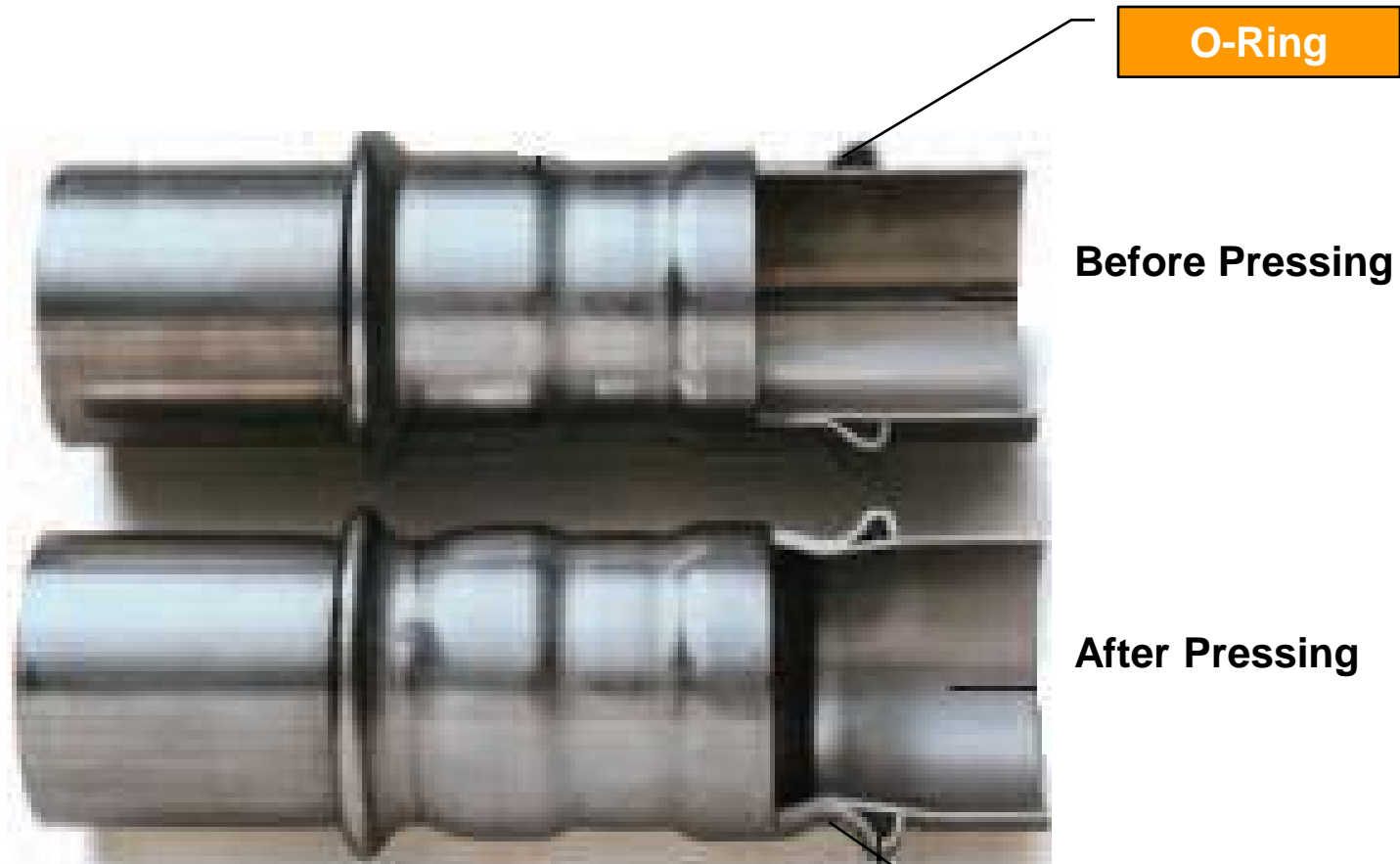
Fast, Clean & Safe
No Soldering, Welding, or Screwing



After Pressing



Joining



**No gap between
fitting & pipe, no
water reaches O ring**

Waste water treatment - LCC



← Old

Huddersfield, UK

Waste water treatment

New ↓



- 98% reduction in maintenance costs
- 25% extra plant capacity

Easy to install



Indus Hotel, Delhi



Flat in Mumbai

Easy to use in Difficult areas

Time taken :

About 8 hrs against 2-3 days for GI& Copper (1/3rd time).

Expected to come down further to 4-5 hrs.

Photographs of Installations



Ambala - House



Gwalior – Heritage Hotel



Mumbai - Flat



Delhi - House



Hisar - Hospital



Delhi - House

Cost Comparison

Estimated Cost of Plumbing in a typical Bathroom

| <u>Cost</u> | <u>GI</u> | <u>SS</u> |
|-----------------|-----------|-----------|
| • Material Cost | 4,000 | 10,000 |
| • Labor Cost | 4,000 | 4,000 |
| • Total Cost | 8,000 | 14,000 |

SS costs an additional Rs 6,000/- per bathroom (approx)

Savings:

Stainless Steel allows for use of lower size of pipes
thereby saving in both material and labor costs

Fast Installation

Life Cycle Costs

| <u>Cost</u> | <u>GI</u> | <u>SS</u> |
|--------------------------------|----------------|---------------|
| • Total Cost | 8,000 | 14,000 |
| • Average Life | 10 years | 50 years |
| – Repairs | 1 times | Nil |
| • Cost of Repair (5 times) | 10,000 | 0 |
| – Replacement | 4 times | Nil |
| • Cost of Replacement | 60,000 | 0 |
| • Cost of Interiors | 60,000 | 0 |
| • Total Lifecycle Costs | 138,000 | 14,000 |

**VIDEO of
Joining Process**

For more details please contact

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Thank You