Stainless Flexible Service Line
A permanent solution for water loss

PROBLEM
Leakage from water distribution systems is a significant problem in many cities. Water scarcity, seismic events, high water cost, a continued increase in city populations due to ongoing mass urbanization, droughts and climate change are key drivers to addressing leakage. Many of the world’s utilities often do not know exactly the extent of the water loss in their system.

Both Tokyo and Taipei have determined that some 95% of leakage repairs affect their service tubes of 50 mm (2 inch) diameter or less.

Historically, service pipes there had been constructed of lead, iron or plastics.

Once a service line is in the ground various forces, such as:
- Vibrations from traffic and construction work
- Subsidence
- Seismic events
can cause the pipes to deform, become detached or even break.

The lead lines not only had leakage problems, but there were also grave health concerns which required accelerated replacement of these lines.

SOLUTION
In 1980, to combat the scourge of leaks, Tokyo instituted a three part solution to the problem:
- Replacing the existing service pipes with Type 316 (UNS S31600) stainless steel and the cast iron mains with ductile iron
- Improving leakage detection
- Shortening response time when a leak is detected

In 1998 stainless partially corrugated pipe (SPCT) was introduced instead of straight pipe and fittings. Corrugations at regular intervals enable bending during installation to accommodate changes in direction without additional joints. It also allows to absorb the stresses from vibrations, subsidence and seismic events. The number of joints was significantly reduced by using a single length of corrugated tube, which proved a cost benefit.

RESOLUTİON
Tokyo reduced its water loss from 15% to around 3% over a twenty-year period and keeps saving hundreds of millions of dollars per year by reducing water loss and repair jobs. They have fewer than 0.2 leakage cases per 1000 stainless steel service connections per year, even though about 70% of their stainless steel service lines are 30+ years old, as of 2023.

Tokyo’s success at reducing leakage attracted the attention of Taipei and Seoul. In Taipei, a 20-year water loss reduction project, started in 2006, includes the systematic replacement of service

RESULTS
Taipei's service line replacement in particular has been the largest contributor to leakage reduction from 26% to 11% by the end of 2021. Additional achievements: a reduction of repair cases from around 12,000 to 2,000 per year (only a dozen of them are related to stainless steel), which corresponds to 0.06 leaks / 1000 service connections, decreased energy use and CO2 emissions.

Furthermore, Seoul was able to reduce the number of water treatment plants by 40%.

WHY TYPE 316 STAINLESS?
Type 316 stainless steel with 2% molybdenum and 10% nickel content has excellent corrosion resistance in a wide range of soils. Tokyo expects service life to be in excess of 100 years.

ADVANTAGES

Stainless Steel Characteristics:
- Corrosion resistant
- Durable
- Hygienic and resistant to hydrocarbons
- Strong
- Lower Life Cycle Cost
- Not susceptible to cracking
- Negligible maintenance costs
- Improved water quality
- 100% recyclable

Flexible pipes:
- Reduced leakage by minimizing the number of joints
- Flexible and easy to install
- Resistant to seismic shocks, soil movement or land slides
- Matching fittings to connect to the water main and valves and meters
- Manufactured to regional and international quality standards

CONCLUSIONS
The corrosion resistance, durability, resilience and reduced number of joints of service lines made of stainless partially corrugated tube have played an important role in stopping leaks.

Management gains accumulated by Tokyo, Seoul and Taipei prove the suitability of stainless steel for service lines even for very large systems. While the initial cost compared to competing materials may be higher, stainless steel has been shown to be a good investment over its entire service life, paying back each year in water savings, reduced maintenance and cost per liter processed.