

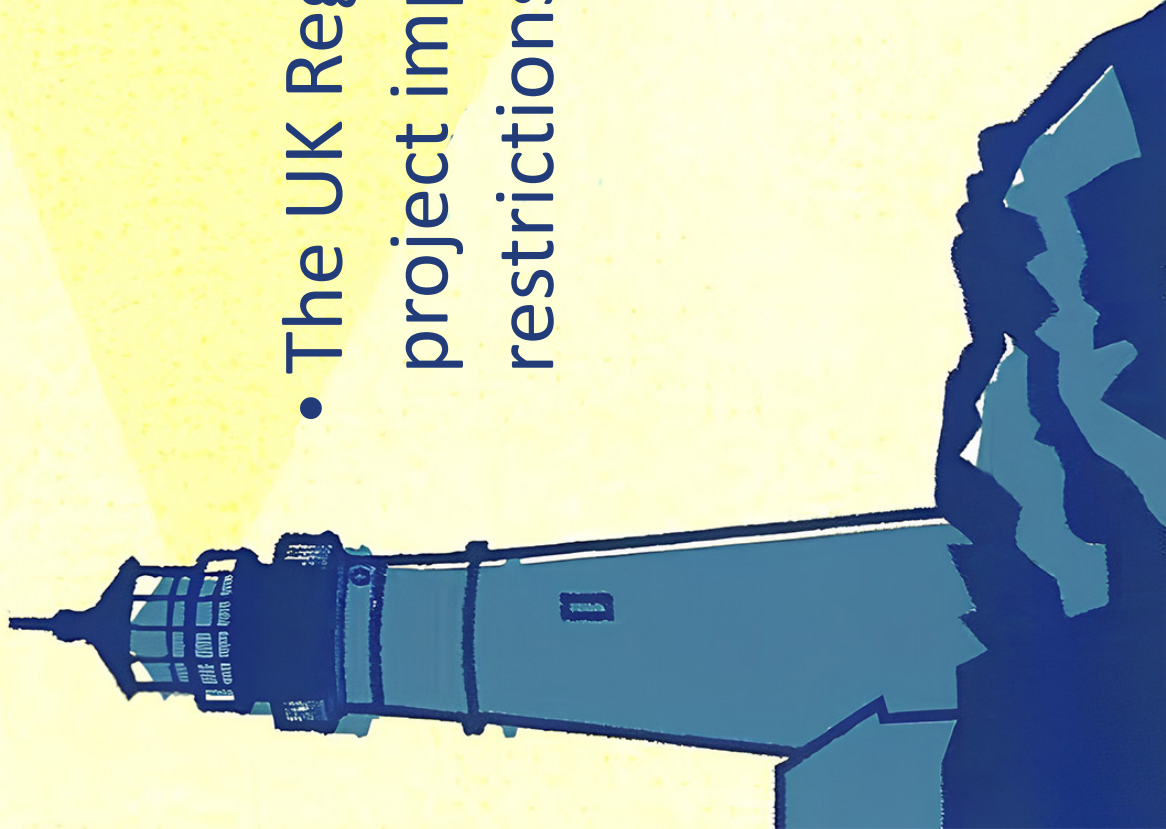
TECHNICAL ADVANCES IN CURED-IN-PLACE-PIPE (CIPP) LININGS

BY


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- The Cured-In-Place-Pipe (CIPP) process was originally invented and patented in the UK by E. Wood and Sons in the early 1970's
- The UK Government directed the eleven (11) privatized water companies to replace the existing deteriorating UK Victorian cast iron potable piping in situ




- The UK Regulatory Agency governing the project imposed the following restrictions on the contractors:

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- No excavation was to be performed except to install new manholes at 100-foot lengths along the mainline pipe
 - Potable water supply to each dwelling served by the supply piping was to be limited to a maximum of one week
 - The installed pipe lining would not leach any chemicals deemed “hazardous” by the UK Government

A stylized illustration of a lighthouse on a rocky shore. The lighthouse is dark blue with a white lantern room. The sky is a gradient of yellow and orange, suggesting a sunset or sunrise. The text is positioned in the upper half of the image.

Ultimately the project work was performed successfully per the UK Government technical specifications and schedule

In the early 1980's a US company was considering licensing the E. Wood process and patenting the process in the USA

A stylized illustration of a lighthouse on a rocky shore. The lighthouse is dark blue with a white lantern room. The sky is a bright yellow, and the water is a dark blue. The lighthouse is positioned on the left side of the image, and the text is centered in the yellow sky area.

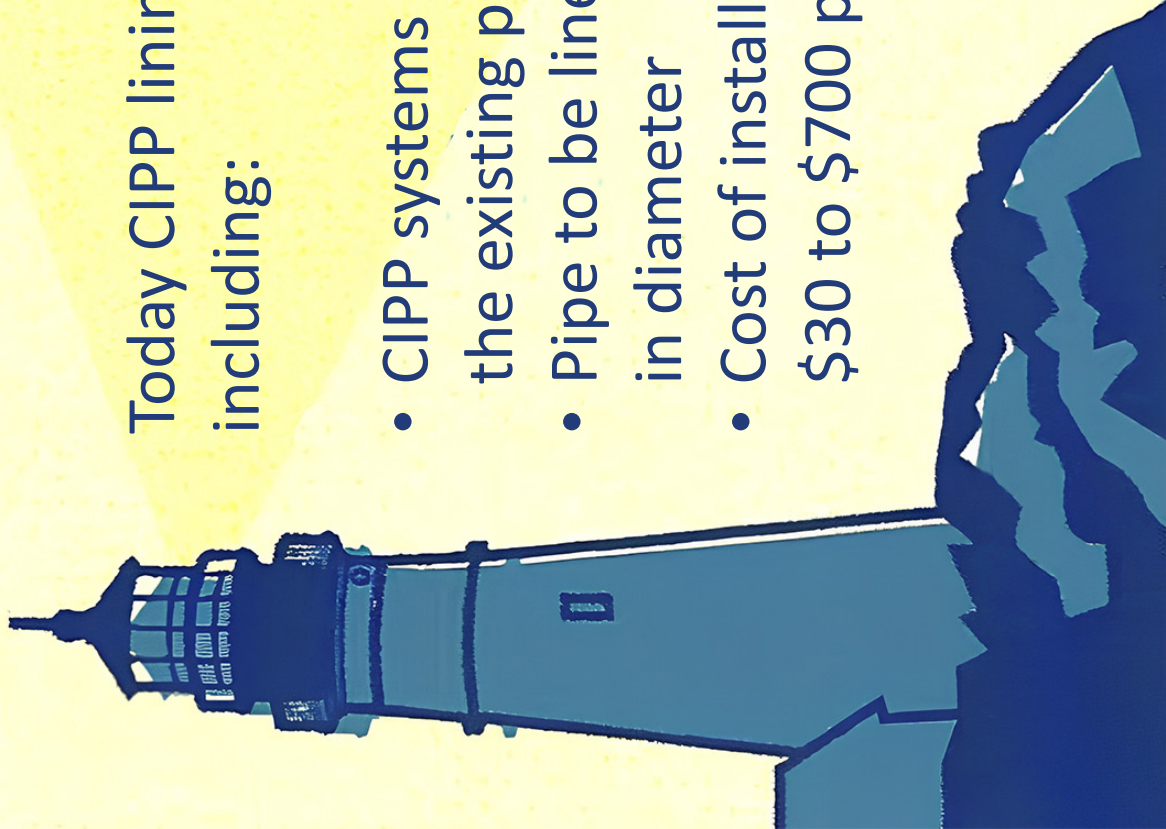
I was engaged by that US company to travel to the UK to observe the process being performed for safety, engineering and installation acceptability

I advised my client that the process was unique, could be performed safely, and was technically acceptable



CIPP linings used in USA today:

- are a trenchless, in-situ rehabilitation method for underground pipe
- Various thermoset resin formulations are used to create a flexible pipe liner
- Individual CIPP lining processes may differ and are proprietary



Today CIPP linings in USA exhibit unique properties, including:

- CIPP systems may be “stand alone” or adhered to the existing pipe
- Pipe to be lined can be 6 inches up to 120 inches in diameter
- Cost of installed CIPP today typically ranges from \$30 to \$700 per host pipe length



CIPP system resins include proprietary:

- Polyester
- A blend of Vinyl and Polyester (where Vinyl resins are legal)
- Epoxy

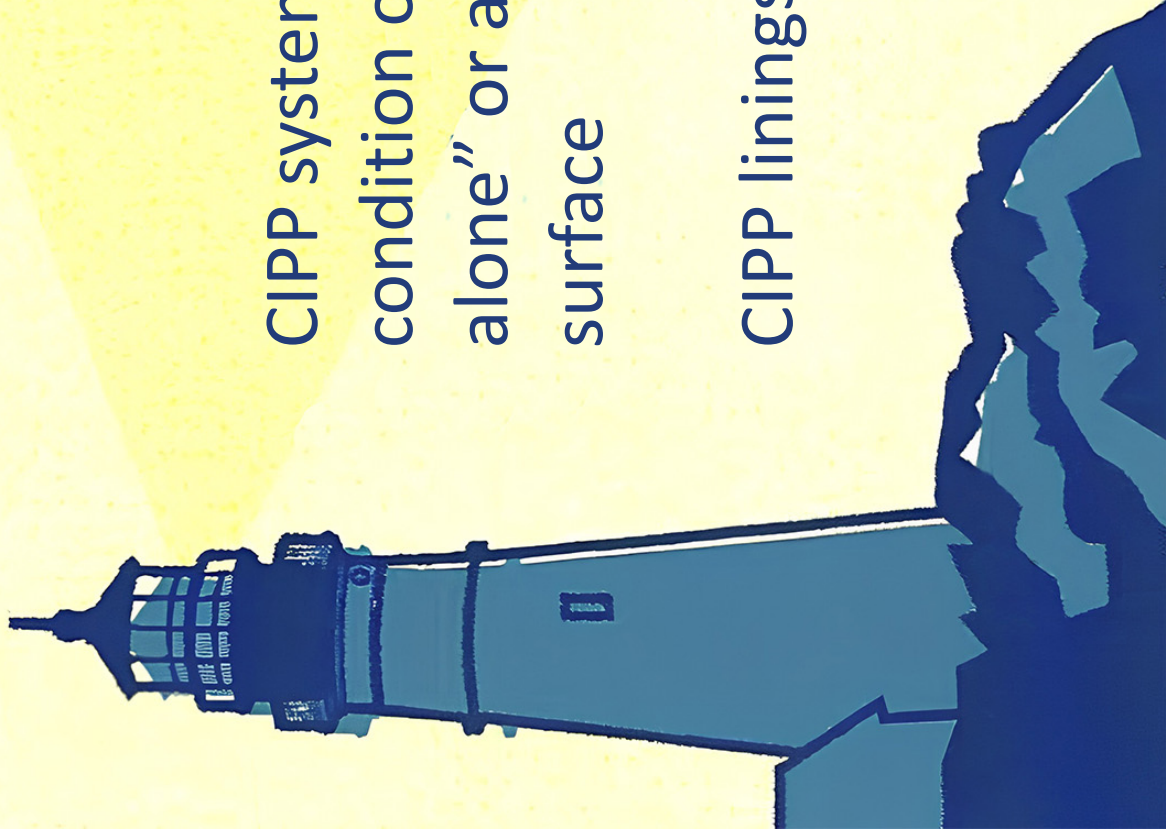
Surface preparation for and application of CIPP is typically performed by robotic remote equipment

A stylized illustration of a lighthouse on a rocky shore. The lighthouse is dark blue with a white lantern room. The sky is a gradient of yellow and orange, suggesting a sunset or sunrise. The water is dark blue.

Applied CIPP systems are cured by:


- Atmospheric exposure
- Applied heat
- UV exposure

depending upon the resin system involved and the host pipe diameter



CIPP systems, depending upon the condition of the host pipe, may be “stand alone” or adhered to the pipe inside surface

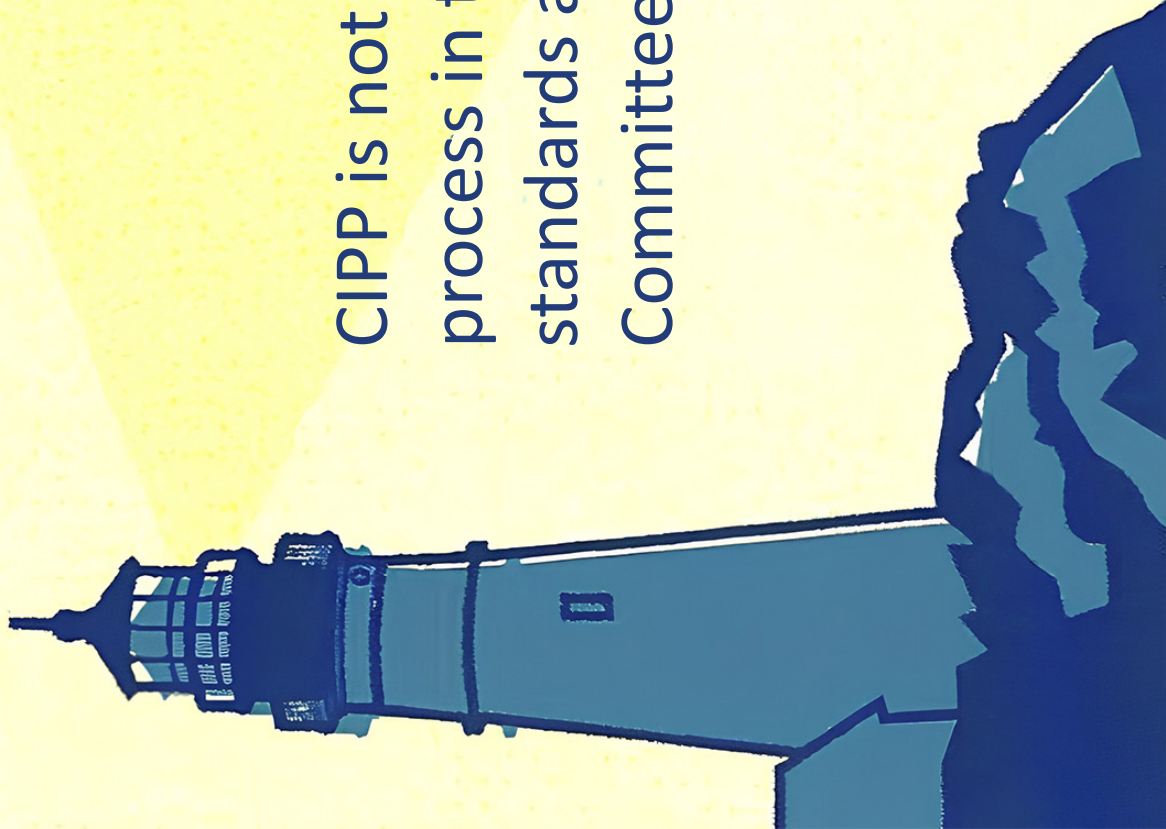
CIPP linings have some disadvantages:

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- They may not be appropriate for use due to unacceptable structural integrity of the host pipe
 - They may not be suitable if large internal gaps are present in the host pipe
 - CIPP systems installation may not be possible to host pipe elbows, “tees,” and other fittings

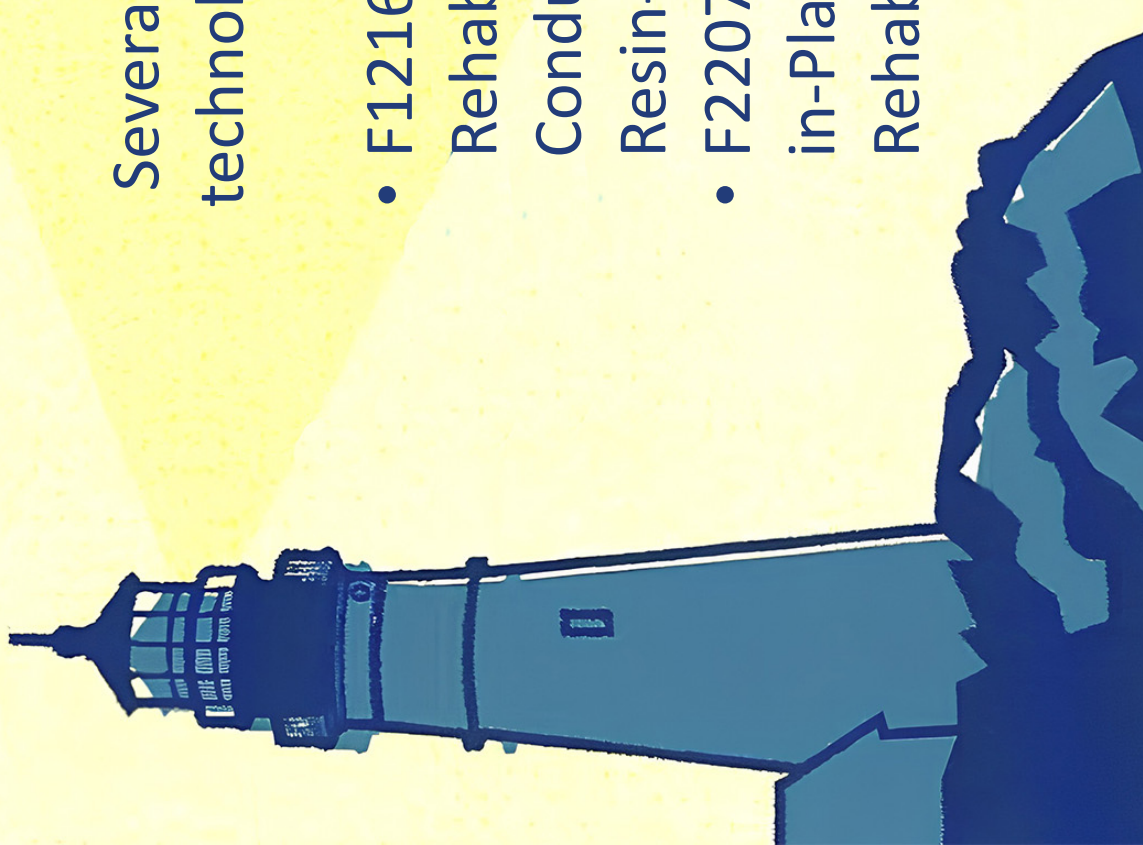


Question: How long do CIPP linings last if properly selected, installed and maintained :

Answer : Based on history to date, typically 50 to 60 years



CIPP is not considered a “coating” or “lining” process in technical parlance. As such, CIPP standards are not prepared by ASTM Committee D01.46 nor D33



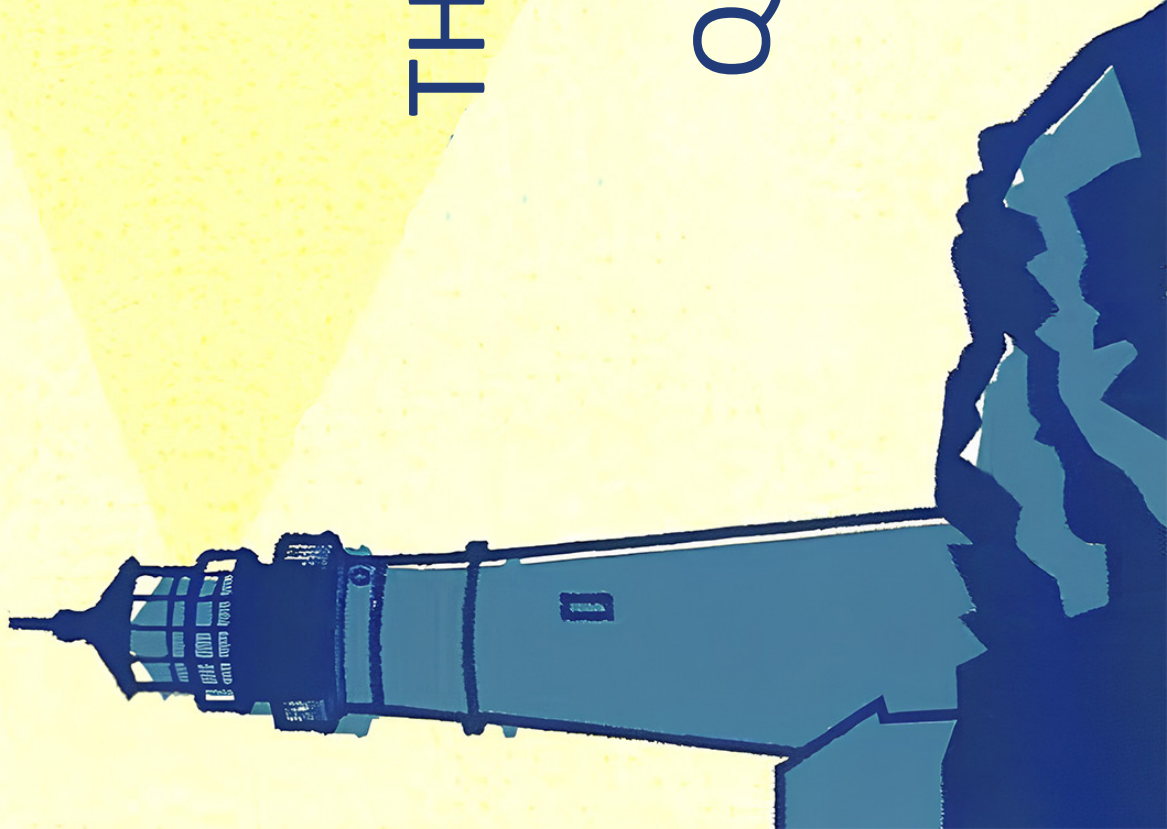
Several ASTM Standards address CIPP technology including:

- F1216, “Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube”
- F2207, “Standard Specification for Cured-in-Place Pipe Lining System for Rehabilitation of Metallic Gas Pipe”



EPRI (Electric Power Research Institute) has published two reports which address CIPP:

- 1013480 - “Design and Qualification of Cured-in-Place Liners for the Rehabilitation of ASME Safety Class 3 Piping Systems”
- 1019178 – “Capacity Testing of Cured-in-Place Pipe”



THANK YOU!

Questions?