

# PITTING CORROSION OF CAST IRON PIPES

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## ABSTRACT

Cast iron pipes have been used to convey water and sewage under pressure for more than 350 years. During that time the method of manufacture has changed from static horizontal casting, to static vertical casting and spun casting. The metallurgical structure of each of these varies considerably and affects the corrodibility of the material. Cast iron pipes typically undergo a phenomenon called graphitization, whereby the ferrite matrix corrodes leaving a silicon rich residue which retains some strength and the pipes original geometry.

This paper presents and discusses the shape and rate of growth of buried cast iron pipes, along with two hypotheses on how pits are formed and how they change shape with time of exposure.

Real pitting data, showing cross-sections of pits, from several grit blasted pipes is presented along with detailed descriptions of the metallurgical structure of the pipes. The paper also presents a literature review of underground pitting corrosion and detailed data from the National Bureau of Standards (USA) field trials during the early and mid 20<sup>th</sup> century where grey cast iron and ductile iron pipes were exposed to a various soil conditions for extended periods of time.

Finally, the effect of pitting corrosion and other factors on performance of cast iron pipes is briefly addressed. Whilst cast iron pipes typically fail from loss of strength due to weakening caused by corrosion, failures can occur due to rapid loading.

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