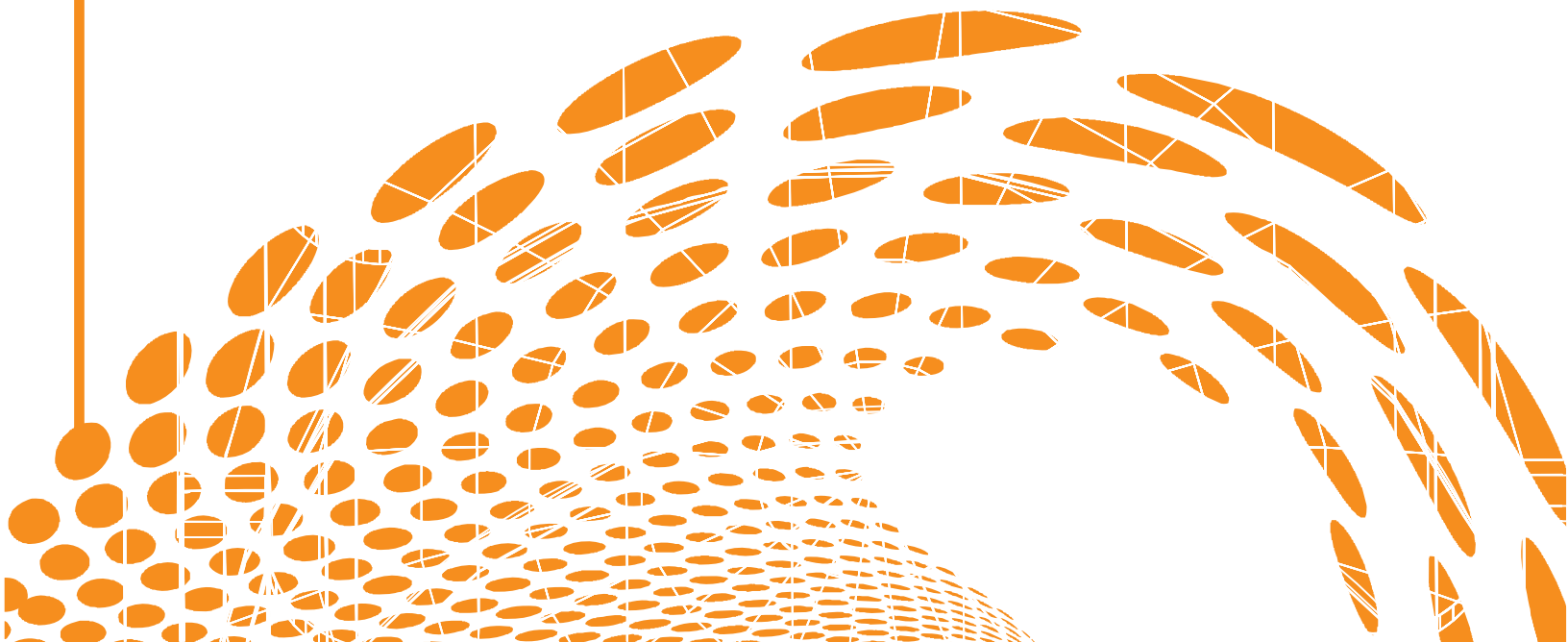
ASME STANDARDS TECHNOLOGY, LLC

STP-NU-098

NEXT GENERATION CONCRETE CONTAINMENT VESSELS



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Date of Issuance: August 4, 2025

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ASME Standards Technology, LLC
Two Park Avenue, New York, NY 10016-5990

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FOREWORD

This research was conducted in collaboration with the Department of Civil Engineering at Kansas State University and the Department of Architecture and Architectural Engineering at Seoul National University. Financial and other support provided from these institutions is acknowledged. We also acknowledge the oversight and input of the ASME Section III Division 2 / ACI 359 Joint committee on concrete containments for their constructive feedback and guidance.

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ABSTRACT

Nuclear power plants serve as a reliable source of energy around the globe, but construction of new concrete containments in the US has been deterred by schedule delays and cost overruns. This project investigates the codification of state-of-the-art materials such as ultra-high performance concrete (UHPC) and prestressing tendons with greased and sheathed strand tendons (GSS tendons) to develop a novel concrete containment vessel design that may meet contemporary demands. This report is largely comprised of three sections. Section 1 proposes UHPC constitutive models and acceptance criteria in line with the design philosophies of both ASME BPVC III-2 (Joint ACI-ASME Committee 359, 2023, herein referred to as the ASME Code) [1] and the FHWA Guideline for UHPC (Graybeal and El-Helou, 2023, herein referred to as the FHWA Guideline) [2]. Section 2 presents experimental research on the compressive creep of UHPC conducted by Kansas State University, exploring how the inclusion of steel fiber affects the time-dependent deformation properties of UHPC under various stress levels. Section 3 analyzes GSS tendon implementation in containment design, focusing on reduced friction losses and increased duct size requirements.