

Industry Assessment

Technical Brief

Lead Authors

Subhashree Panda, Ph.D.
Matthew P. Adams, Ph.D.
Matthew J. Bandelt, Ph.D.

Lead Institution

New Jersey Institute of
Technology

Supporting Institutions

Rutgers University, Center
for Advanced Infrastructure
and Transportation

Oregon State University
University of Florida



Office of the
Assistant Secretary
for Science and
Technology (OST-R)

Building Code and Safety Standards Analysis for Allowance of Steel Slag in Concrete Construction

Overview

This technical brief examines how U.S. building-code frameworks address the use of steel slag/EAF slag in concrete construction, with primary emphasis on code provisions, material standards, and related approval pathways. The review shows that slag cement is better addressed through code-and-standards than steel slag; however, ACI documents commonly cited for slag cement is limited to GGBFS and does not address slags derived from the smelting of materials other than iron ores. In contrast, steel slag remains largely outside explicit recognition in the core structural code framework. Instead, its use is generally considered through broad material standards, alternative-material approval, and project-specific qualification. This reflects continuing concerns related to material variability, volumetric stability, and long-term durability. As a result, steel slag acceptance remains less standardized and more dependent on supporting evidence and agency approvals.

Key Takeaways

- ACI documents provide a clear pathway for slag cement use in concrete.
- Steel slag use is documented mainly in aggregate and pavement applications and was not identified through a direct named pathway for SCM use in the code-and-standards framework.
- Steel slag use depends on broader material provisions, alternative-material approval, and project-specific acceptance.
- Volumetric instability is the main technical concern associated with steel slags.
- Acceptance varies across jurisdictions and applications because approval pathways are not harmonized.
- AASHTO bridge design specifications clearly standardize slag cement through M 302 (specification for slag cement use in concrete and mortars), but no steel-slag-specific bridge-design pathway was identified in the public sources reviewed.
- This gap limits consistent adoption of steel slag in concrete.

USDOT Steel Slag Initiative

Industry Assessment

Building Code and
Safety Standards
Analysis for Allowance
of Steel Slag in
Concrete Construction

July 2026



Office of the
Assistant Secretary
for Science and
Technology (OST-R)

United States Department of Transportation Research Initiative on the Use of Steel Slag in Concrete and Cement

Timeline of ACI Code and Guidance Document Evolution on Slag Cement and Alternative Materials

2001	Slag Cement Association requests ACI terminology shifts from “GGBFS” to “slag cement”.
2003	ACI 233R-03 adopts “slag cement” terminology and positions slag cement as blast-furnace-derived material.
2005	ACI 207.1R-05 Mass Concrete references ACI 233R for ground-granulated blast-furnace slag guidance
2008	ACI 318-08 introduces durability exposure categories/classes, enabling later prescriptive SCM limits by exposure
2011	ACI 318-11, exposure-class tables widely implemented; F3 – associated SCM caps become common specs
2013	ACI E3-13 summarizes slag cement effects on strength, permeability, sulfate/ASR resistance, shrinkage, freeze-thaw
2016	ACI PRC-201.2R-16 durability guidance distinguishes high-deicer exposure subcategories
2017	ACI 233R-17 supersedes ACI 233R-03(11); explicitly excludes non-iron slags
2019	ACI 318-19 adds explicit pathways for alternative cement/aggregates via design professional and building official approval
2022	ACI PRC – 242 – 22 publishes alkali-activated cement report; GGBFS identified as major precursor
2025	ACI 318-25 released; adds sustainability appendix; removes Exposure Class F3 and SCM maximum limits

Note: Slag cement refers to blast furnace slag only, not steel slag. Steel slag is not yet addressed in ACI documentation, code or otherwise.

Source: American Concrete Institute (ACI) 233R-03; ACI 233R-17; ACI 201.2R-16; ACI 318-19; ACI 318-25; ASTM C989/C989M; FHWA, ACI PRC-233-17, ACI descriptions and public previews of ACI/PCI 319-25, ACI/PTI 320-25, ACI 332-20, and ACI 562-25.

Where Steel Slag Fits Across the ACI Code Family and AASHTO Standards

- **ACI 318-25:** Steel slag is not specifically identified in the building code for structural concrete, so any use would need to proceed through the broader code framework rather than a named steel-slag provision.
- **ACI/PCI 319-25:** For structural precast concrete, public preview language includes approval of special systems, construction, or alternative construction materials, but no steel-slag-specific provision is identified in the code.
- **ACI/PTI 320-25:** For post-tensioned concrete, no steel-slag-specific pathway is publicly identified in the code.
- **ACI 332-20:** For residential concrete, the code covers cast-in-place residential concrete, but steel slag is not directly recognized by name in the public code materials.
- **ACI 562-25:** For the repair and rehabilitation code, steel slag may only arise in project-specific existing-structure applications, and the public code materials do not identify a steel-slag-specific pathway.
- **AASHTO** bridge design specifications address slag cement primarily through material specifications M 302, while steel slag lacks a dedicated specification and is accepted indirectly as an aggregate subject to additional agency-specific controls.

