



Reference Codes: ACI 318, IRC 2021, PCA Notes on ACI 318, NRMCA Guidelines

Purpose

This bulletin clarifies the requirement for doweling concrete foundation walls to footings in U.S. residential and light commercial construction, particularly in Insulated Concrete Form (ICF) applications.

Background

In U.S. construction practice, structural connections between foundation walls and footings are required to ensure continuity, resist lateral and vertical forces, and prevent movement due to soil pressure or seismic activity. While doweling may not always be explicitly required, mechanical anchorage is typically necessary to comply with the structural integrity and load transfer requirements of ACI 318 and the International Residential Code (IRC).

Relevant Code References

1. ACI 318 – Building Code Requirements for Structural Concrete

- ACI 318 is the primary design code for structural concrete in the United States.
- Section 16.5 requires structural integrity for cast-in-place walls and prescribes connection details.
- Proper transfer of shear and moment forces at wall-footing joints typically requires mechanical connection via dowels.

2. International Residential Code (IRC) 2021

Section R404 – Foundation and Retaining Walls

- R404.1.2: Reinforced concrete foundation walls shall be anchored to footings to resist sliding and overturning.
- Where plain concrete is used, R403.1.3.1 requires reinforcement to prevent separation from footing under differential movement or load.

These requirements imply a need for doweling or keyed footing-wall joints to maintain structural integrity.

3. PCA Notes on ACI 318 and NRMCA Recommendations

- PCA and NRMCA best practices recommend dowels for positive mechanical connection, particularly in seismic zones or expansive soils.
- For ICF applications, industry practice and engineering design typically require dowels of:
 - #5 bars @ 48" o.c., or
 - #4 bars @ 24" o.c.

Conclusion

While U.S. building codes may not always use the term “dowels,” the performance requirements of ACI 318 and IRC demand a structural connection between footings and walls. Doweling is the most common and effective means to meet these demands, especially in ICF systems.

Action Required

Ensure all concrete foundation walls are anchored to footings with dowels or other engineered positive connections in accordance with ACI 318, IRC 2021, and prevailing best practices. Doweling should follow prescriptive schedules or be designed by a qualified structural engineer.