

# Segregation in concrete

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**Segregation in concrete** is a case of particle segregation in concrete applications, in which particulate solids tend to segregate by virtue of differences in the size, density, shape and other properties of particles of which they are composed.

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## Definition

It is described by American Society for Testing and Materials as follows: "Segregation in concrete is commonly thought as separation of some size groups of aggregates from cement mortar<sup>[nb 1]</sup> in isolated locations with corresponding deficiencies of these materials in other locations. Segregation results in proportions of the laid concrete being in variation to those as designed.<sup>[2]:38</sup> Segregation could result from internal factors such as concrete that is not proportioned properly and not mixed adequately, or too workable a mix. It also could result from external factors such as too much vibration,<sup>[nb 2]</sup> improper transportation, placement, or adverse weather conditions.<sup>[3]:7,8</sup> The corresponding increase in proportion of cement paste in upper areas would tend to make them susceptible to increased shrinkage and formation of cracks. These cracks could be 10 μm to 500 μm wide, formed perpendicular to the surface, and be in the form of map patterns."<sup>[4]:149</sup>

The effect of aggregate segregation on the mechanical and transport behavior of concrete has been the focus of both modeling as well as experimental investigation

## See also

- Properties of concrete

## Notes

1. Mortar is a mixture of fine aggregates and cement, that in concrete acts as a binder between particles of coarse aggregates.<sup>[1]:119,120</sup>

2. Compaction describes the process employed to obtain maximum density in concrete after it has been deposited in place. Compaction could be achieved by mechanical vibrators, devices that vibrate at various frequencies and which transfer these vibrations to concrete.<sup>[1]:144</sup>

## References

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2. American Society for Testing Materials. Committee C-9 on Concrete and Concrete Aggregates (1 January 1956). *Significance of Tests and Properties of Concrete and Concrete Aggregates: A Résumé of Present Information on the Significance of the Properties of Concrete and Concrete Aggregates and the Tests by which They are Studied and Determined*. ASTM International. GGKEY:SL4DFHZUPJ6. Retrieved 20 May 2012.
3. Sybil K. Reinert; Iowa State University. Civil, Construction, and Environmental Engineering (2007). *Optimizing Portland Cement Concrete Mix Design to Environmental and Construction Variables with the Aid of Computer Design Software*. ProQuest. ISBN 978-0-549-33432-3. Retrieved 20 May 2012.
4. Ravindra K. Dhir; Mukesh C. Limbachiya (1999). *Utilizing Ready Mix Concrete and Mortar: Proceedings of the International Conference Held at the University of Dundee, Scotland, UK on 8-10 September 1999*. Thomas Telford. ISBN 978-0-7277-2823-4. Retrieved 20 May 2012.

## Further reading

- American Society of Concrete Contractors (2005). "The Contractor's Guide to Quality Concrete Construction". American Concrete Institute. p. 133. Retrieved May 19, 2012. ISBN 0870311670
- Towards a realistic morphological model for the meso-scale mechanical and transport behavior of cementitious composites (<http://dx.doi.org/10.1016/j.compositesb.2015.06.024>) Davood Niknezhad; Balaji Raghavan; Fabrice Bernard; Siham Kamali-Bernard; Composites Part A: Engineering, Volume 381, 72-83, 2015 Elsevier

## External links

- Bleeding in concrete - [www.construction-guide.in](http://www.construction-guide.in) (<http://www.construction-guide.in/civil-works/plain-and-reinforced-concrete/bleeding-concrete>)
- Lecture 12: Module 5 Lecture - 4 Fresh Concrete : Segregation & Bleeding (<http://freevidelectures.com/Course/86/Building-Materials-and-Construction/12>) – from the Indian Institute of Technology, Delhi

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