

Slump and Workability

What is Slump and Workability?

Slump is a field measured indicator of the consistency of fresh concrete. It reflects how much the concrete subsides under its own weight when the supporting mold is removed.

Workability is a broader concept that describes how easily concrete can be mixed placed consolidated finished and cured without segregation or excessive bleeding. Workability depends on many factors including mixture proportions aggregate characteristics admixtures temperature and placement method.



Concrete with varying slumps

What is the difference between Slump and Workability?

Slump is a single numerical test result. Workability is an overall performance characteristic. Two concretes can have the same slump but very different workability. For example, a concrete with rounded aggregates and a water reducer may place and finish easily while another concrete with angular aggregates and no admixtures may feel harsh and difficult to consolidate even at the same slump. Slump is therefore an indicator but not a complete measure of workability.

How is Slump Measured on Site?

Slump or slump flow is measured using the in accordance with CSA A23.2-5C, Test Method for slump of concrete or CSA A23.2-19C, Test Method for slump flow of concrete.

In both tests, the cone is placed on a rigid non-absorbent surface and filled and rodded as per the test method. The cone is then lifted vertically in a smooth motion and the concrete is allowed to settle. The slump value is the vertical difference between the height of the cone and the highest point of the slumped concrete while the flow is the diameter of the concrete spread on the flow board. When testing slump flow, other parameters including the T_{50} time and VSI (visual rating) are also performed.

Concrete delivered to site must be a predetermined of specified tolerance within an application range. Examples of slumps include 80 +/- 30mm, 120+/-30mm, 190+/-40mm. Slump tolerances are specified in CSA A23.1:24 Clause 4.3.2.3.2. Self consolidating concrete or SCC is specified by slump flow, typically around 650 mm +/- 70 mm.

How is Slump Adjusted on Site?

Slump adjustments should only be made in accordance with project specifications and quality control procedures. The preferred method is the addition of approved chemical admixtures such as water reducing or high range water reducing admixtures. These can increase slump and improve workability without increasing the water to cementing materials ratio (w/cm). Adding water directly to the concrete should be avoided unless explicitly permitted as it can negatively affect strength, durability, shrinkage and permeability. Any adjustment should be documented and followed by adequate mixing to ensure uniformity before placement. For further information on the addition of water on the job site and addition of superplasticizers, additional information can be found in CSA A23.1:24 Clause 5.2.5.3.2. (Addition of water on the job site) and Clause 5.2.5.3.3 (Control of slump or slump flow of plasticized concrete on the job site).

Three Rules to Consider:

1. Ensure on-site slump testers are CCIL or ACI certified,
2. Adjust slump only with approved admixtures, not extra water unless approved to do so
3. Check workability considering mix proportions, aggregates, and placement method.

References

1. CSA A23.1 A23.2 2024. *Concrete materials and methods of concrete construction Test methods and standard practices for concrete.* CSA Group
2. *Design and Control of Concrete Mixtures. 9th Edition.* Cement Association of Canada

Disclaimer

The information provided above is intended for general information and educational purposes only. It does not replace project specific requirements, professional judgment, or applicable standards and codes. Readers are responsible for reviewing and complying with all project specifications, contract documents, and governing standards before applying any of the information discussed.