

Compression Test of Concrete/Timber



Objective

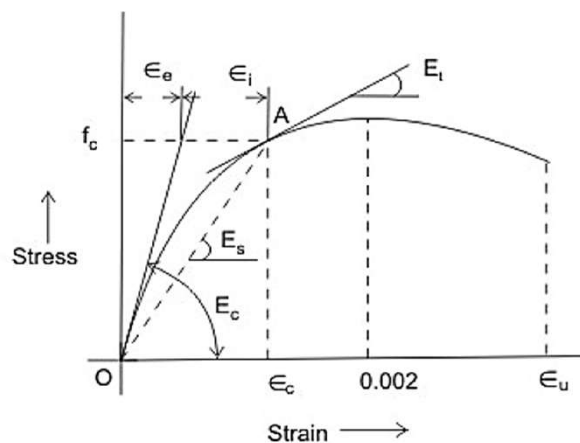
- To test a concrete specimen under compressive loading
- To draw the stress strain diagram
- To Study the failure characteristics of the specimen





- To determine the following properties:
 - I. Yield Strength at 0.01% offset
 - II. Ultimate Strength/Compressive strength (f'_c)
 - III. Initial Tangent Modulus of Elasticity
 - IV. Secant Moduli of elasticity at stresses of 5, 10, 15 MPa
 - V. Static Modulus of Elasticity($= 47\sqrt{f'_c}$)

Typical Stress strain diagram



Sample Data Sheet



Length Measurement				Diameter			
L ₁ =	L ₂ =	L ₃ =	L ₄ =	D ₁ =	D ₂ =	D ₃ =	D ₄ =
Avg. Length, L=.....mm				Avg. Diameter, D=.....mm			
				Cross Sectional Area, A=..... mm ²			

Observation No.	Load reading	Actual load (kN)	Strain gauge reading	Deformation (mm)	Stress (N/mm ²)	Strain (mm/mm)
1						
2						
3						
4						
5						
6						

Test conditions



- Standard Ref : ASTM D 143
- Strain rate = 0.003 in./in. of nominal specimen length/min
- Observation : 4 unit of interval of load reading corresponding deformation

Experimental Setup (Digital)



Experimental Setup (Analog)



Failure pattern in compression

- For parallel loading 6 types of pattern



Crushing

This term shall be used when the plane of rupture is approximately horizontal.



Wedge Split

The direction of the split, that is whether radial or tangential, shall be noted.



Shearing

This term shall be used when the plane rupture makes an angle of more than 45 deg with the top of the specimen.



Splitting

This type of failure usually occurs in specimens having internal defects prior to test and shall be the basis for culling the specimen.



Compression and Shearing Parallel to Grain

This failure usually occurs in cross-grained pieces and shall be the basis for culling the specimen.





Brooming or End-Rolling



This type of failure is usually associated with either an excess moisture content at the ends of the specimen, improper cutting of the specimen, or both. This is not an acceptable type of failure and usually is associated with a reduced load. Consideration should be given to remedial conditions when this type of failure is observed.



- For Perpendicular Loading :



barreling or bulging



ASSIGNMENT

1. Compression tests are generally performed on brittle materials, why?
2. Which will have a higher strength: a small specimen or a full size member made of the same material?
3. How does the h/d ratio of specimen affect the test result?
4. How do ductile and brittle materials differ in their behavior in compression test?