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**Product Name :**

Plastic Bending of Portals

**Product Code :**

SLE/EG/26



# Description :

**Plastic Bending of Portals** (Product Code: SLE/EG/26) is a structural experiment in which a specimen portal frame is loaded beyond its elastic limit until plastic hinges form and it collapses. Load cells apply and measure vertical, horizontal or combined loads through cables held at 90 degrees to the portal, while precision indicators track how the frame deforms. The apparatus shows how a building can yield yet still carry load long enough for people to leave safely. It is manufactured by **Jain Scientific Equipments Pvt Ltd (ScienceLab)**, Ambala, an engineeringlab equipment manufacturer supplying civil and structural engineering departments.

## Key Details

| Parameter | Detail |
|---|---|
| Type | Plastic collapse experiment for portal frames |
| Specimen mounting | Portal frame fitted to fixing blocks that simulate fixed foundations |
| Load application | Load cells apply and measure the load through cables at 90 degrees to the portal, preserving load direction as the portal deforms |
| Load cases | Vertical, horizontal or combined loads |
| Deformation measurement | Precision indicators |
| Behaviour studied | Elastic region, plastic region with permanent deformation,formation of plastic hinges and plastic collapse |
| Analysis outcome | Interaction between vertical and horizontal loads and an interaction diagram to predict the failure mode |

## Typical Use

Before loading, students predict the collapse loads for the chosen load case using textbook plastic analysis, identifying where hinges should form in a fixed-base portal. They then increase load through the cable-and-load-cell system, recording force and deformation. The response starts out linear, then flattens as the first hinge forms and the frame begins to deform permanently, until a mechanism develops and the portal can take no more load. Because the cables stay at 90 degrees to the portal, the load direction is preserved even as the frame sways, so the measured collapse load can be compared fairly with prediction.

Repeating the test with vertical only, horizontal only and combined loads lets the class plot an interaction diagram and see which failure mode governs for each combination. This builds real understanding of ductility and reserve strength, and why designers value them. The rig is well suited to final-year undergraduate and postgraduate structures work and to technical institutes teaching limit-state concepts.

## Manufacturer

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