

## **\*\*Tensile Test and Finite Element Optimization of the Triple-pipe Rebar Connector\*\***

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### **General Introduction**

This dataset contains data collected during uniaxial tensile tests at Tianjin Chengjian University, as part of a research project on the triple-pipe rebar connector. The data are publicly available both as supplementary data for related publications and to enable other researchers to use these data in their own work.

### **Purpose of the Testing Activity**

The experiments aimed to investigate the failure modes and tensile properties of two types of triple-pipe rebar connectors, namely the welded formed and the integrally formed. The tests were designed to evaluate the force transfer efficiency between upper small-diameter steel bars and a lower larger-diameter steel bar, facilitating rapid installation in prefabricated concrete structures. The results provide insights into the connector's ultimate bearing capacity, stress distribution, and deformation behavior. Based on the experimental data, finite element parameter analysis was conducted to optimize the design parameters of the integrally formed connector.

### **Test Equipment**

All tests were conducted using uniaxial tensile testing equipment in the Structural Testing Laboratory of Tianjin Chengjian University. Displacement, force, and strain were measured in millimeters (mm), kilonewtons (kN), and microstrain ( $\mu\epsilon$ ), respectively. The data acquisition system synchronized the measurements from the testing machine and strain gauges.

### **Description of the Data in This Dataset**

The data in this dataset are organized by test type and connector type. The files include:

- Connector load-strain curves: Load versus strain data for the connectors.
- Load-strain curves of connector steel: Load versus strain data for the steel material used in the connectors.
- Comparison of rebar load-strain curves: Comparative load-strain curves for the rebars involved.
- Connector load-displacement curves: Load versus displacement data for the connectors.

The data files follow a naming system:

- `Type` = Connector type (e.g., `Welded` or `Integral`). ZB represents the welded connector, JB represents the integrally formed connector.
- `Height` = Connector height in mm (e.g., `50mm`, `75mm`, `100mm`)
- `Data\_Category` = Type of data (e.g., `LoadStrain`, `LoadDisplacement`, `SteelCurve`, `RebarComparison`)

All data are provided in xlsx format, with columns indicating displacement (mm), force (kN), and strain ( $\mu\epsilon$ ) as applicable.