



Capacity Table and Summary for Rack System

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Attention: Jiangsu JISE Intelligent Storage Equipment Co,ltd

Factory: No.28 New Material Equipment Industry
Park,Qingdong Town,Dongtai city,Jingsu,China

BARRASON'S GROUP
STRUCTURAL AND CIVIL CONSULTANTS



Summary

- **Load Description:** Each frame is designed to support **8 pallets**, each weighing **25 kg**.
- **Support Structure:**
 - Each bay consists of **two main beams** and **four columns**.
 - **Two cross beams** support **two pallets**.
- The analysis considers the structural adequacy of components under **Ultimate Limit States (ULS)** and **Serviceability Limit States (SLS)** as per **AS 4084-2023**.

Capacity Table

1. Beam Capacity

Load Combination	Design Moment (kNm)	Resistant Moment (kNm)	Deflection Limit (mm)	Result
D1_ULS	0.179	1.037	L/250	OK
D2_ULS	0.131	1.037	L/250	OK
D3_ULS	0.131	1.037	L/250	OK

2. Column Capacity

Parameter	Value
Maximum Axial Force (Nc)	24.403 kN
Compressive Resistance (NC,Rd)	61.699 kN
Moment Resistance (MC,y,Rd)	1.150 kN·m
Moment Resistance (MC,z,Rd)	0.564 kN·m
Combined Check	Utilization = 0.66

3. Brace Capacity

Load Combination	Maximum Axial Force (F) (kN)	Cross-Sectional Area (A) (mm ²)	Stress (σ) (MPa)	Yield Stress (f_y) (MPa)	Result
All Combinations	2.028	82.14	24.7	235	OK

4. Cross Beam Capacity

Load Combination	Design Moment (Md) (kN·m)	Resistant Moment (MRd) (kN·m)	Result
All Combinations	0.050	0.335	OK

5. Connection Capacity

Load Combination	Design Moment (Md) (kN·m)	Design Shear Force (Sd) (kN)	Resistant Moment (MRd) (kN·m)	Result
D1_ULS	0.286	0.763	1.037	OK
D2_ULS	0.346	0.813	1.037	OK
D3_ULS	0.287	0.766	1.037	OK

6. Base Plate and Anchor Capacity

Load Combination	Vertical Force (FZ) (kN)	Horizontal Force (FX or FY) (kN)	Effective Area (Abas) (mm ²)	Concrete Resistance (fj) (N/mm ²)	Result
D3_ULS	30.593	1.086	1,945	33.3	OK

7. Global Deflection

Load Combination	Maximum Deflection (mm)	Deflection Limit (mm)	Result
D1_SLS	3.08	L/250	OK
D2_SLS	4.90	L/250	OK



Key Insights

- **Deflection:** All deflection values are well within the $L/250$ limit, ensuring no excessive sag under SLS conditions.
- **Column and Brace Strength:** Columns and braces have sufficient axial and compressive resistance, maintaining stability under all ULS combinations.
- **Connection and Base Plate:** The beam-to-column connections and base plate-anchor system meet all resistance requirements against combined vertical and horizontal loads.