



# REBAR TABLES

Insulated Concrete Forms by Nudura

BASIS OF DESIGN & GENERAL USAGE

Nudura is an Insulated Concrete Formwork (ICF) system which comprises of prefabricated polystyrene form work blocks reinforced with plastic webs with notches for placing reinforcement. Nudura has commissioned JMS Engineers to provide design tables and typical details with a focus on structures falling within Class 1 disproportionate collapse requirements and a particular focus on build-ability, to properly utilize Nudura’s ability to reduce construction time on site.

It is important to note that the tables are only intended to illustrate the capabilities and limitations of the Nudura ICF product and do not replace full structural calculations by a suitably qualified structural engineer.

Lintels:

- Lintels for various reinforcement and geometric arrangements were designed in accordance with Eurocode 2 and the corresponding UK National Annex.
- The ultimate shear resistance is calculated for lintels not requiring shear reinforcement (links/stirrups). The ultimate bending moment resistance is calculated for lintels not requiring compression reinforcement (top bars).
- Triangulation to load on lintel should not be used for ICF walls.
- Concrete grade is taken to be C20/25 (fck = 20N/mm2) and maximum aggregate size is taken to be 12mm.
- Reinforcement grade is 500H (fyk = 500N/mm2) and cover to bottom and sides is taken to be 20mm.
- For practicality and ease of construction the number of bars are limited to 1No. for the 4” (100mm) and 6” (150mm) cores.
- Reinforcement bar sizes range from H10s to H20s to represent commonly stocked rebar sizes.
- Maximum safe working loads for common door and window spans were calculated for each reinforcement, core and depth combination. A blanket factor of safety of 2 was used to calculate these values derived from the smaller of the ultimate bending and ultimate shear reinforcement.

Maximum Wall Heights

Maximum achievable wall heights are calculated based on slenderness limits for unreinforced concrete walls as described in Eurocode 2. To provide realistically achievable heights the following nominal loads (based on the ground floor of a typical 2 storey residential building with timber floors and trussed rafters) were also applied:

- Wind Pressure = 0.75kN/m
- Dead Load = 15kN/m
- Live Load = 10kN/m

It is important to note that the maximum unreinforced wall height check represents the first step in checking if a certain height of wall is acceptable to be unreinforced for a given core thickness. Achievable wall heights quoted may be further limited if heavier or more eccentric loads are present.

Core thicknesses were limited to 4-8” (100-200mm) which are what would be realistically used for structures falling within Class 1 disproportionate collapse requirements.

Where large openings, which are greater than 1/3 of the wall height and 10% of the total area, are present, then the walls either side of and between the openings should be checked separately.

Walls with chases or recesses were not considered.

BASIS OF DESIGN & GENERAL USAGE

Retaining Walls:

- Only cantilevered, straight-backed retaining walls were considered for the tables and details provided. Propped, stepped or tapered retaining walls were not considered.
- Only the design of the stem was carried out, as this is the part of the retaining wall formed of the Nudura ICF product. Additionally, the design of the base was deemed to be too influenced by site specific conditions and should be designed by a suitably qualified structural engineer. The following loads/soil parameters were considered for the design of the stem:
  - Soil density =18kN/m3
  - Nominal surcharge =10kN/m2
  - Angle of repose =30°

Groundwater was not considered. If a high water table is present then the retaining wall falls outside the scope of these tables.

Maximum wall heights were based on a basic l/d check as per Eurocode 2. Higher wall heights may be achievable by introducing props or lower surcharges.

Reinforcement was placed at fixed spacings according to the geometric properties of the form work blocks (203mm c/c for vertical bars and 457mm c/c for horizontal bars) to maximize speed and ease of construction. Corresponding ultimate shear and moment capacities were calculated and tabulated for each wall core and reinforcement combination. Closer spacings, albeit more difficult to construct, can be used to improve the performance of the retaining wall.

Concrete grade used was C25/30, a maximum aggregate size of 12mm and reinforcement cover was determined by the placement and size of horizontal reinforcement.

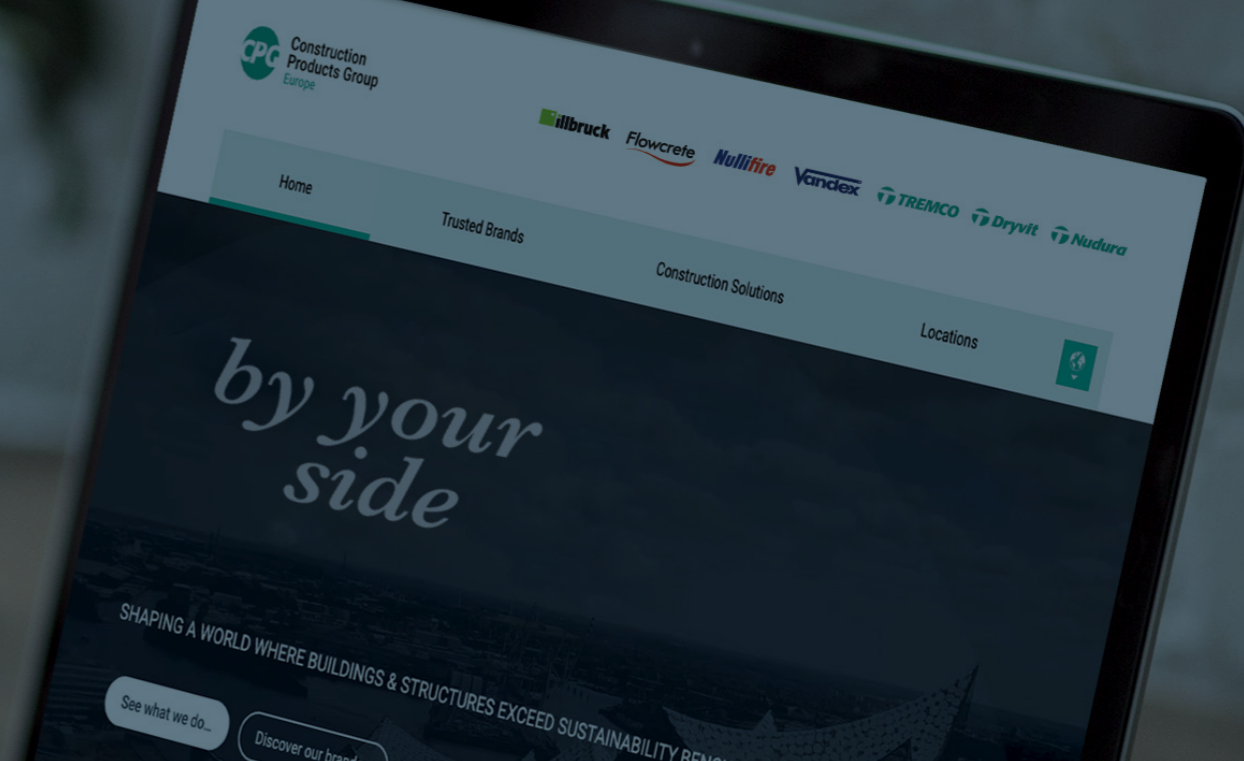
In addition to the typical detail and corresponding maximum wall height and resistance table, a full conservative design for a typical 1m high retaining wall was also provided. The design was based on the same soil and load parameters described above.

GENERAL NOTES:

1. ON THE WALLS, THE DOWNING IS INDICATED. ALL DIMENSIONS ARE IN MILLIMETERS.
2. THESE WALLS ARE ONLY INTENDED TO SUPPORT THE WEIGHT OF THE REINFORCEMENT AND NOT TO BE USED AS A WALL.
3. THE REINFORCEMENT IS TO BE PLACED IN THE WALLS IN ACCORDANCE WITH A SUBMITTAL DATED 10/10/2018.
4. THE REINFORCEMENT IS TO BE PLACED IN THE WALLS IN ACCORDANCE WITH A SUBMITTAL DATED 10/10/2018.
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| CORE WIDTH (mm) | LITEL DEPTH (mm) | REINFORCEMENT | LITEL DEPTH (mm) | LITEL DEPTH (mm) | MAXIMUM SKEW WORKING LOAD (kN/m²) FOR CLEAR SPAN (mm) |      |      |      |      |      |      |      |      |      |      |      |
|-----------------|------------------|---------------|------------------|------------------|---|------|------|------|------|------|------|------|------|------|------|------|
|                 |                  |               |                  |                  | 600   | 800  | 1000 | 1200 | 1500 | 2000 | 2500 | 3000 | 3500 | 4000 | 4500 | 5000 |
| 100             | 200              | 1010          | 9.7              | 18.1             | 30.1  | 20.1 | 19.9 | 19.1 | 17.9 | 16.1 | 13.9 | 11.1 | 8.1  | 5.1  | 2.9  | 2.4  |
|                 |                  | 1015          | 9.8              | 18.2             | 30.2  | 20.2 | 19.9 | 19.1 | 17.9 | 16.1 | 13.9 | 11.1 | 8.1  | 5.1  | 2.9  | 2.4  |
|                 |                  | 1020          | 9.9              | 18.3             | 30.3  | 20.3 | 19.9 | 19.1 | 17.9 | 16.1 | 13.9 | 11.1 | 8.1  | 5.1  | 2.9  | 2.4  |
|                 |                  | 1025          | 10.0             | 18.4             | 30.4  | 20.4 | 19.9 | 19.1 | 17.9 | 16.1 | 13.9 | 11.1 | 8.1  | 5.1  | 2.9  | 2.4  |
|                 |                  | 1030          | 10.1             | 18.5             | 30.5  | 20.5 | 19.9 | 19.1 | 17.9 | 16.1 | 13.9 | 11.1 | 8.1  | 5.1  | 2.9  | 2.4  |
|                 |                  | 1035          | 10.2             | 18.6             | 30.6  | 20.6 | 19.9 | 19.1 | 17.9 | 16.1 | 13.9 | 11.1 | 8.1  | 5.1  | 2.9  | 2.4  |
|                 | 250              | 1010          | 10.4             | 23.4             | 38.0  | 25.0 | 23.5 | 22.5 | 20.9 | 18.5 | 15.4 | 11.7 | 8.4  | 5.7  | 4.8  | 8.0  |
|                 |                  | 1015          | 10.5             | 23.5             | 38.1  | 25.1 | 23.5 | 22.5 | 20.9 | 18.5 | 15.4 | 11.7 | 8.4  | 5.7  | 4.8  | 8.0  |
|                 |                  | 1020          | 10.6             | 23.6             | 38.2  | 25.2 | 23.5 | 22.5 | 20.9 | 18.5 | 15.4 | 11.7 | 8.4  | 5.7  | 4.8  | 8.0  |
|                 |                  | 1025          | 10.7             | 23.7             | 38.3  | 25.3 | 23.5 | 22.5 | 20.9 | 18.5 | 15.4 | 11.7 | 8.4  | 5.7  | 4.8  | 8.0  |
|                 |                  | 1030          | 10.8             | 23.8             | 38.4  | 25.4 | 23.5 | 22.5 | 20.9 | 18.5 | 15.4 | 11.7 | 8.4  | 5.7  | 4.8  | 8.0  |
|                 |                  | 1035          | 10.9             | 23.9             | 38.5  | 25.5 | 23.5 | 22.5 | 20.9 | 18.5 | 15.4 | 11.7 | 8.4  | 5.7  | 4.8  | 8.0  |
| 150             | 300              | 1010          | 22.5             | 30.8             | 51.5  | 34.1 | 32.7 | 30.8 | 27.1 | 22.8 | 17.1 | 12.7 | 9.4  | 6.4  | 4.1  | 10.0 |
|                 |                  | 1015          | 22.6             | 30.9             | 51.6  | 34.2 | 32.7 | 30.8 | 27.1 | 22.8 | 17.1 | 12.7 | 9.4  | 6.4  | 4.1  | 10.0 |
|                 |                  | 1020          | 22.7             | 31.0             | 51.7  | 34.3 | 32.7 | 30.8 | 27.1 | 22.8 | 17.1 | 12.7 | 9.4  | 6.4  | 4.1  | 10.0 |
|                 |                  | 1025          | 22.8             | 31.1             | 51.8  | 34.4 | 32.7 | 30.8 | 27.1 | 22.8 | 17.1 | 12.7 | 9.4  | 6.4  | 4.1  | 10.0 |
|                 |                  | 1030          | 22.9             | 31.2             | 51.9  | 34.5 | 32.7 | 30.8 | 27.1 | 22.8 | 17.1 | 12.7 | 9.4  | 6.4  | 4.1  | 10.0 |
|                 |                  | 1035          | 23.0             | 31.3             | 52.0  | 34.6 | 32.7 | 30.8 | 27.1 | 22.8 | 17.1 | 12.7 | 9.4  | 6.4  | 4.1  | 10.0 |
|                 | 400              | 1010          | 28.7             | 33.2             | 55.3  | 37.0 | 35.7 | 33.2 | 27.7 | 22.2 | 16.5 | 11.8 | 8.2  | 5.2  | 12.8 | 12.8 |
|                 |                  | 1015          | 28.8             | 33.3             | 55.4  | 37.1 | 35.7 | 33.2 | 27.7 | 22.2 | 16.5 | 11.8 | 8.2  | 5.2  | 12.8 | 12.8 |
|                 |                  | 1020          | 28.9             | 33.4             | 55.5  | 37.2 | 35.7 | 33.2 | 27.7 | 22.2 | 16.5 | 11.8 | 8.2  | 5.2  | 12.8 | 12.8 |
|                 |                  | 1025          | 29.0             | 33.5             | 55.6  | 37.3 | 35.7 | 33.2 | 27.7 | 22.2 | 16.5 | 11.8 | 8.2  | 5.2  | 12.8 | 12.8 |
|                 |                  | 1030          | 29.1             | 33.6             | 55.7  | 37.4 | 35.7 | 33.2 | 27.7 | 22.2 | 16.5 | 11.8 | 8.2  | 5.2  | 12.8 | 12.8 |
|                 |                  | 1035          | 29.2             | 33.7             | 55.8  | 37.5 | 35.7 | 33.2 | 27.7 | 22.2 | 16.5 | 11.8 | 8.2  | 5.2  | 12.8 | 12.8 |
| 200             | 400              | 1010          | 42.7             | 41.1             | 65.1  | 45.1 | 42.7 | 39.8 | 32.7 | 24.4 | 16.5 | 11.1 | 7.5  | 4.5  | 13.7 | 13.7 |
|                 |                  | 1015          | 42.8             | 41.2             | 65.2  | 45.2 | 42.7 | 39.8 | 32.7 | 24.4 | 16.5 | 11.1 | 7.5  | 4.5  | 13.7 | 13.7 |
|                 |                  | 1020          | 42.9             | 41.3             | 65.3  | 45.3 | 42.7 | 39.8 | 32.7 | 24.4 | 16.5 | 11.1 | 7.5  | 4.5  | 13.7 | 13.7 |
|                 |                  | 1025          | 43.0             | 41.4             | 65.4  | 45.4 | 42.7 | 39.8 | 32.7 | 24.4 | 16.5 | 11.1 | 7.5  | 4.5  | 13.7 | 13.7 |
|                 |                  | 1030          | 43.1             | 41.5             | 65.5  | 45.5 | 42.7 | 39.8 | 32.7 | 24.4 | 16.5 | 11.1 | 7.5  | 4.5  | 13.7 | 13.7 |
|                 |                  | 1035          | 43.2             | 41.6             | 65.6  | 45.6 | 42.7 | 39.8 | 32.7 | 24.4 | 16.5 | 11.1 | 7.5  | 4.5  | 13.7 | 13.7 |
|                 | 600              | 1010          | 54.4             | 43.6             | 72.8  | 48.4 | 45.4 | 41.4 | 31.4 | 21.1 | 15.0 | 10.1 | 6.5  | 3.5  | 15.8 | 12.5 |
|                 |                  | 1015          | 54.5             | 43.7             | 72.9  | 48.5 | 45.5 | 41.5 | 31.5 | 21.2 | 15.1 | 10.2 | 6.6  | 3.6  | 15.9 | 12.6 |
|                 |                  | 1020          | 54.6             | 43.8             | 73.0  | 48.6 | 45.6 | 41.6 | 31.6 | 21.3 | 15.2 | 10.3 | 6.7  | 3.7  | 16.0 | 12.7 |
|                 |                  | 1025          | 54.7             | 43.9             | 73.1  | 48.7 | 45.7 | 41.7 | 31.7 | 21.4 | 15.3 | 10.4 | 6.8  | 3.8  | 16.1 | 12.8 |
|                 |                  | 1030          | 54.8             | 44.0             | 73.2  | 48.8 | 45.8 | 41.8 | 31.8 | 21.5 | 15.4 | 10.5 | 6.9  | 3.9  | 16.2 | 12.9 |
|                 |                  | 1035          | 54.9             | 44.1             | 73.3  | 48.9 | 45.9 | 41.9 | 31.9 | 21.6 | 15.5 | 10.6 | 7.0  | 4.0  | 16.3 | 13.0 |
| 250             | 400              | 1010          | 58.1             | 45.1             | 76.1  | 51.1 | 47.1 | 43.1 | 33.1 | 22.1 | 15.1 | 10.1 | 6.5  | 3.5  | 16.8 | 12.5 |
|                 |                  | 1015          | 58.2             | 45.2             | 76.2  | 51.2 | 47.2 | 43.2 | 33.2 | 22.2 | 15.2 | 10.2 | 6.6  | 3.6  | 16.9 | 12.6 |
|                 |                  | 1020          | 58.3             | 45.3             | 76.3  | 51.3 | 47.3 | 43.3 | 33.3 | 22.3 | 15.3 | 10.3 | 6.7  | 3.7  | 17.0 | 12.7 |
|                 |                  | 1025          | 58.4             | 45.4             | 76.4  | 51.4 | 47.4 | 43.4 | 33.4 | 22.4 | 15.4 | 10.4 | 6.8  | 3.8  | 17.1 | 12.8 |
|                 |                  | 1030          | 58.5             | 45.5             | 76.5  | 51.5 | 47.5 | 43.5 | 33.5 | 22.5 | 15.5 | 10.5 | 6.9  | 3.9  | 17.2 | 12.9 |
|                 |                  | 1035          | 58.6             | 45.6             | 76.6  | 51.6 | 47.6 | 43.6 | 33.6 | 22.6 | 15.6 | 10.6 | 7.0  | 4.0  | 17.3 | 13.0 |
|                 | 600              | 1010          | 68.1             | 47.1             | 86.1  | 53.1 | 49.1 | 45.1 | 35.1 | 24.1 | 16.1 | 11.1 | 7.1  | 4.1  | 17.8 | 12.5 |
|                 |                  | 1015          | 68.2             | 47.2             | 86.2  | 53.2 | 49.2 | 45.2 | 35.2 | 24.2 | 16.2 | 11.2 | 7.2  | 4.2  | 17.9 | 12.6 |
|                 |                  | 1020          | 68.3             | 47.3             | 86.3  | 53.3 | 49.3 | 45.3 | 35.3 | 24.3 | 16.3 | 11.3 | 7.3  | 4.3  | 18.0 | 12.7 |
|                 |                  | 1025          | 68.4             | 47.4             | 86.4  | 53.4 | 49.4 | 45.4 | 35.4 | 24.4 | 16.4 | 11.4 | 7.4  | 4.4  | 18.1 | 12.8 |
|                 |                  | 1030          | 68.5             | 47.5             | 86.5  | 53.5 | 49.5 | 45.5 | 35.5 | 24.5 | 16.5 | 11.5 | 7.5  | 4.5  | 18.2 | 12.9 |
|                 |                  | 1035          | 68.6             | 47.6             | 86.6  | 53.6 | 49.6 | 45.6 | 35.6 | 24.6 | 16.6 | 11.6 | 7.6  | 4.6  | 18.3 | 13.0 |
| 300             | 400              | 1010          | 78.1             | 49.1             | 96.1  | 55.1 | 51.1 | 47.1 | 37.1 | 26.1 | 17.1 | 12.1 | 8.1  | 4.1  | 18.8 | 12.5 |
|                 |                  | 1015          | 78.2             | 49.2             | 96.2  | 55.2 | 51.2 | 47.2 | 37.2 | 26.2 | 17.2 | 12.2 | 8.2  | 4.2  | 18.9 | 12.6 |
|                 |                  | 1020          | 78.3             | 49.3             | 96.3  | 55.3 | 51.3 | 47.3 | 37.3 | 26.3 | 17.3 | 12.3 | 8.3  | 4.3  | 19.0 | 12.7 |
|                 |                  | 1025          | 78.4             | 49.4             | 96.4  | 55.4 | 51.4 | 47.4 | 37.4 | 26.4 | 17.4 | 12.4 | 8.4  | 4.4  | 19.1 | 12.8 |
|                 |                  | 1030          | 78.5             | 49.5             | 96.5  | 55.5 | 51.5 | 47.5 | 37.5 | 26.5 | 17.5 | 12.5 | 8.5  | 4.5  | 19.2 | 12.9 |
|                 |                  | 1035          | 78.6             | 49.6             | 96.6  | 55.6 | 51.6 | 47.6 | 37.6 | 26.6 | 17.6 | 12.6 | 8.6  | 4.6  | 19.3 | 13.0 |
|                 | 600              | 1010          | 88.1             | 51.1             | 106.1   | 57.1 | 53.1 | 49.1 | 39.1 | 28.1 | 18.1 | 13.1 | 9.1  | 4.1  | 19.8 | 12.5 |
|                 |                  | 1015          | 88.2             | 51.2             | 106.2   | 57.2 | 53.2 | 49.2 | 39.2 | 28.2 | 18.2 | 13.2 | 9.2  | 4.2  | 19.9 | 12.6 |
|                 |                  | 1020          | 88.3             | 51.3             | 106.3   | 57.3 | 53.3 | 49.3 | 39.3 | 28.3 | 18.3 | 13.3 | 9.3  | 4.3  | 20.0 | 12.7 |
|                 |                  | 1025          | 88.4             | 51.4             | 106.4   | 57.4 | 53.4 | 49.4 | 39.4 | 28.4 | 18.4 | 13.4 | 9.4  | 4.4  | 20.1 | 12.8 |
|                 |                  | 1030          | 88.5             | 51.5             | 106.5   | 57.5 | 53.5 | 49.5 | 39.5 | 28.5 | 18.5 | 13.5 | 9.5  | 4.5  | 20.2 | 12.9 |
|                 |                  | 1035          | 88.6             | 51.6             | 106.6   | 57.6 | 53.6 | 49.6 | 39.6 | 28.6 | 18.6 | 13.6 | 9.6  | 4.6  | 20.3 | 13.0 |
| 350             | 400              | 1010          | 98.1             | 53.1             | 116.1   | 59.1 | 55.1 | 51.1 | 41.1 | 30.1 | 19.1 | 14.1 | 10.1 | 4.1  | 20.8 | 12.5 |
|                 |                  | 1015          | 98.2             | 53.2             | 116.2   | 59.2 | 55.2 | 51.2 | 41.2 | 30.2 | 19.2 | 14.2 | 10.2 | 4.2  | 20.9 | 12.6 |
|                 |                  | 1020          | 98.3             | 53.3             | 116.3   | 59.3 | 55.3 | 51.3 | 41.3 | 30.3 | 19.3 | 14.3 | 10.3 | 4.3  | 21.0 | 12.7 |
|                 |                  | 1025          | 98.4             | 53.4             | 116.4   | 59.4 | 55.4 | 51.4 | 41.4 | 30.4 | 19.4 | 14.4 | 10.4 | 4.4  | 21.1 | 12.8 |
|                 |                  | 1030          | 98.5             | 53.5             | 116.5   | 59.5 | 55.5 | 51.5 | 41.5 | 30.5 | 19.5 | 14.5 | 10.5 | 4.5  | 21.2 | 12.9 |
|                 |                  | 1035          | 98.6             | 53.6             | 116.6   | 59.6 | 55.6 | 51.6 | 41.6 | 30.6 | 19.6 | 14.6 | 10.6 | 4.6  | 21.3 | 13.0 |
|                 | 600              | 1010          | 108.1            | 55.1             | 126.1   | 61.1 | 57.1 | 53.1 | 43.1 | 32.1 | 21.1 | 15.1 | 11.1 | 4.1  | 21.8 | 12.5 |
|                 |                  | 1015          | 108.2            | 55.2             | 126.2   | 61.2 | 57.2 | 53.2 | 43.2 | 32.2 | 21.2 | 15.2 | 11.2 | 4.2  | 21.9 | 12.6 |
|                 |                  | 1020          | 108.3            | 55.3             | 126.3   | 61.3 | 57.3 | 53.3 | 43.3 | 32.3 | 21.3 | 15.3 | 11.3 | 4.3  | 22.0 | 12.7 |
|                 |                  | 1025          | 108.4            | 55.4             | 126.4   | 61.4 | 57.4 | 53.4 | 43.4 | 32.4 | 21.4 | 15.4 | 11.4 | 4.4  | 22.1 | 12.8 |
|                 |                  | 1030          | 108.5            | 55.5             | 126.5   | 61.5 | 57.5 | 53.5 | 43.5 | 32.5 | 21.5 | 15.5 | 11.5 | 4.5  | 22.2 | 12.9 |
|                 |                  | 1035          | 108.6            | 55.6             | 126.6   | 61.6 | 57.6 | 53.6 | 43.6 | 32.6 | 21.6 | 15.6 | 11.6 | 4.6  | 22.3 | 13.0 |
| 400             | 400              | 1010          | 118.1            | 57.1             | 136.1   | 63.1 | 59.1 | 55.1 | 45.1 | 34.1 | 23.1 | 16.1 | 12.1 | 4.1  | 22.8 | 12.5 |
|                 |                  | 1015          | 118.2            | 57.2             | 136.2   | 63.2 | 59.2 | 55.2 | 45.2 | 34.2 | 23.2 | 16.2 | 12.2 | 4.2  | 22.9 | 12.6 |
|                 |                  | 1020          | 118.3            | 57.3             | 136.3   | 63.3 | 59.3 | 55.3 | 45.3 | 34.3 | 23.3 | 16.3 | 12.3 | 4.3  | 23.0 | 12.7 |
|                 |                  | 1025          | 118.4            | 57.4             | 136.4   | 63.4 | 59.4 | 55.4 | 45.4 | 34.4 | 23.4 | 16.4 | 12.4 | 4.4  | 23.1 | 12.8 |
|                 |                  | 1030          | 118.5            | 57.5             | 136.5   | 63.5 | 59.5 | 55.5 | 45.5 | 34.5 | 23.5 | 16.5 | 12.5 | 4.5  | 23.2 | 12.9 |
|                 |                  | 1035          | 118.6            | 57.6             | 136.6   | 63.6 | 59.6 | 55.6 | 45.6 | 34.6 | 23.6 | 16.6 | 12.6 | 4.6  | 23.3 | 13.0 |
|                 | 600              | 1010          | 128.1            | 59.1             | 146.1   | 65.1 | 61.1 |      |      |      |      |      |      |      |      |      |





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Europe's leading construction products brands...

## Our Values



COLLABORATION



HONESTY &  
INTEGRITY



RESPECT



ENGAGEMENT



SUSTAINABLE  
DEVELOPMENT

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The product brands housed within CPG Europe cover a wide array of different construction needs and provide a wealth of complex services, support and systems that are rarely found together under one roof.



Passive fire  
protection

Intumescent Coatings, Fire Stopping



Waterproofing

Potable & Waste Water Industry, Balconies and Podia, Terraces, Basements & Foundations



Sealing, bonding  
& insulation

Window Insulation, Façade Construction, Exterior Insulation & EIFS, Structural & Inplant Glazing



Flooring

Seamless Resin Flooring, Subfloor Preparation, Car Parking Structures



Roofing

Liquid Applied Systems, Felt Systems, Vegetated Roofing



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