



higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE

BUILDING AND STRUCTURAL CONSTRUCTION N5

(8060015)

17 April 2020 (X-paper)
09:00–13:00

REQUIREMENTS: Answer book (BOE 8/13)
A2 drawing sheet
Hot-rolled steel sections (BOE 8/2)

Nonprogrammable calculators may be used.

This question paper consists of 6 pages, 1 diagram sheet and 1 formula sheet.

291Q1A2017

DEPARTMENT OF HIGHER EDUCATION AND TRAINING
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BUILDING AND STRUCTURAL CONSTRUCTION N5
TIME: 4 HOURS
MARKS: 100

INSTRUCTIONS AND INFORMATION

1. Answer all the questions.
 2. Read all the questions carefully.
 3. Number the answers according to the numbering system used in this question paper.
 4. Answer QUESTIONS 1, 2, 3, 4 and 7 on the supplied DRAWING SHEET. Answer QUESTIONS 5 and 6 in the ANSWER BOOK.
 5. Make all drawings in pencil with bold outlines.
 6. Make all drawings in accordance with National Standards and fully label it with descriptive notes and dimensions where applicable.
 7. All calculations must conform to the relevant SABS/SANS Codes of Practice.
 8. Work neatly.
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QUESTION 1

A 152 × 152 × 23,4 kg/m H-profile parallel flange universal column is welded in the centre of a 300 × 300 × 25 mm thick base plate and further stabilised by TWO 300 × 150 × 6 mm flange (gusset) plates.

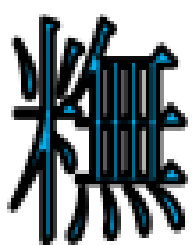
The base plate has FOUR Ø26 mm holes drilled 35 mm from the edges of the plate where M20 holding-down bolts are used to secure the steel column structure to a 400 × 400 mm isolated concrete pad foundation.

Draw, to scale 1:5, an isometric view of the structure to show the following:

Isometric view: Draw the flanges and flange plates on the left-hand side of the drawing.

Pad foundation: Show only part of the concrete depth.

Holding down bolts (L-shaped): Show TWO complete bolts, nuts and washers on the left-hand side of the drawing.

Welding symbols:
 6 mm fillet weld between the flange plate and column.
 6 mm fillet weld between the flange plate and base plate.
 8 mm fillet weld between the column and base plate.

Show at least 400 mm of column length and supply the drawing with all necessary labels and welding symbols.

[18]**QUESTION 2**

2.1 A 150 mm thick reinforced concrete slab is cast 110 mm into a one-brick wide supporting wall. A 270 mm cavity wall is built on top of the slab in line with the external brick wall. The brick wall below the slab has THREE courses brick force while the cavity wall is held together with tie wires.

The slab is reinforced with Y12 main bars at 250 mm centres and R8 secondary steel at 200 centres. The underside of the slab and the internal walls are plastered to a thickness of 19 mm. The top of the slab is finished off with 25 mm screed and 150 × 150 × 15 mm clay tiles.

Draw, to scale 1:10, a vertical section through both the walls and floor. Clearly show the correct position of the reinforcement, damp-proof course, brick force and tie wire on the drawing. Insert all the labelling, dimensions and hatching key symbols.

**(12)**

2.2 Draw an isometric view of a square column supported on a pile cap and TWO piles. The drawing must be drawn within a 1 000 mm × 1 000 mm square frame.

**(3)
[15]**