higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

# NATIONAL CERTIFICATE

# BUILDING AND STRUCTURAL CONSTRUCTION N4

(8060004)

**4 December 2023 (X-paper)**
**09:00–13:00**

**REQUIREMENTS:** **ONE A2 sheet of drawing paper**
**Hot-rolled steel sections**

**This question paper consists of 4 pages.**

237Q1G2304

Copyright reserved

# DEPARTMENT OF HIGHER EDUCATION AND TRAINING
# REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE
BUILDING AND STRUCTURAL CONSTRUCTION N4
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. All drawings must be drawn to the required scale.
5. Use both sides of the DRAWING SHEET.
6. All drawings, including candidate information, must be done in pencil.
7. Drawing with an ink pen is NOT allowed.
8. All drawing work must comply with the relevant SANS (SABS) recommended codes.
9. All abbreviations and symbols must comply with the latest National Building Regulations and all relevant SANS (SABS) codes.
10. Use your own discretion where dimensions are NOT given.
11. A balanced layout is very important and candidates will be penalised for poor planning.
12. Sketches and/or diagrams must be neat, reasonably large, in proportion and fully labelled.
13. All labels must be in capital letters.
14. Provide an appropriate title and scale for ALL drawings.
15. Write neatly and legibly.

---

Copyright reserved 

## QUESTION 1: BONDING

Draw to scale 1:10 an isometric view of alternate plan courses of a 385 mm cavity-wall corner with the length of the walls approximately 1 265 mm and 1 045 mm, each with stopped ends. The lower projection must be FOUR courses high and in English bond. **[15]**

## QUESTION 2: CENTERING OF SEMI-CIRCULAR ARCH

Draw to scale 1: 20 the front view of a centring for a semi-circular arch with a telescopic metal prop in position and label all the parts. Use the following:

SPECIFICATIONS

| | |
|---|---|
| Span | 3 300 |
| Tie beam | 152 mm × 38 mm |
| Struts | 152 mm × 38 mm |
| Lagging | 50 mm × 32 mm |
| Ribs | 32 mm thick |
| Cross braces | 32 mm thick |
| Bearers | 225 mm × 150 mm |
| Sleepers | 225 mm × 38 mm |

**[15]**

## QUESTION 3 INDUSTRIAL STEEL WINDOW

Draw to scale 1:5 a vertical through a 270 mm cavity wall showing treatment at head window. **[15]**

## QUESTION 4: ROOF AND ROOF COVERINGS

A one-brick wall supports a Howe-type timber roof truss with nail-plated joints across the span of the house. The roof truss is made up of 114 × 38 mm rafters and a 150 × 38 mm tie beam. The internal vertical struts are 114 × 38 mm. Fluted-steel roof sheeting is used as covering on 76 × 50 mm purlins. The closed eaves overhang is 250 mm wide with a 19 mm thick fibre-cement fascia attached at the ends of the rafter. The guttering consists of a 100 mm half-round plastic gutter with a ø80 downpipe.

Draw to scale 1:10 a vertical section through one of the eaves to show part of the roof and downpipe and brick wall. The completed drawing must include ALL labels and key symbols. Clearly show the positions of the nail plates at the roof-truss joints. **[17]**

Copyright reserved 

## QUESTION 5 CEILINGS

| | | |
|---|---|---|
| 5.1 | List THREE pieces of equipment needed to finish the joints with joint filler. | (3) |
| 5.2 | List THREE advantages of plasterboard. | (3) |
| 5.3 | List TWO disadvantages of plasterboard. | (2) |
| 5.4 | List FIVE advantages of fibre-cement flat sheets. | (5) |
| 5.5 | Give FIVE guidelines for installing a suspended ceiling. | (5) |

**[18]**

## QUESTION 6 STRUCTURAL STEELWORK

A steel structure is composed of a 254 mm × 254 mm × 89,2 kg/m H-profile steel column with a 254 mm × 146 mm × 31,3 kg/m I-profile main beam and a 152 mm × 152 mm × 23,4 kg/m H-profile secondary beam. The main beam is fixed centrally to the flange outer surface of the H-profile steel column using 90 mm × 90 mm × 12 mm × 15,9 kg/m angle cleats (one fixed above, one fixed below.) ALL joints are fixed by arch weld.

The secondary beam is fixed to the main beam at 400 mm from one end of the main beam to the web of the main beam also using 90 mm × 90 mm × 12 mm × 15,9 kg/m angle cleat and 19 mm rivets. The top surfaces of the beams must be level with each other.

Draw to scale 1:5 a vertical sectional end view through the following:

| | | |
|---|---|---|
| 6.1 | The main beam. Show ALL the welding symbols. | (10) |
| 6.2 | The secondary beam. | (10) |

**[20]**

**TOTAL: 100**

Copyright reserved