higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

BUILDING AND STRUCTURAL CONSTRUCTION N5

13 AUGUST 2019

This marking guideline consists of 7 pages.

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SECTION A: DESIGN

QUESTION 1: BOLT CONNECTION

1.1 Load = Area × stress
Load = $\frac{\pi 12^2}{4} \times 6 \times 100$✓
Load = 67 858 N/1 000✓
Load = 67,858 kN✓✓ (4)

1.2 Load = Area × stress
Load = d × t × fc × n
Load = 12 × (12) × 240 × 3✓
Load = 103 680 N✓
Load = 103,680 kN✓✓ (4)

1.3 Load = Area × stress
Load = $f_t \times [(B \times t) - n(d \times t)]$
Load = 155 × [(60 × 8) – 3(14 × 8)]✓
Load = 22 320 N✓
Load = 22,32 kN✓✓ (4)

1.4 Load = 22,32 kN (1)
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QUESTION 2: LOADED BEAM

2.1 $\frac{RL.4}{4} = \frac{(18 \times 2) + (8 \times 6) - (8 \times 2)}{4}$
RL = 17 kN✓✓

$\frac{RL.4}{4} = \frac{(18 \times 2) + (8 \times 6) - (8 \times 2)}{4}$
RL = 17 kN✓✓ (4)

2.2 @ A = -8 kN✓
@ B = -8 + 17 = 9 kN✓
B–C = 9 – 4 = 5 kN✓
@ C = 5 – 10= -5 kN✓
C–D = 5 – 4 = -9 kN✓
@ D = -9 + 17 = 8 kN✓
@ E = 8 – 8 = 0 (see diagram on the next page) (6)

2.3 BM @ A = 0
BM @ B = (-8 × 2)= -16 kN✓✓
BM @ C = (-8 × 4) + (17 × 2) + (-4 × 1) = -2 kN✓✓
BM @ D = (-8 × 2) = -16 kN✓✓
BM @ E = 0 (see diagram on the next page) (6)

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2.4 $Ze = \frac{Bm\ max}{Pt}$

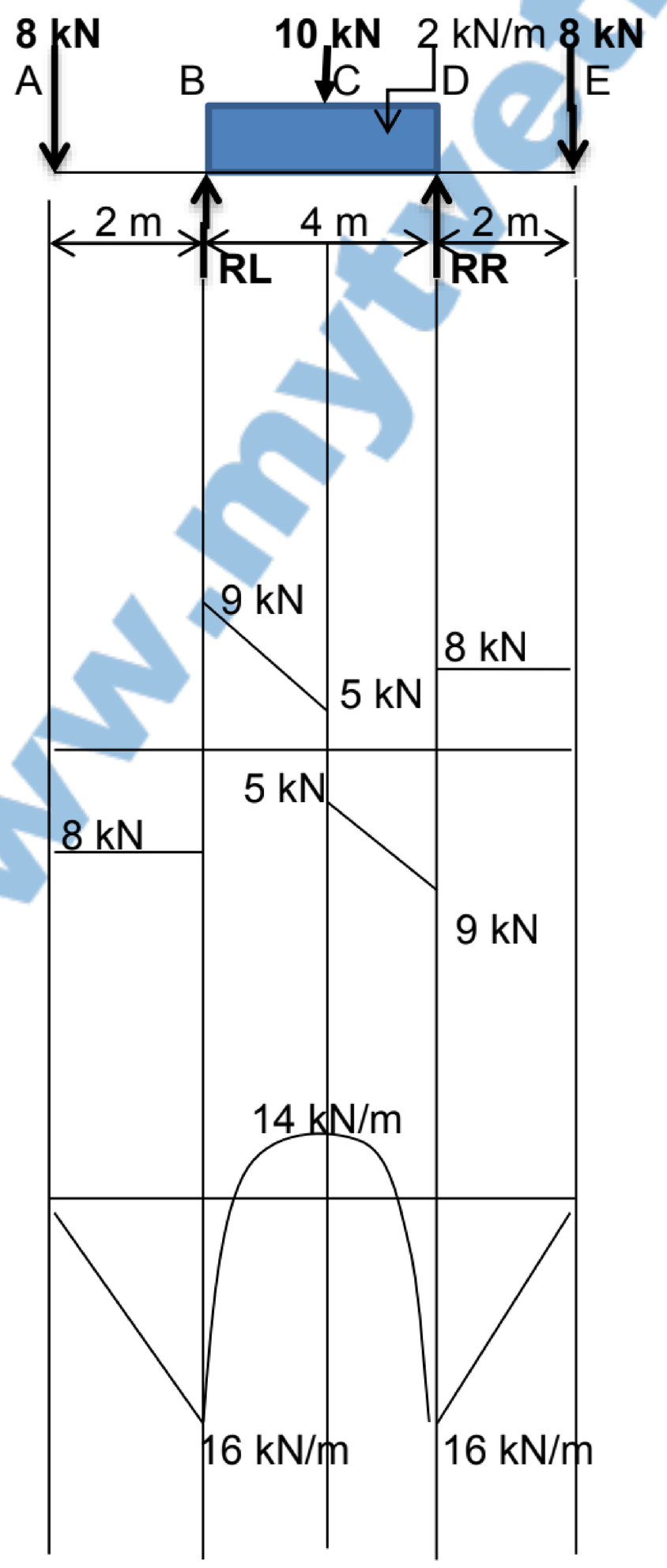
$= \frac{16}{165} \times 1\,000 = 96,97 \times 10^{-6}\ m^3$✓

New Ze = $116,0 \times 10^{-6}\ m^3$✓
Use size 152 × 89 × 17,1 kg/m✓ (3)

2.5 $F_s = \frac{Load}{Area} = \frac{9 \times 1\,000}{152,4 \times 4,9}$✓

= 12,052✓

12,052 is less than 100 MPa, thus safe.✓



(3)
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