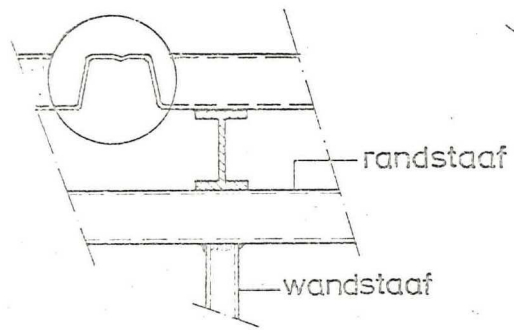
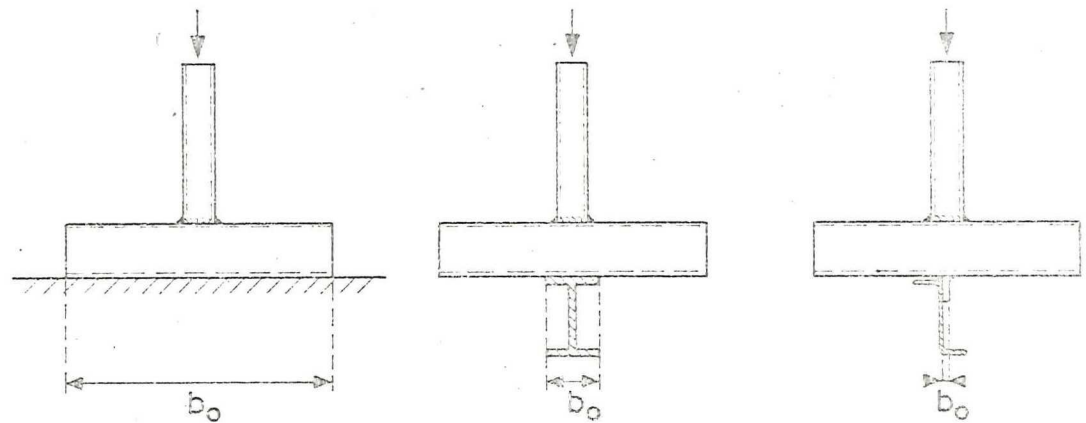


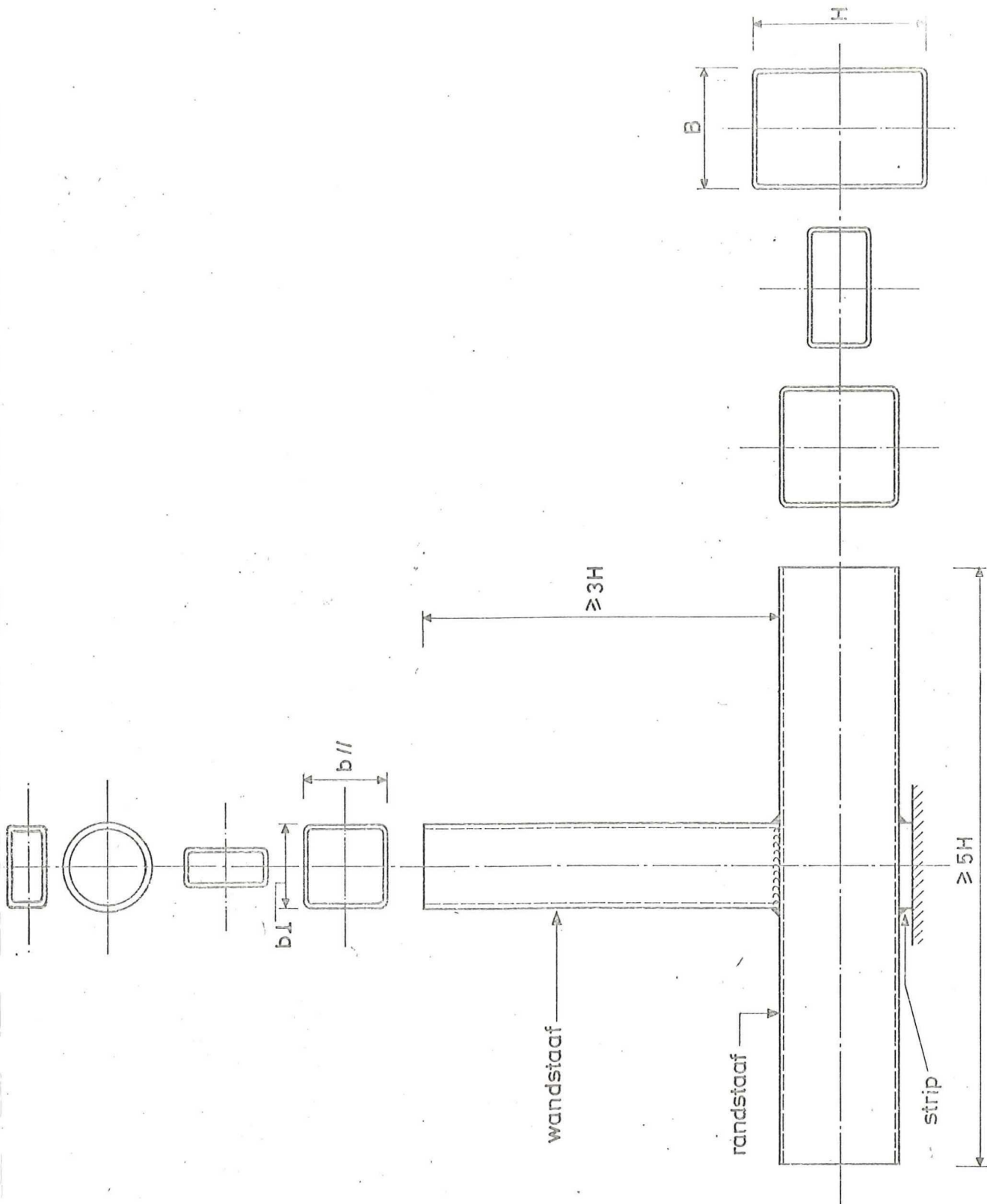
a) Vakwerk samengesteld uit buisprofielen
Verschillende verbindingvormen



b) Belasting T verbinding



c) Geconcentreerde invoer van de belasting op
T verbinding



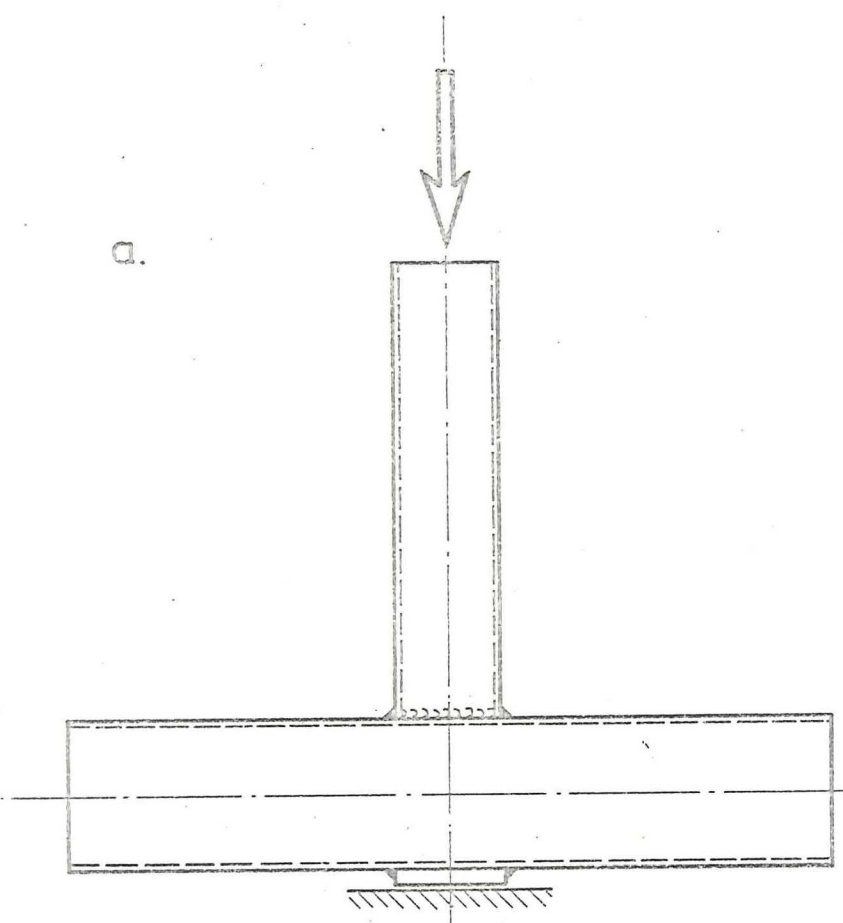
vorm en afmetingen van de van de proefstukken voor
 het onderzoek van gedrukte T-verbindingen.

TNO
 IBBC

Rapp. nr.:

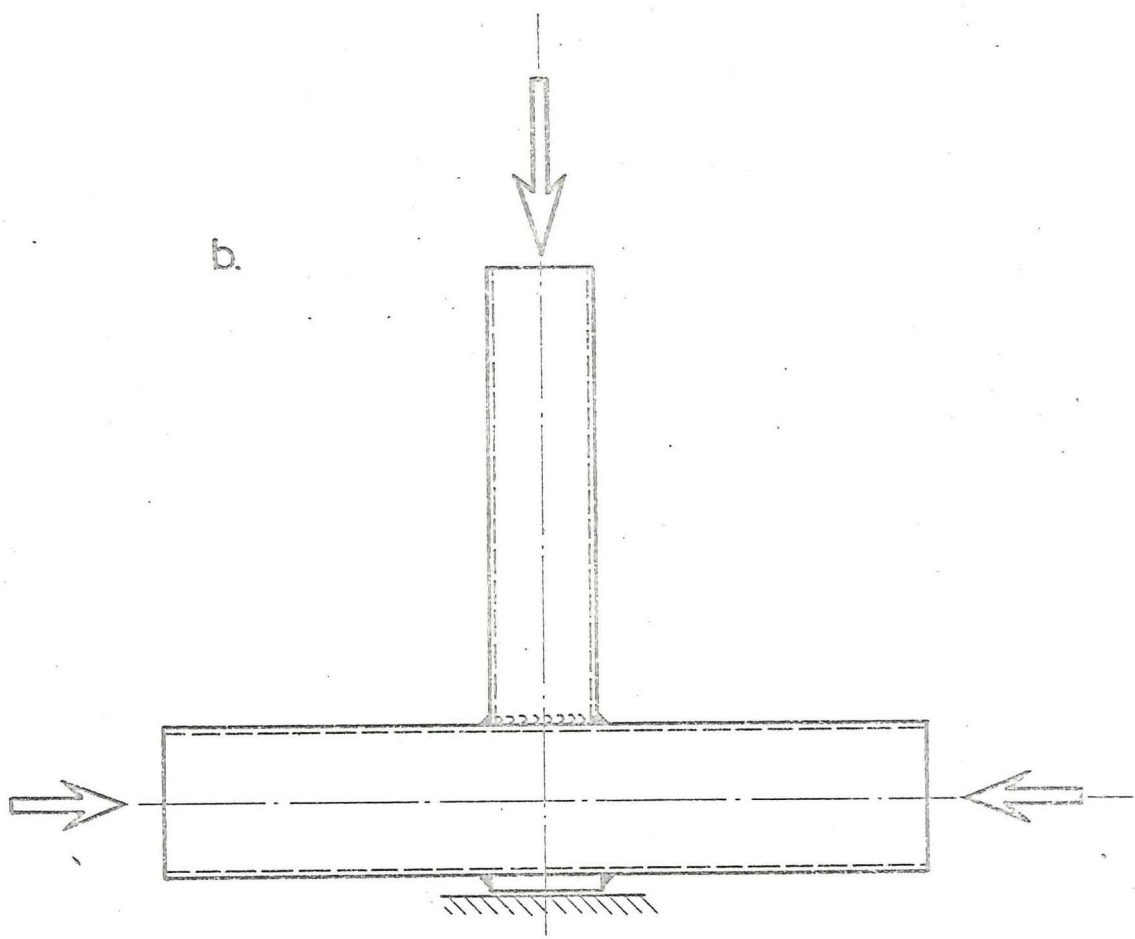
Opdr. nr.:

a.



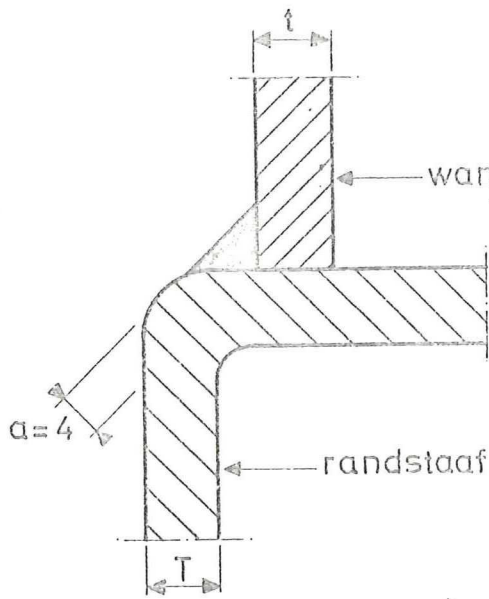
drukkracht op de wandstaaf

b.

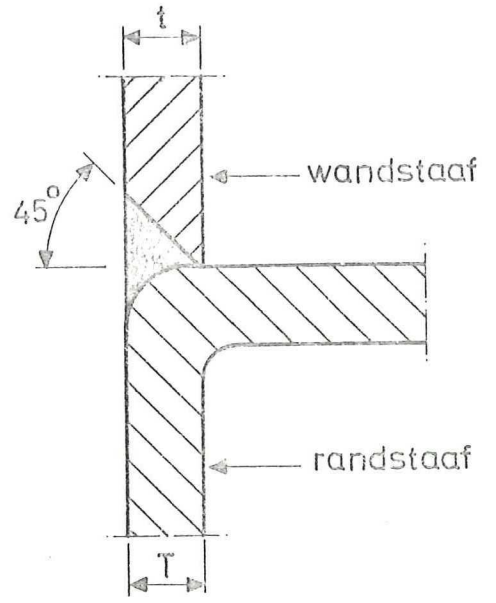


drukkracht op de wandstaaf
en de randstaaf

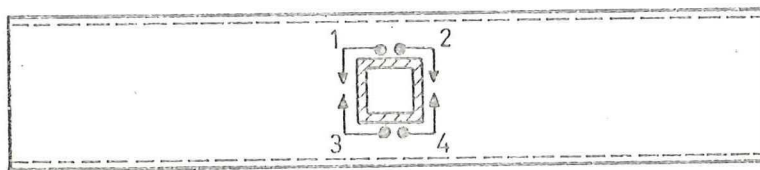
belastingen op het proefstuk



(a)



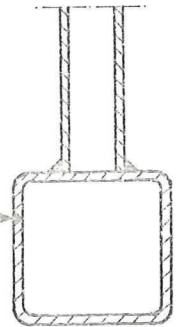
(b)



las volgorde

(c)

plaats
langnaad
in buis -
profiel



plaatsing langsnaad in de randstaaf van een proefstuk

(d)

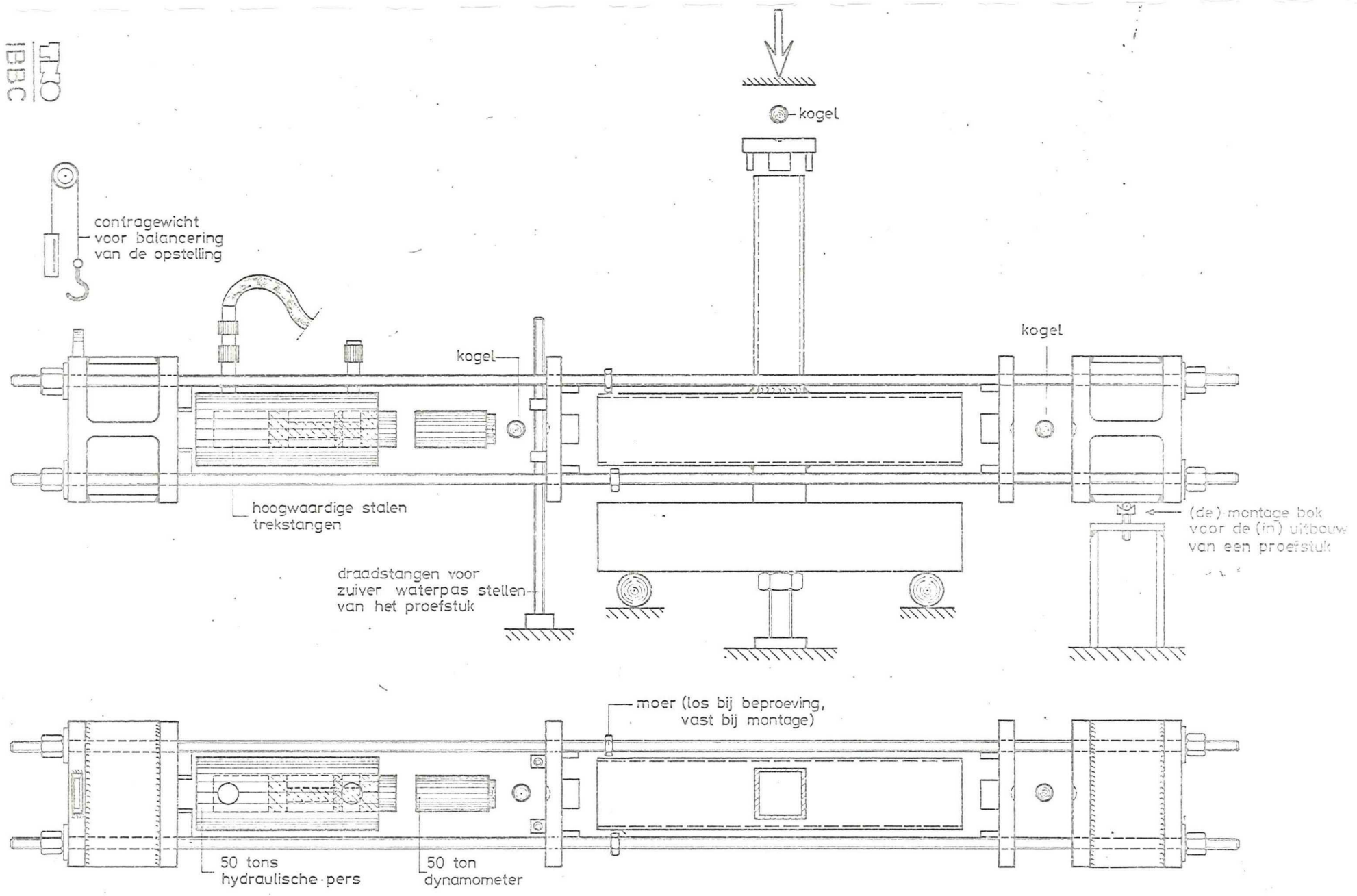
las details

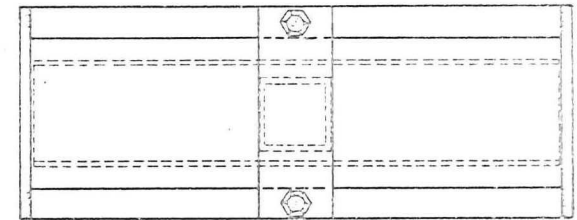
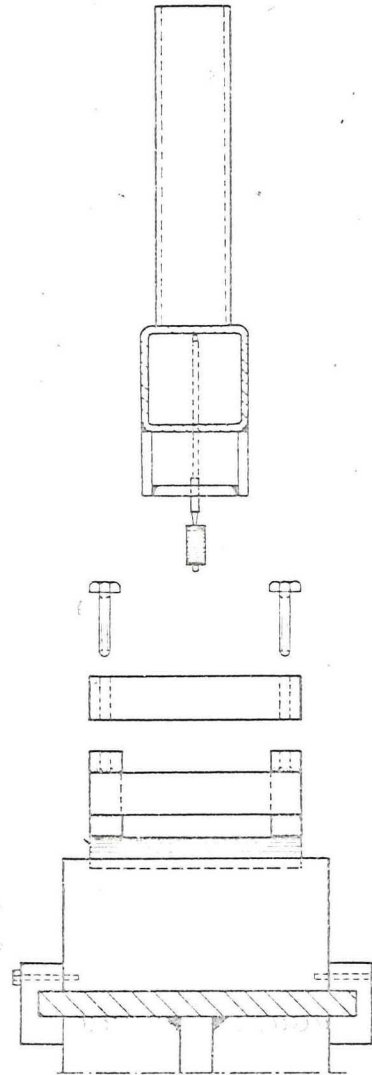
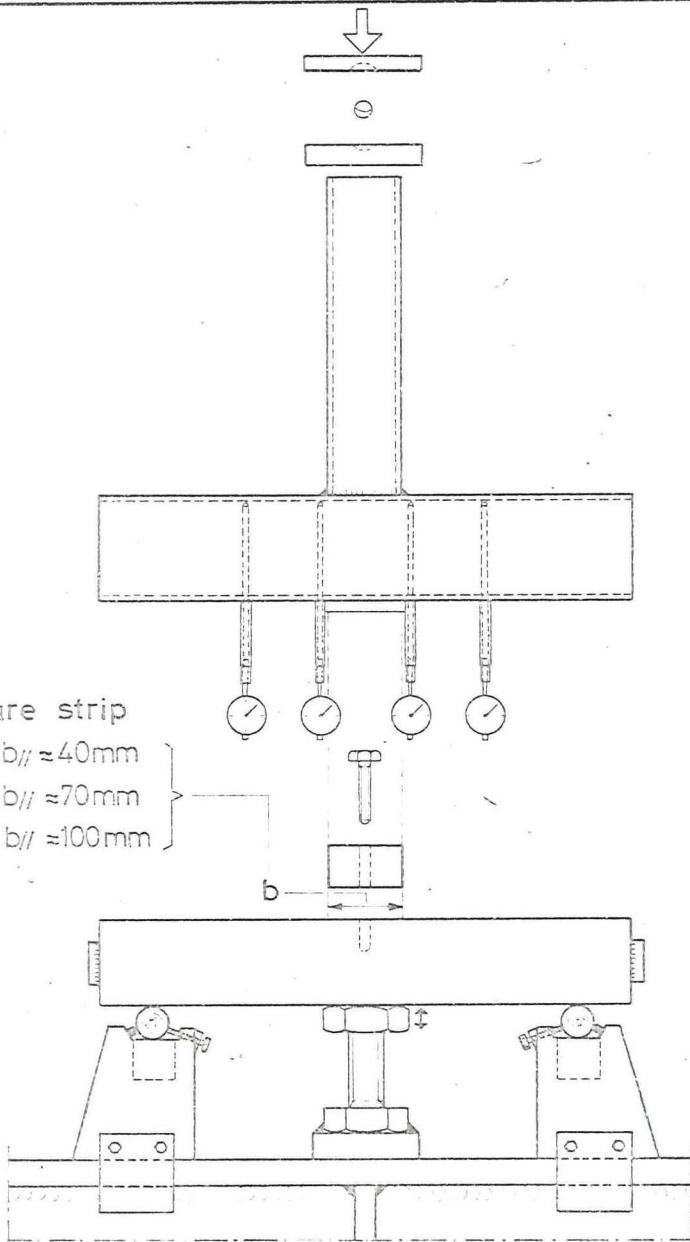
UVO
IBBC

Rapp. nr.:

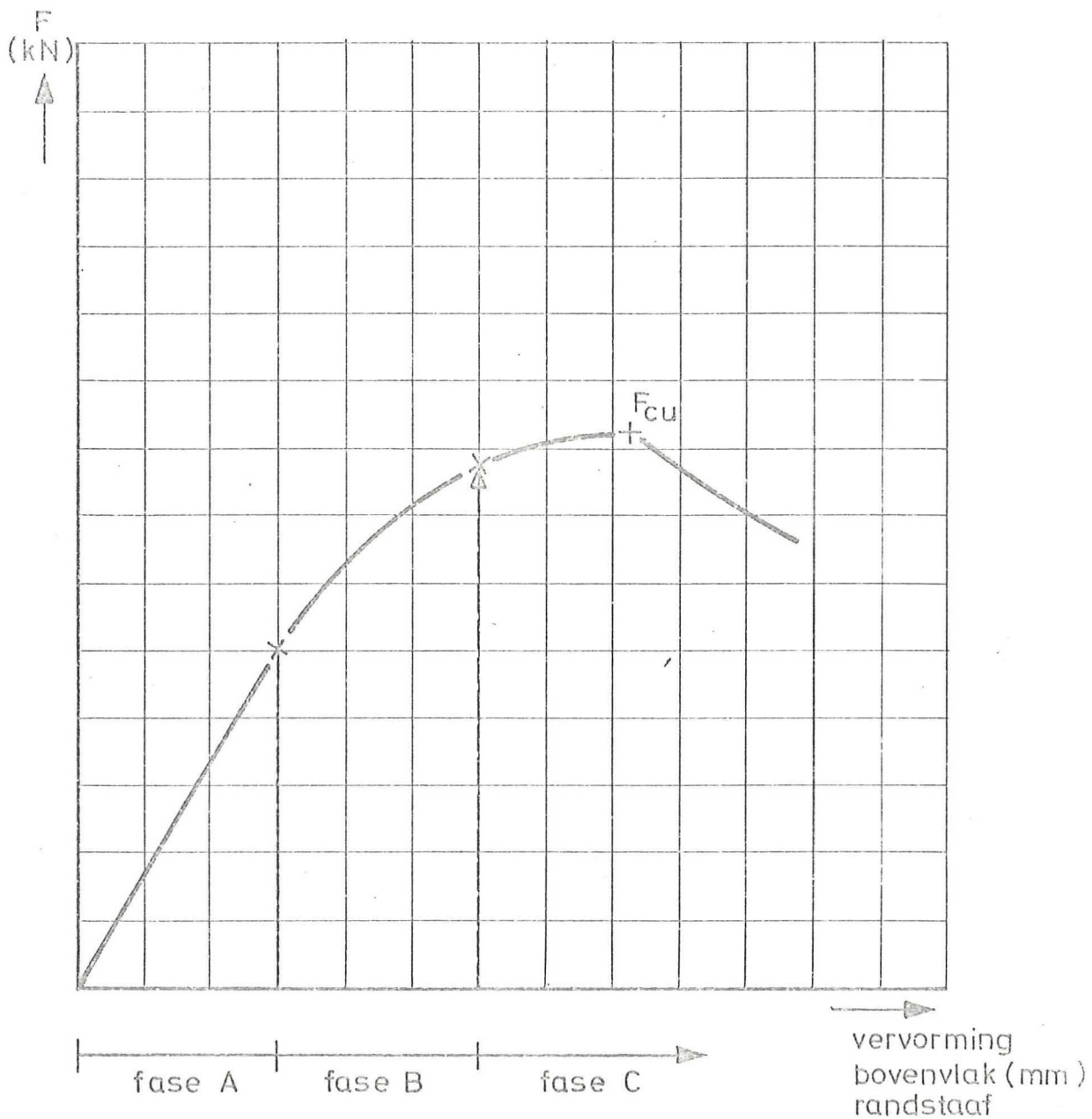
Opdr. nr.:

proefopstelling met axiale voorspankracht in de railstaal.





VARIANT IV

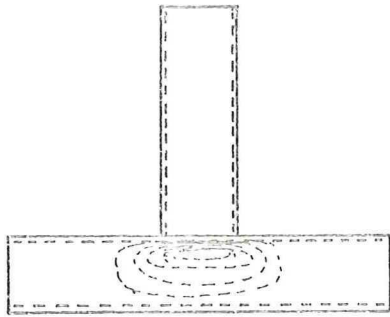


kracht - vervorming verloop bij een T-verbinding.

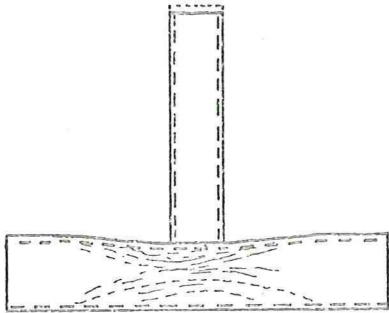
ELO
IBBC

app. nr.:

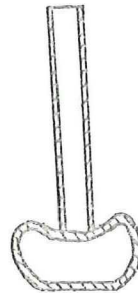
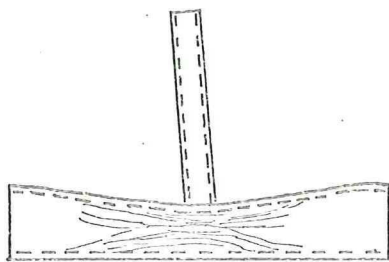
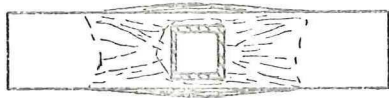
Opdr. nr.:



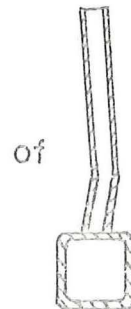
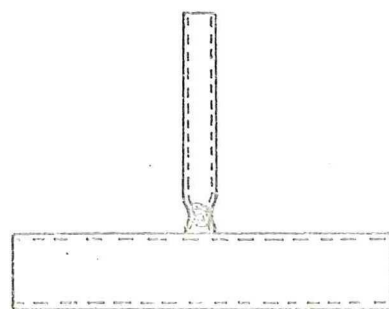
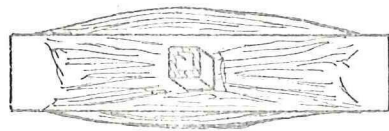
bezwijkvorm I
(instabiliteit)



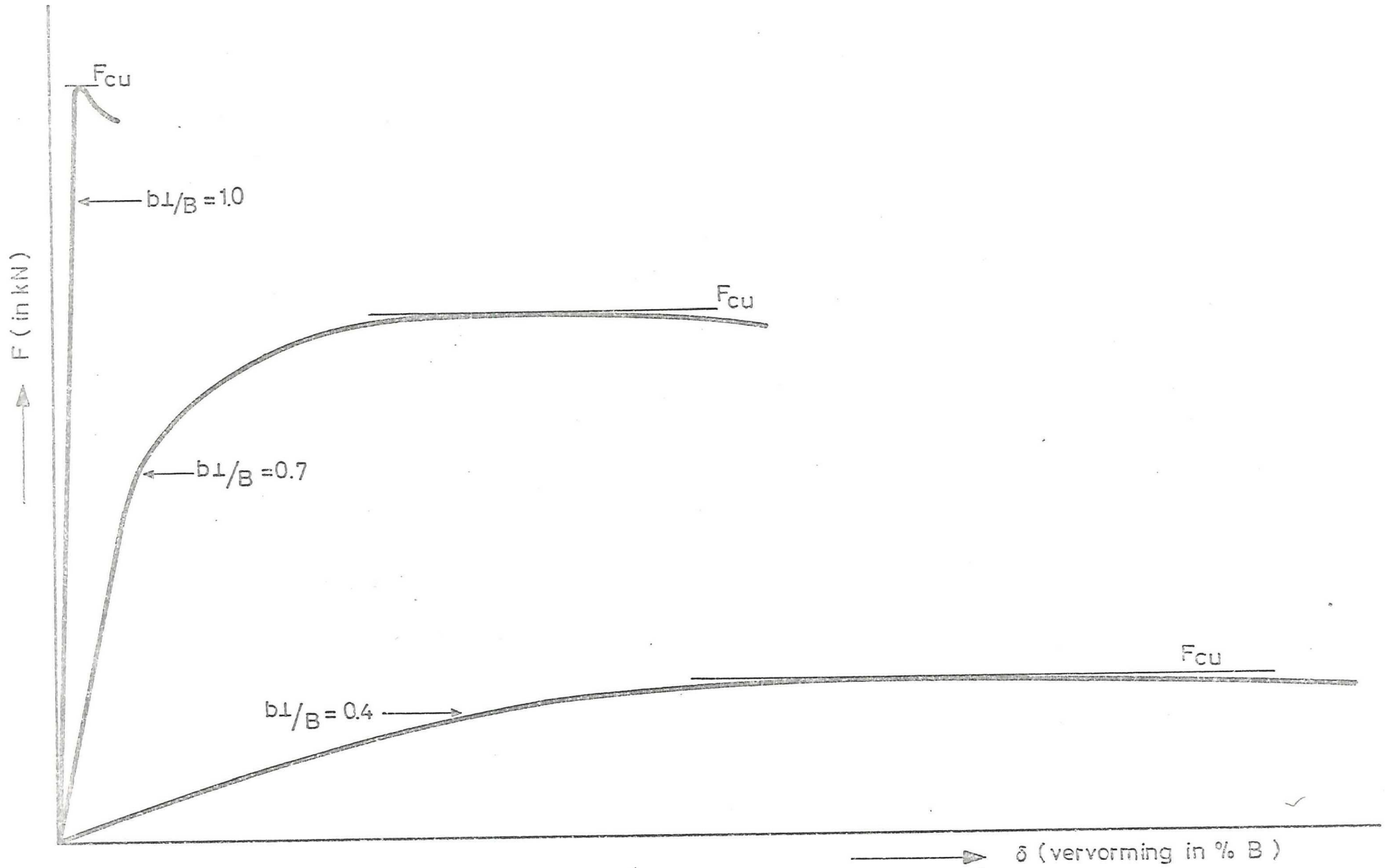
bezwijkvorm II
(plastificeren randstaaf)



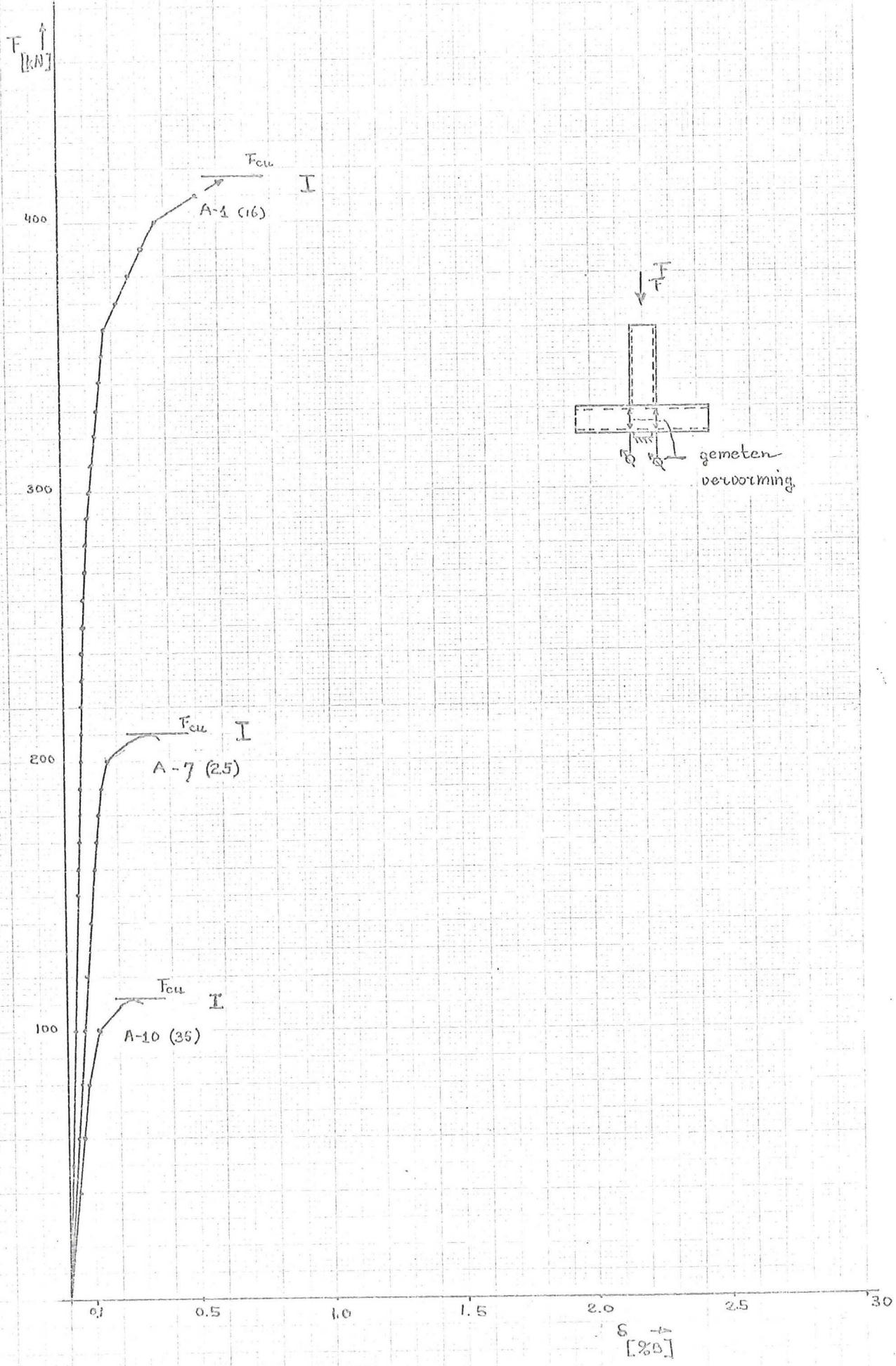
bezwijkvorm III
(plastificeren + grote ver-
vormingen randstaaf)



bezwijkvorm IV
(bezwijken randstaaf)



ligging F/δ lijnen bij verschillende b_{\perp}/B



$F \uparrow$
[kN]

200

150

100

50

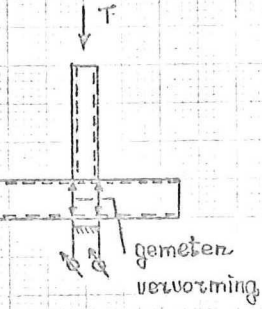
B-2 (16)

B-3 (25)

B-II (35)

F_{cu}

F_{cu} B-II



$\delta \rightarrow$
[%]

D-2

F
↑
[kN]

F_{cu} C-3

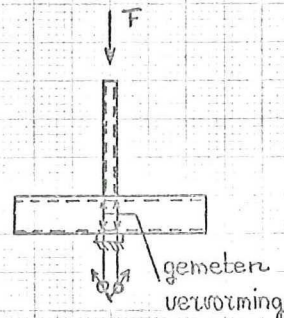
III

200

150

100

50



C-3 (16)

F_{cu} C-9

III

C-9 (25)

F_{cu} C-12

II

C-12 (35)

1

5

10

15

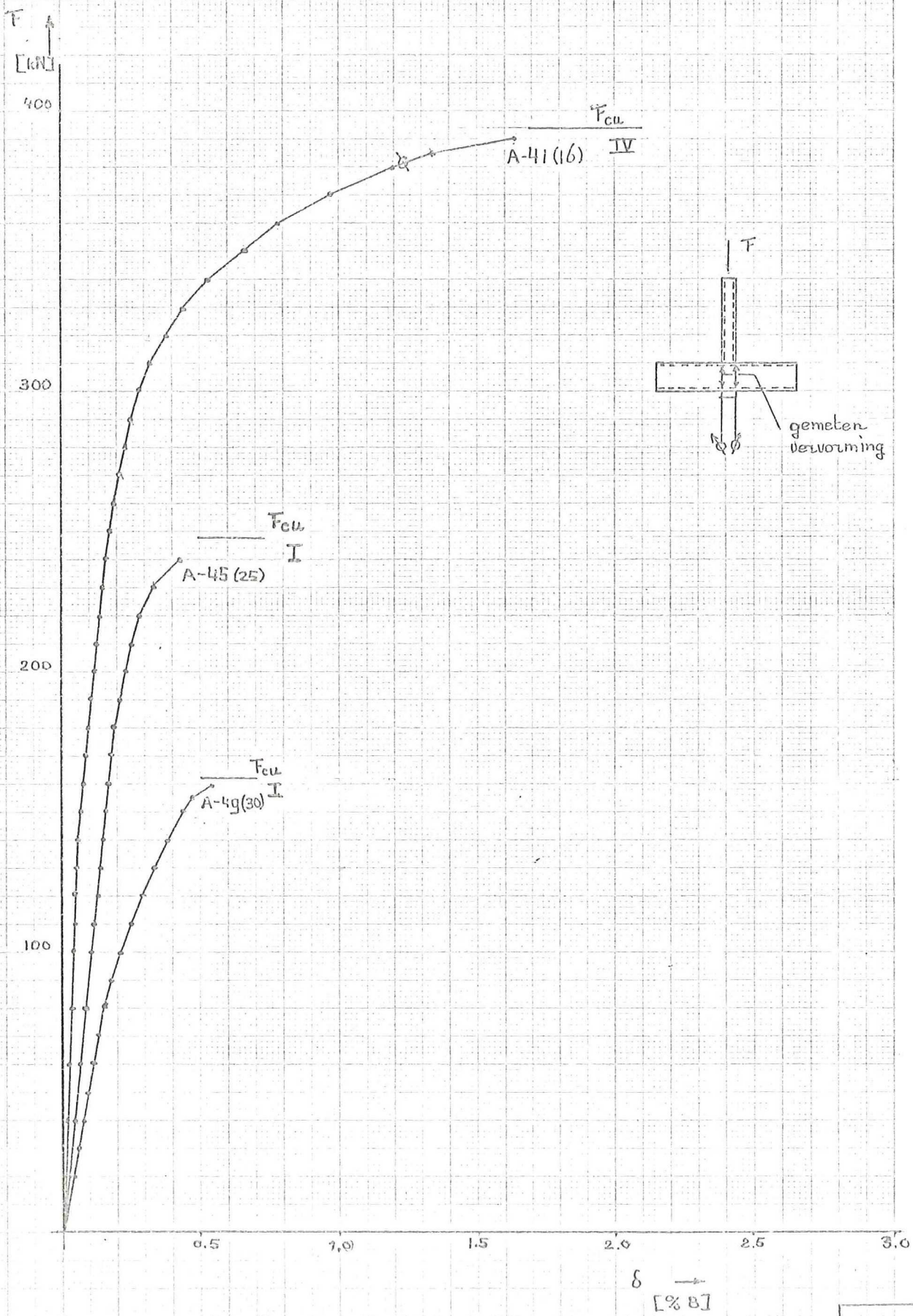
20

25

30

δ →
[%B]

D-3



F_A
[kN]

400

300

200

100

0.1

0.5

1.0

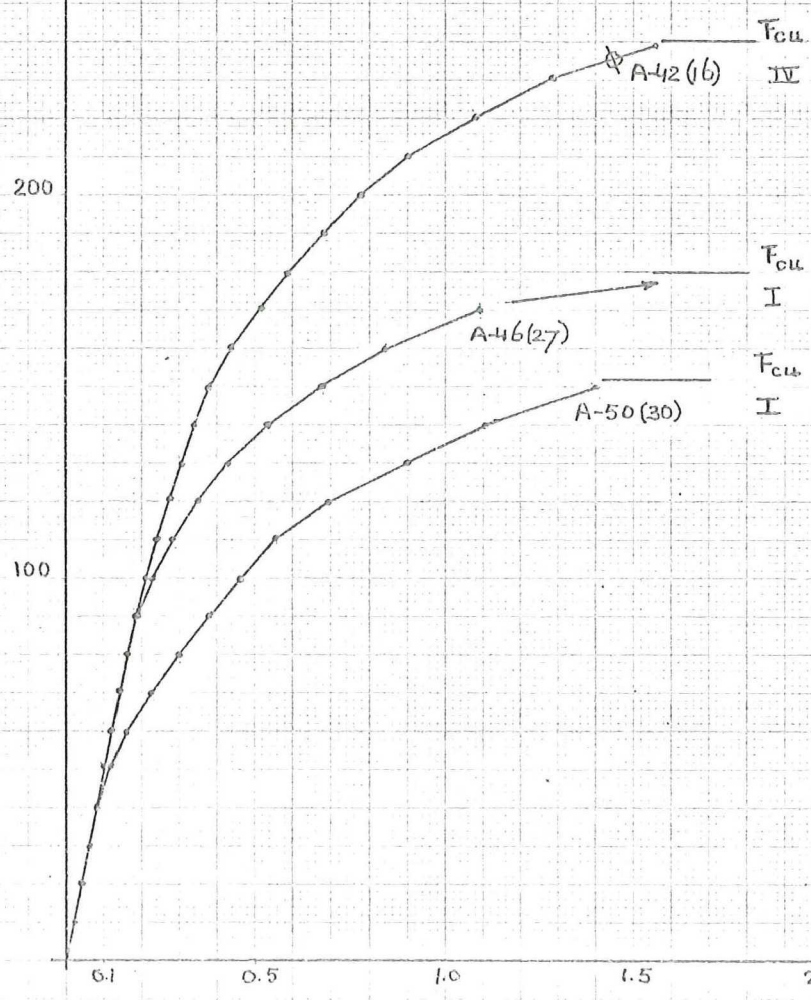
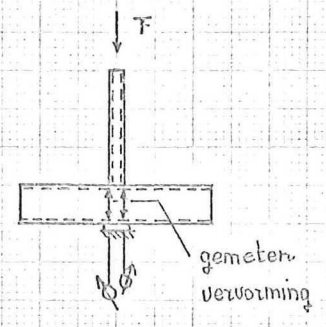
1.5

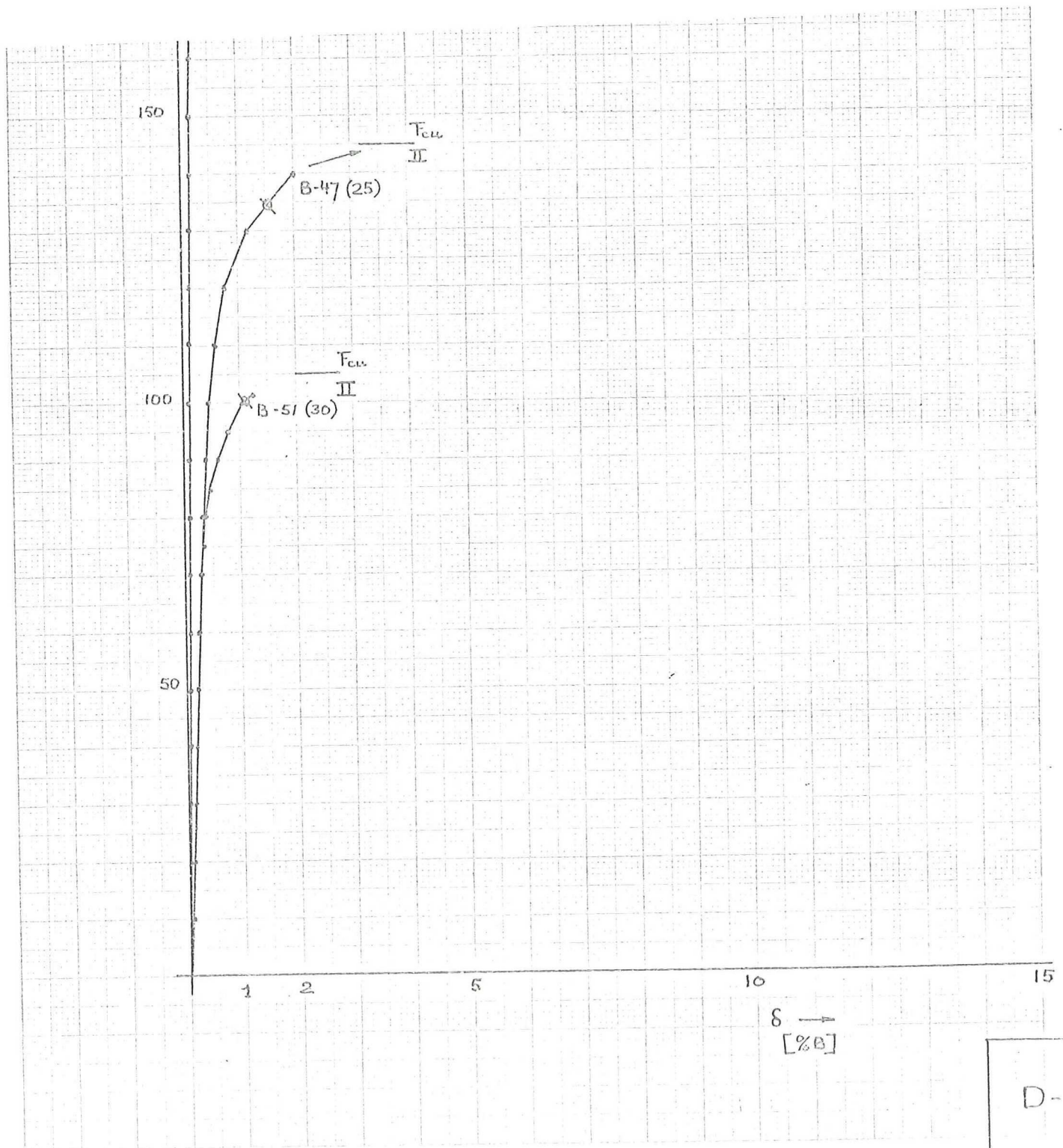
2.0

2.5

3.0

δ
[% B]





D-6

F
[kN]

200

150

100

50

1

5

10

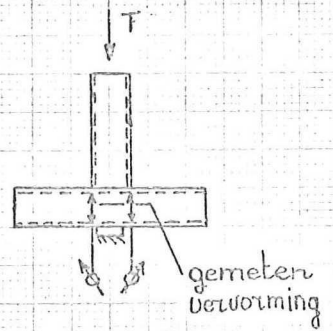
15

20

25

30

δ
[%B]



$F_{0.2}$ C-44
IV

$F_{0.2}$ C-48
III

$F_{0.2}$ C-52
III

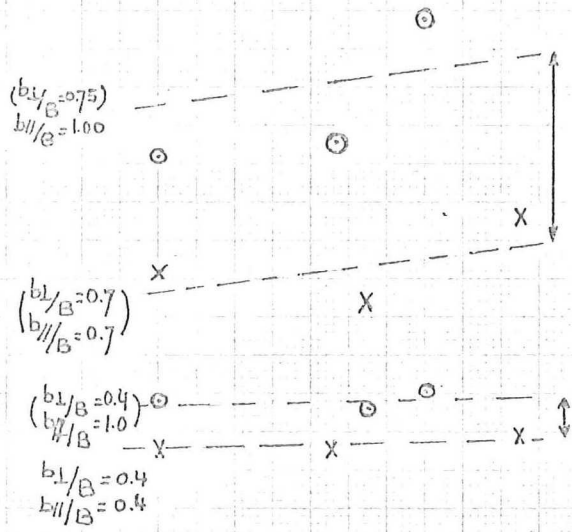
C-44 (16)

C-48 (27)

C-52 (30)

$\frac{F_{23}^*}{T^e}$
 $[\frac{kN}{m^2}]$

9
8
7
6
5
4
3
2
1



wandstaaf

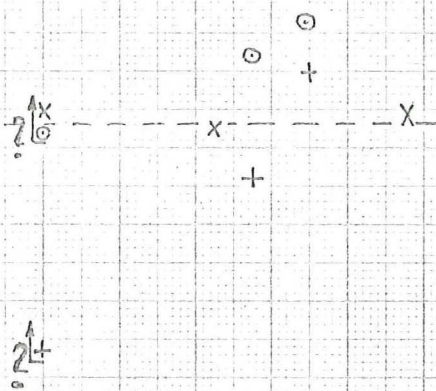
x : $\phi 40 \times 40$ &
 $\phi 70 \times 70$

o : $\phi 100 \times 75$ &
 $\phi 100 \times 40$

10 20 30 40 B/T

$\frac{F_{cu}^*}{T^{1.7}}$
 $[\frac{kN}{m^2}]$

16
14
12
10
8
6
4
2

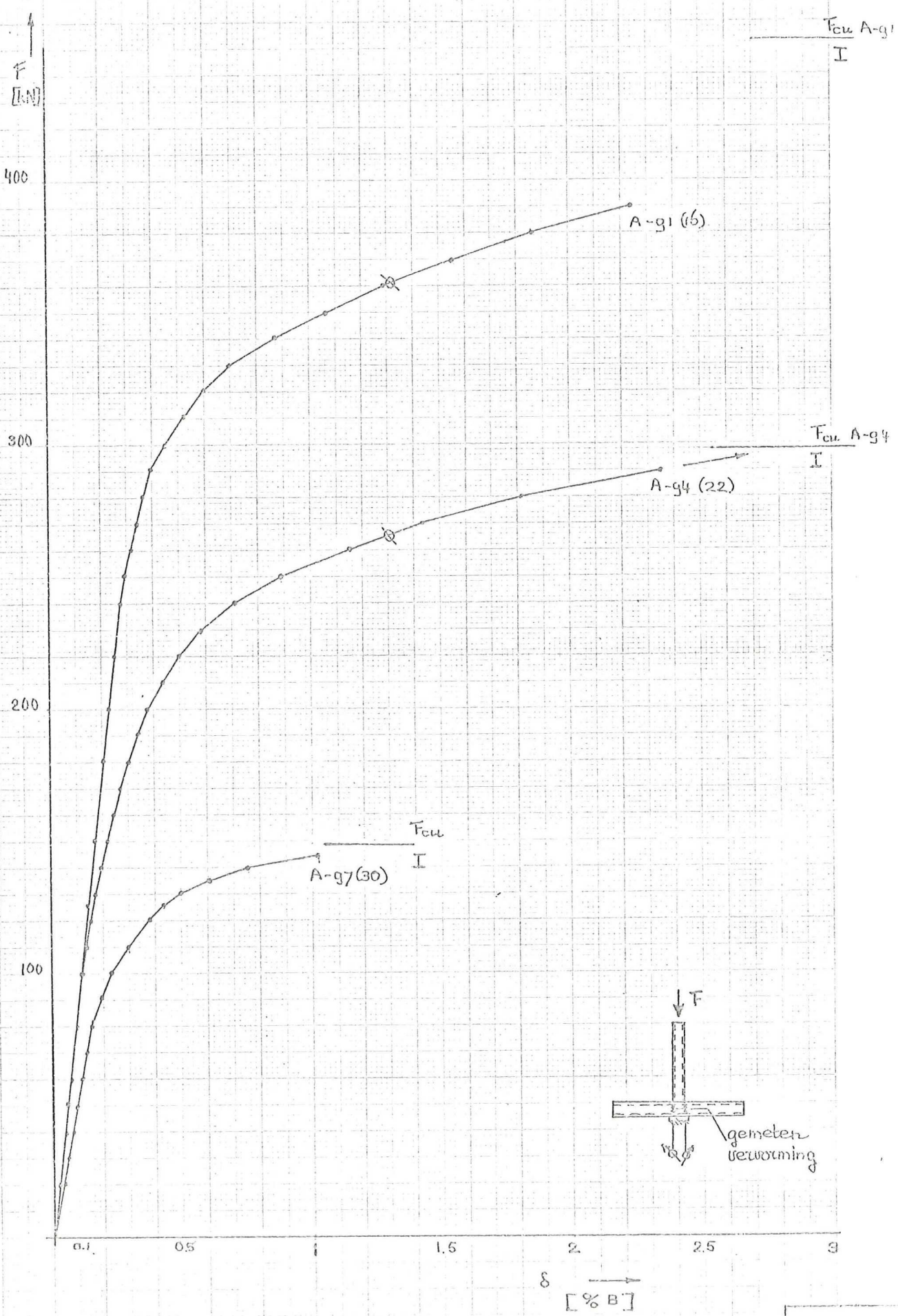


wandstaaf

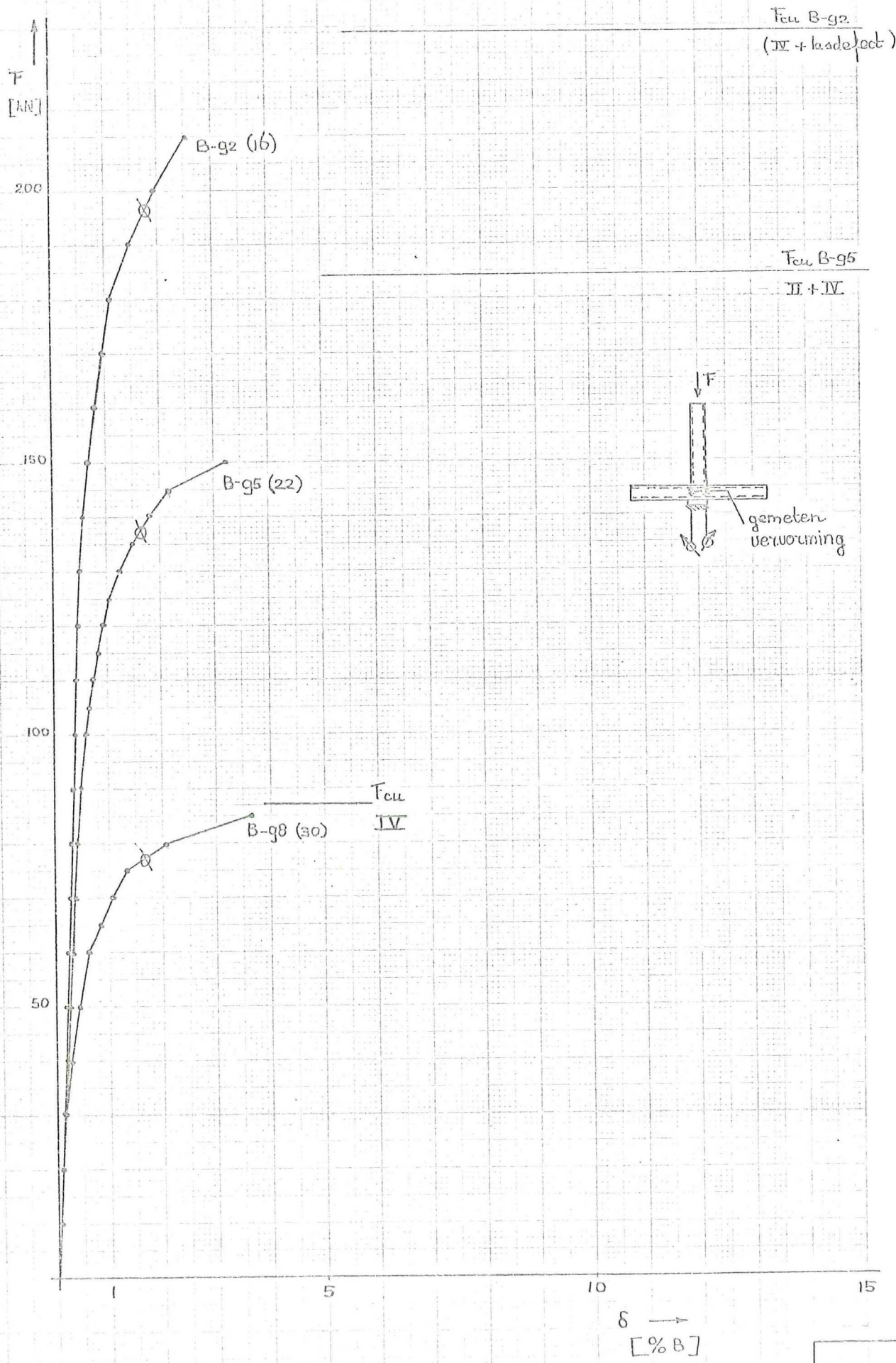
x : $\phi 100 \times 100$
o : $\phi 100 \times 75$
+ : $\phi 100 \times 40$

? : afwijkende
bewijkingen.

10 20 30 40 B/T



D-9



F
[kN]

200

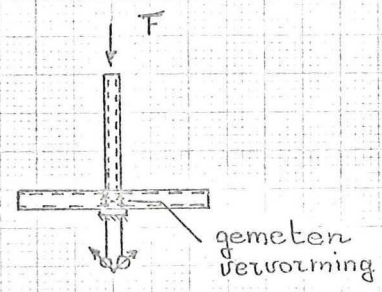
150

100

50

$F_{cu} C-g3$
(has defect)

$F_{cu} C-g6$
(100% B
vervorming)



c-g3 (16)

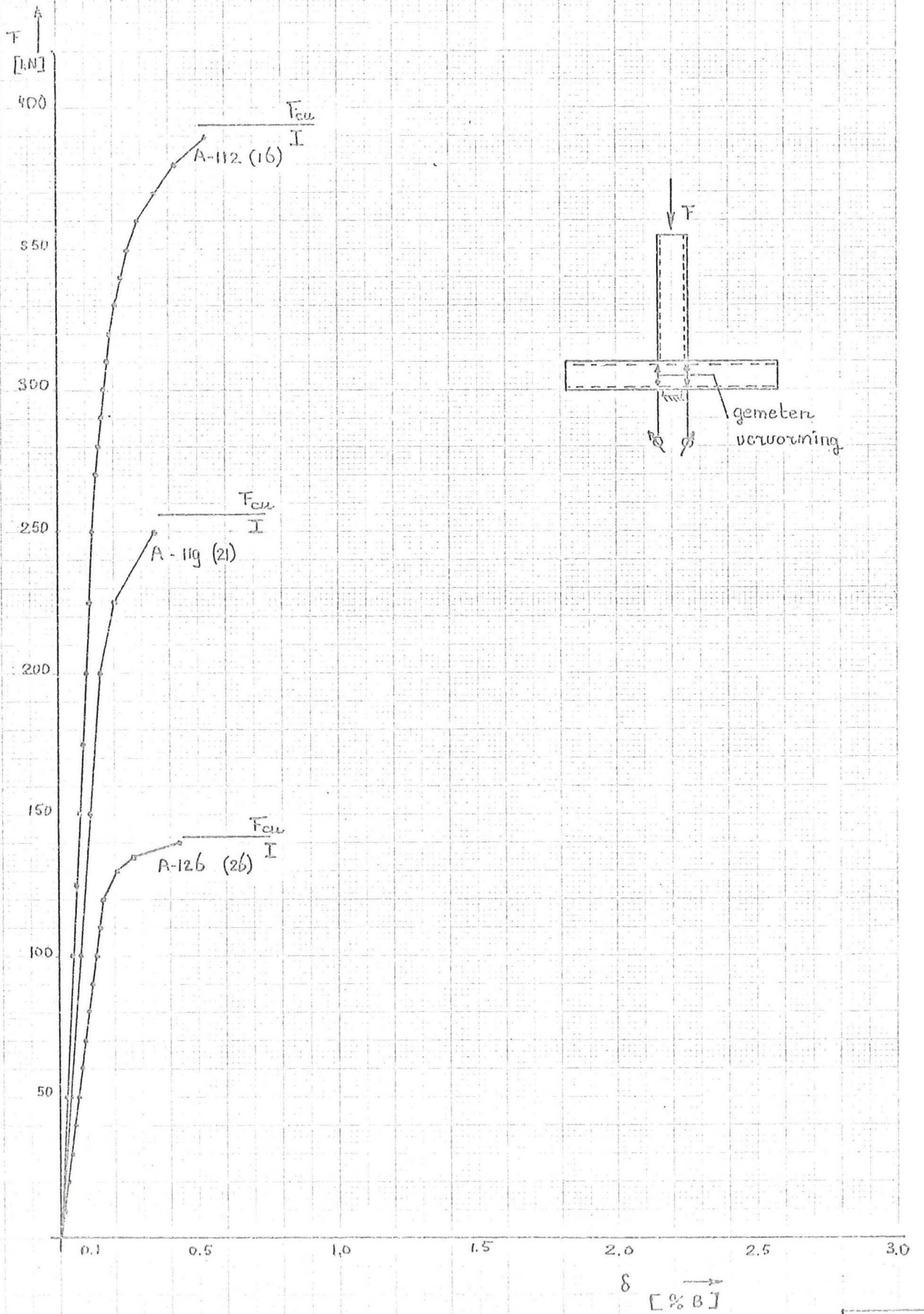
c-g6 (22)

c-g9 (30)

$F_{cu} C-g9$
III

δ
[%B]

D-11



F
[KN]

200

150

100

50

B-116 (16)

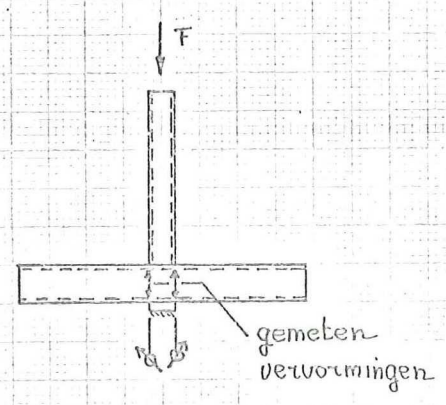
B-123 (21)

B-130 (26)

$T_{Cu} B-116$
II + IV

$T_{Cu} B-123$
III

$T_{Cu} B-130$
II



5

10

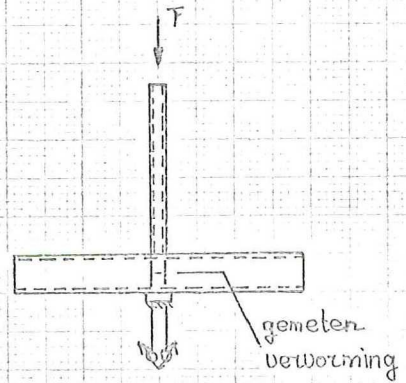
15

δ
[‰ B]

F ↑
[kN]
200

F_{cu} C-118
III

150



F_{cu} C-125
III

100

50

C-118 (16)

C-125 (21)

F_{cu}
III
C-132 (26)

1

5

10

15

20

25

30

δ →
[% B]

D-14

F_{100}^* / T^2

8
7
6
5
4
3
2
1

10

20

30

40

B/T

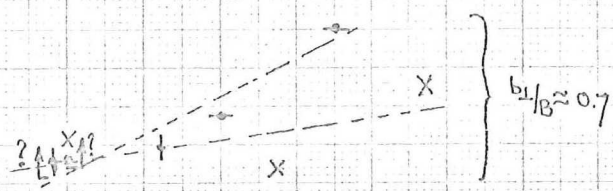
Wandstaał

X : $\phi 70 \times 70$ of $\phi 40 \times 40$

o : $\phi 70 \times 50$ of $\phi 40 \times 40$

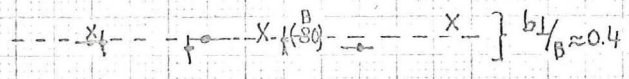
φ : $\phi 70 \times 70$ of $\phi 40 \times 40$

? : afwijkende bewegvoorm



$b_1/B \approx 0.7$

$\phi(B)$



$b_1/B \approx 0.4$

F_{cu}^* / T^2

18
16
14
12
10
8
6
4
2

10

20

30

40

H/T

o Randstaał $\phi 100 \times 50$

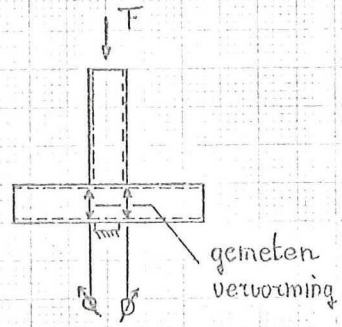
X Randstaał $\phi 100 \times 100$

φ Randstaał $\phi 150 \times 100$



$\phi(B)$

F ↑
[kN]
400



F_{cu} A-151
IV

300

A-151 (17)

200

F_{cu}
I
A-157 (25)

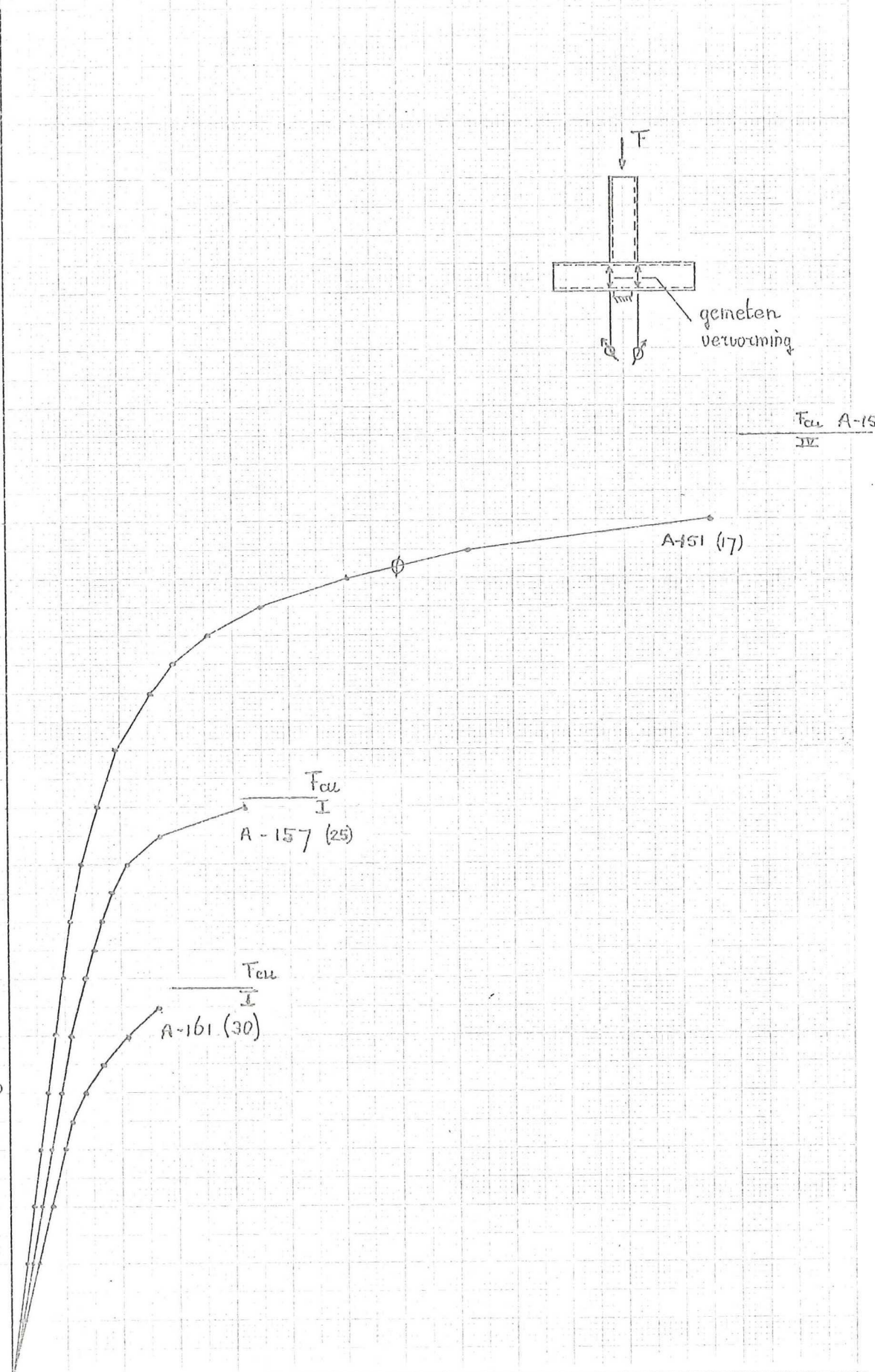
100

F_{cu}
I
A-161 (30)

0.10 0.50 1.0 1.5 2.0 2.5 3.0

δ →
[mm]

D-16



F [kN]

200

150

100

50

$F_{cu} B-152$
III

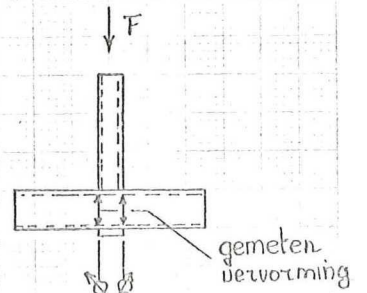
B-152 (17)

$F_{cu} B-158$
III

B-158 (25)

$F_{cu} B-161$
III

B-161 (30)



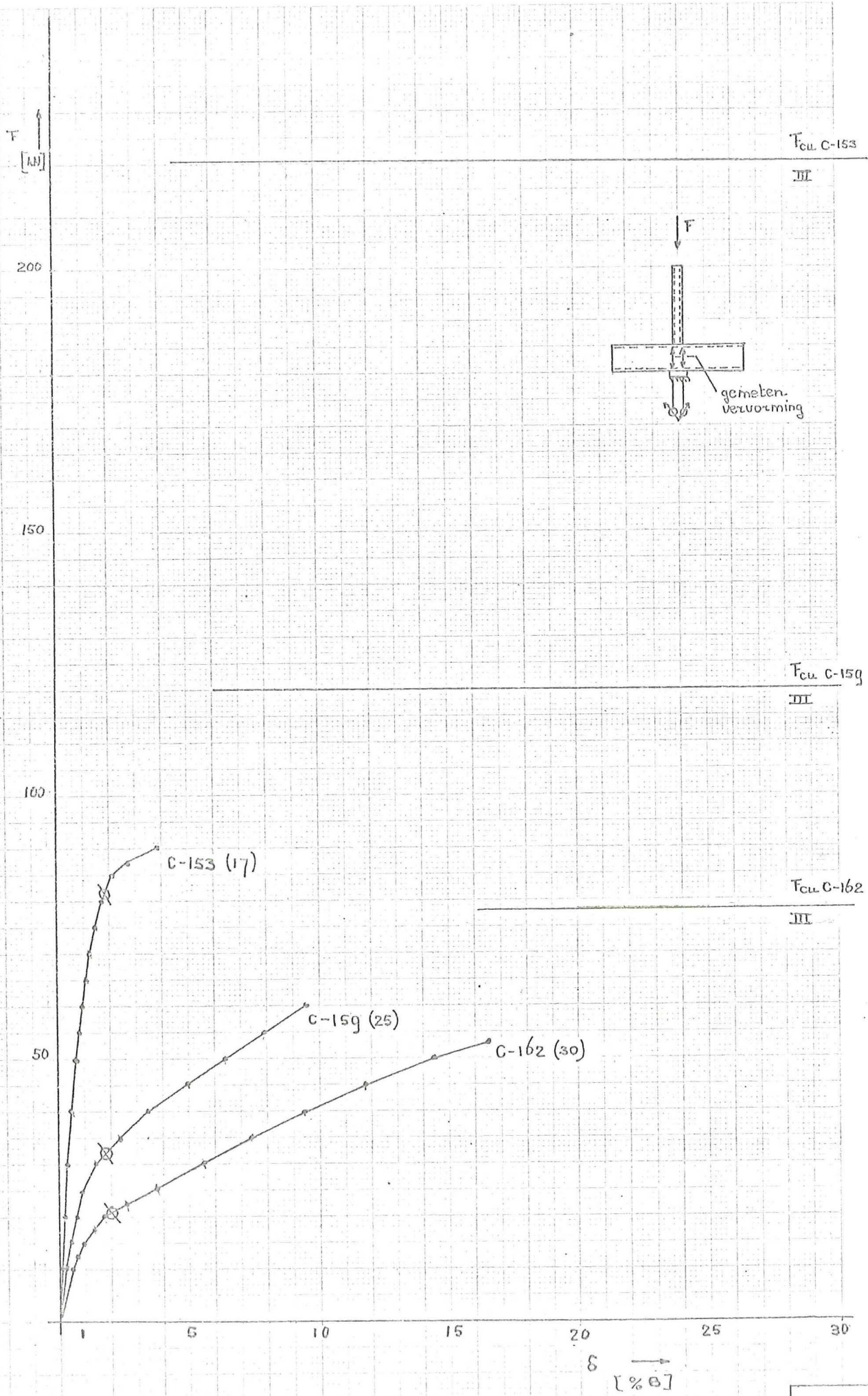
10

5

15

δ [%B]

D-17



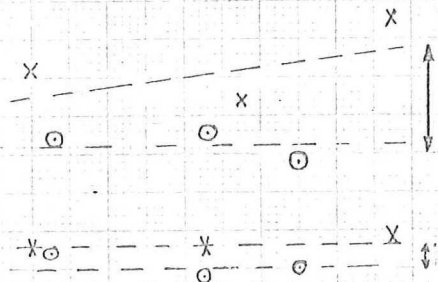
$$\frac{T_{100} \times}{T^2}$$

8
7
6
5
4
3
2
1

Wandstaaf

\square 70x70 \circ \square 40x40

ϕ 70 \circ ϕ 40



10 20 30 40 $\frac{B}{T} \rightarrow$

$$\frac{T_{100} \times}{T^2} \times 17$$

18
16
14
12
10
8
6
4
2

Wandstaaf

X: \square 100x100

\circ ϕ 100

? afwijkende bezwijkvorm



10 20 30 40 $\frac{B}{T} \rightarrow$

F ↑
[kN]

400

300

200

100

0.1

0.5

1.0

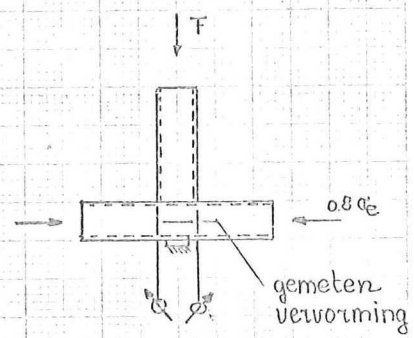
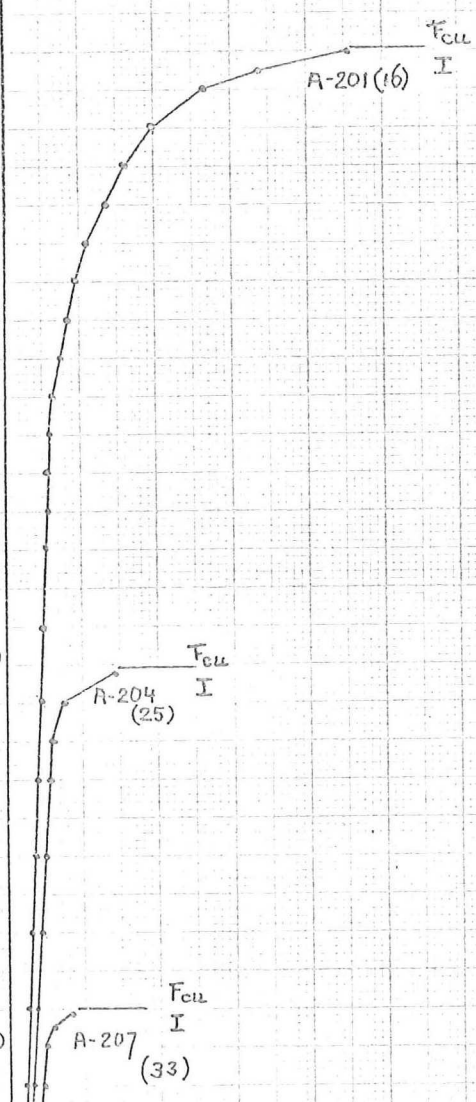
1.5

2.0

2.5

3.0

δ →
[%B]



D-20

F ↑
[kN]

200

150

100

50

F_{cu}
II

B-202 (16)

F_{cu}
II

B-205 (25)

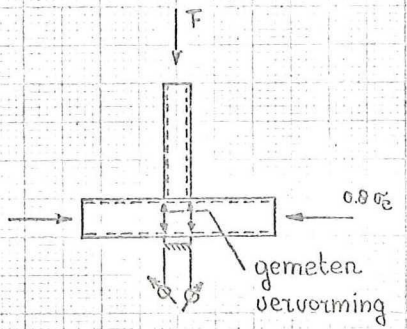
F_{cu}
II

B-208 (33)

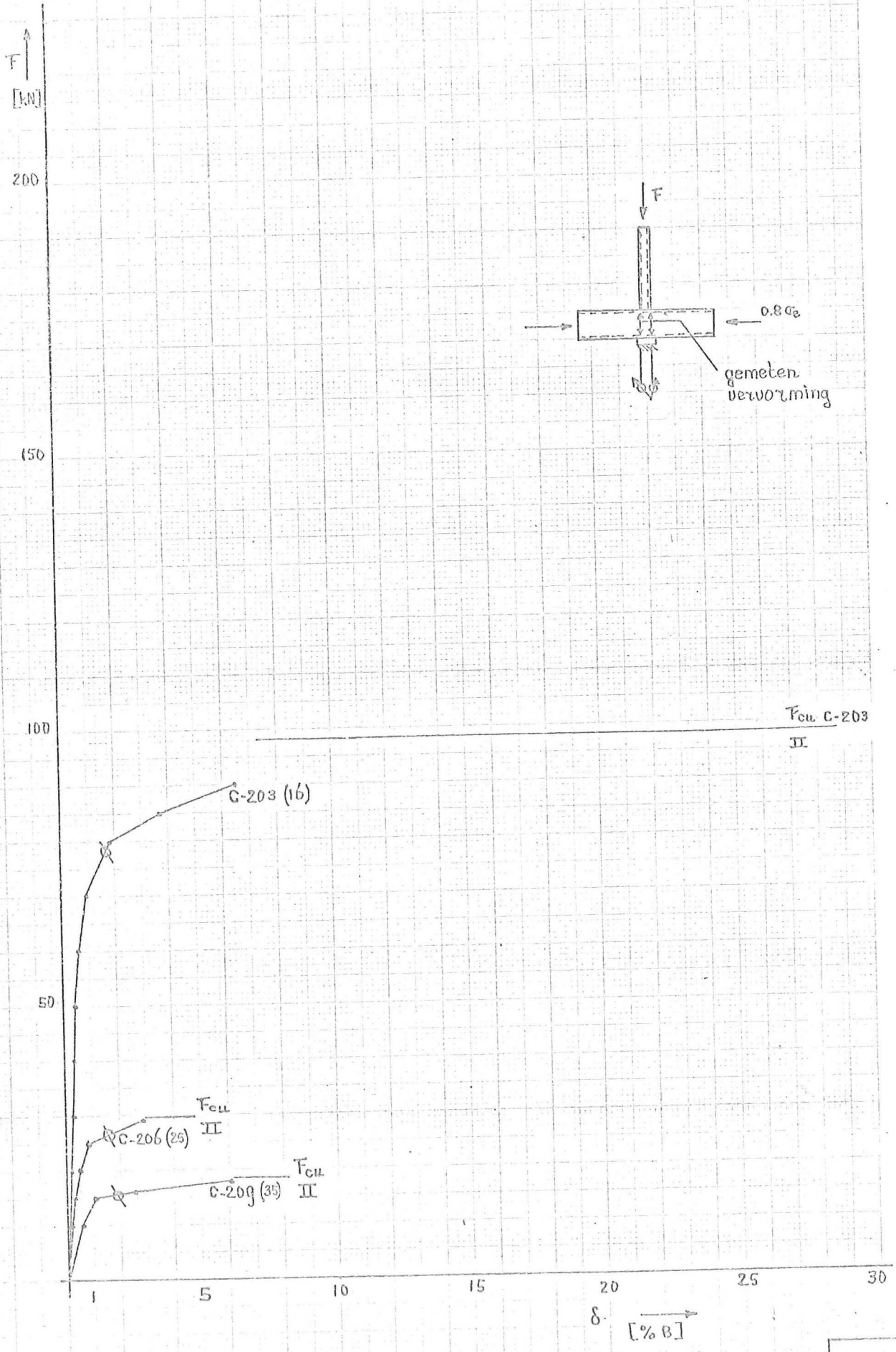
5

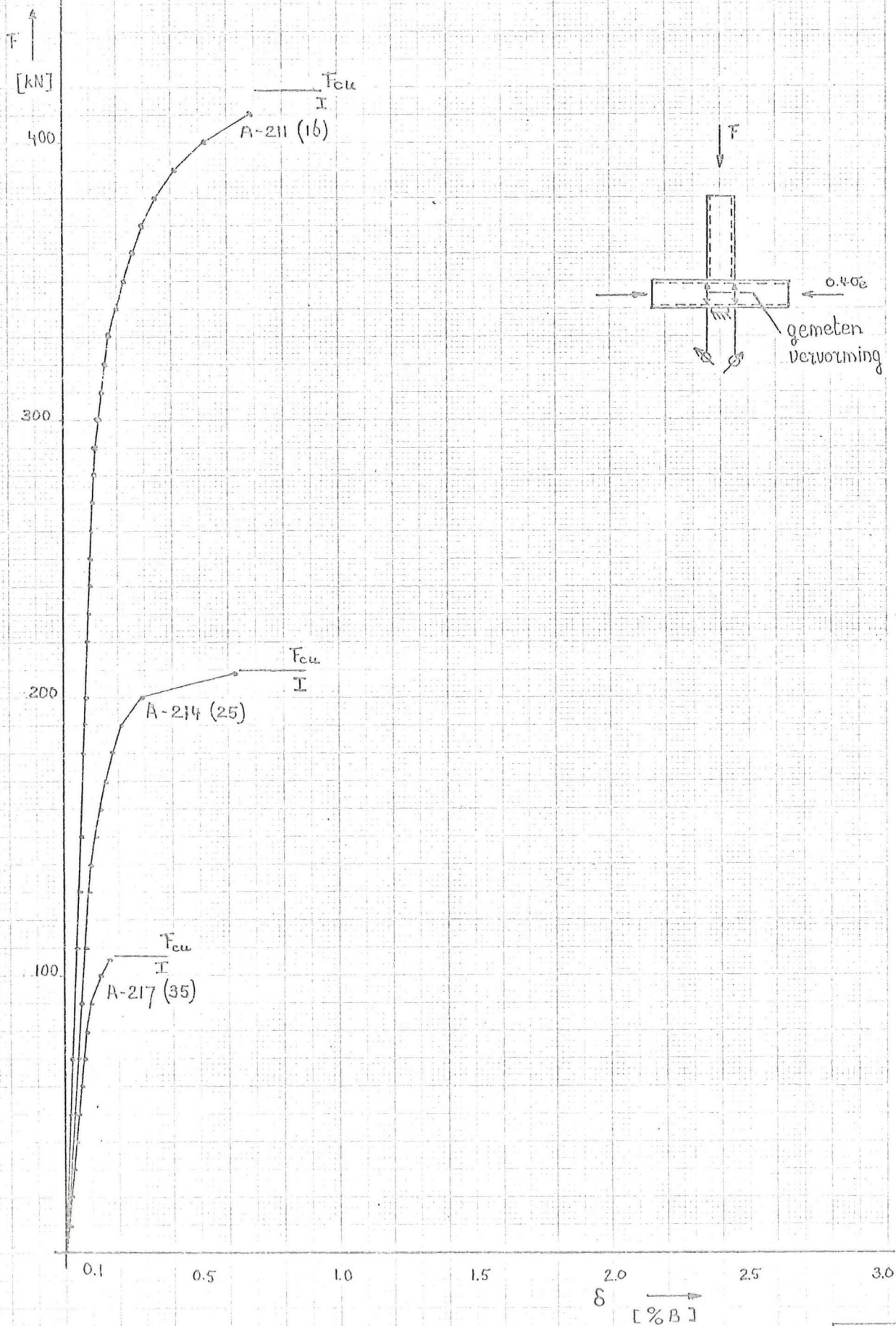
10

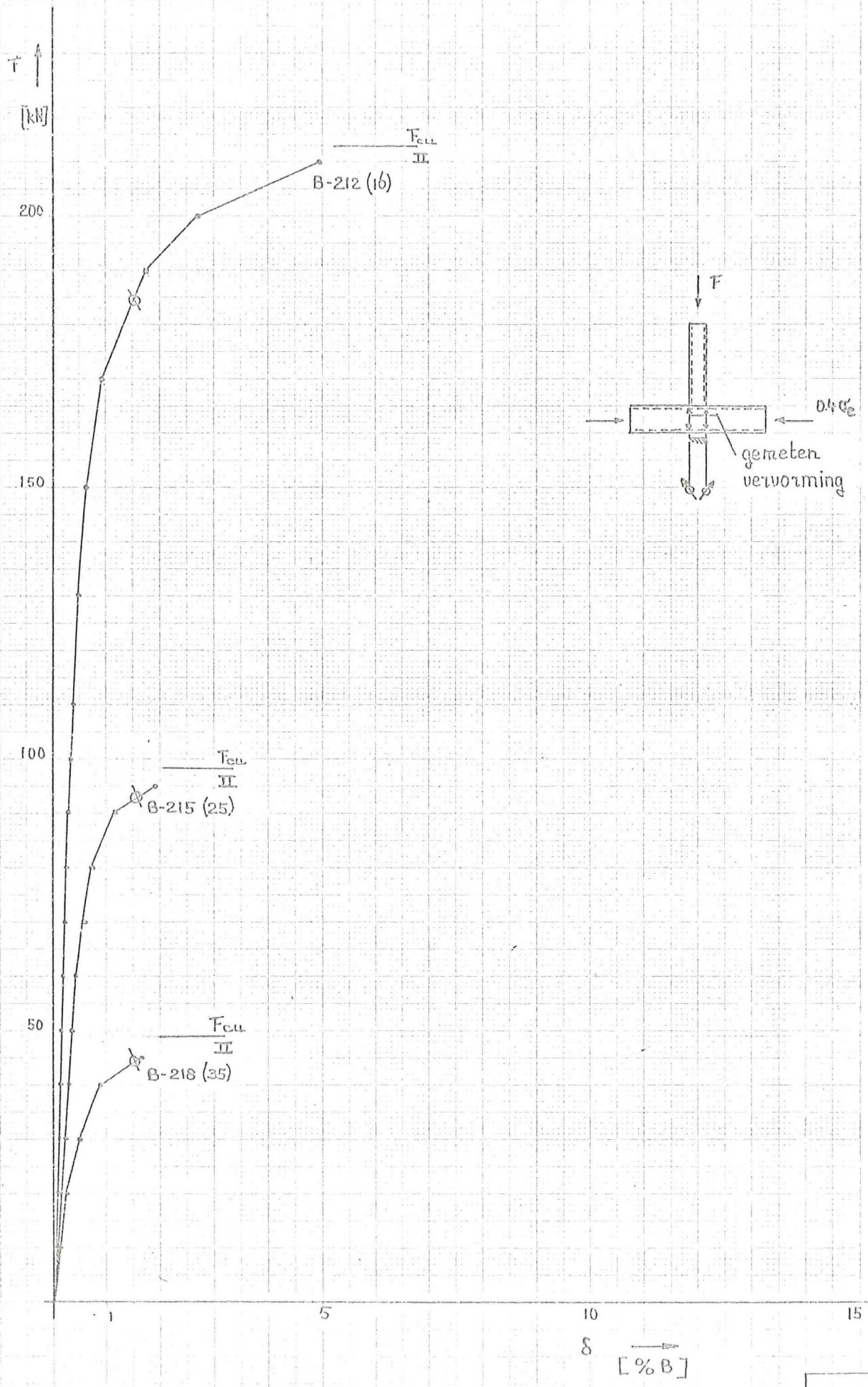
15



δ →
[% ϵ]







F ↑
[kN]

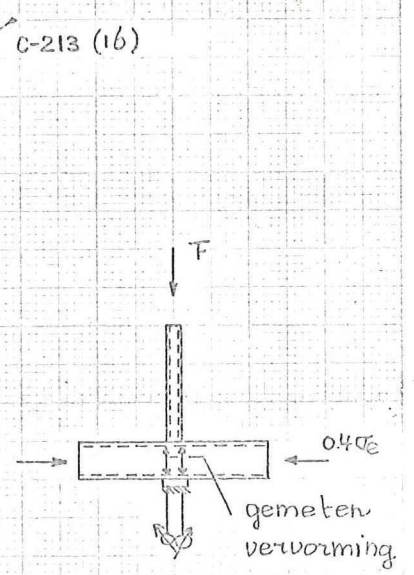
200

150

100

50

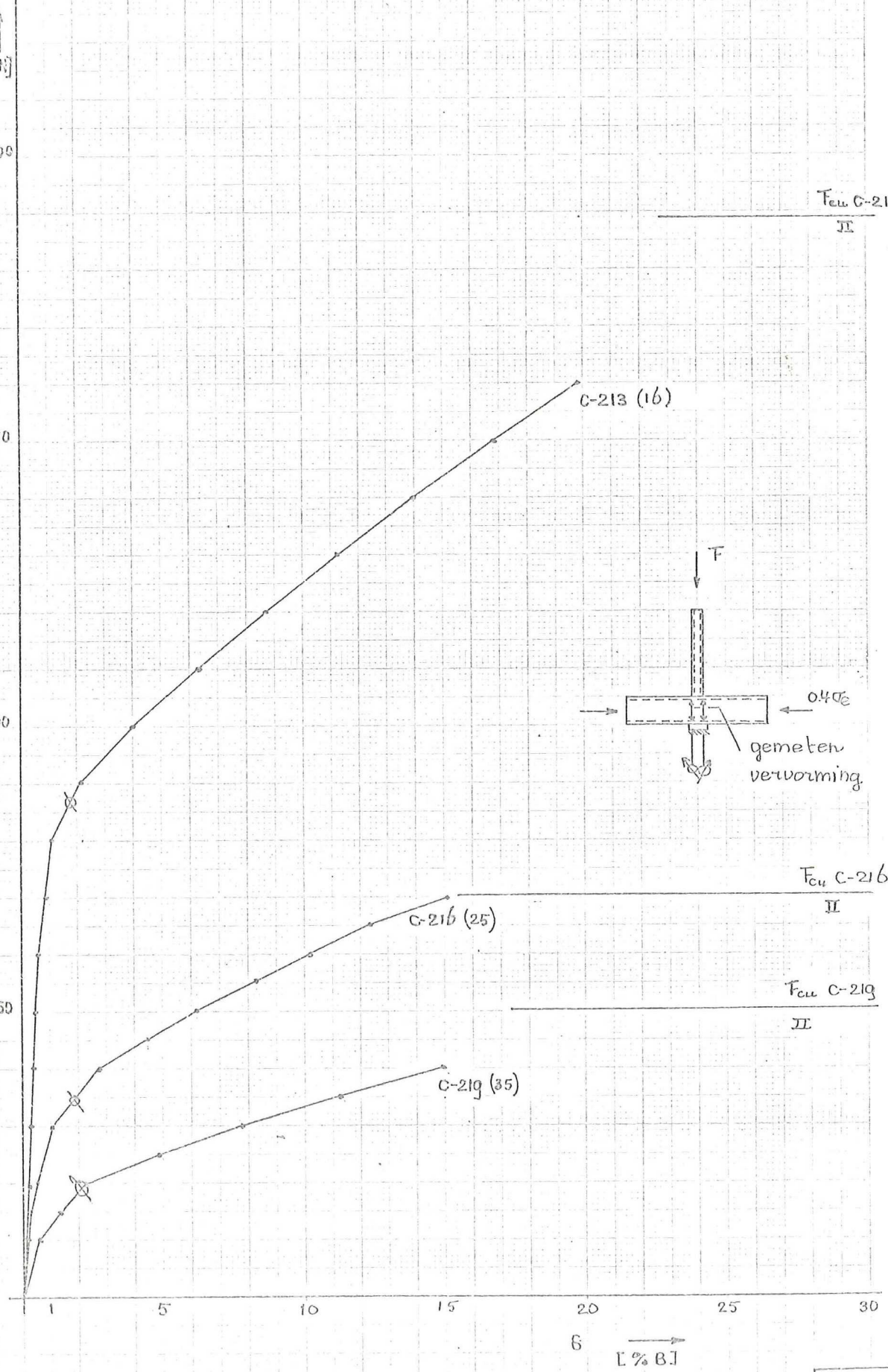
$F_{cu} C-213$
II



$F_{cu} C-216$
II

$F_{cu} C-219$
II

6 →
[‰ B]



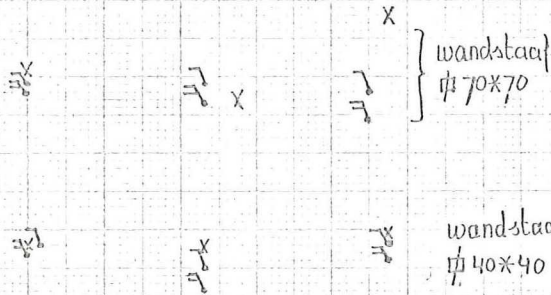
D-25

$$\frac{F_{ax}^*}{F^2}$$

8
7
6
5
4
3
2
1

Voorspanning

- x : $F_{ax} = 0$
- ∩ : " = $0.4 \sigma_e$
- ∪ : " = $0.8 \sigma_e$



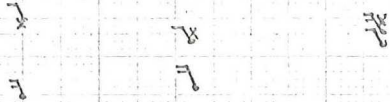
10 20 30 40 $B/T \rightarrow$

$$\frac{F_{ax}^*}{F^2} \cdot 1.7$$

18
16
14
12
10
8
6
4
2

Voorspanning

- x : $F_{ax} = 0$
- ∩ : $F_{ax} = 0.4 \sigma_e$
- ∪ : $F_{ax} = 0.8 \sigma_e$



10 20 30 40 $B/T \rightarrow$

Vergelijking van de vervormingen en bezwijkwaarde
 bij variërende b_{II}/b_I verhouding (Serie A - Serie C)

F ↑

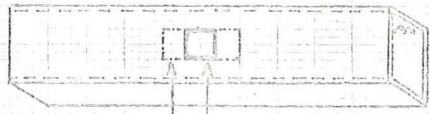
[kN]

200

150

100

50



$b_{II}/b_I = 25/100$
 C-44 C-3
 C-48 C-9
 C-52 C-12

F_{cu} C-3 (III)

F_{cu} C-44 (IV)

F_{cu} C-48 (III)

F_{cu} C-52 (III)

F_{cu} C-9 (III)

F_{cu} C-12 (II)

C-44 (16)

C-3 (16)

C-48 (27)

C-9 (25)

C-52 (30)

C-12 (35)

(tussen haakjes
 bij proefstuknr.: B/T
 bij F_{cu} : bezwijkwaarde)

3

5

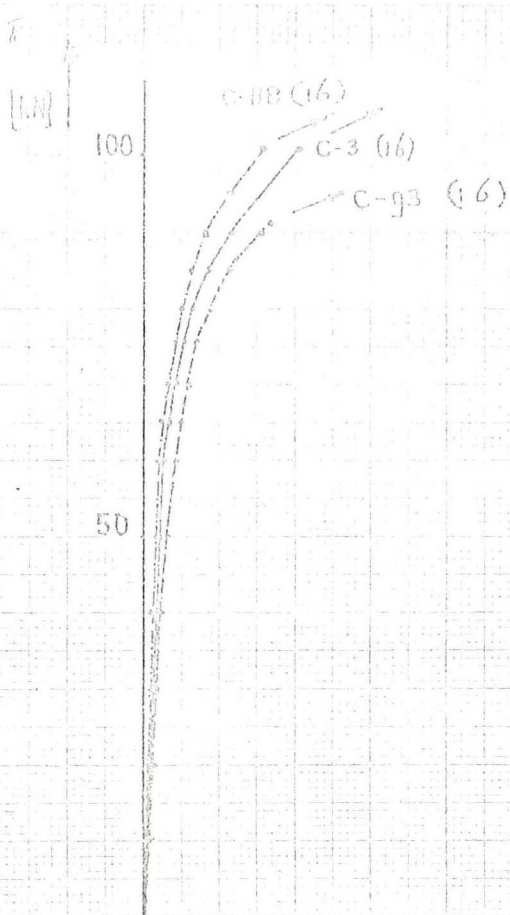
10

15

20

25

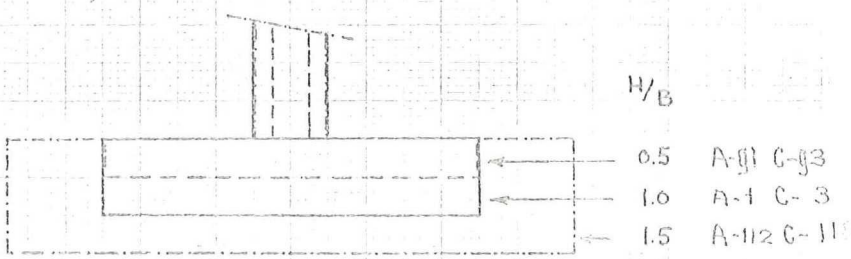
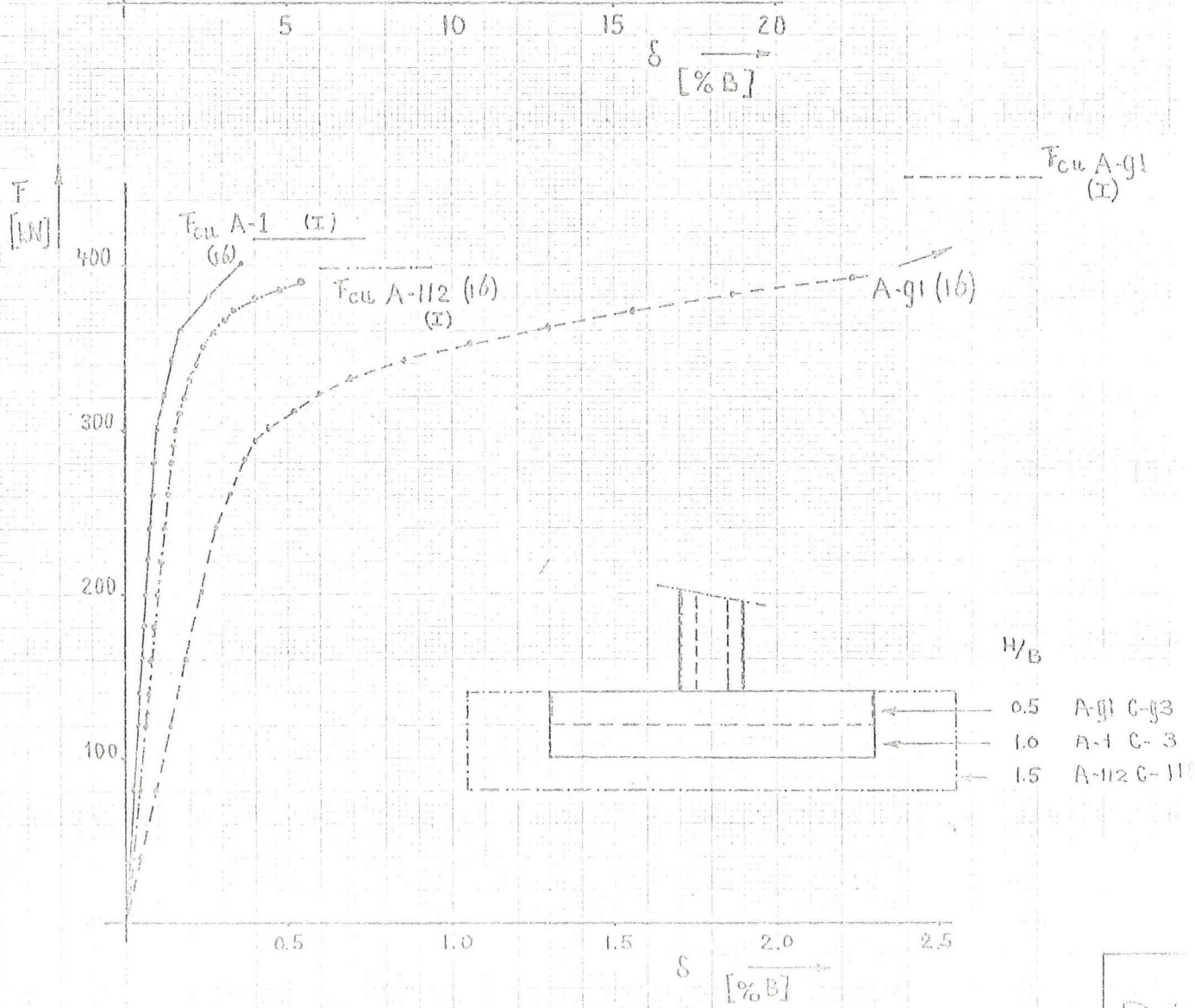
δ [% B]



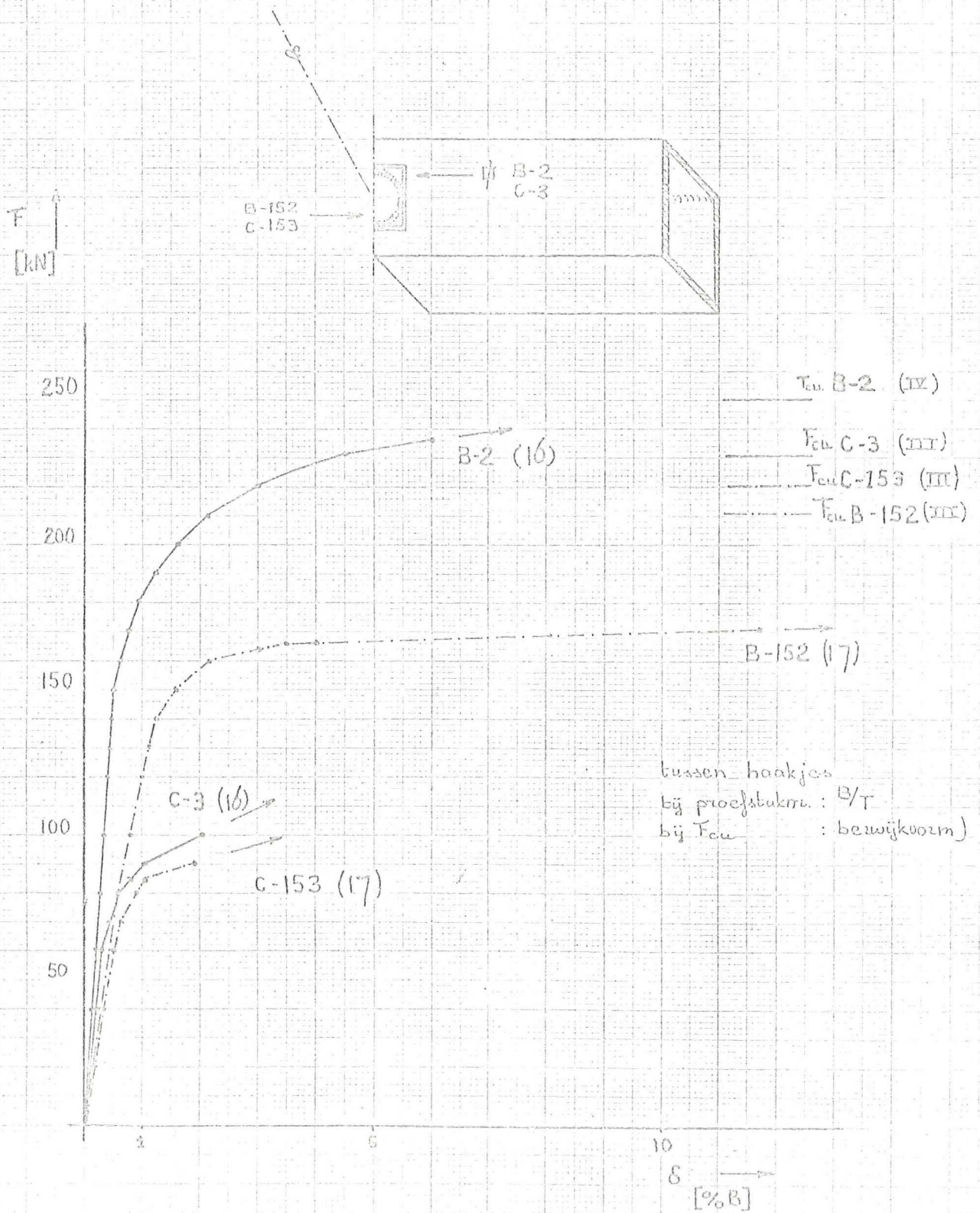
— F_{cu} C-3 (III)
 - - - F_{cu} C-118 (III)
 ···· F_{cu} C-93 (WD)

Vergelijking van de vervormingen en bezwijkwaarden bij variërende H/B verhouding (Serie A-Serie E)

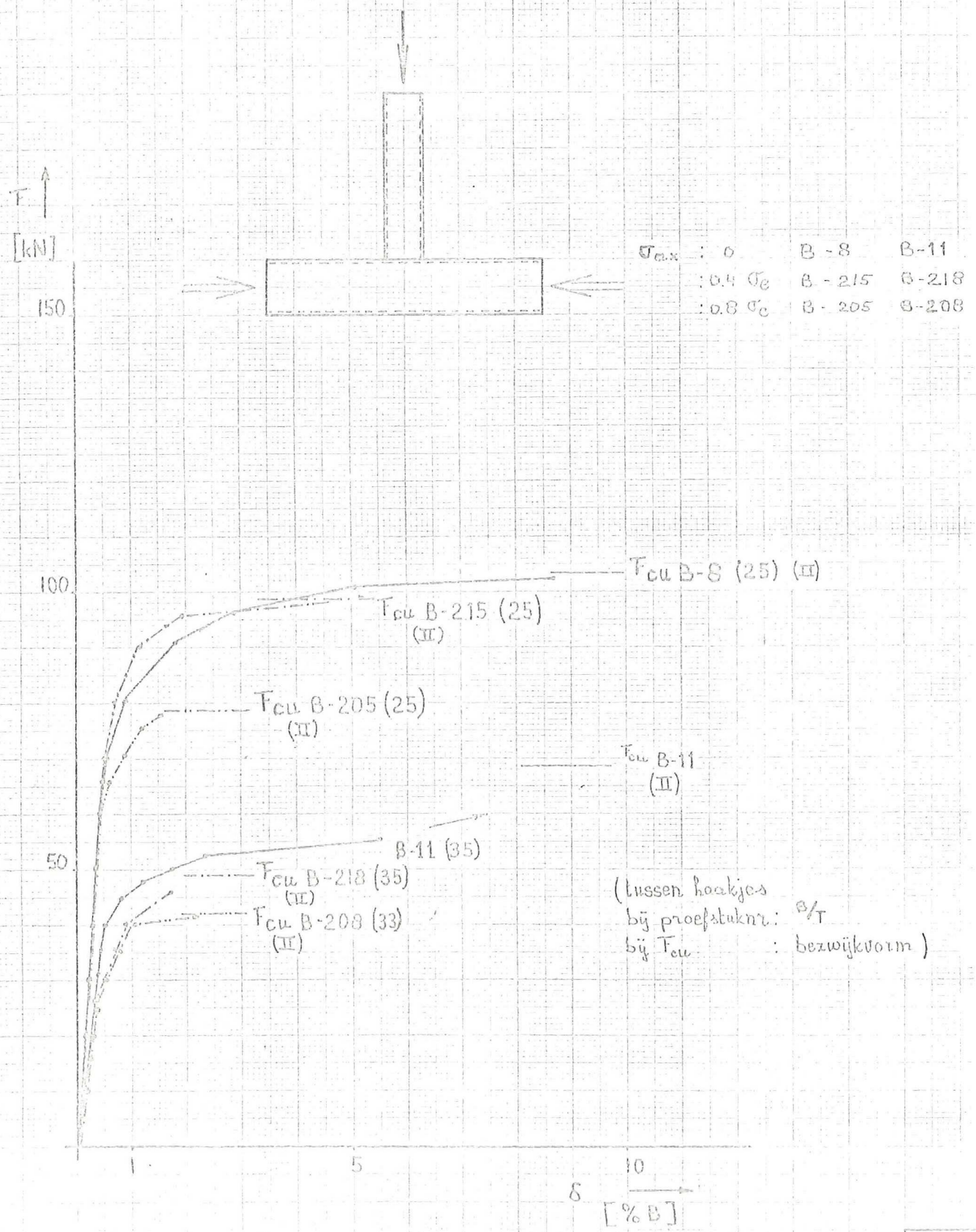
(tussen haakjes
 bij proefstuk: B/r
 bij F_{cu} : bezwijkvorm)



Vergelijking van de vervormingen en bezwijkwaarden
 bij ronde en vierkante wandstaven (Serie A - Serie F)



Vergelijking van de verormingen en bezwijkwaarden
 bij variërende σ_{ax} verhouding (Serie A - Serie G)



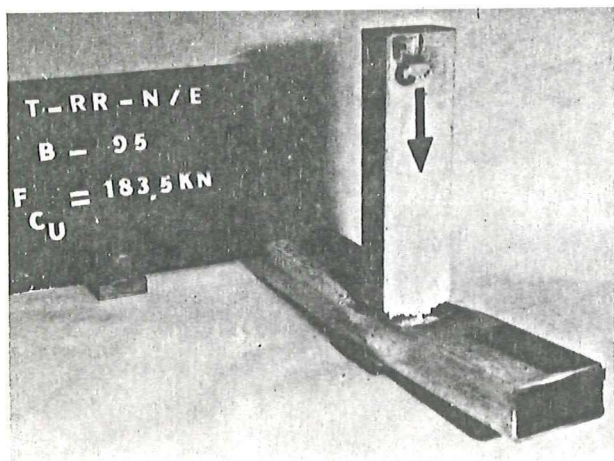


Foto 1.
 Bezwijkvorm I.
 Instabiliteit Randstaaf

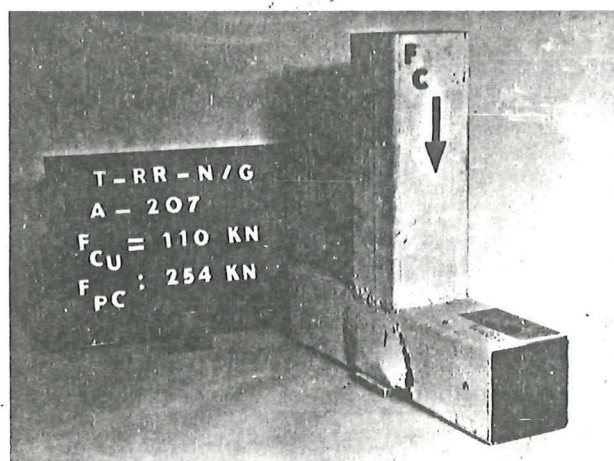


Foto 2.
 Bezwijkvorm II.
 Plastificeren Randstaaf

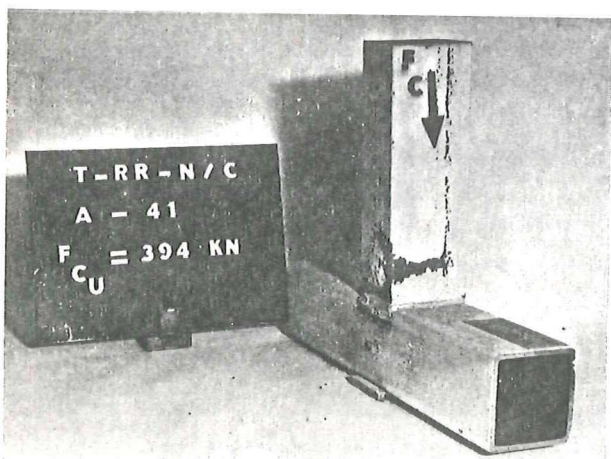


Foto 3.
 Bezwijkvorm III.
 Plastificeren Randstaaf;
 grote vervormingen

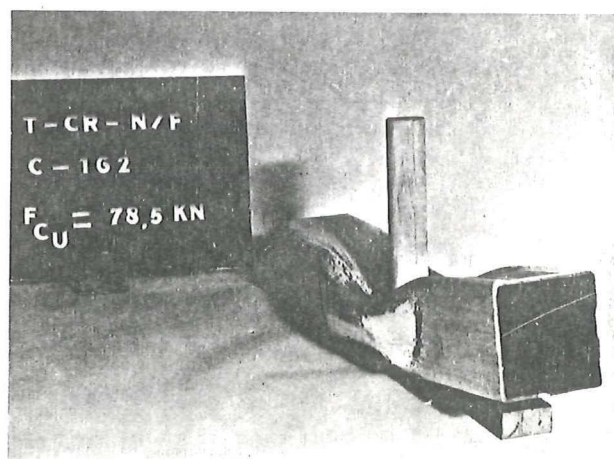


Foto 4.
 Bezwijkvorm IV.
 Bezwijkvorm Wandstaaf

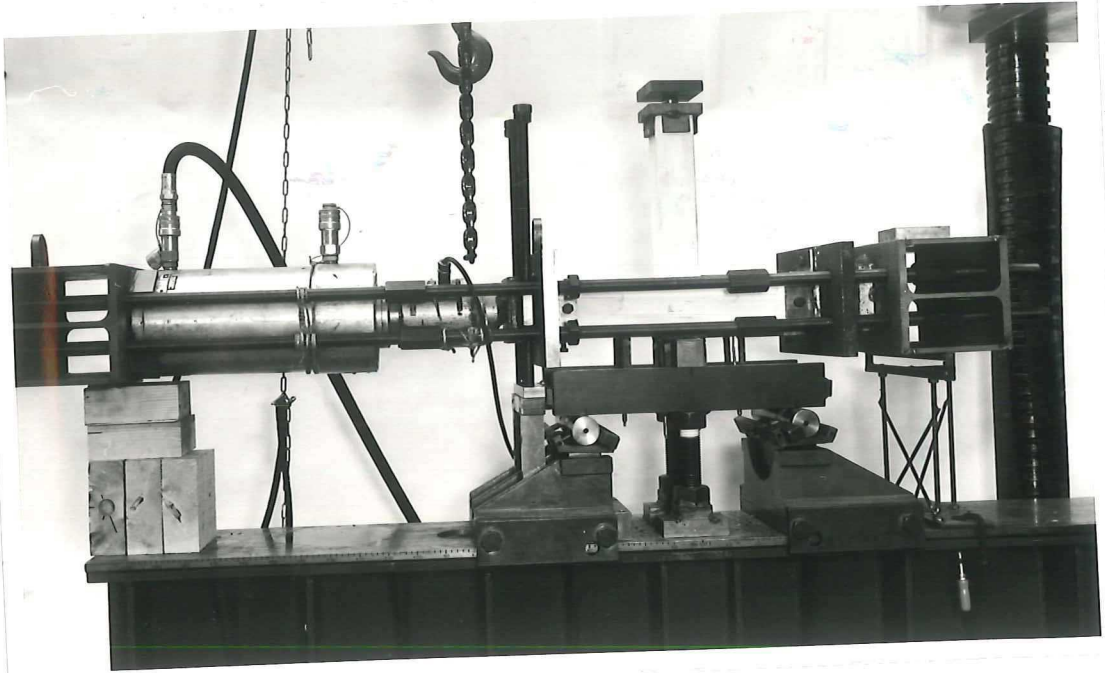


Foto 5.
Plaatsing van een proefstuk uit de serie
G in de opstelling.

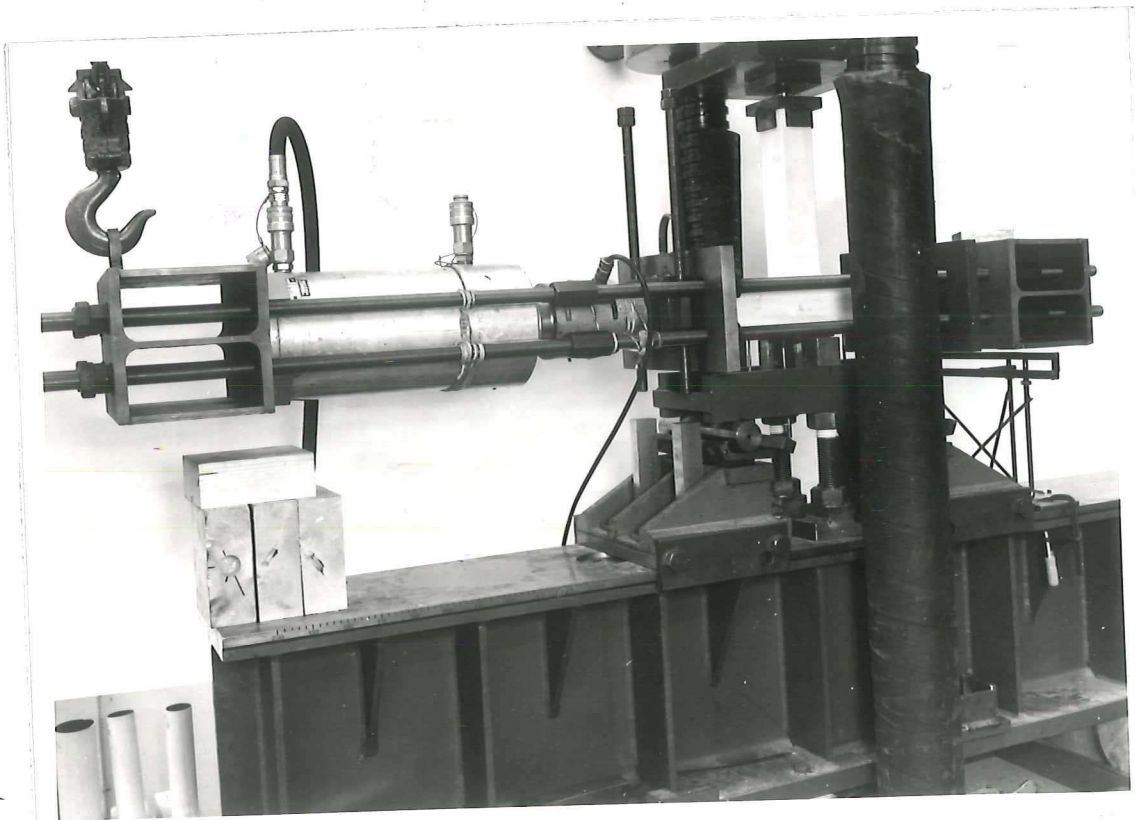


Foto 6.
Beproeving van het proefstuk uit foto 5.

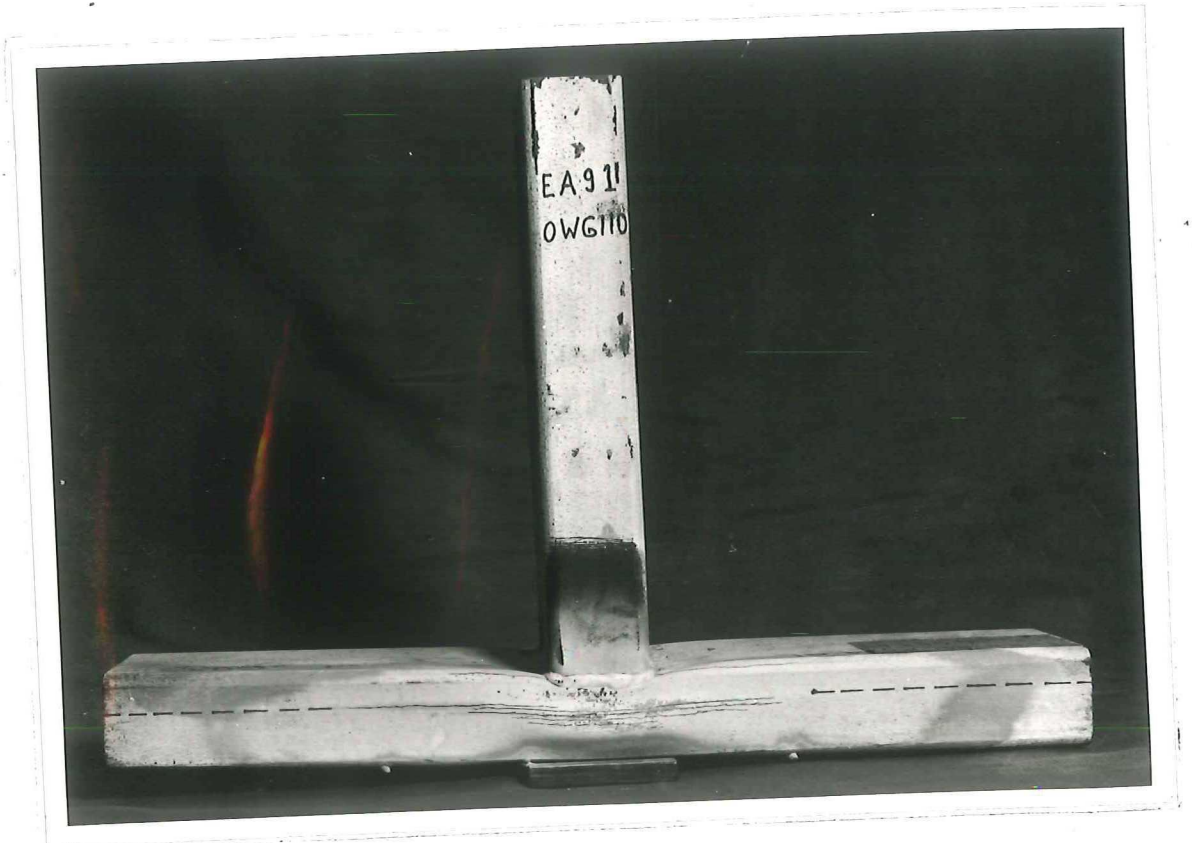


Foto 7.
Opengesprongen lasnaad.
Proefstuk T-RR-E-A-91.



Foto 8.
Opengesprongen lasnaad.
Proefstuk T-RR-E-C-93.