

**MINISTERUL EDUCAȚIEI ȘI ÎNVĂȚĂMÂNTULUI  
INSTITUTUL POLITEHNIC "TRAIAN VUIA" TIMIȘOARA**

**Ing. PATRAȘ MARCEL**

**T E Z A  
D E  
D O C T O R A T  
  
( A N E X E )**

**Conducător științific  
Prof. em. ing. CONSTANTIN AVRAM  
Membru corespondent al Academiei R.S.R**

**1975**

BIBLIOTECA CENTRALĂ  
UNIVERSITATEA "POLITEHNICA"  
TIMIȘOARA

~~UNIVERSITATEA "POLITEHNICA" TIMIȘOARA~~

..... 357/067  
..... 233.....

CUPRINS - ANEXE

ANEXA 1. ( Capitolul VIII din teză )

A 1-1...A 1-16	- Relevée fisuri la grinzile G 1- G16 . . . . .	pg. 1
A 1-17	- Relevée fisuri grinda G 18-12-7 . . . . .	pg. 33
A 1-18,.. A 1-25	- Relevée fisuri la grinzile P <sub>0</sub> ...P <sub>8</sub> . . . . .	pg. 35
Foto A 1-26... A 1-	Fotografii - grinzile G 1 - G 16 după incercare . . . . .	pg. 51

ANEXA 2. Grinzi de 9,2 m cu bare groase PC90 și toroane TBP . . . . . pg.

Foto A 2-1, A 2-2, A 2-3	- Execuția pe stand a grinzilor . . . . .	pg. 67
Fig. A 2-4 a ...g	- Deformația secțiunii mediane la precomprimare . . . . .	pg. 71
Fig. A 2-5a...f	- Deformația betonului în fibra inferioară și fibra superioară la încercare . . . . .	pg. 85
Fig. A 2-6	- Cofraj de lemn . . . . .	69 pg.
Foto A 2-7	- Măsurarea forței cu dinamometrul de 100 t . . . . .	69 pg.
Foto A 2-8 Foto A 2-9	- Comparare pe bare groase PC90 și toroane TBP . . . . .	pg. 99
Foto A 2-10 a, b Foto A 2 - 11	- Aspecte de la încercarea grinzilor . . . . .	101 pg.

ANEXA 3. Grinzi de 3,4 m experimentate la ULB - Belgia - 1970

Fig. A 3-1	- Determinarea experimentală a contracției pe priză . . . . .	103 pg.
Fig. A 3-2a,b,c	- Diagrame P - la tensionarea cablurilor . . . . .	105 pg.
Fig. A 3-3a,b	- Deformația betonului în fibra inferioară la precomprimare . . . . .	111 pg.
Fig. A 3-4	- Contrastaștea grinzilor la precomprimare . . . . .	115 pg.
Fig. A 3-5a,b	- Deformația secțiunii mediane la precomprimare . . . . .	117 pg.
Fig. A 3-6	- Eforturi unitare în armătura pasivă la precomprimare . . . . .	121 pg.
Fig. A 3-7a,b,c	- Deformația betonului în fibra inferioară	
Fig. A 3-8	- funcție de încărcare . . . . .	123 pg.

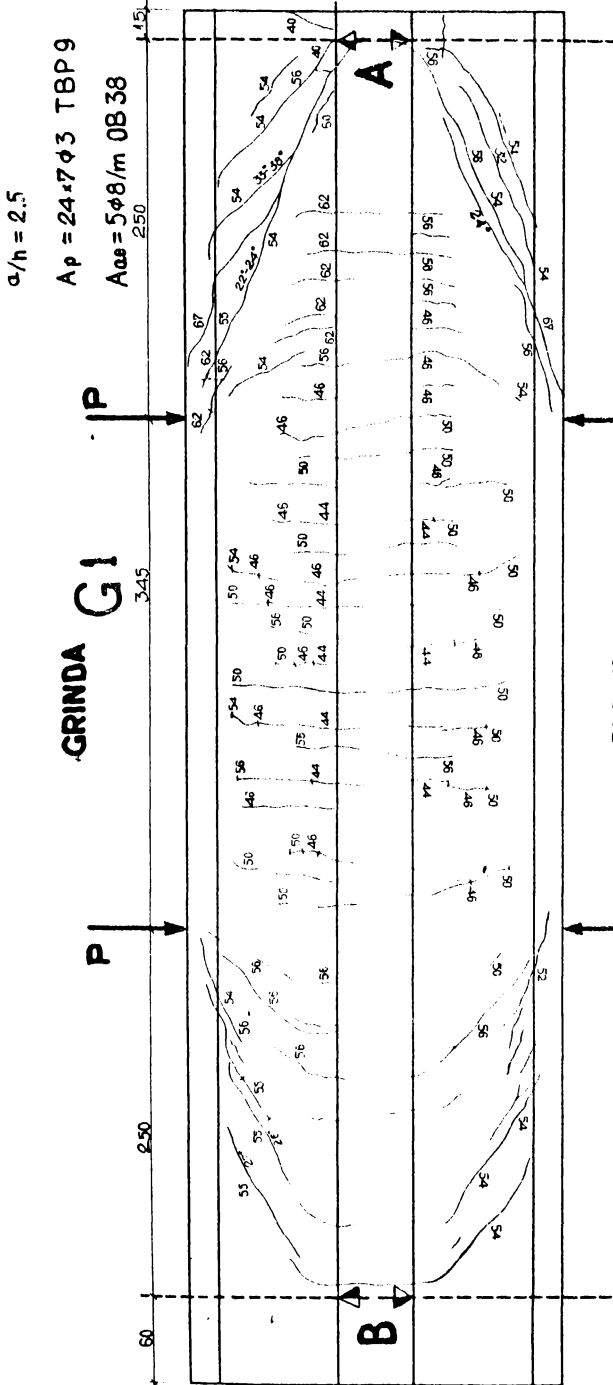
Fig. A3-9a,b,c	- Sigeata grinzilor functie de incarcare . . . . .	PG. 11
Fig. A3-10a,b,c,d	- Deformatie in lungul grinzii . . . . .	PG. 11
Fig. A3-11	- Sistemul de precompunare BBAV . . . . .	PG. 14
Foto A3-12	- Aspect de la precompunare . . . . .	PG. 14
Foto A3-13	- O grinda in timpul incercarii . . . . .	PG. 14
Foto A3-14	- Sistem de masura digital automat . . . . .	PG. 14
Foto A3-15	- Deformetre inductive . . . . .	PG. 14
Foto A3-16	- . . . . .	PG. 14
Foto A3-17, A3	- Grinzile $P_0, P_4, P_6, P_8$ dupa incercare . . . . .	PG. 15
Fig. A3-18	- Deschiderea fisurilor inclinate functie de incarcare . . . . .	PG. 15

ANEXA 4. Grinzi de 12 - 18 m

Foto A4-1	- Grinda G18-12-7 pe standul de incercare . . . . .	PG. 15
Foto A4-2 - A4-3	- Armarea grinzii G18-6 cu PC90 . . . . .	PG. 15
Foto A4-4	- Grinda G18-6 cu bare PC90 pe standul de incercare . . . . .	PG. 16
Foto A4-6	- Armarea grinzii G12-6 cu bare PC 90 . . . . .	PG. 16
Foto A4-7	- Comparatoare pentru masurarea intrarii barilor . . . . .	PG. 16
Foto A4-8	- Grinda G18-12 - 7 dupa incercare . . . . .	PG. 65
Foto A4-9	- Grinda G18-6 dupa incercare . . . . .	PG. 16
Foto A4-10	- Grinda G12-6 dupa incercare . . . . .	PG. 16

# RELEVEUL FISURILOR

## GRINDA G1



FISURI NORMALE  
FISSURES VERTICALES

$P(t)$	443	466	528	608
$\sigma_t^n$ max	0.016	0.020	0.032	0.063
$\sigma_t^n$ med	0.015	0.018	0.024	0.043

- $P_t^n = 44t$
- $P_{tA}^i = 54.5$
- $P_{tB}^i = 55.0t$
- $P_{tA} = 62.3t$
- $P_{tB} = 67.5t$

Fig. X-1.

RELEVÉUL FISURILOR  
SCHEMA DES FISSURES

GRINDA G2  
POUTRE

$\alpha/h = 2.5$   
 $A_p = 24.17 \phi 3$   
 $A_{as} = 3 \phi 6 \text{ OB } 38$

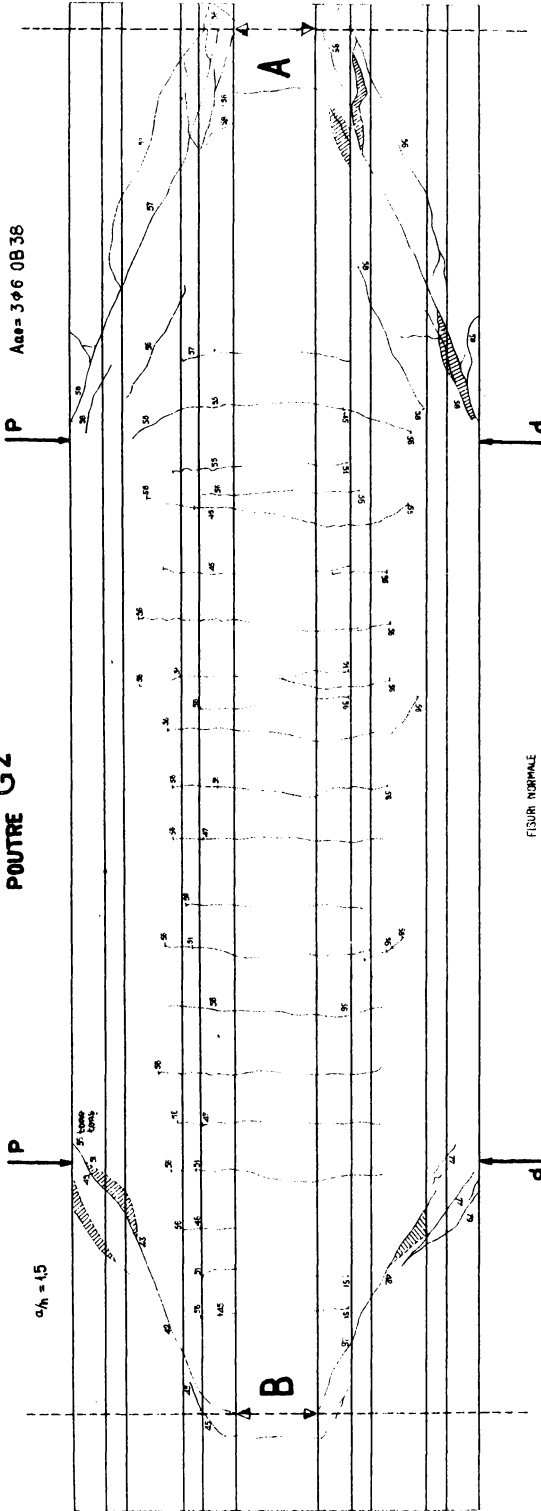


FIGURA NR. 1  
FISURILE VERTICALE

P(t)	45	51	56.5	58.5
$d_f$ max	0.005	0.015	0.025	0.030
$d_f$ med	0.005	0.010	0.014	0.020

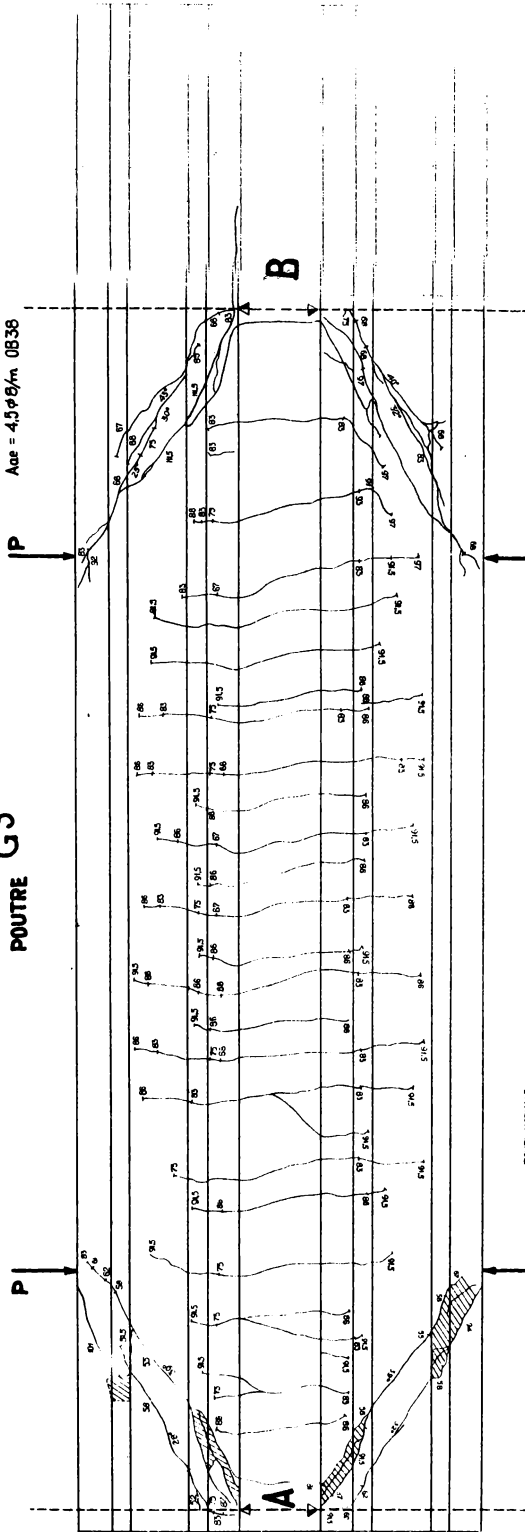
$P^c = 46.5 \text{ t}$   
 $P^h = 56.5 \text{ t}$   
 $P^m = 42 \text{ t}$   
 $P_n = 58.5 \text{ t}$   
 $P_g = 79.4 \text{ t}$

Fig VIII-2

# RELEVÉUL FISURILOR SCHEMA DES FISSURES

GRINDA G3  
POUTRE

$\sigma_{ch} = 13$   
 $A_p = 19 \times 7 \phi 3 \text{ TBP}$   
 $A_{oe} = 4,5 \phi 8 / m \text{ OB36}$



FISUR NORMALE  
FISSURES VERTICALES

P (t)	68,5	72	75	83	86	91,5
$\sigma_{ch}$ max	0,0015	0,0035	0,0215	0,020	0,025	0,039
$\sigma_{ch}$ moy	0,0040	0,0020	0,0045	0,022	0,025	0,03

FISUR INCLINATE  
FISSURES INCLINEES

P (t)	56	62	67	75	83	86
$\sigma_{ch}$ max	0,017	0,035	0,030	0,070	0,145	0,15
$\sigma_{ch}$ moy	0,015	0,025	0,040	0,035	0,10	0,12

$P_f^0 = 67,5t$   
 $P_{fA}^1 = 55t$   
 $P_{fB}^1 = 67t$   
 $P_{fA} = 101t$   
 $P_{fB} = 112t$

Fig. Vitr-3  
A1-3

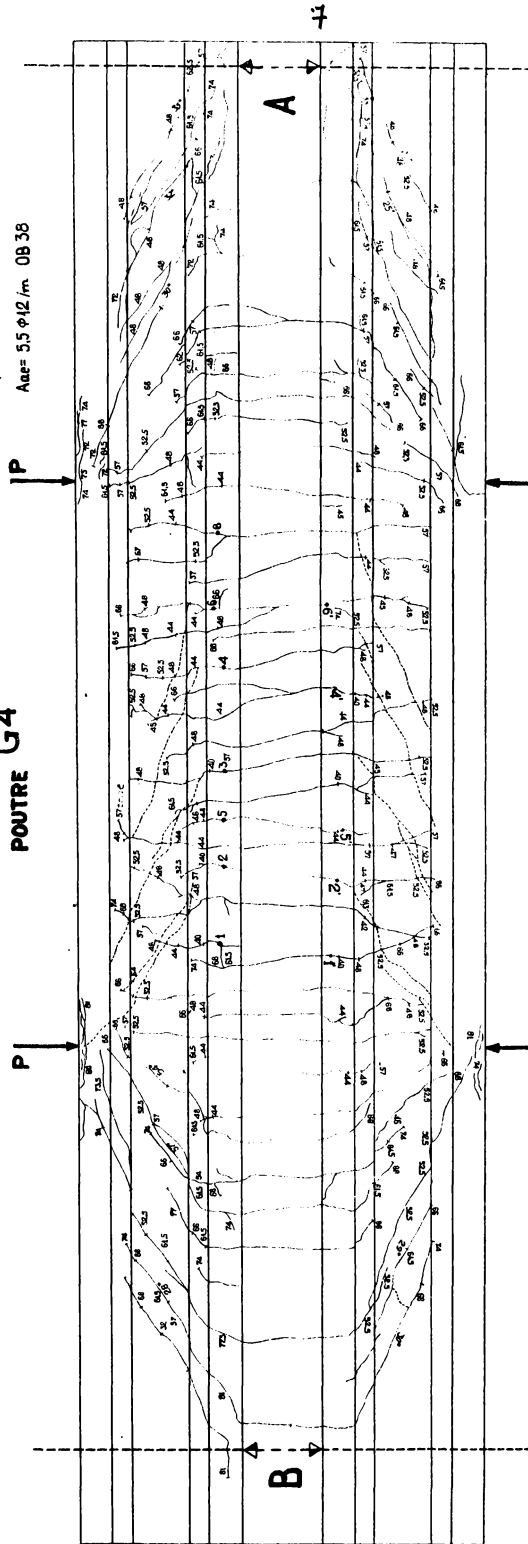
RELEVÉUL FISURILOR  
SCHEMA DES FISSURES

GRINDA G4  
POUTRE

$\alpha_h = 2.5$

$A_p = 16 \cdot 7 \phi 4$

$A_{ae} = 5.5 \phi 12 / m \text{ OB } 38$



$P_f = 40.5 \text{ t}$   
 $P_{fN} = 49 \text{ t}$   
 $P_{fB} = 50.8 \text{ t}$   
 $P_{fA} = 78.35 \text{ t}$   
 $P_{fB} = 8 \text{ t}$

FISUR INCLINATE FISSURES INCLINEES		P (t)		67	
ouverture deschidurii	45	525	57	615	67
	$c_f$ max	0.007	0.028	0.04	0.075

FISUR NORMALE FISSURES VERTICALES		P (t)		615	
ouverture deschidurii	40	49	525	57	615
	$c_f$ max	0.01	0.032	0.05	0.064
$c_f$ moy	0.008	0.028	0.035	0.050	0.065

Fig. VIII-4  
A1-4



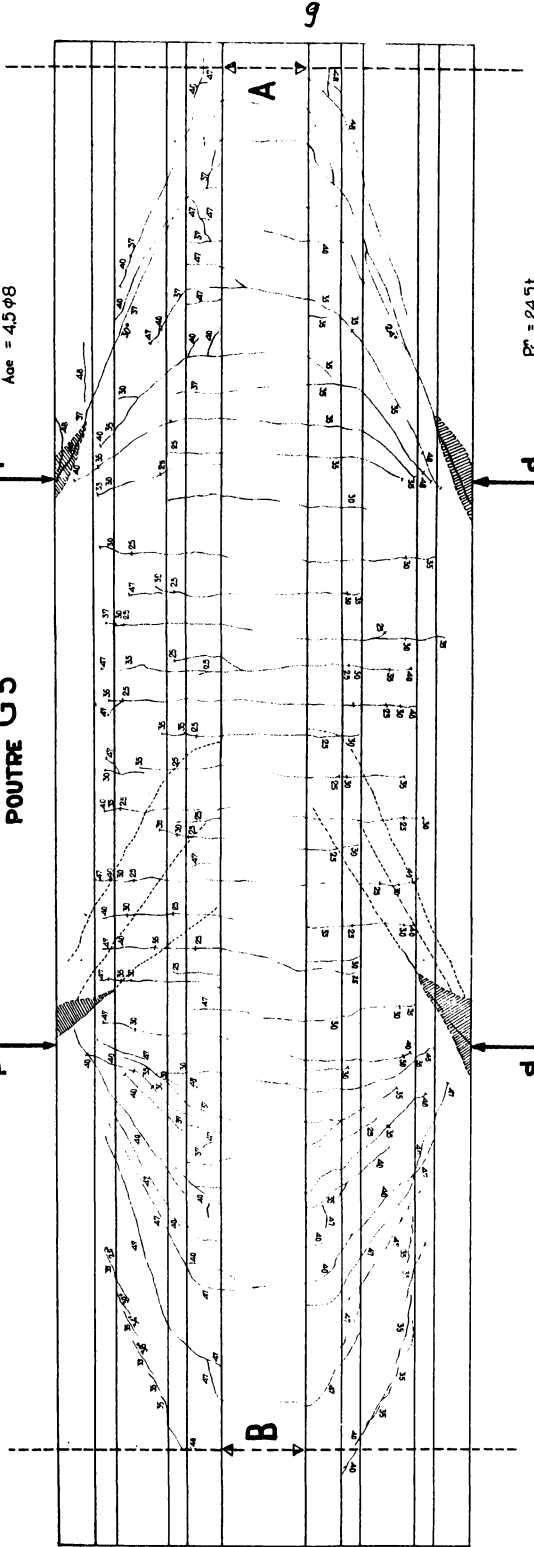
RELEVÉUL FISURLOR  
SCHEMA DES FISSURES

GRINDA  
POUTRE G5

$\sigma_h = 2.5$

$A_p = 18.7\phi^4 \text{ TBP12}$

$A_{oe} = 4.5\phi^8$



$P^* = 24.5t$   
 $P^*_{A_1} = 38.5t$   
 $P^*_{B_1} = 36.2t$   
 $P^*_{A_2} = 49.3t$   
 $P^*_{B_2} = 49.6t$

FISURI INCLINATE  
FISSURES INCLINEES

$P(t)$	365	415	46	49
$\sigma_f$ max	0.02	0.032	0.030	0.041
$\sigma_f$ med	0.015	0.017	0.030	0.035

FISURI NORMALE  
FISSURES VERTICALES

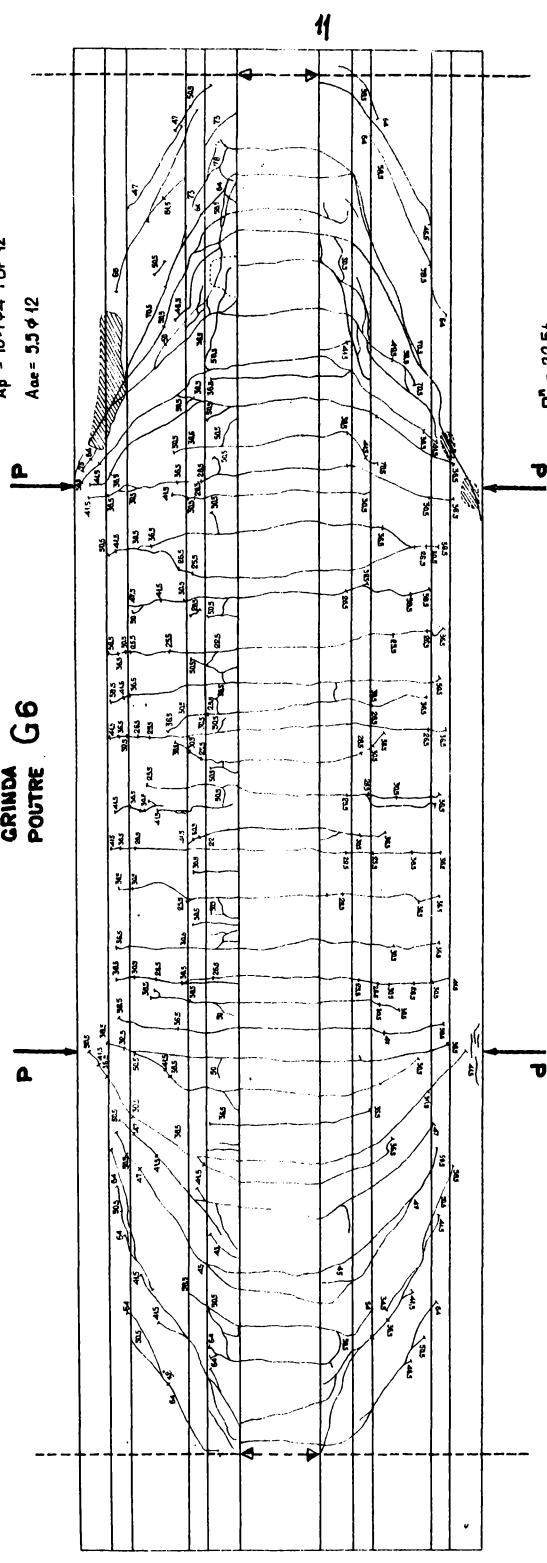
$P(t)$	25	265	315	365	415
$\sigma_f$ max	0.016	0.018	0.033	0.044	0.047
$\sigma_f$ med	0.012	0.015	0.027	0.036	0.038

Fig. 10-5  
A1-5

RELEVÉ DES FISSURES  
SCHEMA DES FISSURES

GRANDA  
POUTRE G6

$\alpha/h = 2.5$   
 $A_p = 19.7 \phi 4$  TBP 12  
 $A_{acc} = 5.5 \phi 12$



$P_1^m = 22.5t$   
 $P_{1A}^l = 46.5t$   
 $P_{1B}^l = 50.5t$   
 $P_{1C}^m = 74.7t$   
 $P_{1D}^m = 85.5t$

FISSURES INCLINÉES  
FISSURES INCLINÉES

$P(t)$	46.5	50.5	58.5
max	0.002	0.015	0.045
$\alpha_f$			

FISSURES VERTICALES  
FISSURES VERTICALES

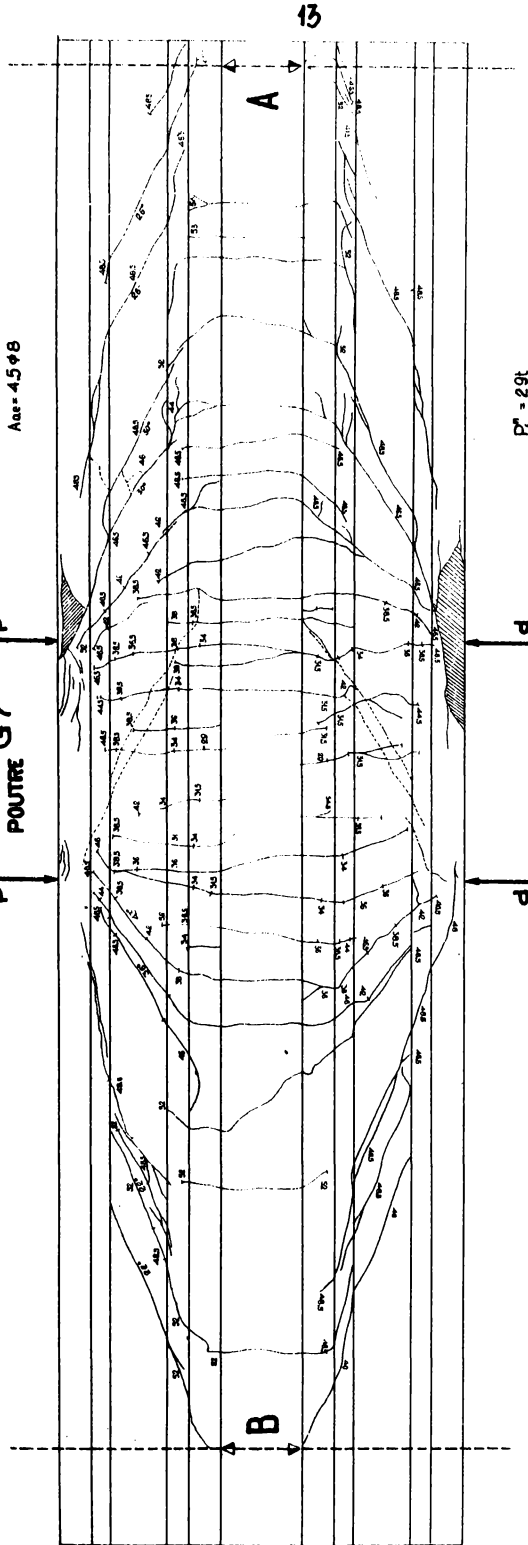
$P(t)$	22.5	25.5	29.5	36.5	41.5	50.5
max	0.005	0.015	0.035	0.064	0.090	0.105
$\alpha_f$						
max	0.0047	0.014	0.024	0.042	0.054	0.081

Fig. VIII-6  
A1-6

RELEVÉUL FISURILOR  
SCHEMA DES FISSURES

$\sigma/h = 3.5$   
 $A_p = 19 \times 7 \phi 4$  TBP 12  
 $A_{ae} = 4.5 \phi 8$

GRINDA G7  
 POUTRE



$P_1^t = 29t$   
 $P_{FA}^t = 48.5t$   
 $P_{FB}^t = 48.5t$   
 $P_{FA} = 52.5t$   
 $P_{FB} = 55.0t$

FISURILOR NORMALE  
 FISSURES VERTICALES

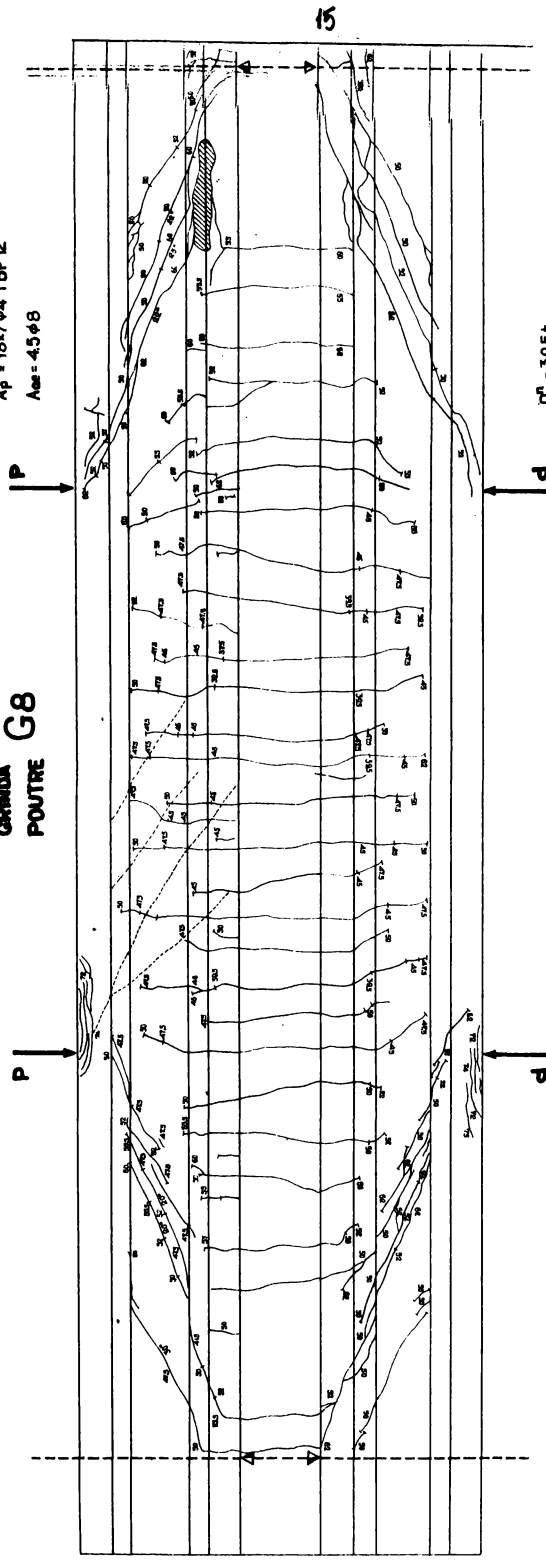
$P(t)$	29	31.5	34	36	38	41.5	46	48.5	52
$\sigma_{max}$ (MPa)	0.002	0.006	0.012	0.021	0.035	0.05	0.065	0.073	0.083
$\sigma_{med}$ (MPa)	0.002	0.0042	0.0080	0.0145	0.025	0.034	0.0471	0.054	0.066

Fig. No. 7  
 A1-7

**RELEVÉ FISSURILOR  
SCHEMA DES FISSURES**

**GRANDA  
POUTRE G8**

$a/h = 2.5$   
 $A_p = 19 \times 7 \phi 4$  TBP 12  
 $A_{soll} = 4.5 \phi 8$



$P_1^i = 39.5t$   
 $P_{1A}^i = 50.0t$   
 $P_{1B}^i = 47.5t$   
 $P_{1A} =$   
 $P_{1B} =$

FIGURI NORMALI  
FISSURE VERTICALI

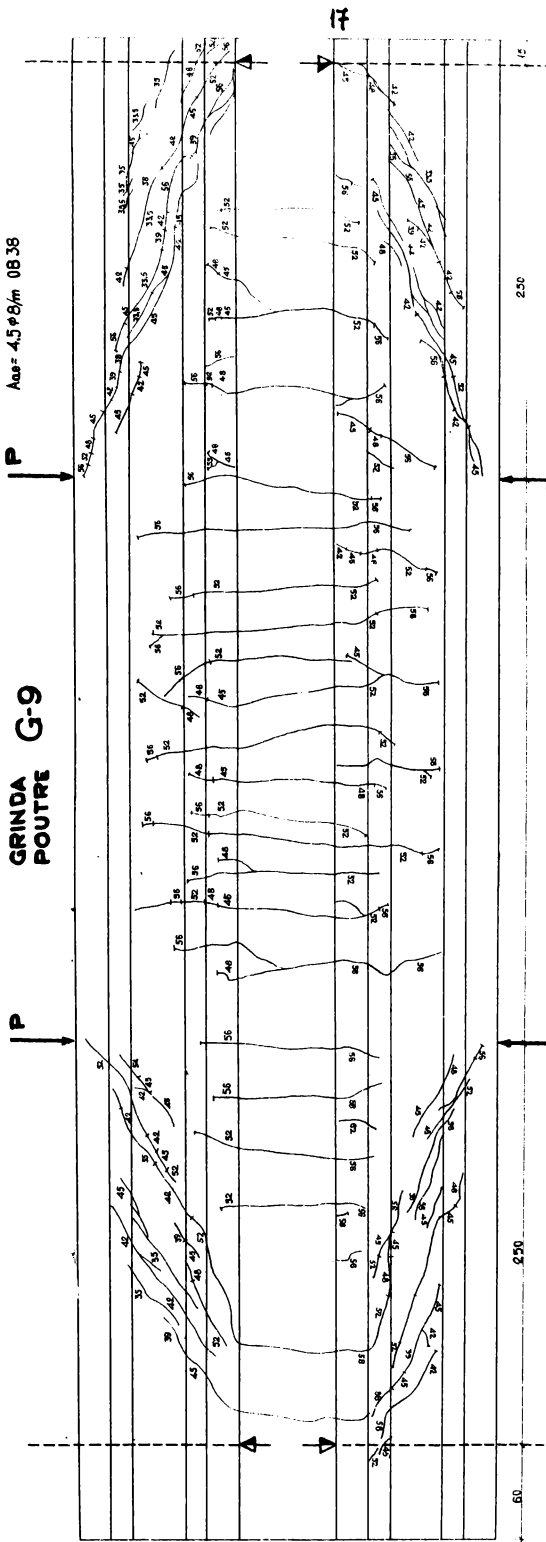
$P(t)$ max med	39.5	45	47.5	50	55.5
$\epsilon_f^i$ max	0.007	0.030	0.040	0.046	0.056
$\epsilon_f^i$ med	0.004	0.032	0.037	0.026	0.040

**Fig VIII-8  
A1-8**

# RELEVÉ FISURILOR SCHEMA DES FISSURES

## GRINDA G-9 POUTRE

$\alpha_A = 2.5$   
 $A_p = 18 \cdot 7 \cdot 4 \text{ TBP } 12$   
 $A_{as} = 4.5 \phi 8/m \text{ OB } 38$



$P_f^n = 42t$   
 $P_{fA}^1 = 33.5t$   
 $P_{fB}^1 = 35t$   
 $P_{fA} = 57.2t$   
 $P_{fB} = 57.5t$

*Fisuri inclinate  
Fisures inclinées*

$P$ (t)	35.5	38	42	45
ouverture (cm)				
$L_f^m$ max	0.025	0.045	0.07	0.8
$L_f^m$ moy	0.025	0.035	0.045	0.08

*Fisuri normale  
Fisures normales*

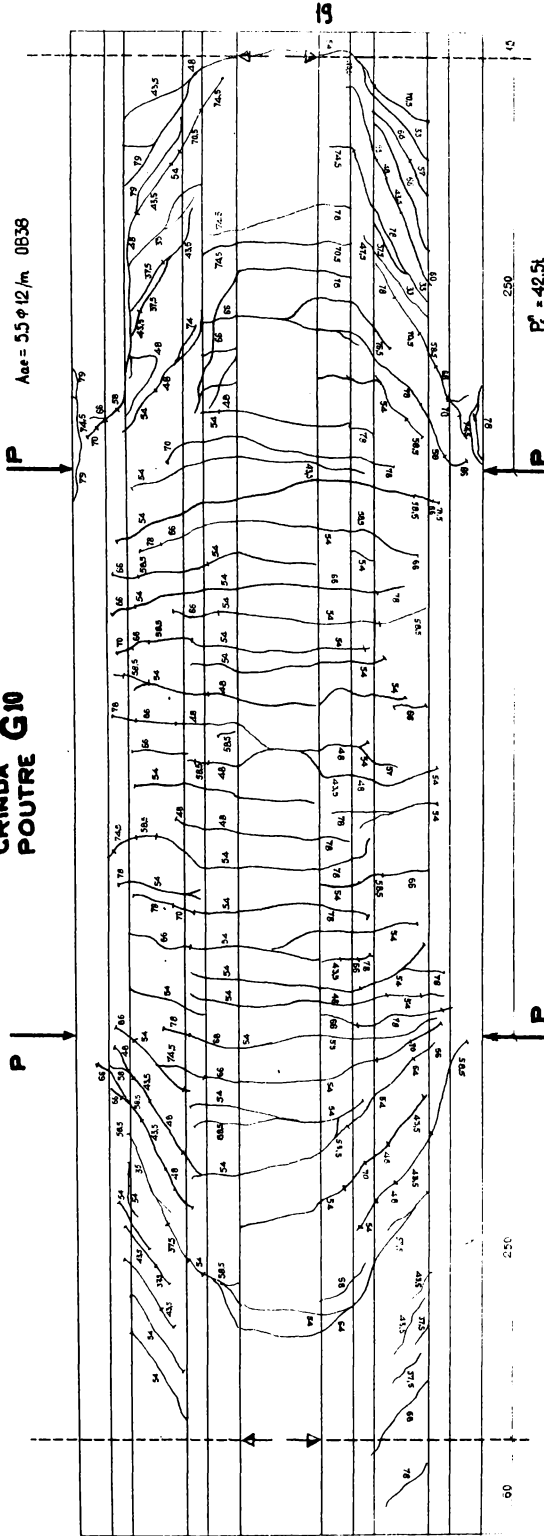
$P$ (t)	42	45	48	52	56
ouverture (cm)					
$L_f^m$ max	0.01	0.013	0.017	0.02	0.025
$L_f^m$ moy	0.008	0.01	0.015	0.018	0.02

FIG VIII-9  
A1-9

357069

**RELEVÉUL FISURILOR  
SCHEMA DES FISSURES  
GRINDA G10  
POUTRE**

$\alpha/h = 2.5$   
 $A_p = 18.7 \phi 4 \text{ TBP}$   
 $A_{ac} = 5.5 \phi 12 / m \text{ OB38}$



Etari normale  
Fisures normale

$P(t)$									
$\sigma_{cr}$									
$f_t^{max}$									
$f_t^{med}$									

Fisuri inclinate  
Fisures inclinate

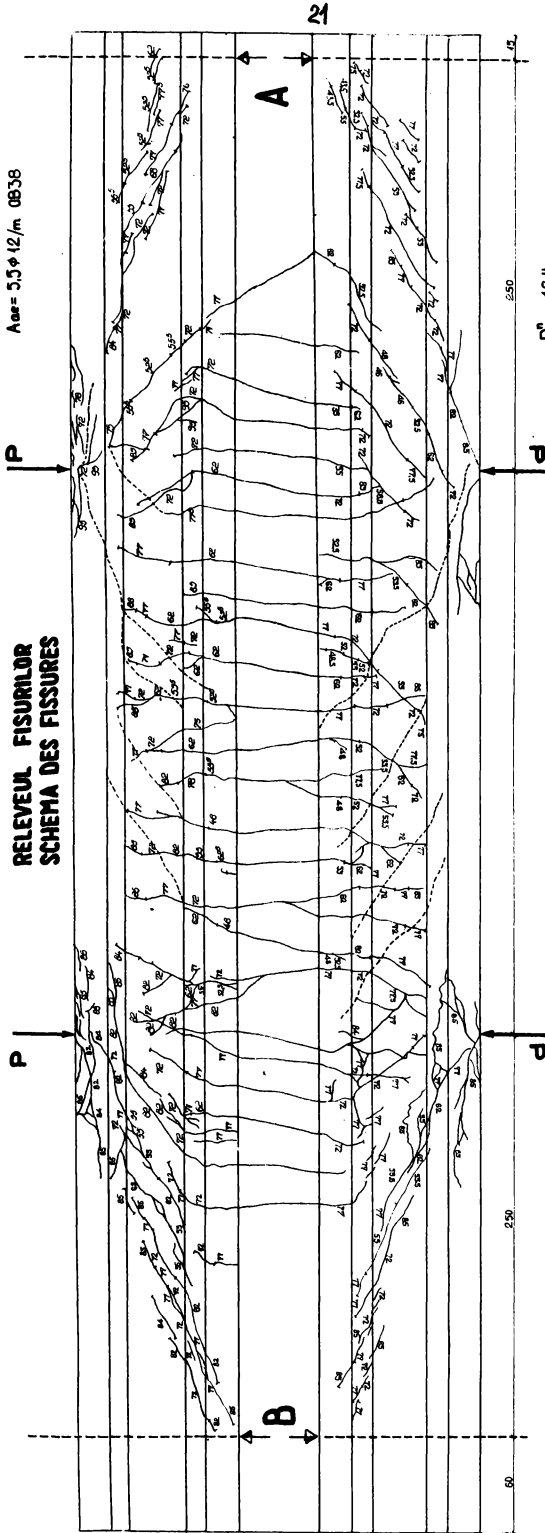
$P(t)$									
$\sigma_{cr}$									
$f_t^{max}$									
$f_t^{med}$									

$P_f^* = 42.5t$   
 $P_{fK}^* = 33.0t$   
 $P_{fR}^* = 33.0t$   
 $P_{rK} = 79.0t$   
 $P_{rR} = 80.2t$

**Fig. VII-10  
A1-10**

**GRINDA G II**  
**POUTRE**  
**RELEVÉUL FISURILOR**  
**SCHEMA DES FISSURES**

$\alpha/m = 2.5$   
 $A_p = 8\phi 25$  PC 90  
 $A_{as} = 5.5\phi 12/m$  0838



50

550

$P_f^0 = 48.1t$   
 $P_{fa}^0 = 52.5t$   
 $P_{fb}^0 = 55t$   
 $P_{ra}^0 = 103.5t$   
 $P_{rb}^0 = 86.0t$  (see next column PC 90)

**FIGURI INCLINATE**  
**FISSURES INCLINATE**

$P(t)$ (cm)	481	52.5	55.5	63.5	72.5	78.5
$f_{max}^0$	0.007	0.013	0.024	0.023	0.04	0.065
$f_{med}^0$	0.007	0.009	0.015	0.017	0.037	0.05

**FIGURI NORMALE**  
**FISSURES NORMALES**

$P(t)$ (cm)	45.9	47.7	48.5	52.5	55.5	63.5	72.5
$f_{max}^0$	0.007	0.015	0.018	0.024	0.025	0.049	0.10
$f_{med}^0$	0.007	0.013	0.016	0.017	0.021	0.037	0.067

**Fig. VII-11**  
**A1-11**

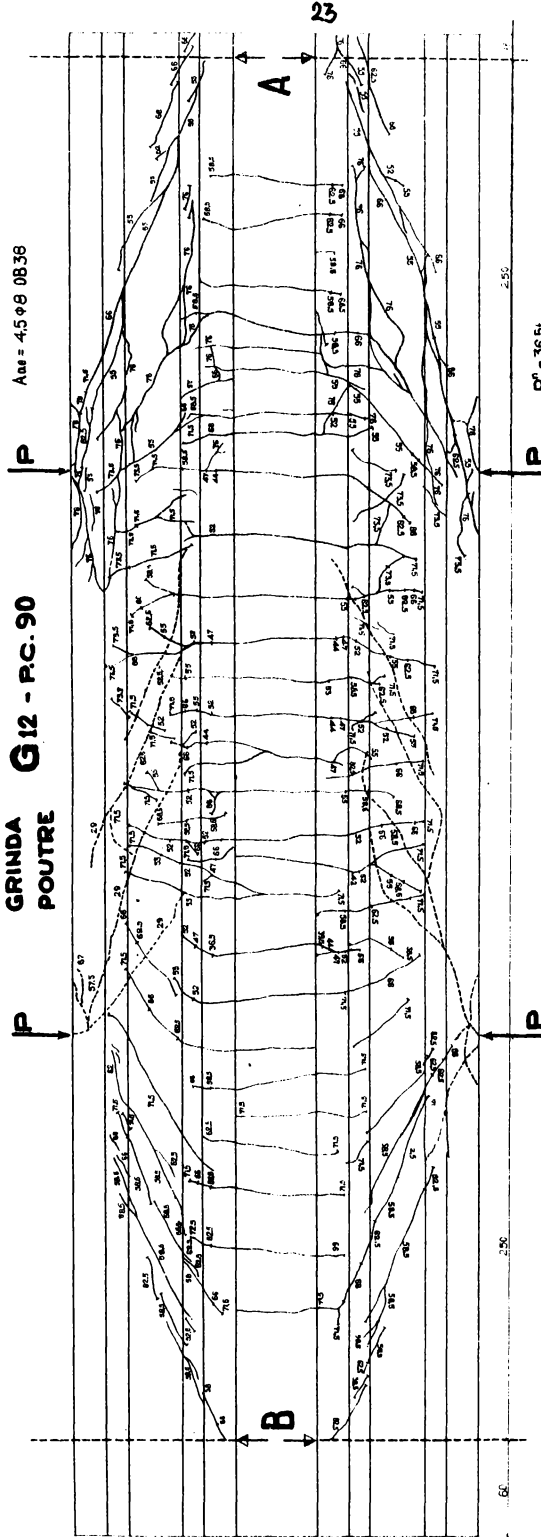
RELEVÉUL FISURILOR  
SCHEMA DES FISSURES

GRINDA G12 - PC.90  
POUTRE

$a/h = 2.5$

$A_p = 9 \phi 25 \text{ PC } 90$

$A_{as} = 4.5 \phi 8 \text{ OB } 38$



$P_i(t)$	32.2	38	42.5	47.25	52	55	56.5	62.25	71.5
$L_i^m$ mm	0.005	0.007	0.007	0.013	0.020	0.024	0.027	0.045	0.065
$L_i^m$ mm	0.002	0.004	0.005	0.009	0.018	0.025	0.035	0.035	0.076

$P_f' = 36.5t$   
 $P_A' = 52t$   
 $P_{10}' = 52.5t$   
 $P_A'' = 76.5t$   
 $P_B'' = 87t$

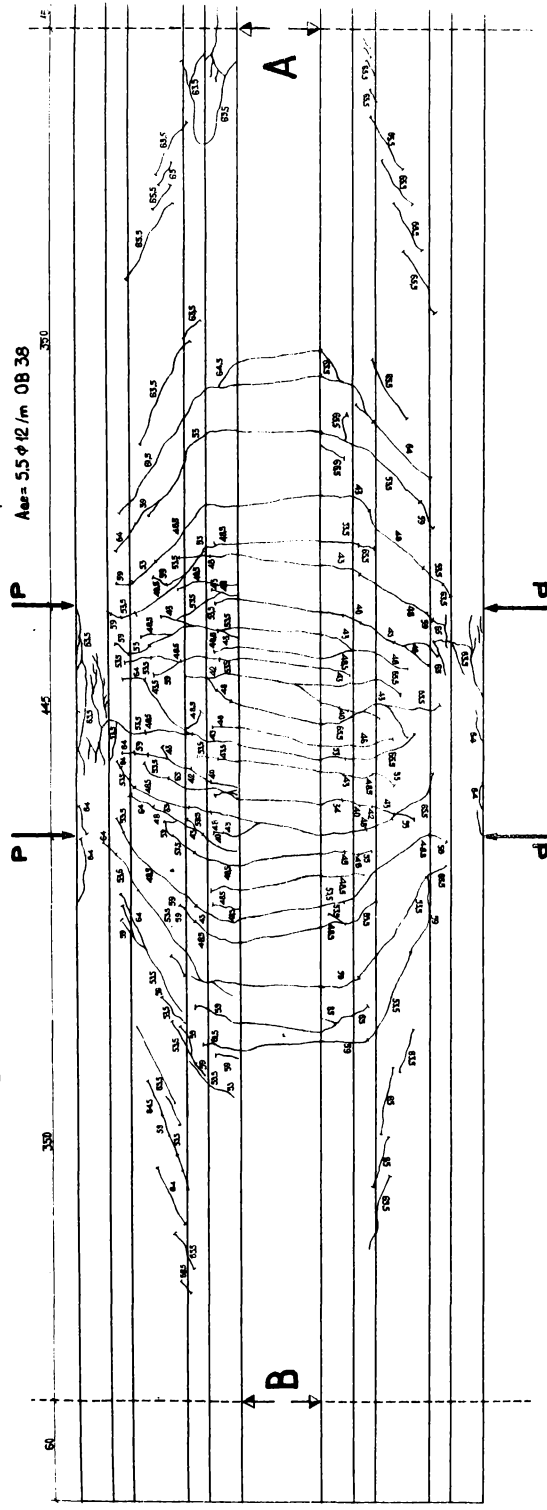
Fig. Nr. 12  
A1-12



RELEVUL FISURILOR  
SCHEMA DES FISURES

GRINDA G13  
POUTRE

$q/h = 3.5$   
 $A_p = 40.7 \phi 4$  TBP 42  
 $A_{se} = 5.5 \phi 12 / m$  OB 38



FISURI NORMALE  
FISURES NORMALES

$P_{cr}$	40	41	43	48.5
$f_{cr}$	0.035	0.025	0.035	0.045
$f_{cr}^{max}$	0.000	0.005	0.005	0.009
$f_{cr}^{med}$				

FISURI INCLINATE  
FISURES INCLINEES

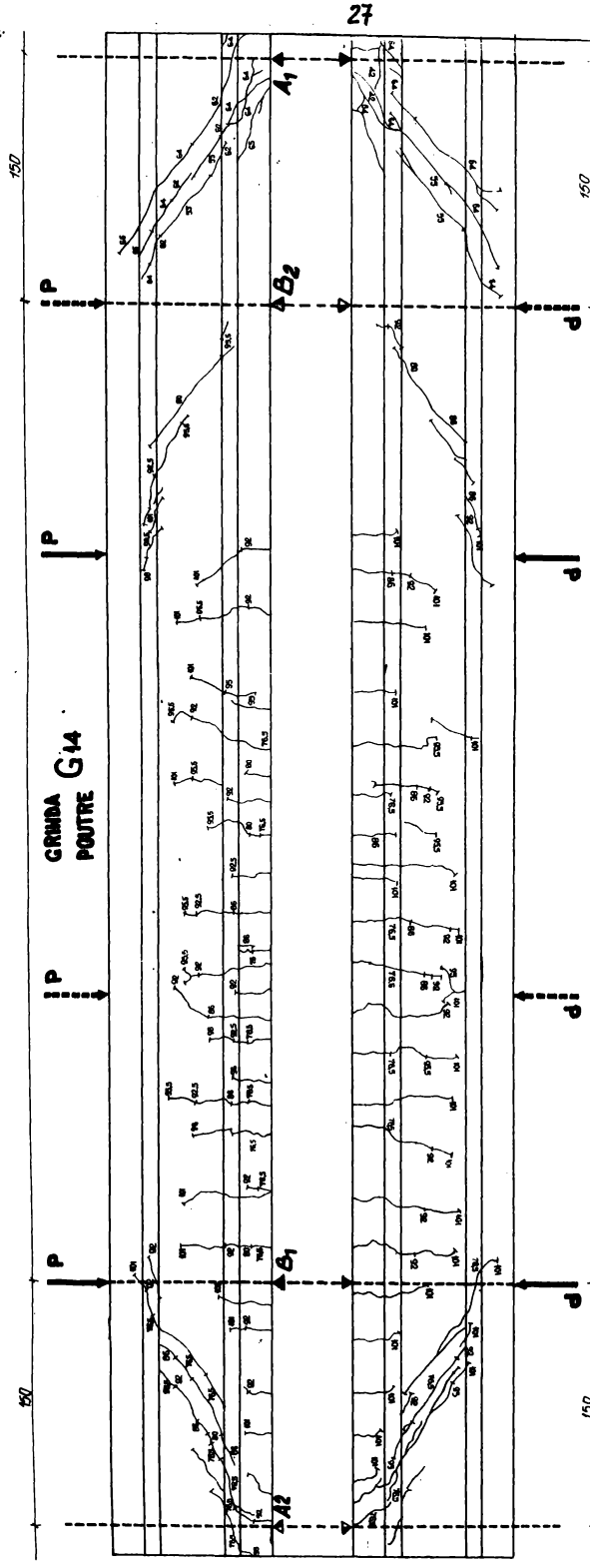
$P_{cr}$	48.5	53.5	65.5
$f_{cr}$	0.003	0.008	0.035
$f_{cr}^{max}$	0.002	0.005	0.025
$f_{cr}^{med}$			

$P_{cr}^c = 35t$   
 $P_{cr}^a = 65.5t$   
 $P_{cr}^b = 59.0t$   
 $P_{cr}^c = 65.0t$   
 $P_{cr}^b = 65.0t$

Fig. V.08-19  
A1-13

INSTITUTUL NAȚIONAL DE RECHERȘI ȘI PROIECTARE  
 ÎN CONSTRUCȚII

RELEVUL FISURILOR

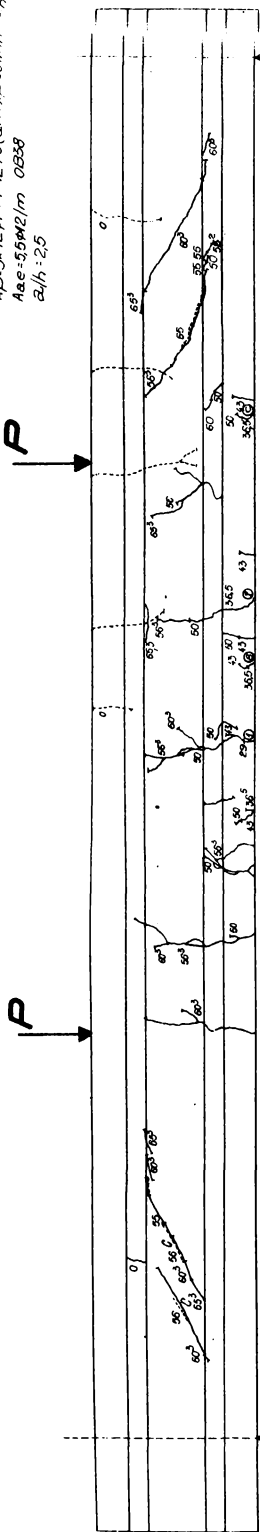


POZITIELE - linie interupte si rezemata A, corepond incercarii 1<sup>a</sup>.  
 POZITIELE - linie plina si rezemata B, corepond incercarii 2<sup>a</sup>.

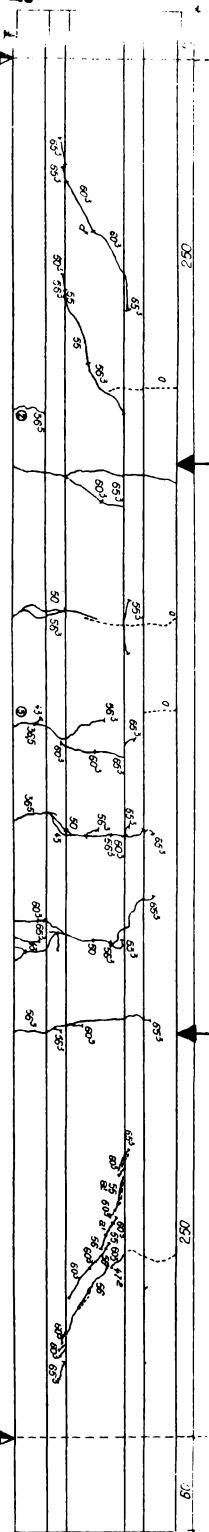
Fig. VII-46.  
 AI-14

# GRINDA G15

$A_p = 3 \times 1297 + 1 \times 1295$  (arm. 2035) f.m.f. 0.054  
 $A_{se} = 5592/m$  0.0338  
 $z/h = 2.5$



29



$F_n = 36.5 \text{ t}$   
 $F_n^0 = 550 \text{ t}$   
 $F_n^p = 560 \text{ t}$   
 $F_n^0 = 110 \text{ t}$

Fisuri inclinate

$F_{\text{zone}}$	55	56	60	65
$\text{max. fisur./m}$				
$\sigma_{\text{max. cr}}$	0.10	0.16	0.27	0.51
$\sigma_{\text{f. med}}$	0.08	0.157	0.205	0.35

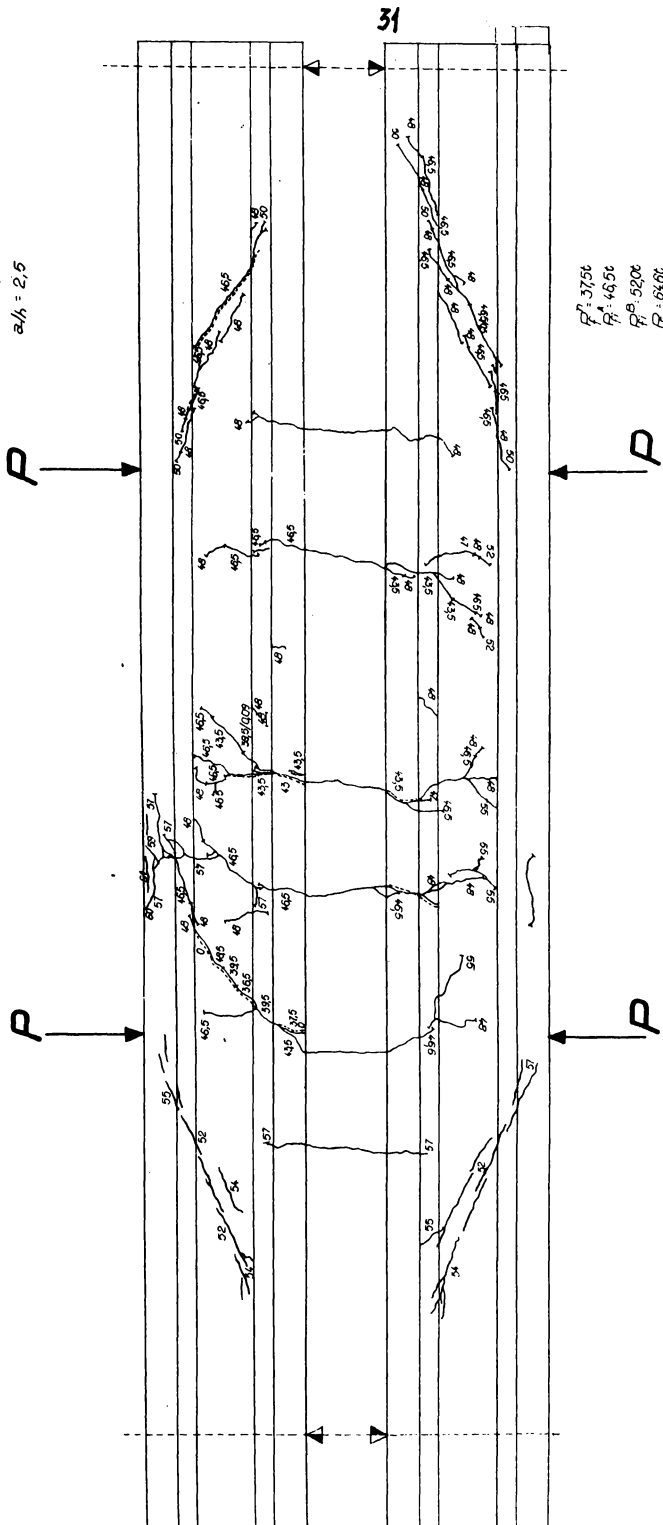
Fisuri normale

$F_{\text{zone}}$	36.5	4.25	500	56
$\text{max. fisur./m}$				
$\sigma_{\text{f. med}}$	0.13	0.24	0.50	0.75
$\sigma_{\text{f. med}}$	0.075	0.13	0.275	0.35

Fig. V-15  
AI-15

# GRINDA 616

$A_D = 2 \times 1207 + 2 \times 1245$   
 $A_{ee} = 4508 / m^2$   
 $a/h = 2,5$

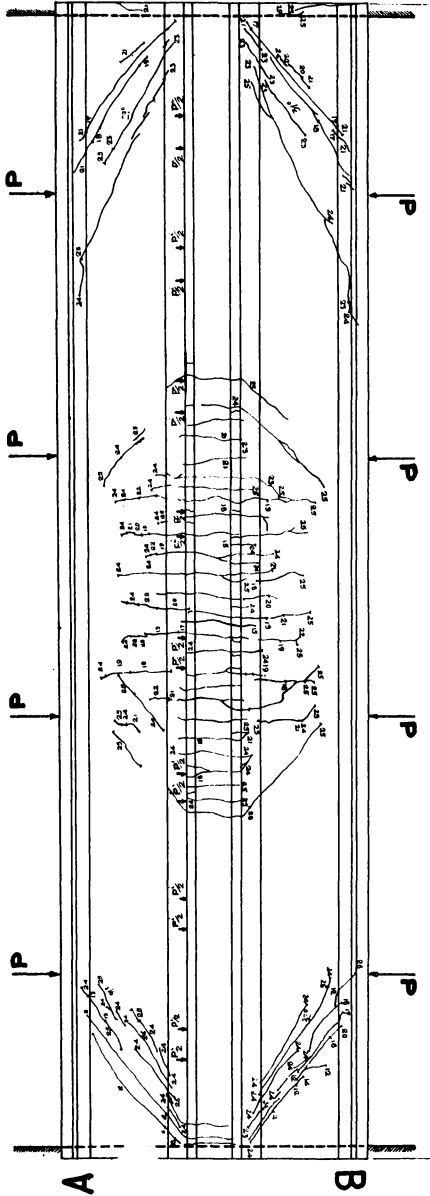


**Fig. VIII-16**  
**AI-16**

$R^1 = 37,56$   
 $R^2 = 48,56$   
 $R^3 = 52,06$   
 $R^4 = 61,68$

$A_p = 24 \times 7 \text{ t}$

**RELEVÉ FISURI G18-12-7**



DETERMINA FISIURAS NORMALES PUNTO DE INGENIERIA  
 DIFERENTE EN PUNTO DE INGENIERIA PUNTO DE INGENIERIA

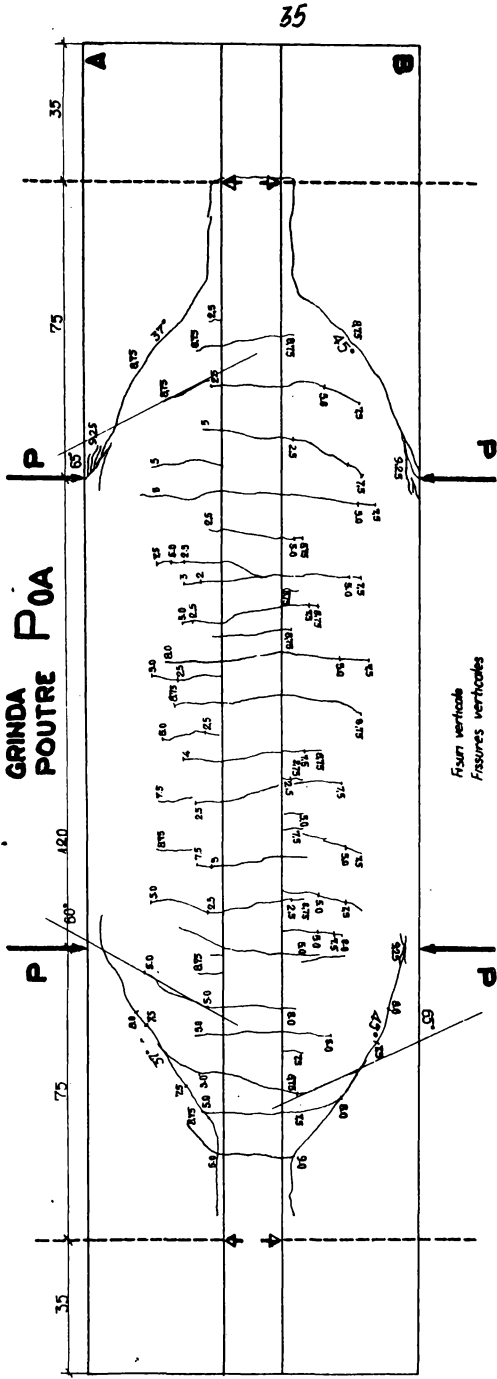
TRAZO	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
LONGITUD	3025	32	34	377	414	452	49	525	562	6025	64	675	7175	7325	
ANCHO	0.15	0.25	0.25	0.25	0.23	0.25	0.3	0.35	-	0.40	0.40	0.50	1.0	1.22	
$L_f$	0.17	-	0.19	-	0.25	0.23	-	0.30	-	0.32	0.33	0.40	0.58		
$L_f$ mm	0.05	0.07	-	0.1	-	0.15	0.08	-	-	0.25	0.1	0.5			

$P_{1.5t}^A = 68.5t + 12.8t$   
 $P_{1.5t}^B = 60.5t + 12.8t$   
 $P = 164.6t$

**Fig. 17**  
**A1-17**

**RELEVÉUL FISURILOR  
SCHEMA DES FISSURES**

$A_p=0$   
 $A_e=3\phi 22$  B35



1,2..... FISSURES MESURÉES

$P_f^1 = 2.5t$   
 $P_f^2 = 8.75t$   
 $P_f = 9.2t$

Four verticale  
Fissures verticales

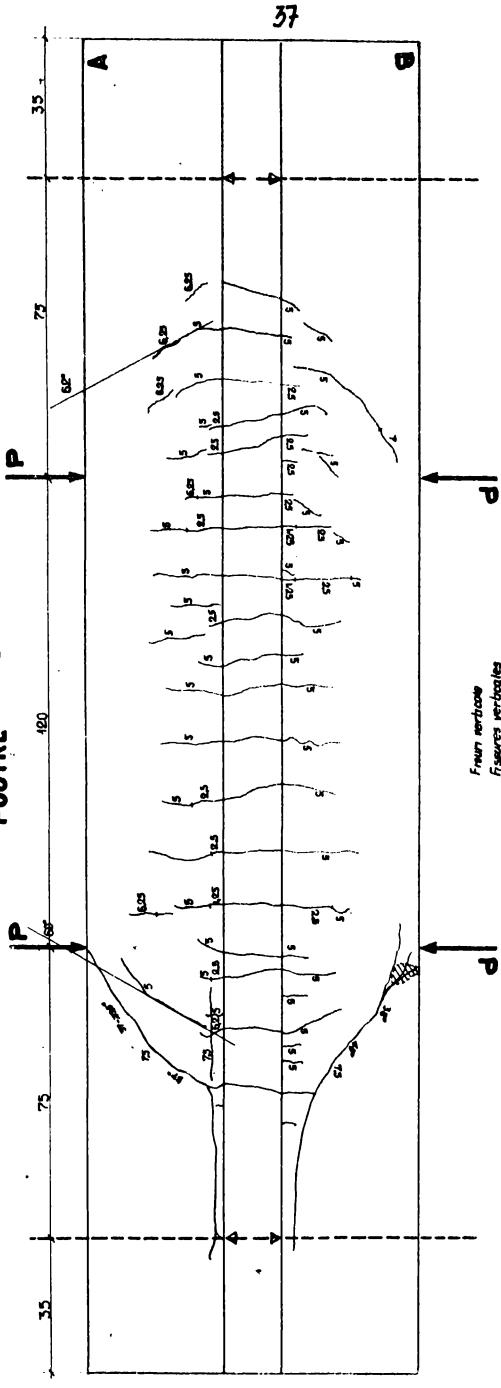
$P_f(t)$ ouverture (cm)	2,65	5,15	7,65	8,9
$f_{max}$	0,0014	0,00485	0,0074	0,0084
$f_{moy}$	0,00074	0,0041	0,0058	0,0065
$f_{min}$	0,0003	0,0024	0,0031	0,0032

Fig. VII-18.  
A1-18

RELEVÉ FISURILOR  
SCHEMA DES FISSURES

GRINDA P 0 B  
POUTRE

$A_p = 0$   
 $A_a = 3 \phi 22 \text{ B35}$



37

Fisuri verticale  
Fissures verticales

P (t)	2.65	3.9	5.15	6.4
$\sigma_f$ max (cm)	0.00151	0.0020	0.00262	0.0030
$\sigma_f$ moy	0.00035	0.00075	0.00095	0.00106
$\sigma_f$ min	0.00025	0.00025	0.00034	0.00051

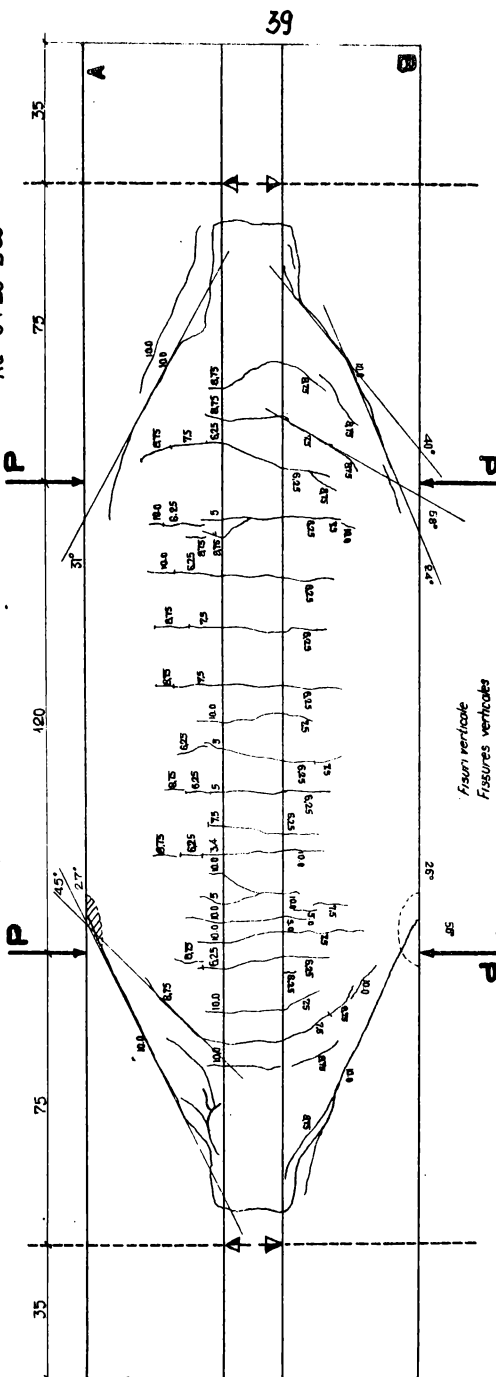
$P_f^* = 2.5t$   
 $P_f^* = 9.3t$   
 $P_f = 9.78t$

Fig. VIII-19  
A1-19

**RELEVÉ FISURILOR  
SCHEMA DES FISSURES**

**GRINDA P4A  
POUTRE**

$A_p = 4\phi 7$  Hm 446 LS  
 $A_c = 3\phi 20$  B 35



P (t)	Fisură verticală Fissures verticales					
	3,5	5,15	6,4	7,65	8,9	10,15
$f_t^{max}$ (cm)	0,0006	0,0024	0,0046	0,0064	0,0092	0,0114
$f_t^{moy}$	0,0016	0,00205	0,0038	0,00505	0,0067	0,0081
$f_t$ mm	—	0,00155	0,0026	0,0036	0,0052	0,0065

$P_t^1 = 5,15t$   
 $P_t^2 = 10,0t$   
 $P_t^3 = 10,65t$

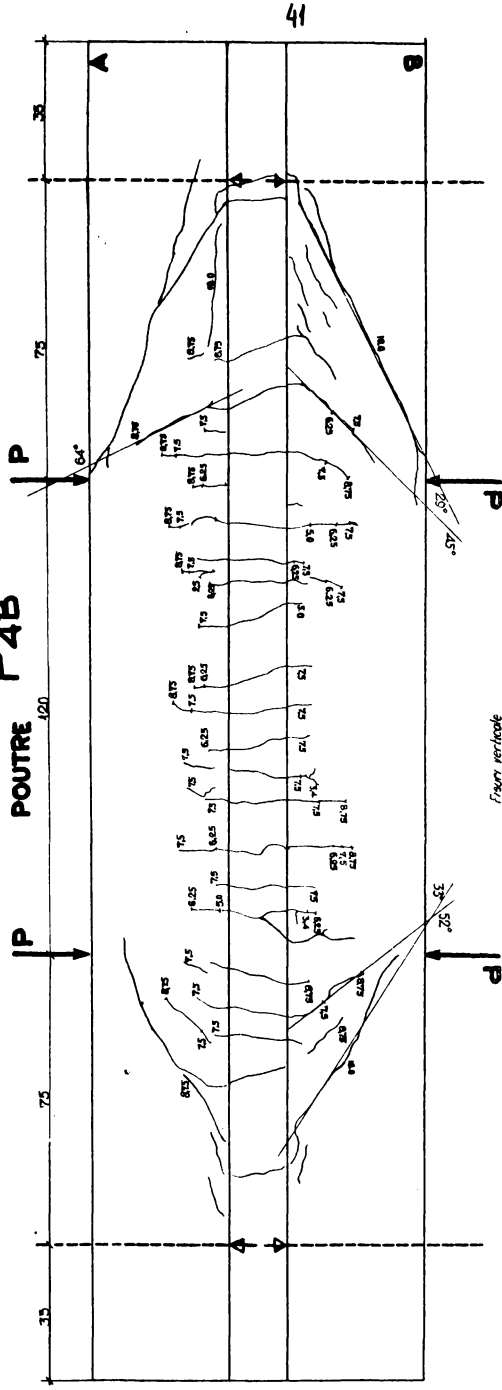
**Fig. VII- 20**  
**A1- 20**



RELEVÉ FISURILOR  
SCHEMA DES FISSURES

GRINDA P4B  
POUTRE

$A_p = 4\phi 7$  Hm LS  
 $A_a = 3\phi 8$  B 35



Fisuri verticale  
Fissures normales

$P(t)$ ouvertures (C/D)	3.55	5.15	6.4	7.65	8.9	10.0
	0.0007	0.0035	0.0051	0.0065	0.0085	0.0101
	0.0007	0.0032	0.0050	0.0065	0.0084	0.0100
	—	—	—	—	—	—

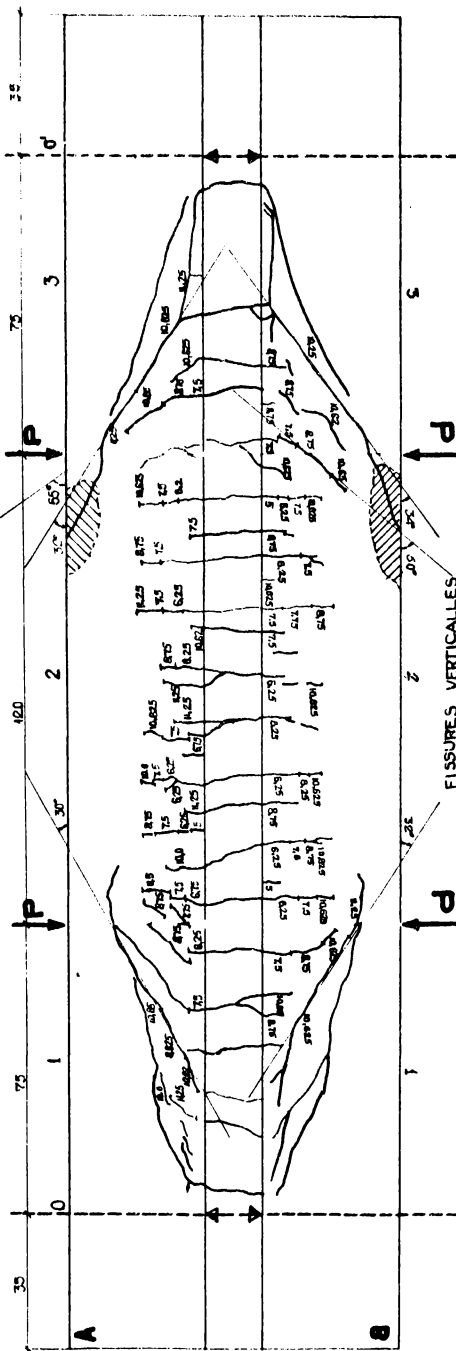
$P_t^m = 5.0t$   
 $P_t^i = 10.0t$   
 $P_t = 10.8t$

Fig. VII-21  
A1-21

RELEVUL FISURILOR  
SCHEMA DES FISSURES

GRINDA P6A  
POUTRE

$A_p = 6\phi 7$  Hm 446  
 $A_a = 3\phi 12$  B 35



$P$ (doli)	5150	6400	7650	8900	10100	10775	11400
ouverture (mm)	0,015	0,024	0,053	0,086	0,117	0,132	0,143
$w_{fmax}$	0,125	0,016	0,042	0,064	0,084	0,095	0,105
$w_{fmin}$	0,012	0,012	0,032	0,047	0,069	0,069	0,070

$P_1^* = 6,4t$   
 $P_2^* = 10,65t$   
 $P_3 = 11,45t$

FISSURES VERTICALES

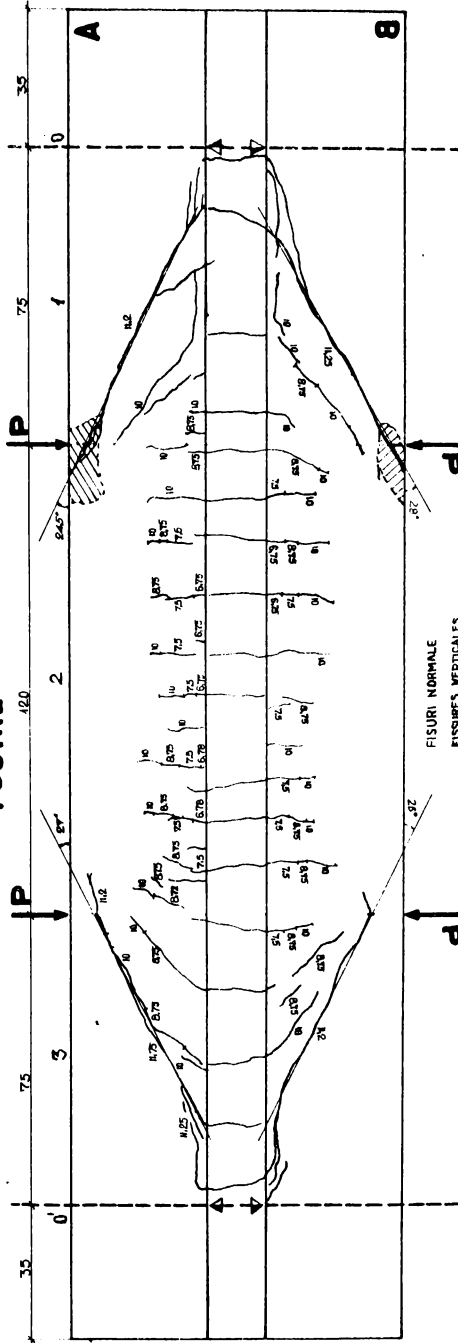
FIG. VIII-22  
A1-22

INS  
T I  
BIBLIOTECA CENTRALĂ

RELEVÉ FISURILOR  
SCHEMA DES FISSURES

GRINDA P6B  
POUTRE P6B

$A_p = 6\phi 7$  Hm 446 LS  
 $A_e = 3\phi 18$  B35



FISURI NORMALE  
FISSURES VERTICALES

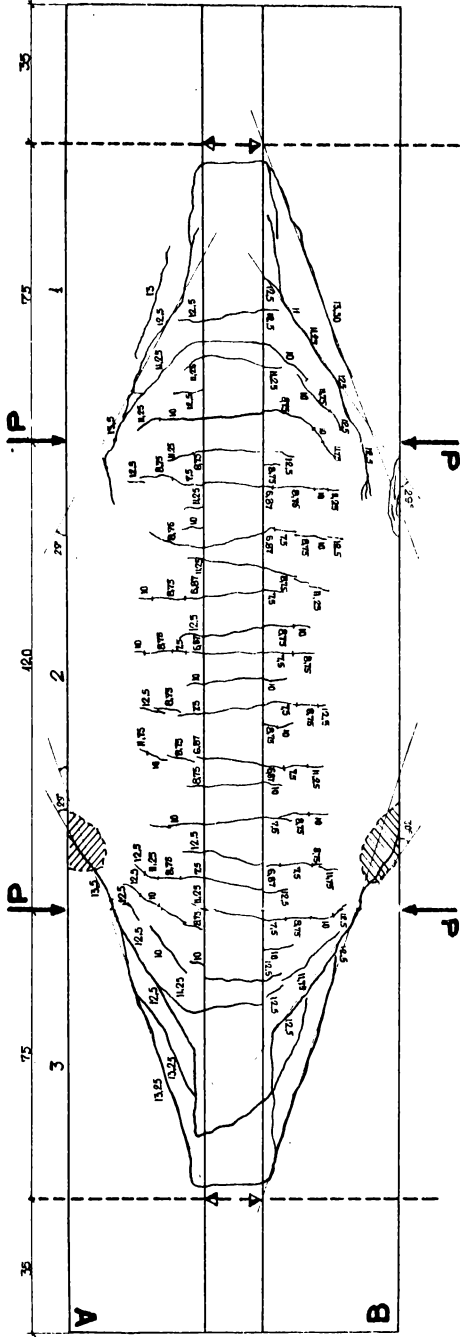
$P$ (daN)	6400	7650	8900	10150
$l_f$ max	0.04	0.042	0.070	0.090
$l_f$ moy	0.0153	0.035	0.055	0.070
$l_f$ min	0.0115	0.031	0.044	0.056

$P_1^* = 6.25t$   
 $P_2^* = 11.0t$   
 $P_3^* = 11.40t$

FIG VIII-23  
A1-23

RELEVÉUL FISURILOR  
SCHEMA DES FISSURES  
GRINDA POUTRE P 84

$A_p = 8 \phi 6$  Hm 446  
 $A_c = 2 \phi 16$  B 35



$P_f^I = 705t$   
 $P_f^2 = 41,55t$   
 $P_f = 45,7t$

$P_{f,ok}$ (mm) ouverture	6875	7650	6900	10160	11400	12650	13900
$\omega_f$ max	0,0280	0,061	0,096	0,126	0,147	0,167	0,192
$\omega_f$ moy	0,0148	0,0335	0,0635	0,0885	0,1120	0,1370	0,1590
$\omega_f$ min	0,0127	0,024	0,0395	0,055	0,071	0,096	0,110

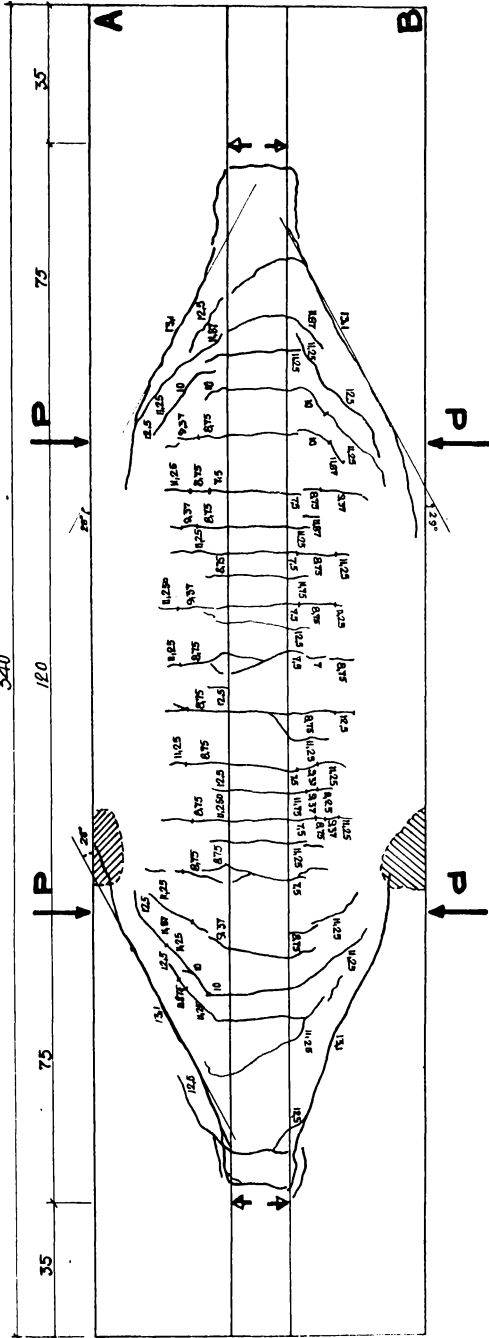
Fig. VIII-24

RELEVÉUL FISURILOR  
SCHEMA DES FISSURES

$A_p = 8 \phi 7$  Hm. 4.46 LS  
 $A_u = 2 \phi 16$  B35

GRINDA P8B

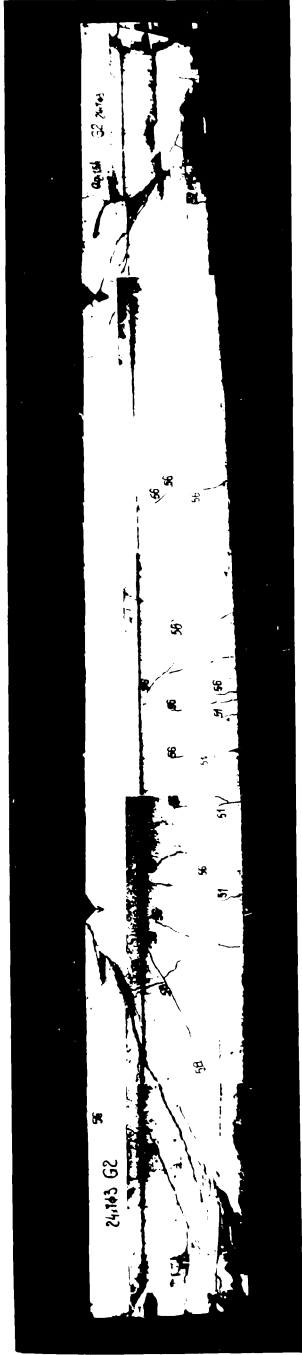
340



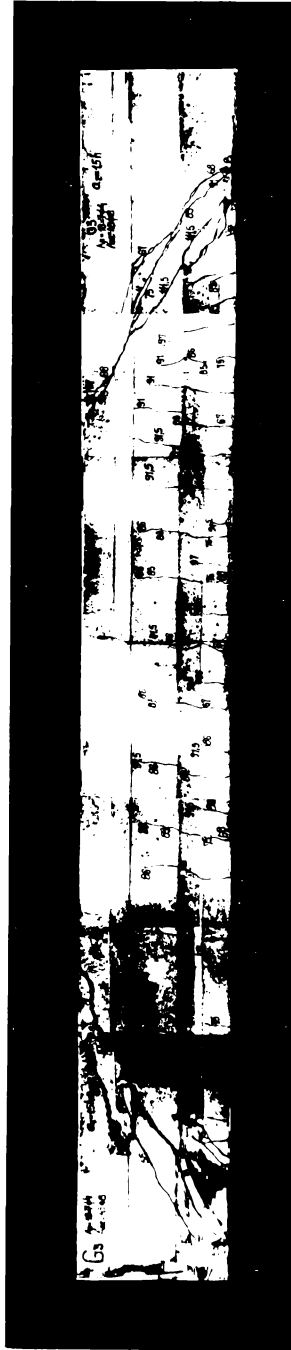
$P_f^0 = 7.5t$   
 $P_f^1 = 12.5t$   
 $P_f = 15.3t$

$\frac{(f_{tm} - P_{f, max})}{\sigma_{f, max}}$	7650	8900	9225	10150	11400	12025	12650
$\sigma_f$ max	0.0265	0.0610	0.0825	0.0960	0.1300	0.1500	0.1620
$\sigma_f$ moy	0.0225	0.051	0.065	0.076	0.096	0.111	0.123
$\sigma_f$ min	0.023	0.046	0.058	0.066	0.079	0.091	0.101

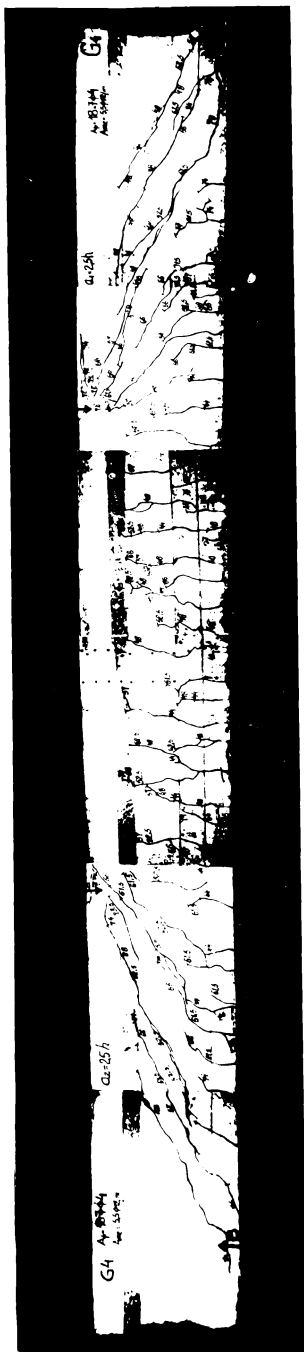
Fig. 18-20.  
Ar-25



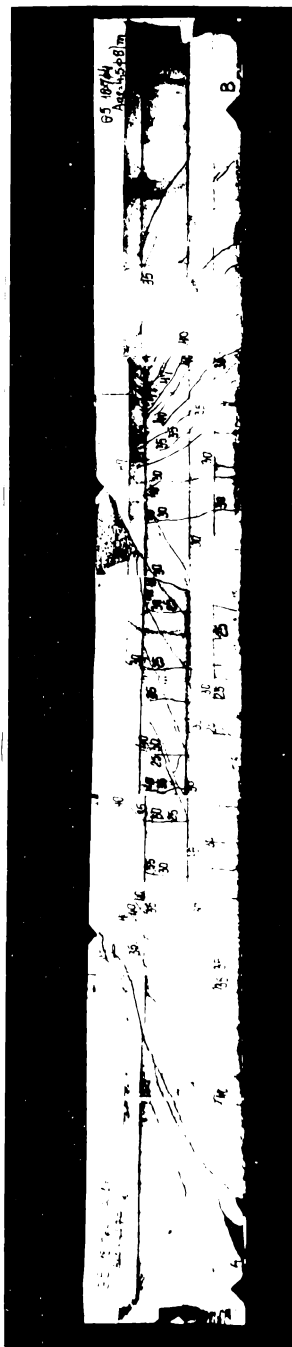
G2



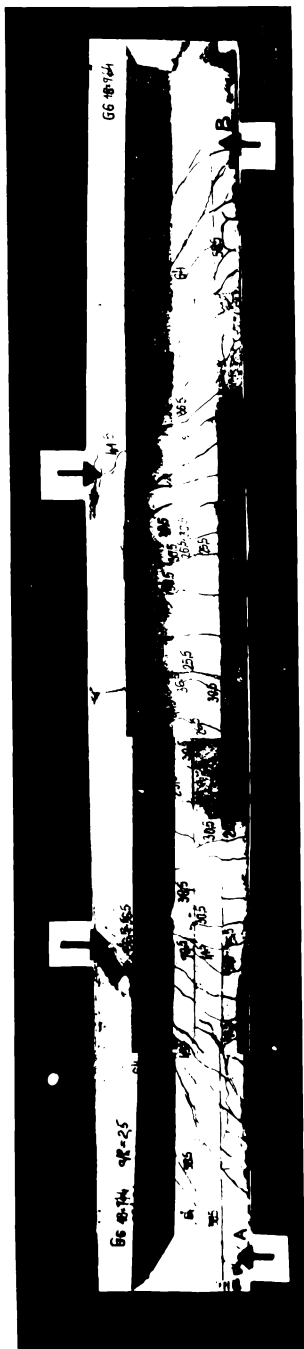
G3



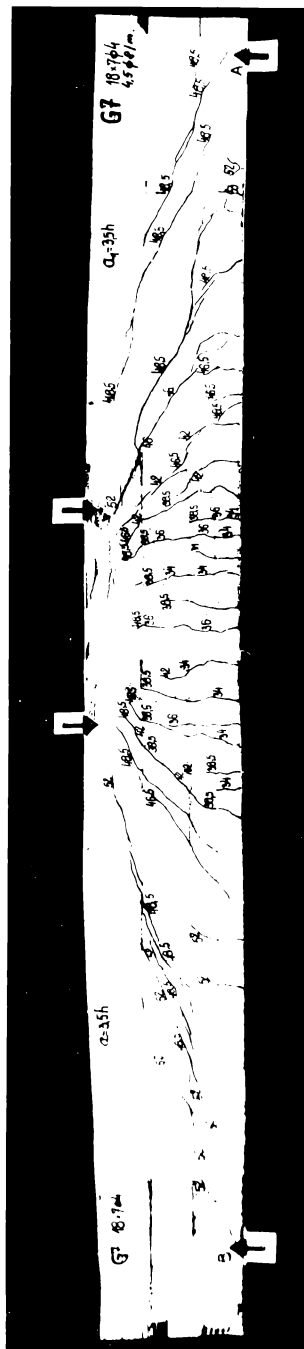
G4



G5

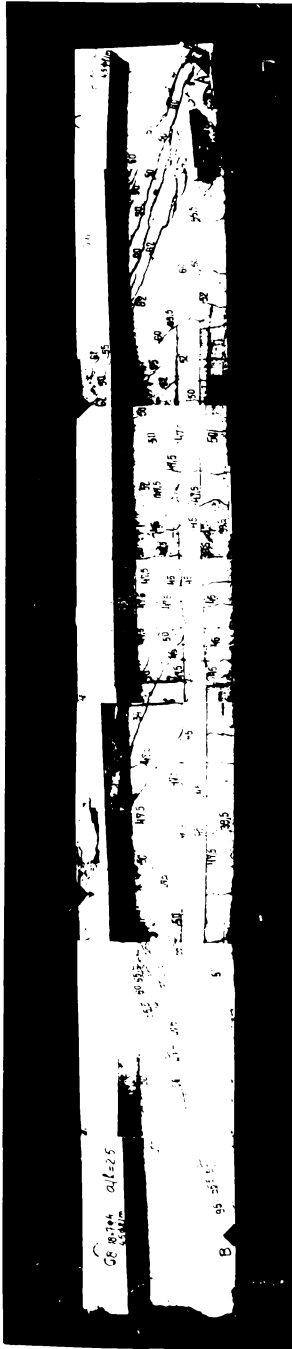


G6



G7





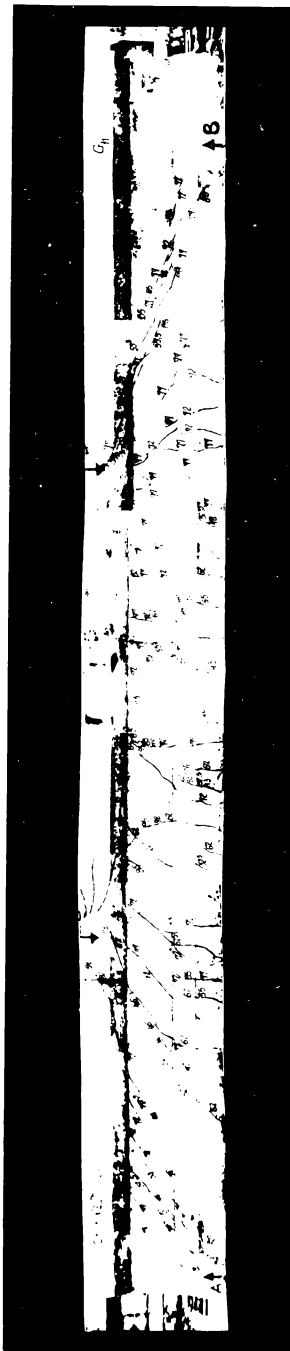
G8



G9



G10



G11



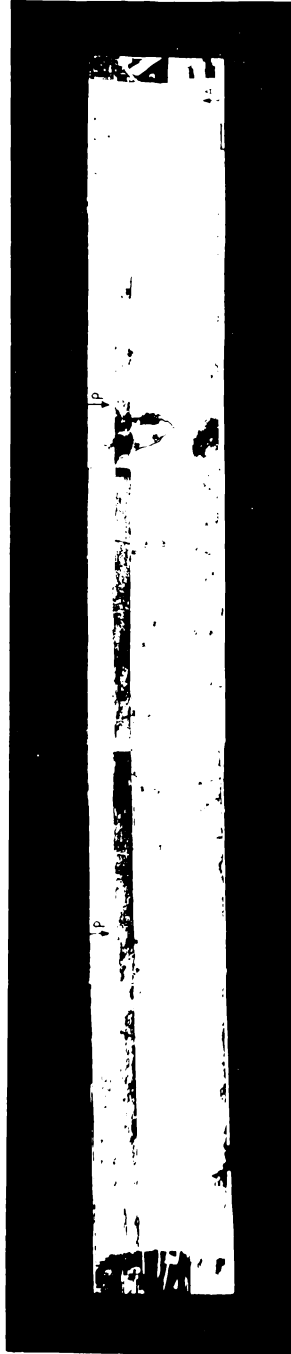
G12



G13



G14



G15

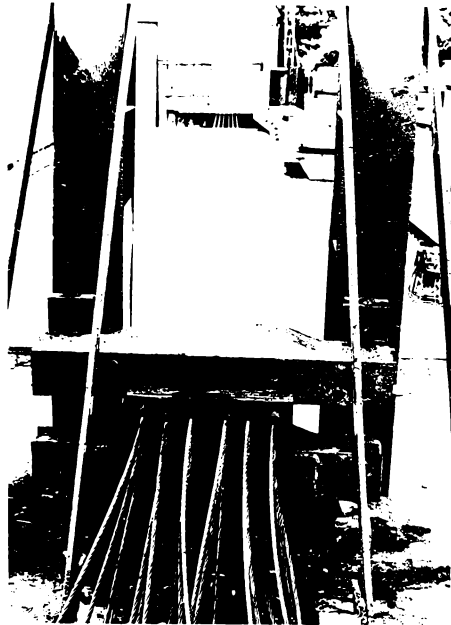


G16

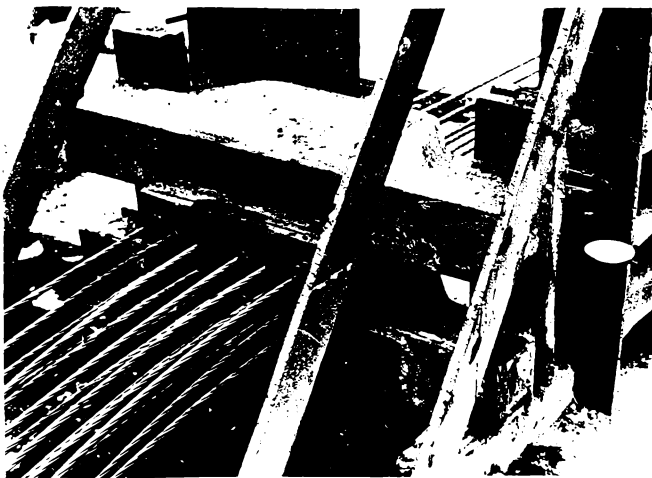


G18-12-7

A 2-1 A 2  
Grinzi de 9,2 m lungime

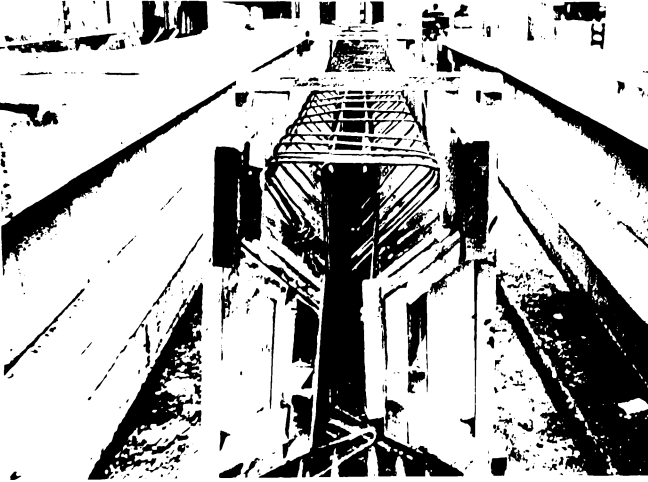


A 2-1 Tensionarea toroanelor

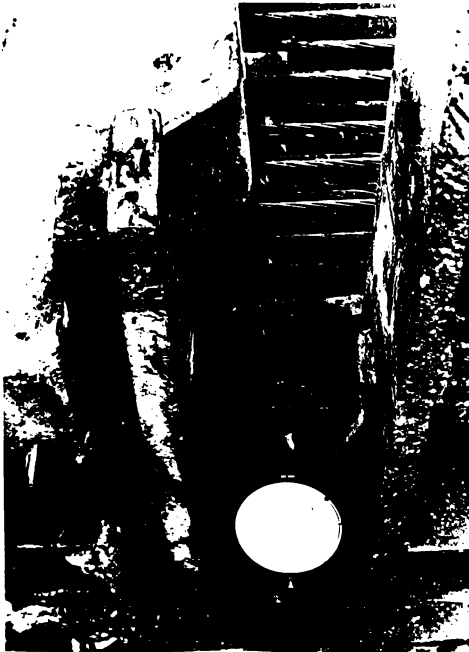


A 2-2 Blocarea toroanelor

INS 111-101  
111  
BUCURESTI

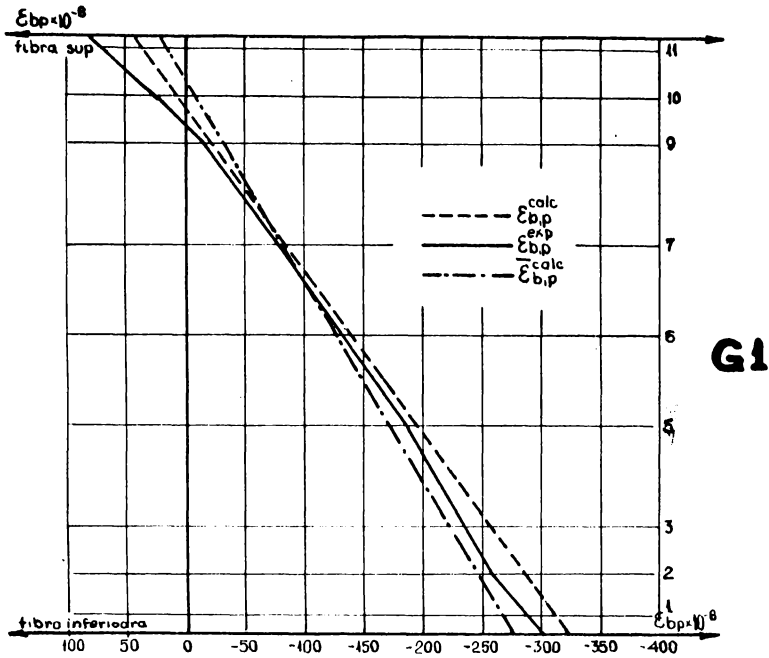


A 2-6 Grindă cofreată

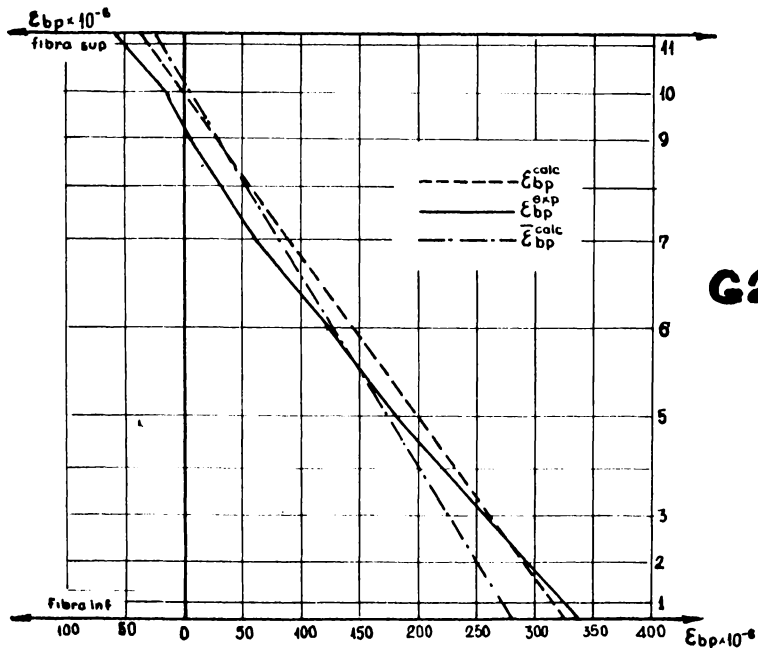


A 2-7 Măsurarea  
forței din toroane  
cu dinamometrul

DEFORMAȚIA BETONULUI PE ÎNĂLȚIMEA GRINZII  
 ÎN SECȚIUNEA DE MIJLOC A GRINZII LA PRECOMPRIMARE



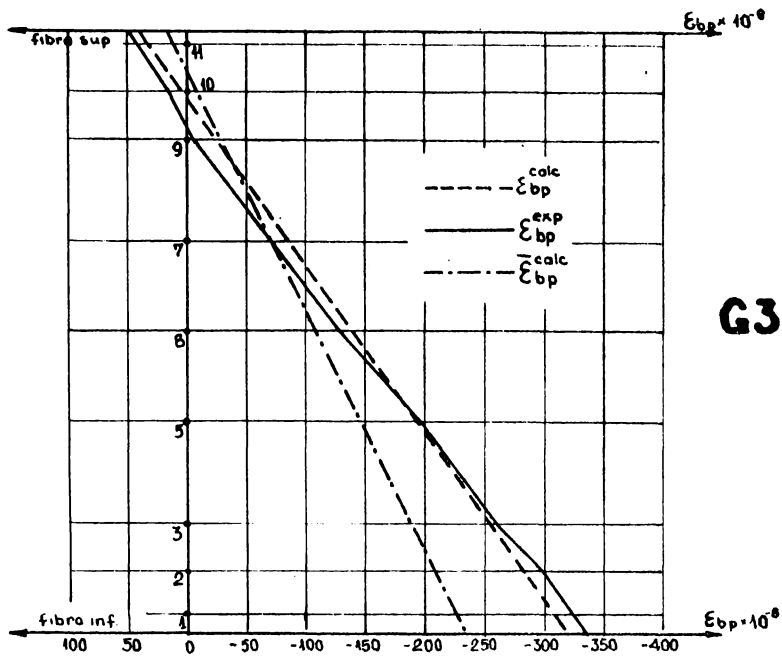
**G1**



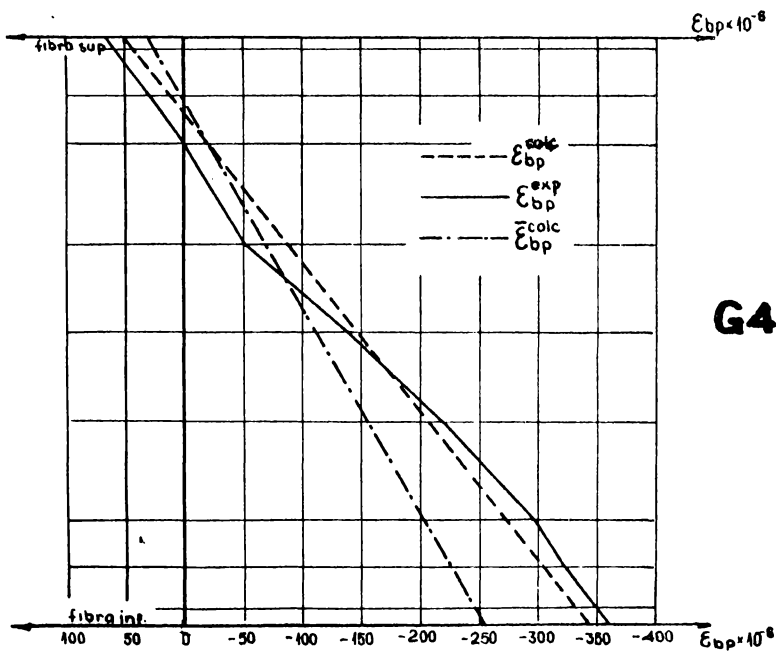
**G2**

Fig.A2-4a





G3



G4

Fig. A2.-4b.

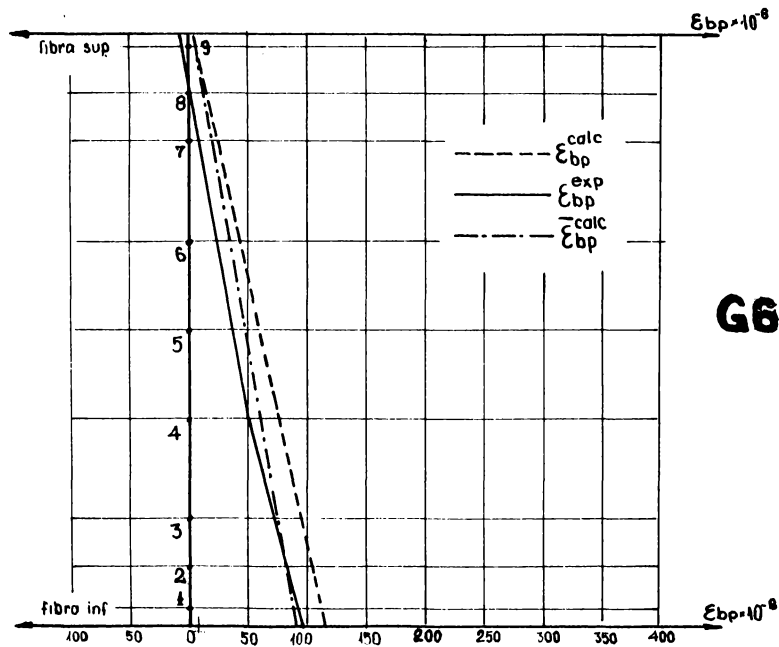
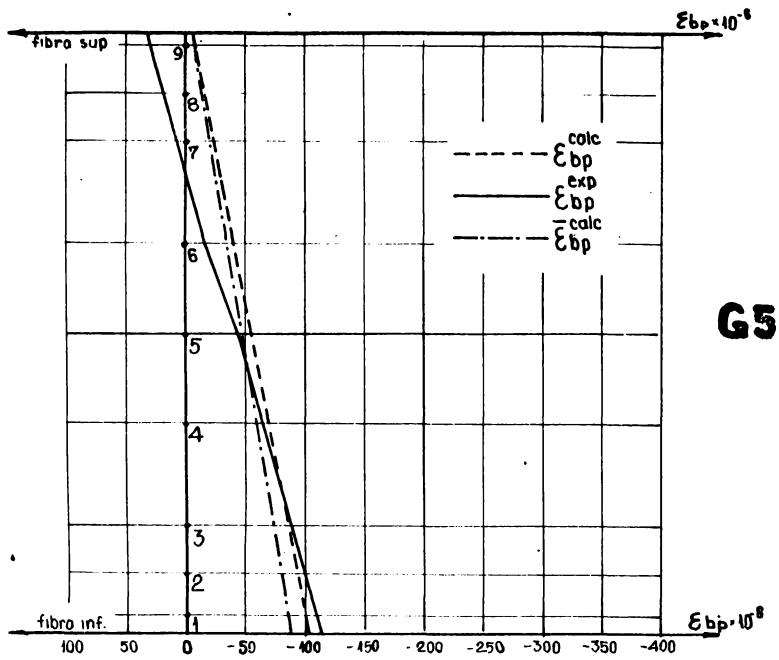
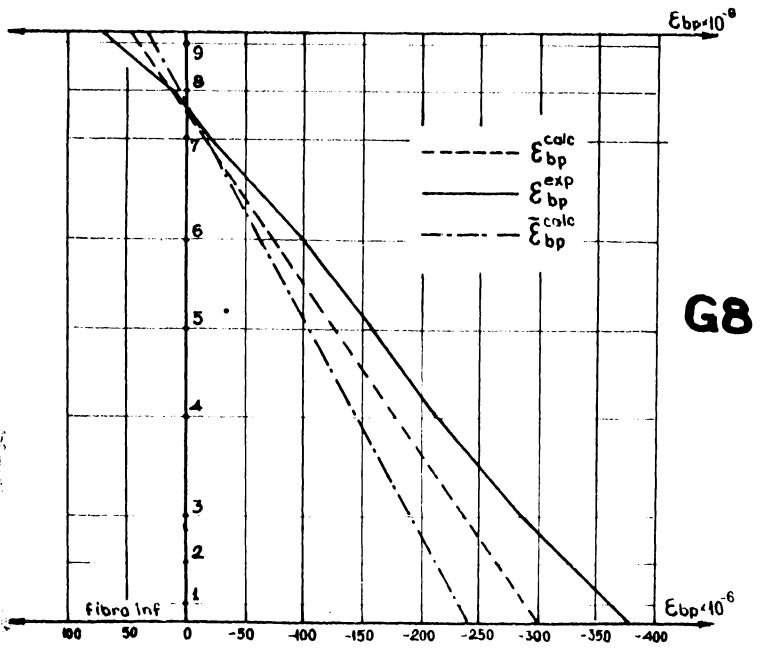
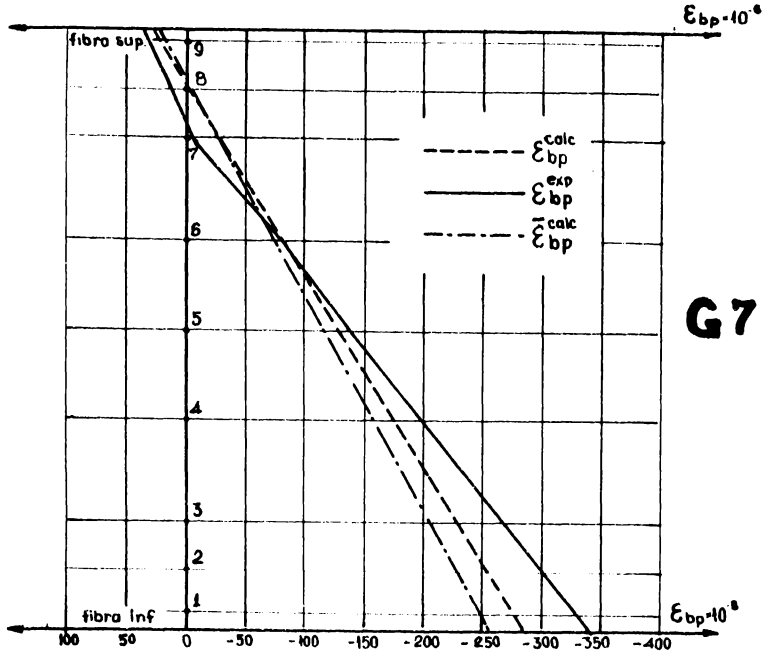
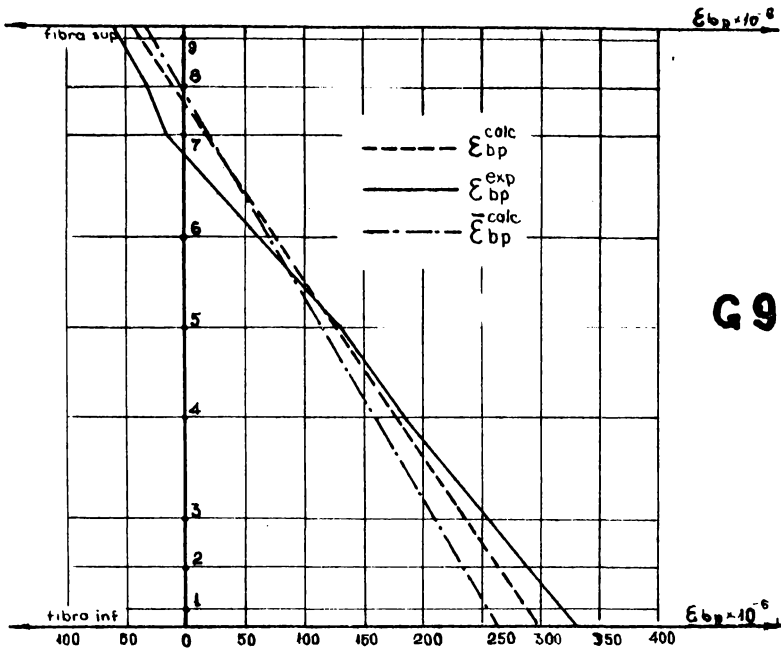


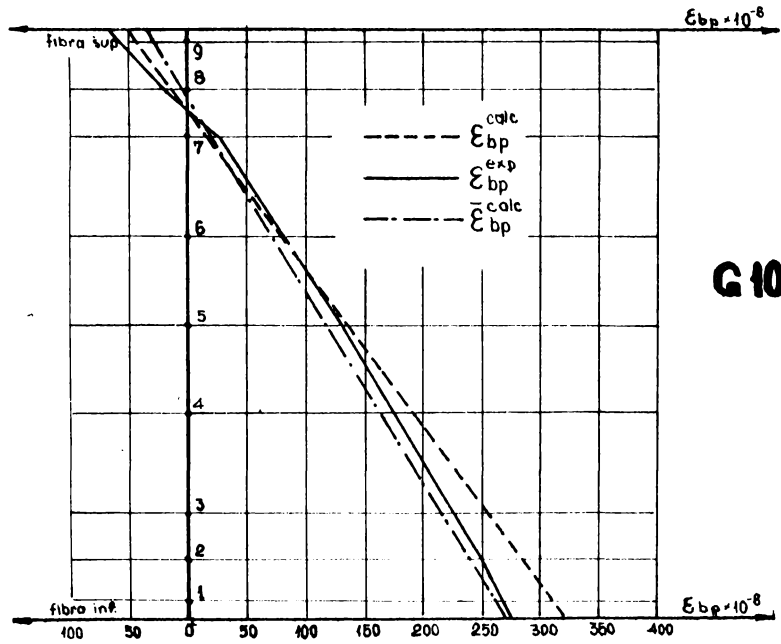
Fig.A2-4C.



FigA2-4d.

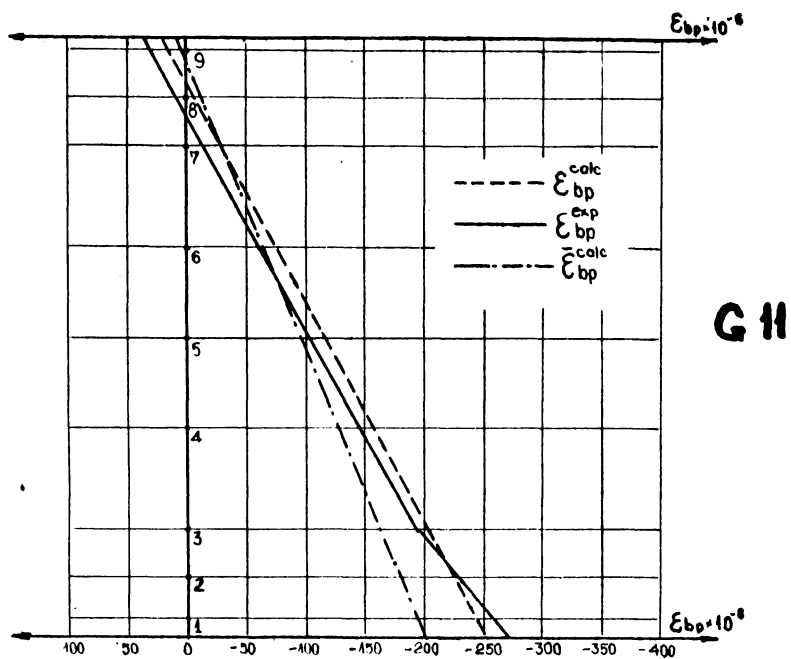


G9

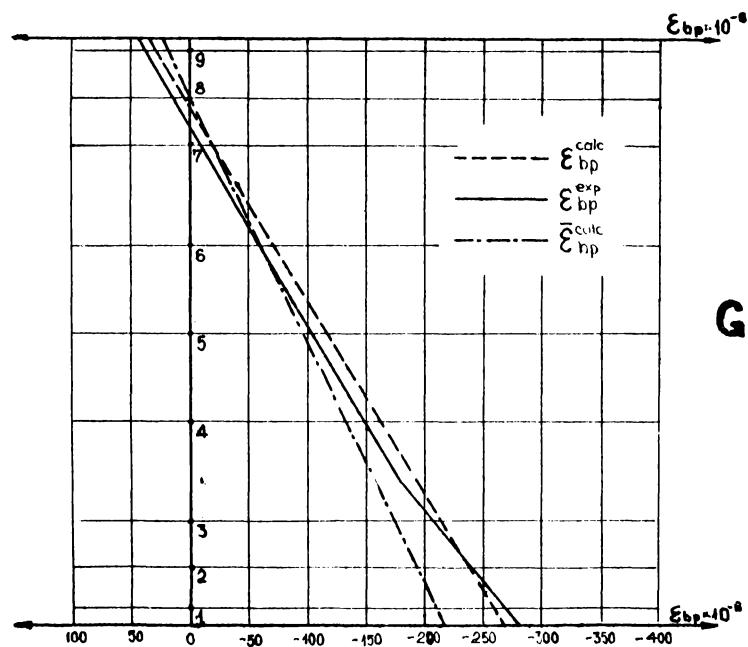


G10

Fig.A2-4e.

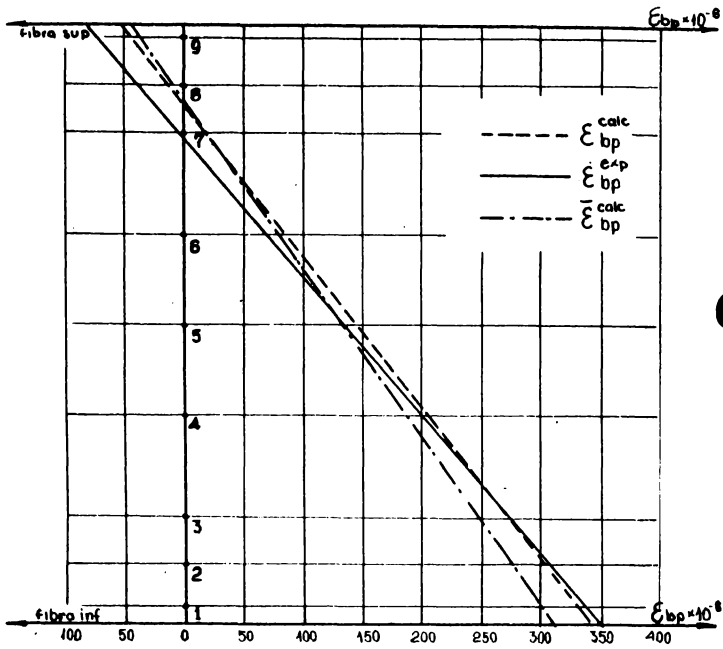


G 11

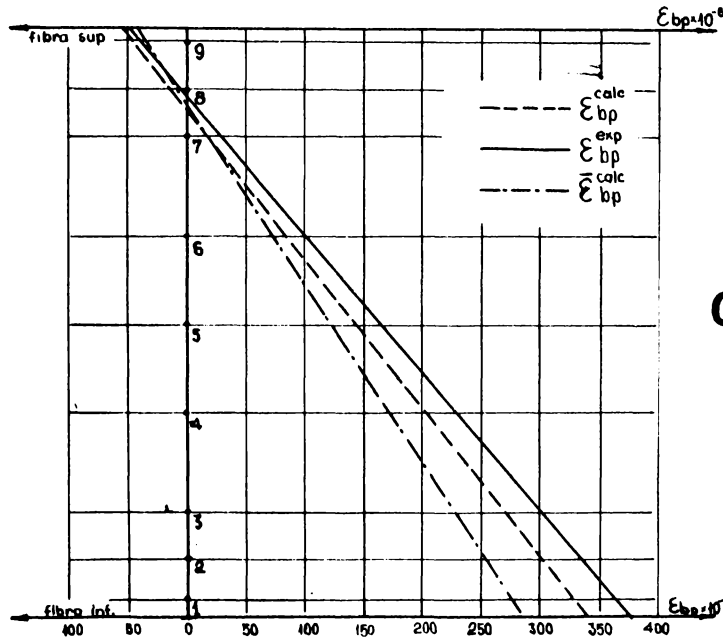


G 12

Fig. A2.-4f.



G 13



G 14

Fig. A2-4g.

Deformatia betonului in fibra intinsa, si sageata maxima functie de incarcare

GRINDA G1

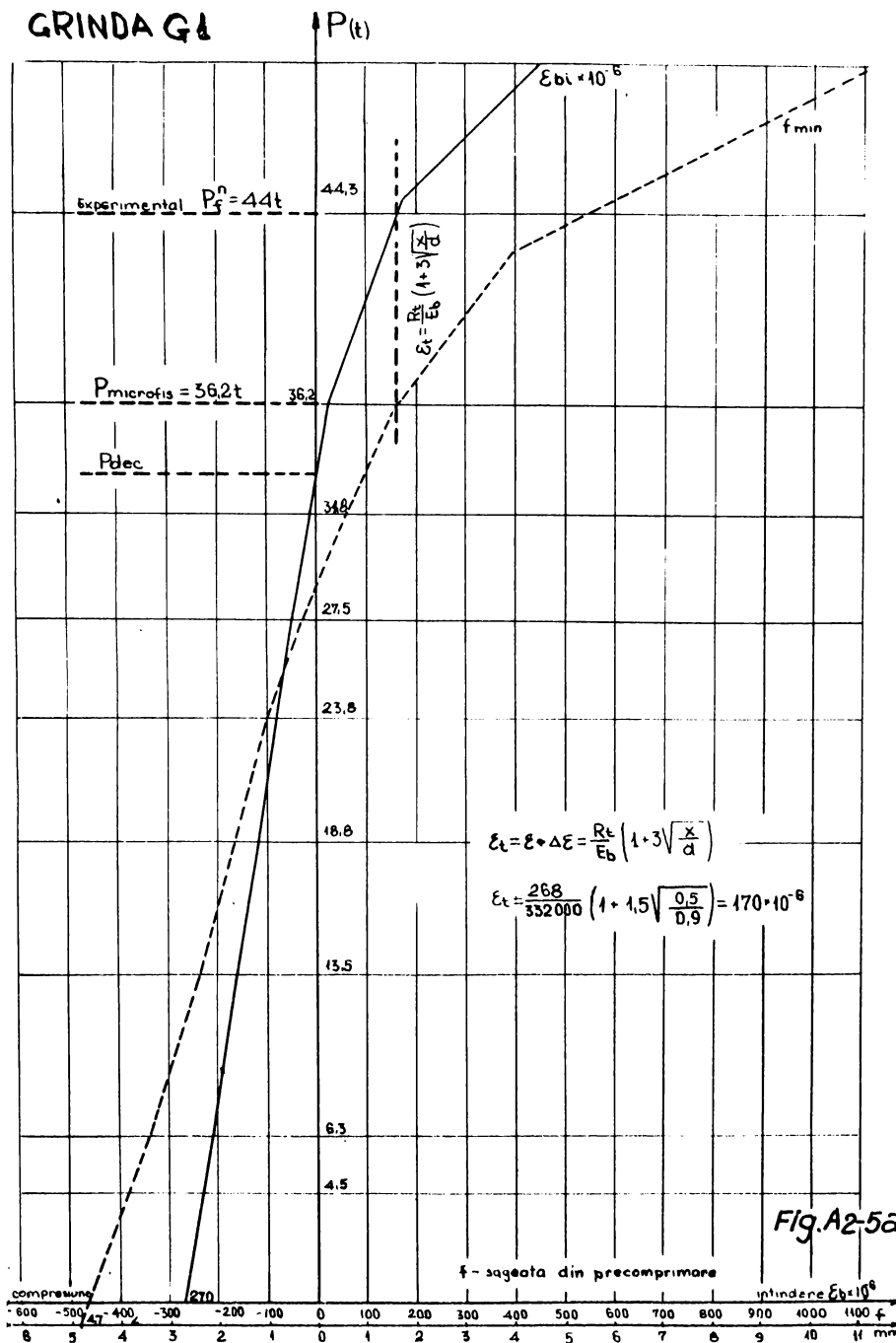


Fig.A2-5a

# Deformatia betonului functie de incarcare

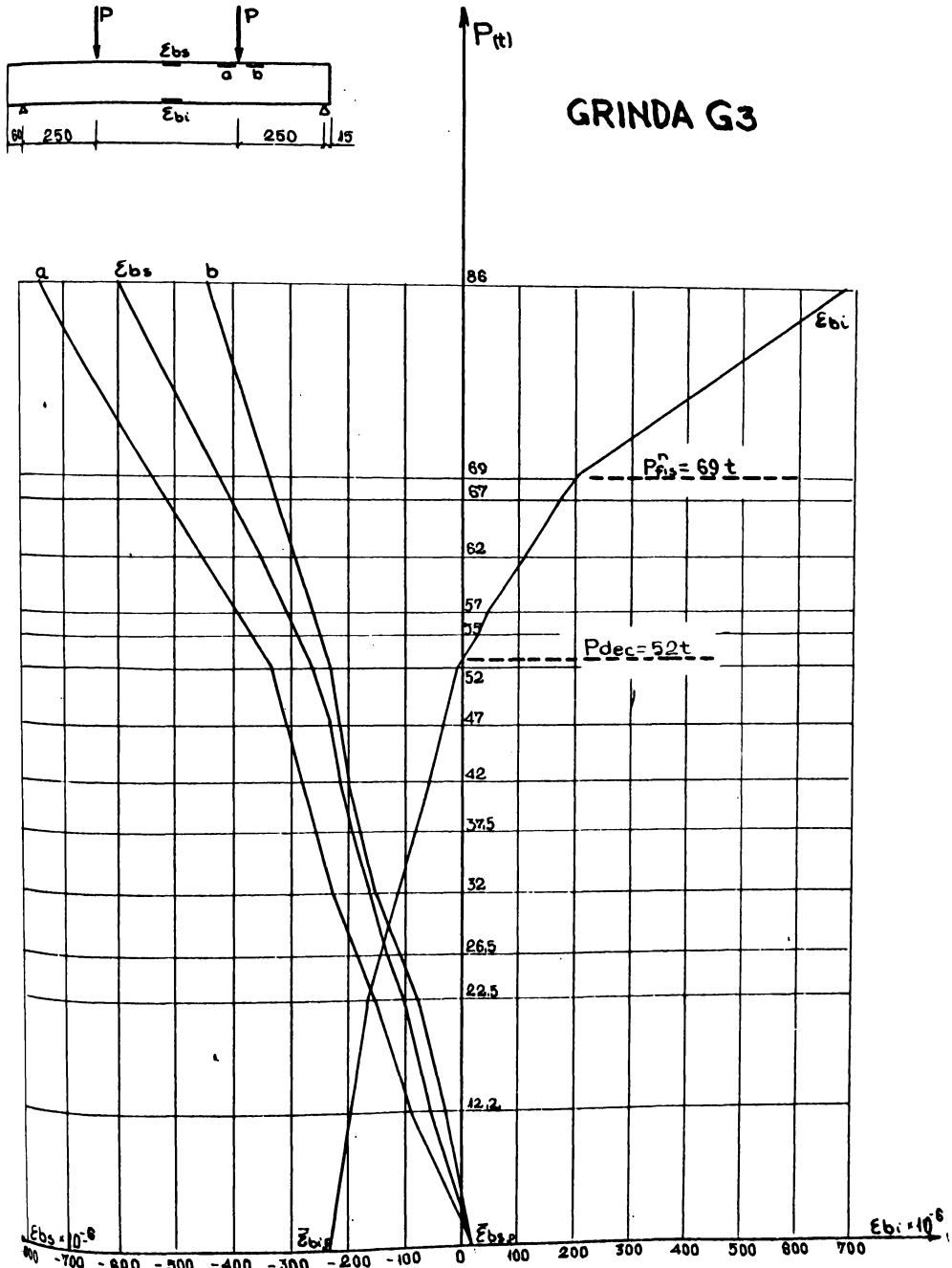


Fig. A2-5b



Deformarea betonului funcție de încărcare

GRINDA G-4

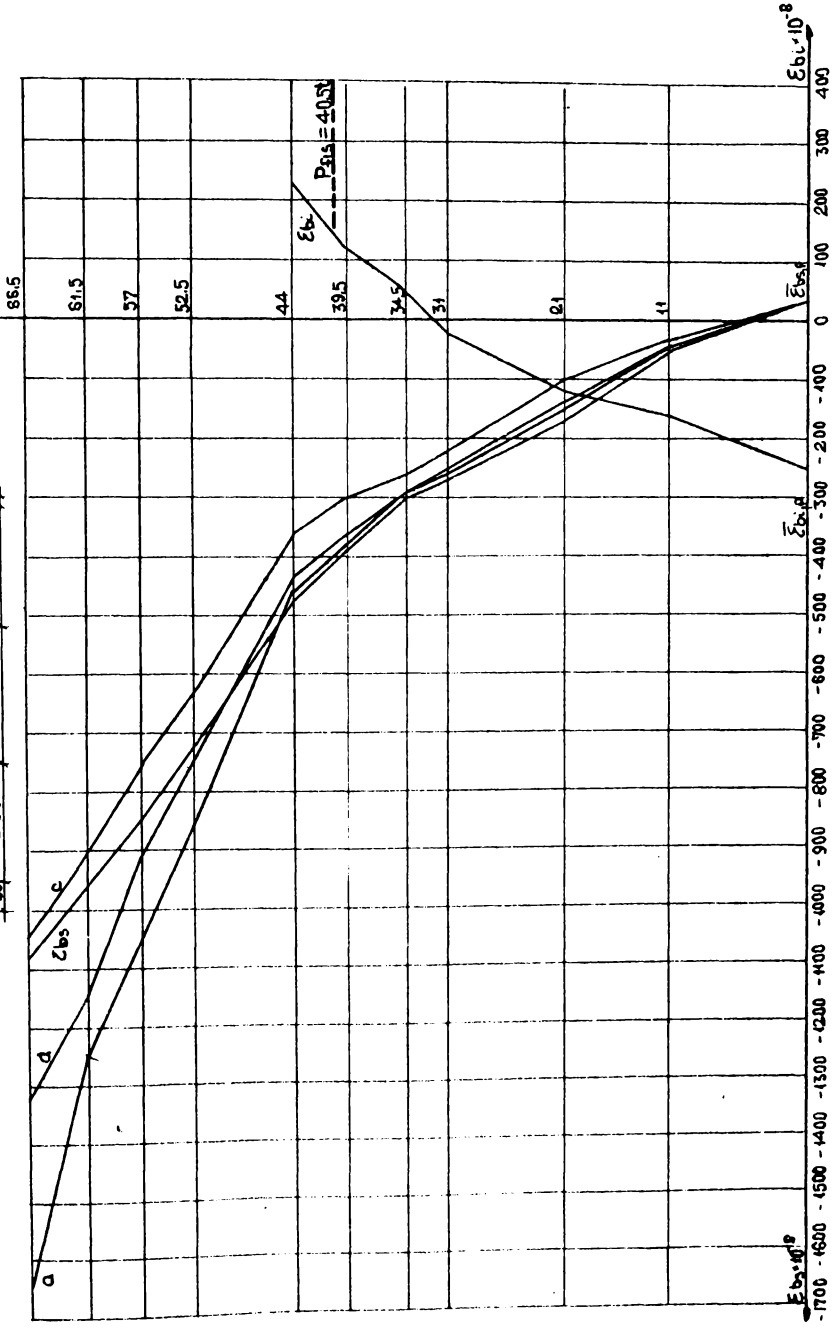
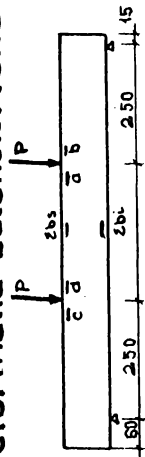


Fig. A.2-5C

Deformatia betonului functie de incarcare

GRINDA G5

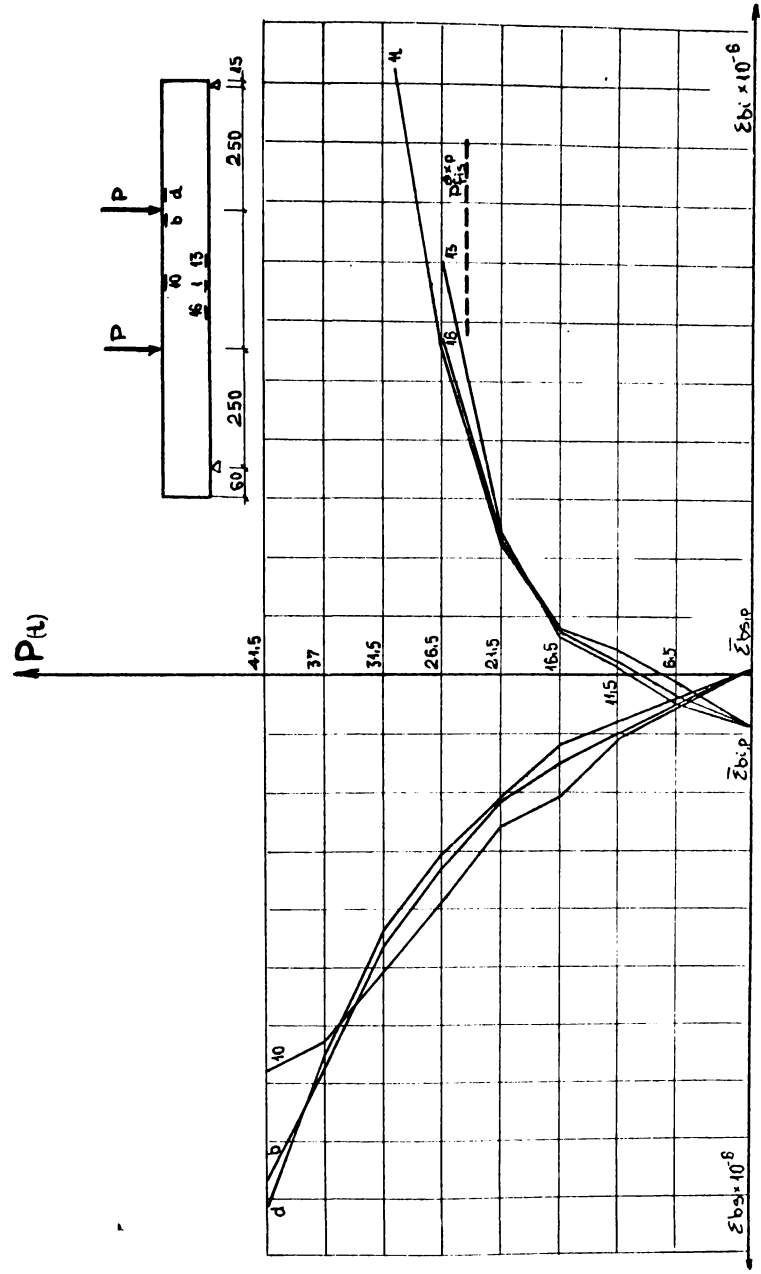


Fig. A2.5d

Deformatia betonului functie de incarcare  
GRINDA G6

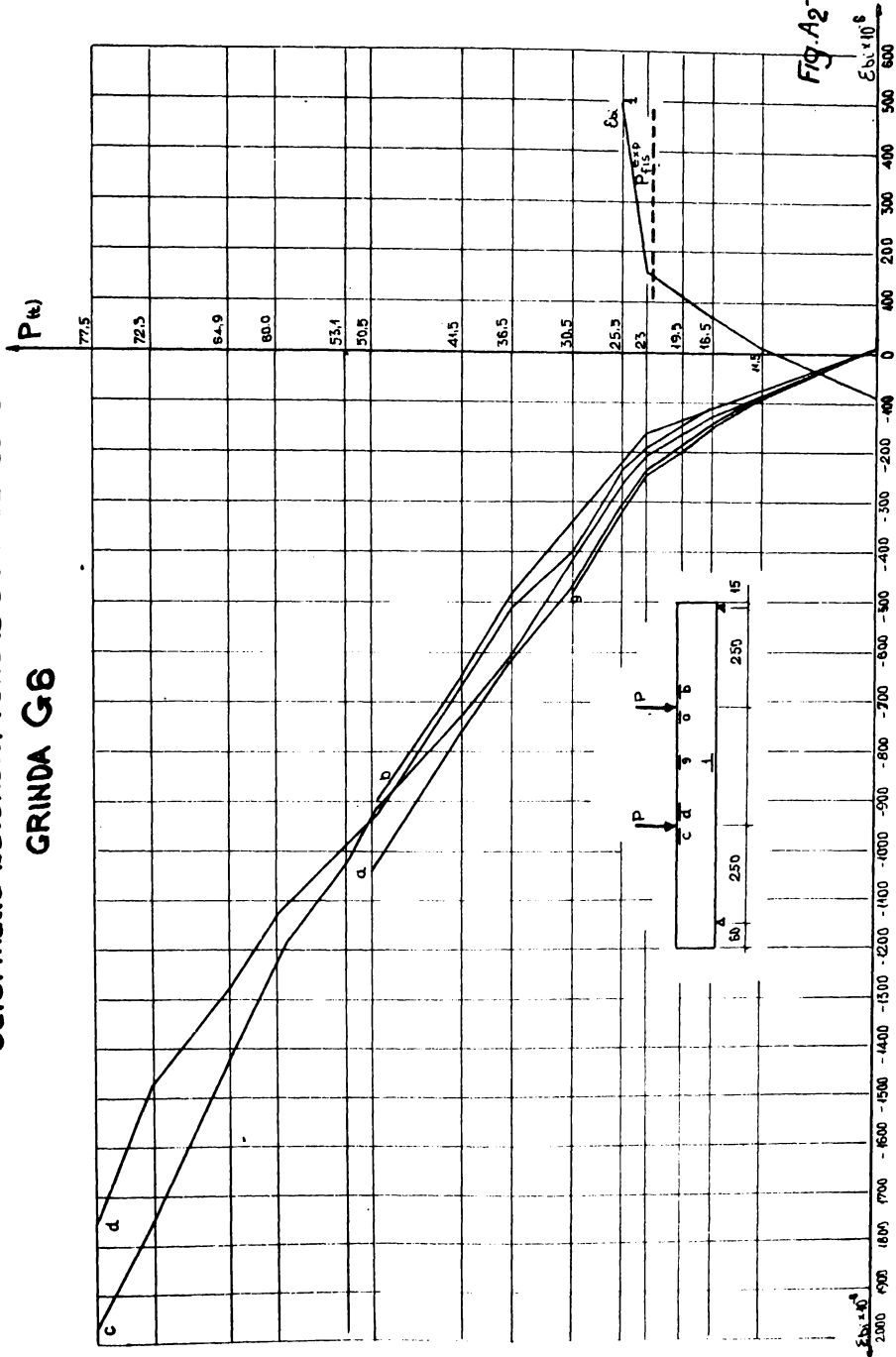


Fig. A2.52

# DEFORMAȚIA BETONULUI FUNCȚIE DE ÎNCĂRCARE

## GRINDĂ G7

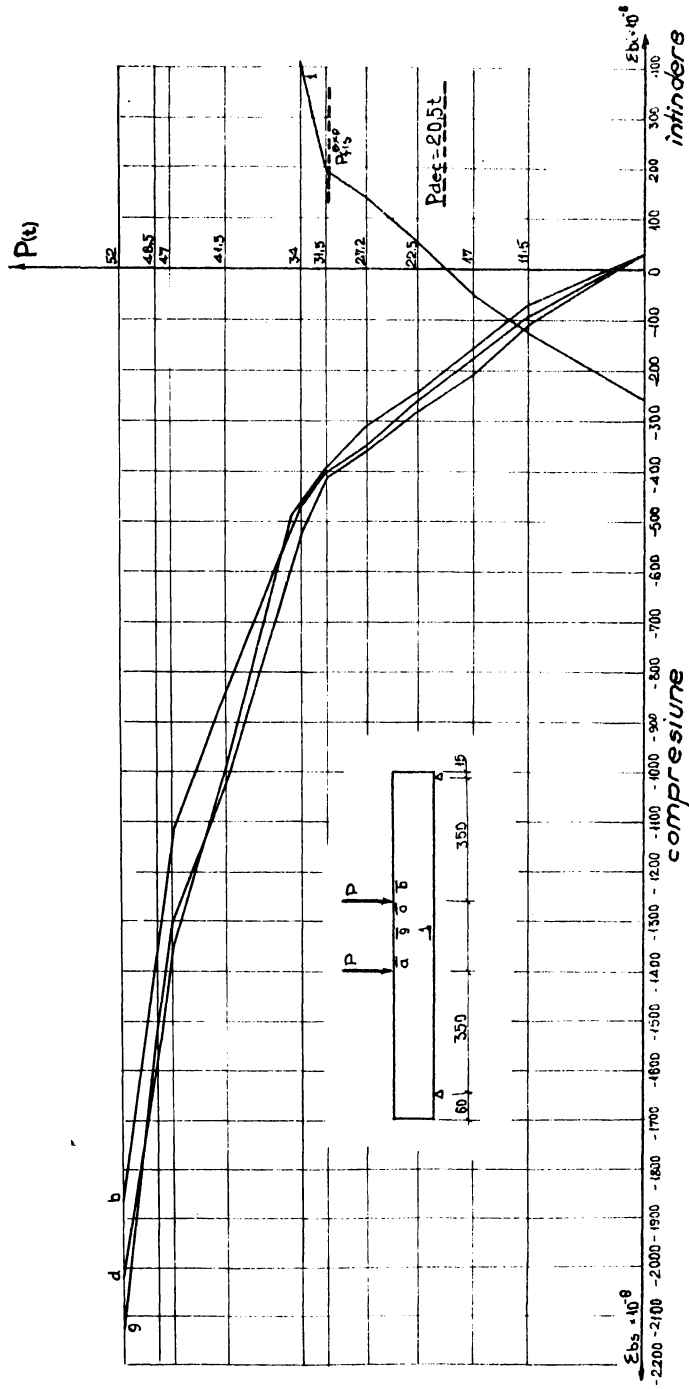
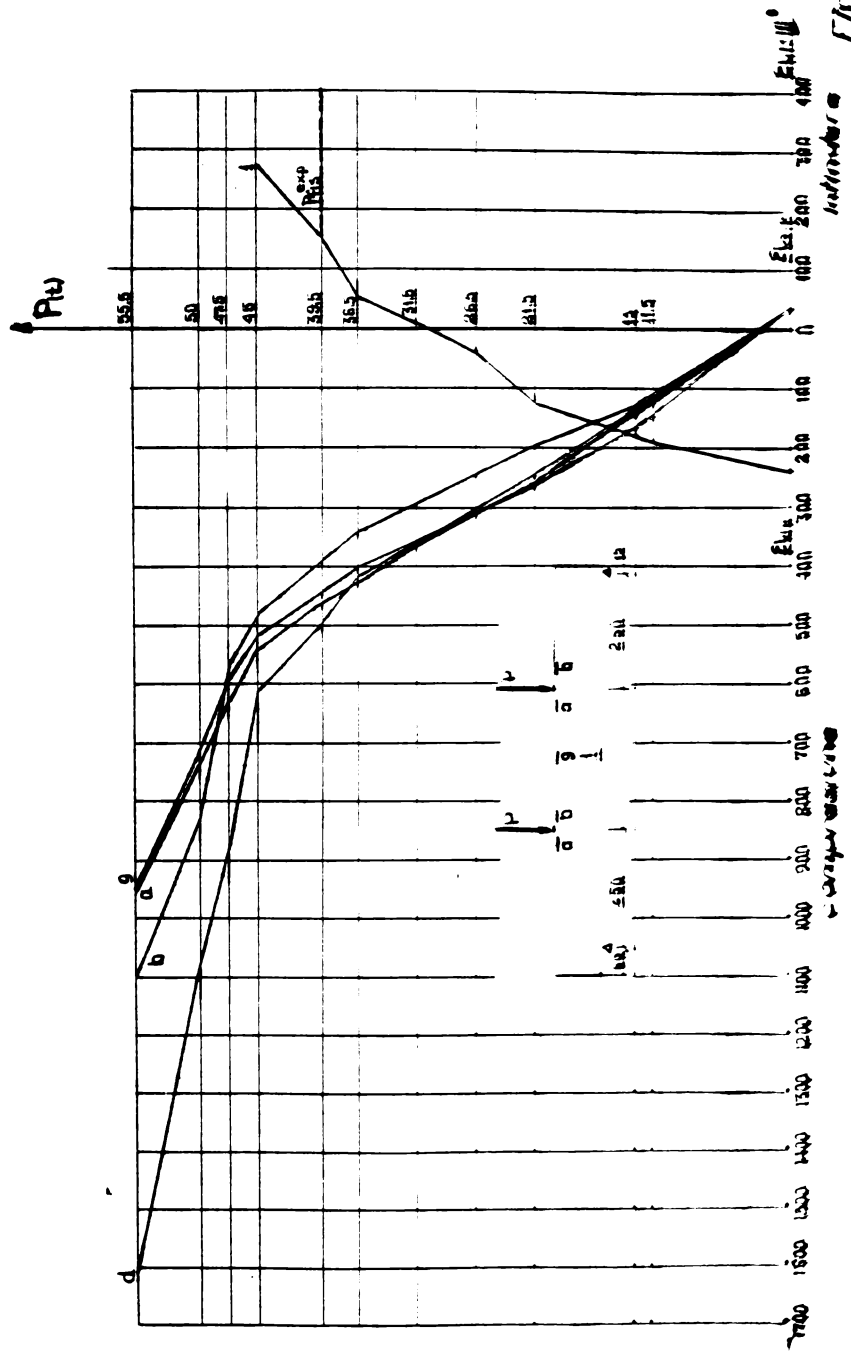
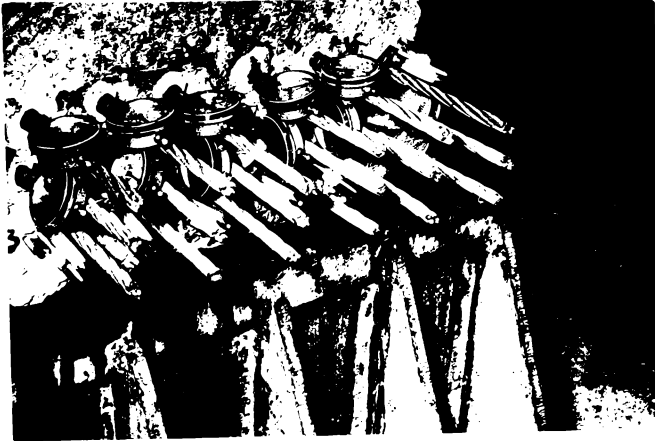


Fig. A2-5f.

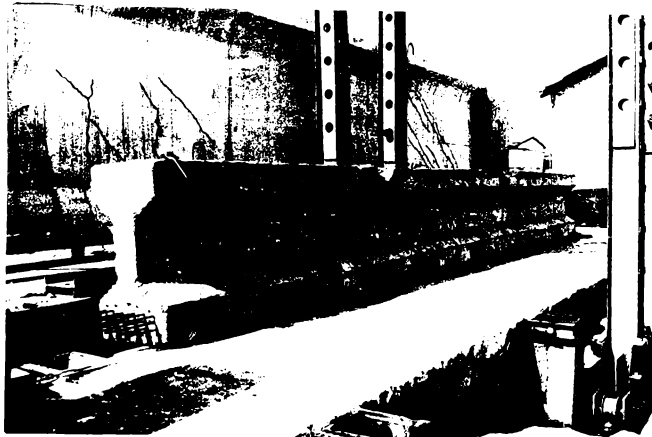
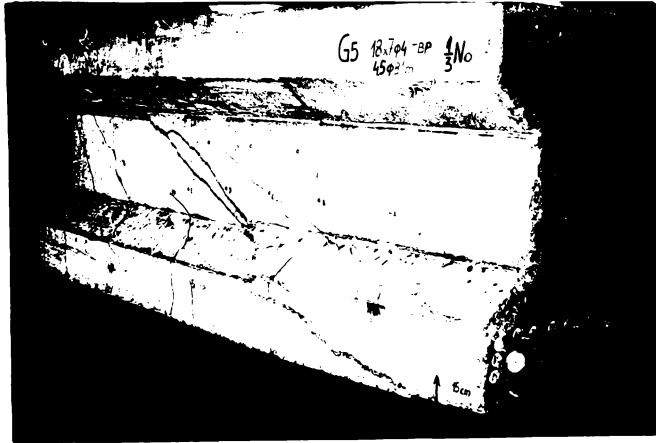
# Deformata Defonului functie de incarcare

## GRINDA GB





A 2-10 Aspecto de la ancladura a la columna



INSTITUTO POLITÉCNICO  
1977

CONTRACTIILE BETONULUI PE PRISMÉ.

# LE RETRAIT DU BÉTON SUR LES PRISMES

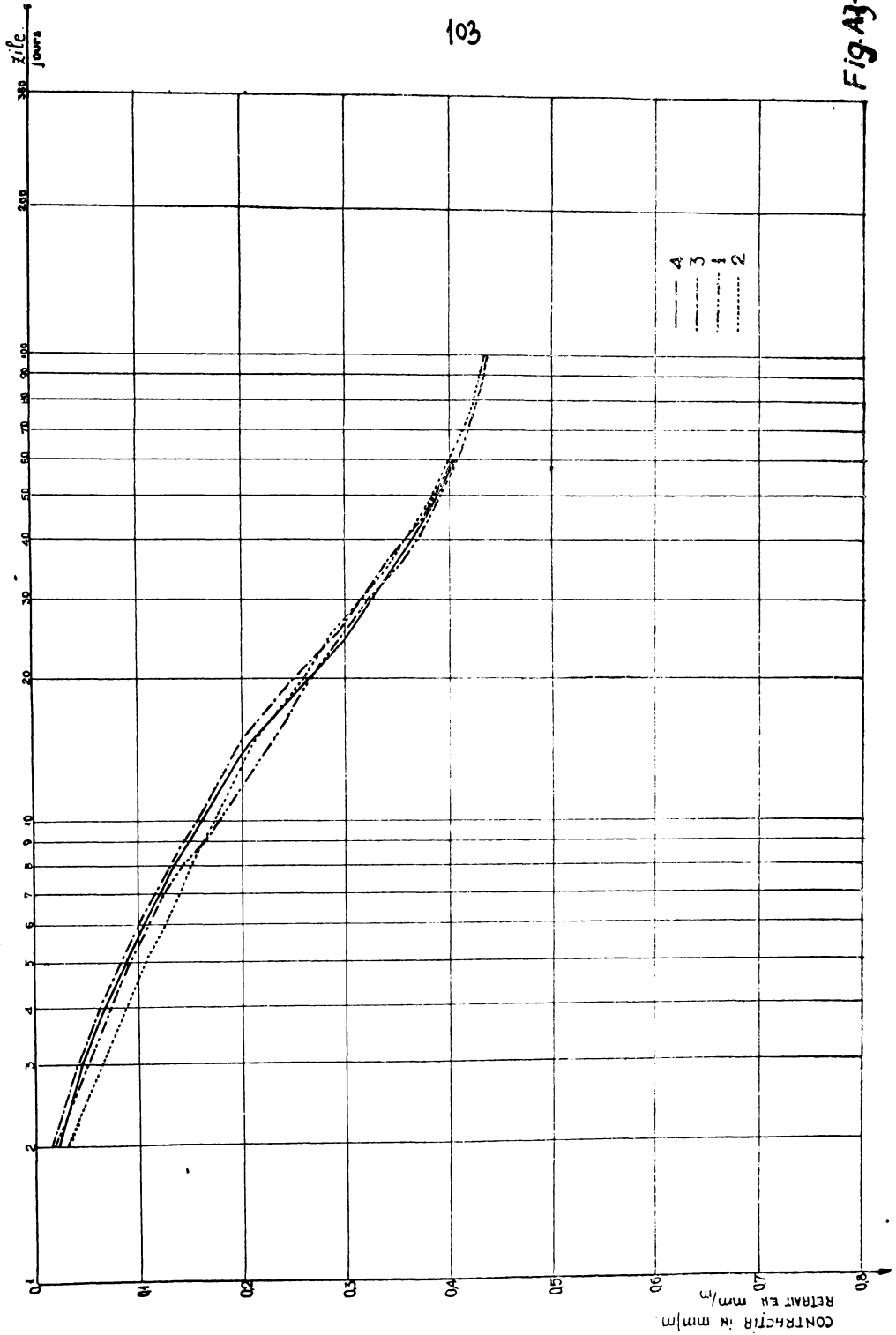


Fig. A3-1



## ALUNGIREA CABLULUI FUNCȚIE DE FORȚA DE TENSIONARE.

## MISE EN PRÉCONTRAÎTE

**P<sub>4</sub>**

## L'ALLONGEMENT DU CABLE EN FONCTION DE LA

## FORCE DE PRÉCONTRAÎTE

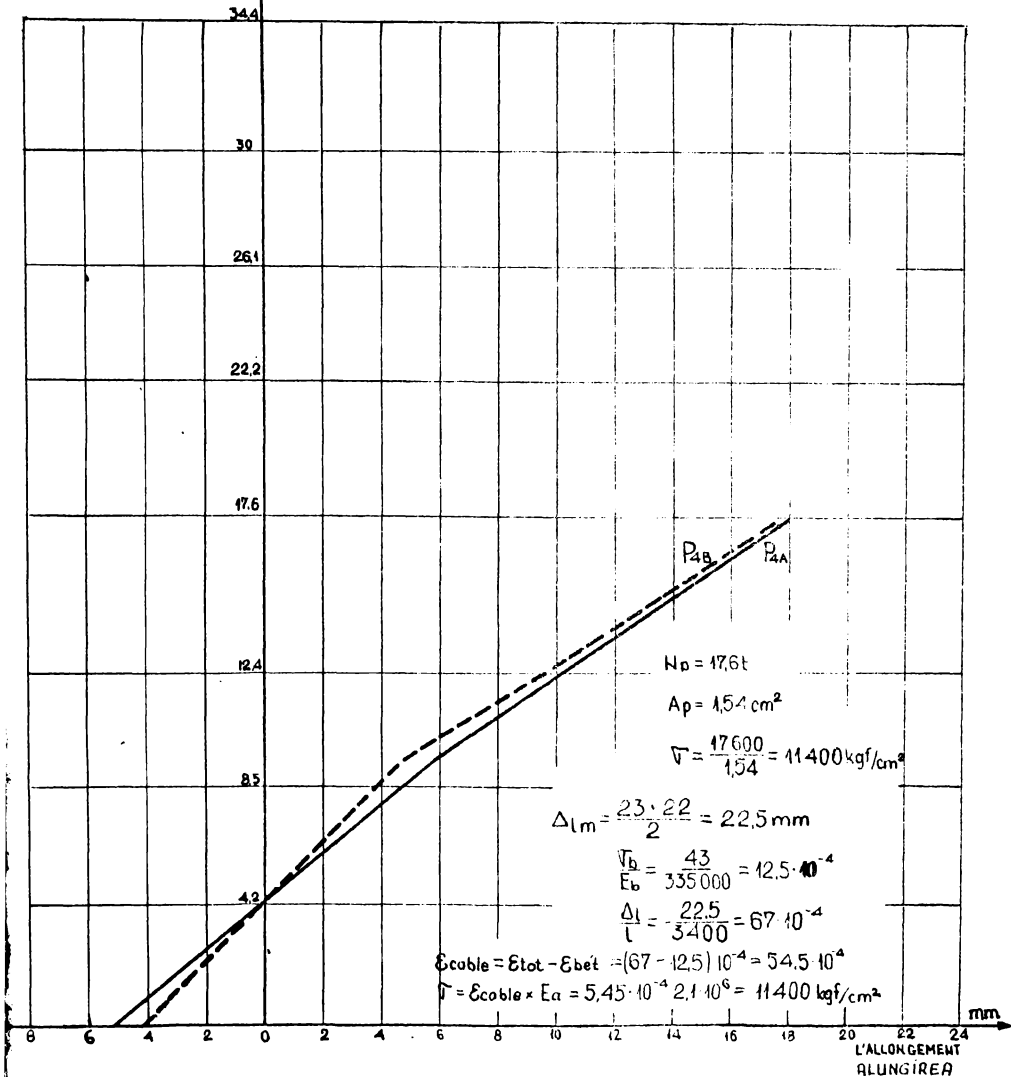
FORȚA DE  
PRÉCONTRAÎTEFORȚA DE  
TENSIONARE

Fig. A3- 2a.

MISE EN PRÉCONTRAINTE:

**P<sub>6</sub>** L'ALLONGEMENT DU CABLE EN FONCTION DE LA FORCE DE PRÉCONTRAINTE

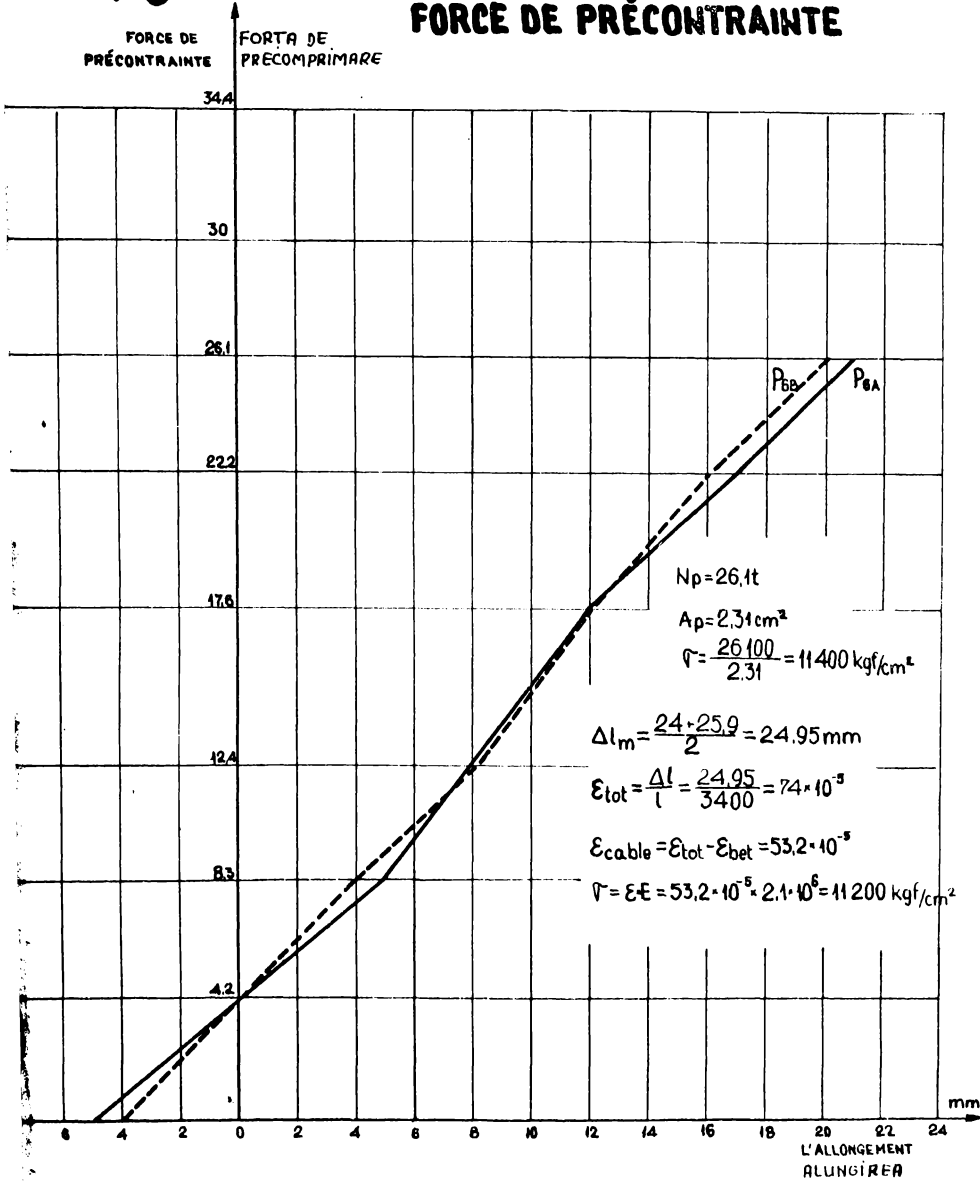


Fig. A3-2b.

## ALUNGIREA CABLULUI FUNCȚIE DE FORȚA DE TENSIONARE

## MISE EN PRÉCONTRAÎTE:

# P<sub>8</sub> L'ALLONGEMENT DU CABLE EN FONCTION DE LA FORCE DE PRÉCONTRAÎTE

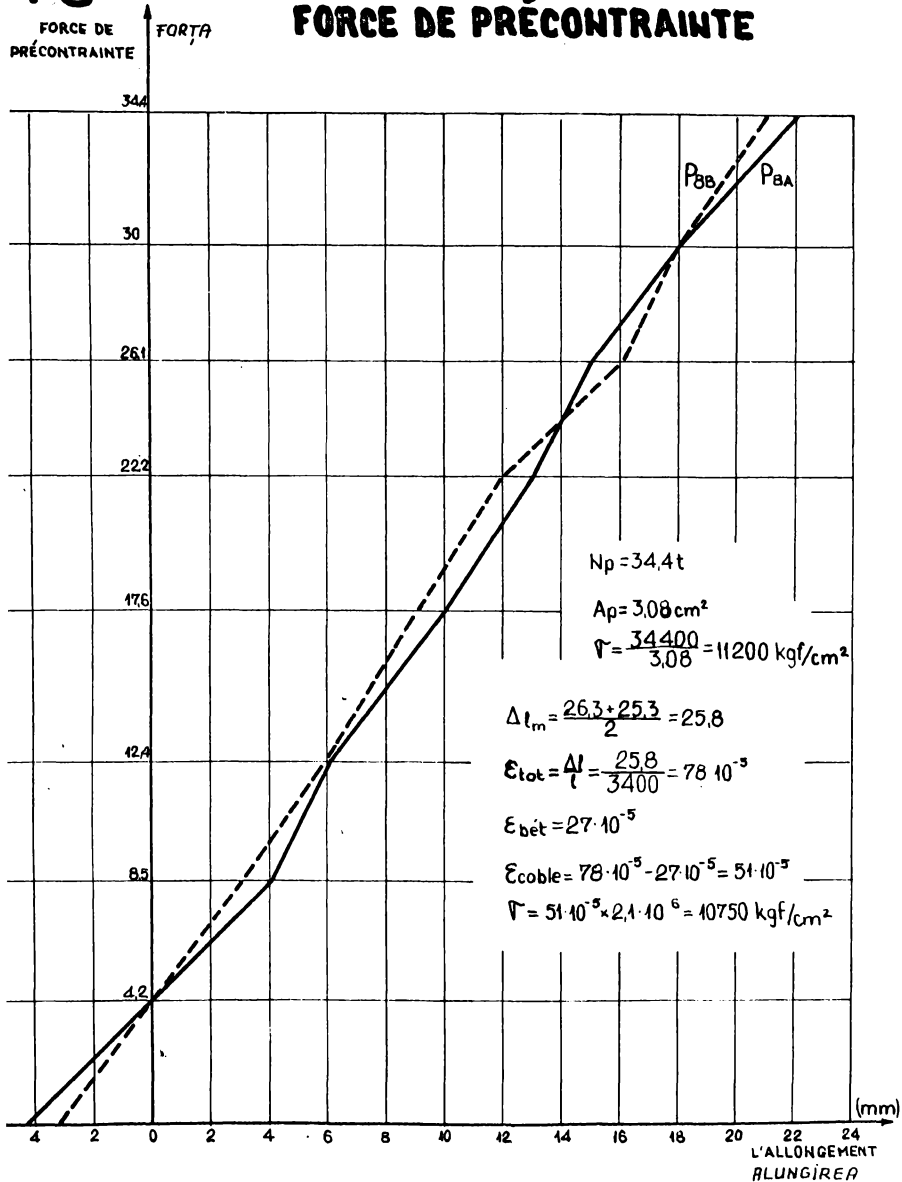


Fig. A3-2c.

DEFORMATION DU BÉTON EN FONCTION DE LA CHARGE

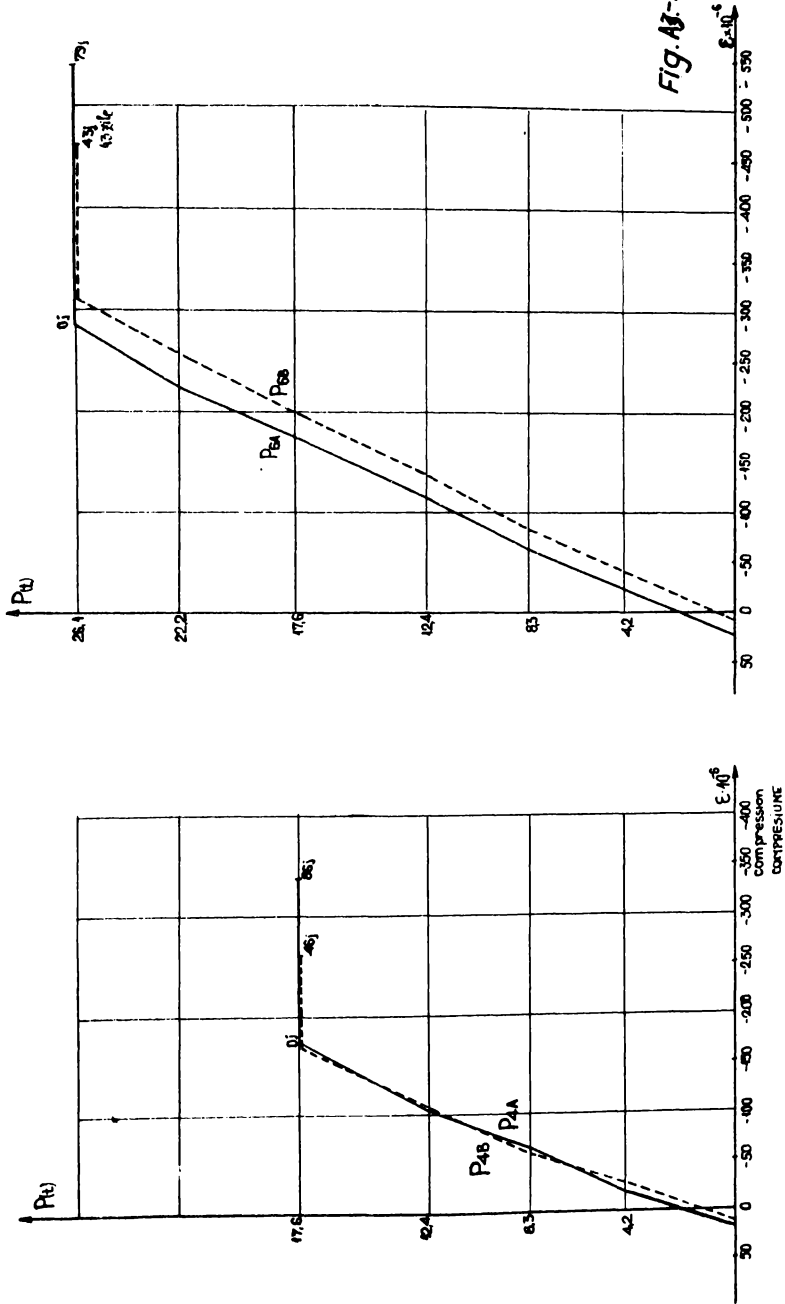
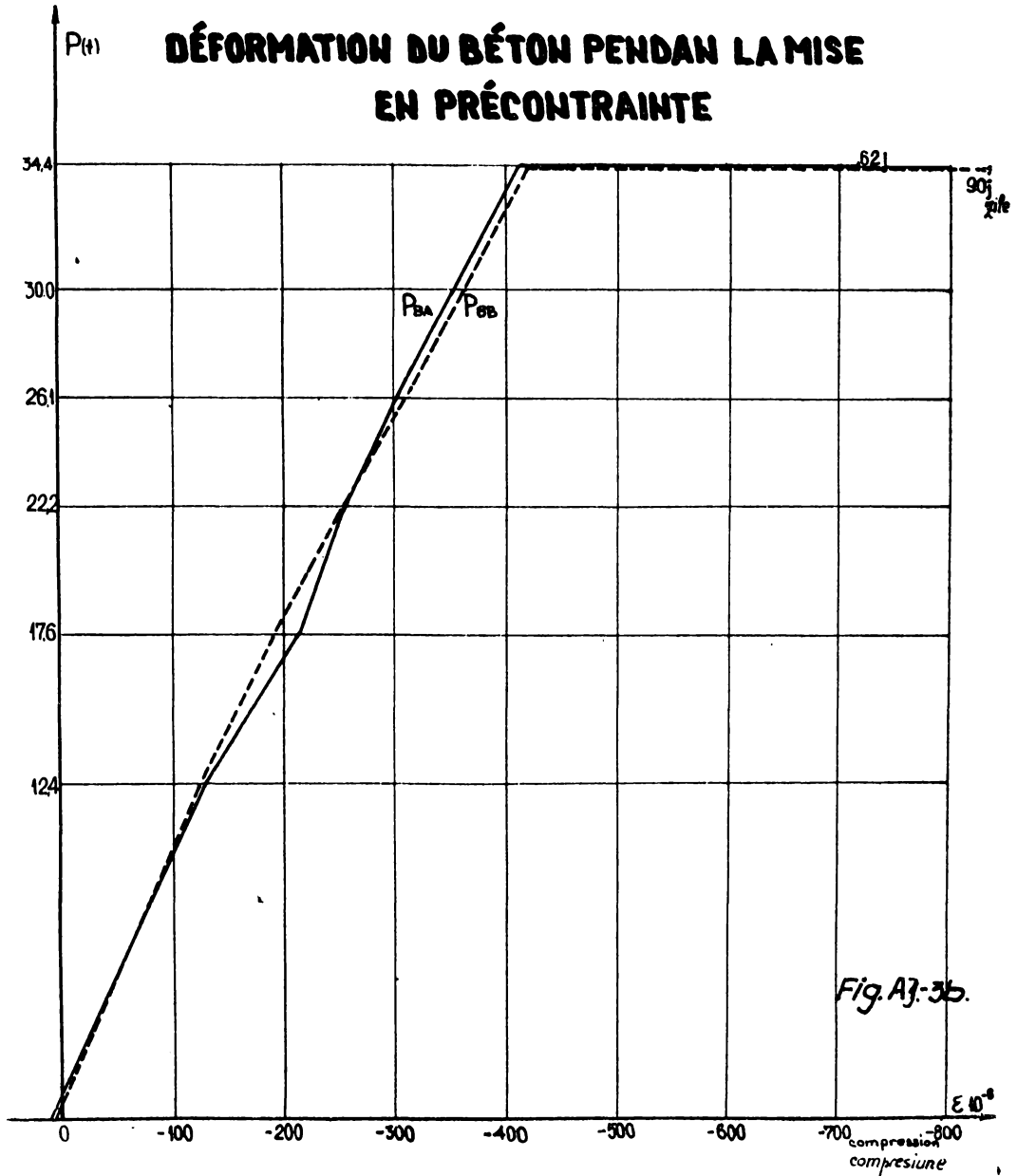
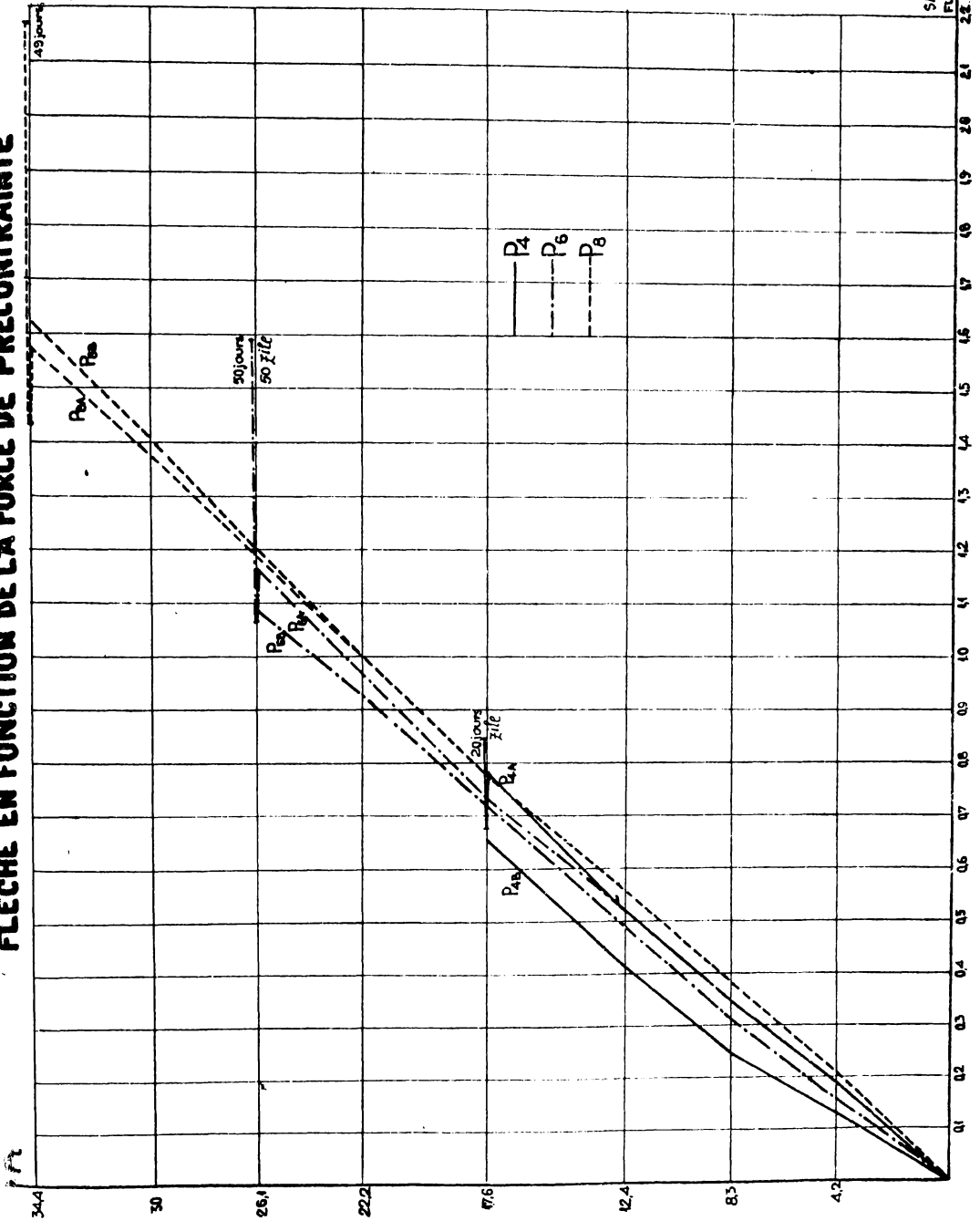


Fig. A7-3a.

DEFORMATIA BETONULUI IN FIBRA INFERIOARA LA  
PRECOMPRIMARE.



# FLECHE EN FONCTION DE LA FORCE DE PRÉCONTRAINTÉ



DEFORMATIA SECTIUNII MEDIANE LA PRECOMPRIMARE

DÉFORMATION DE LA SECTION MÉDIANE MISE EN PRÉCONTRAÎNTE

— d'après le calcul - conform calculului  
 - - - - - poids propre - greutatea proprie  
 - - - - -  $N_0 = 27,5t$   
 - - - - - après 79j - după 79 - 43 zile  
 — d'après le calcul - conform calculului  
 - - - - - poids propre - greutatea proprie  
 - - - - -  $N_0 = 48,05t$   
 - - - - - après 85j - după 85j - 45j



P6

P4

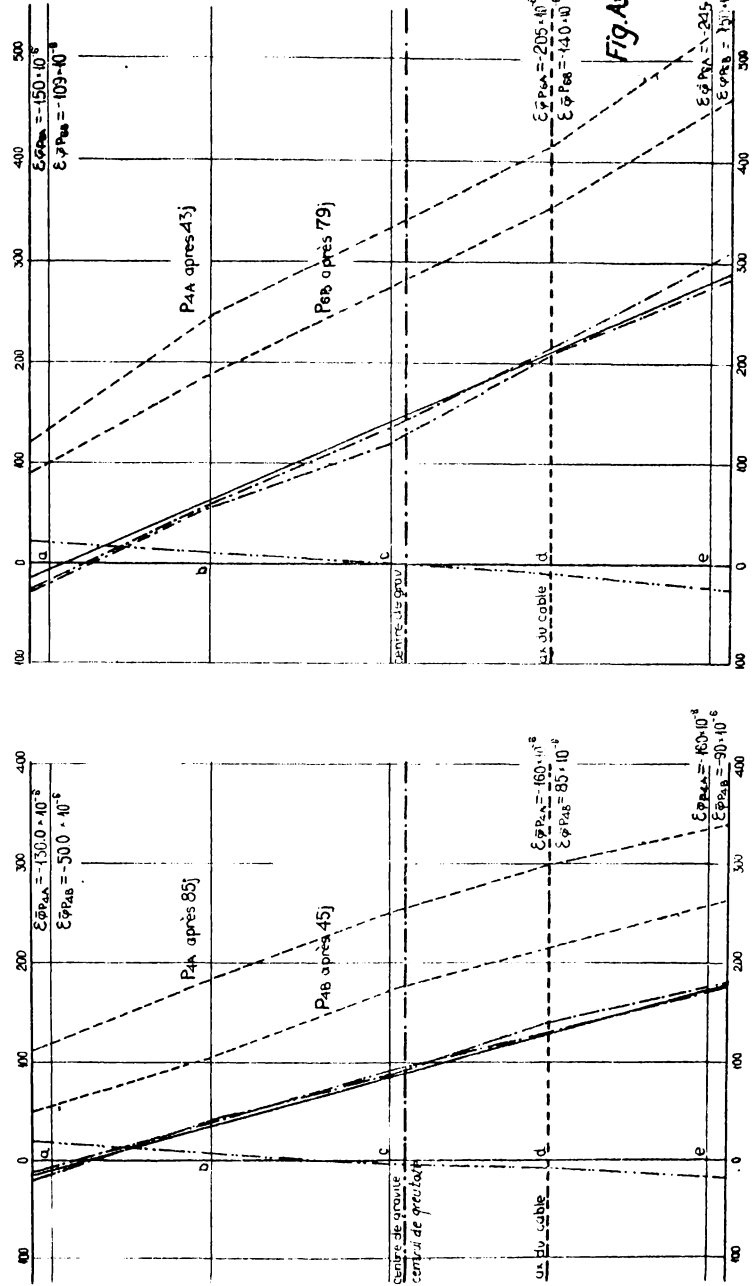
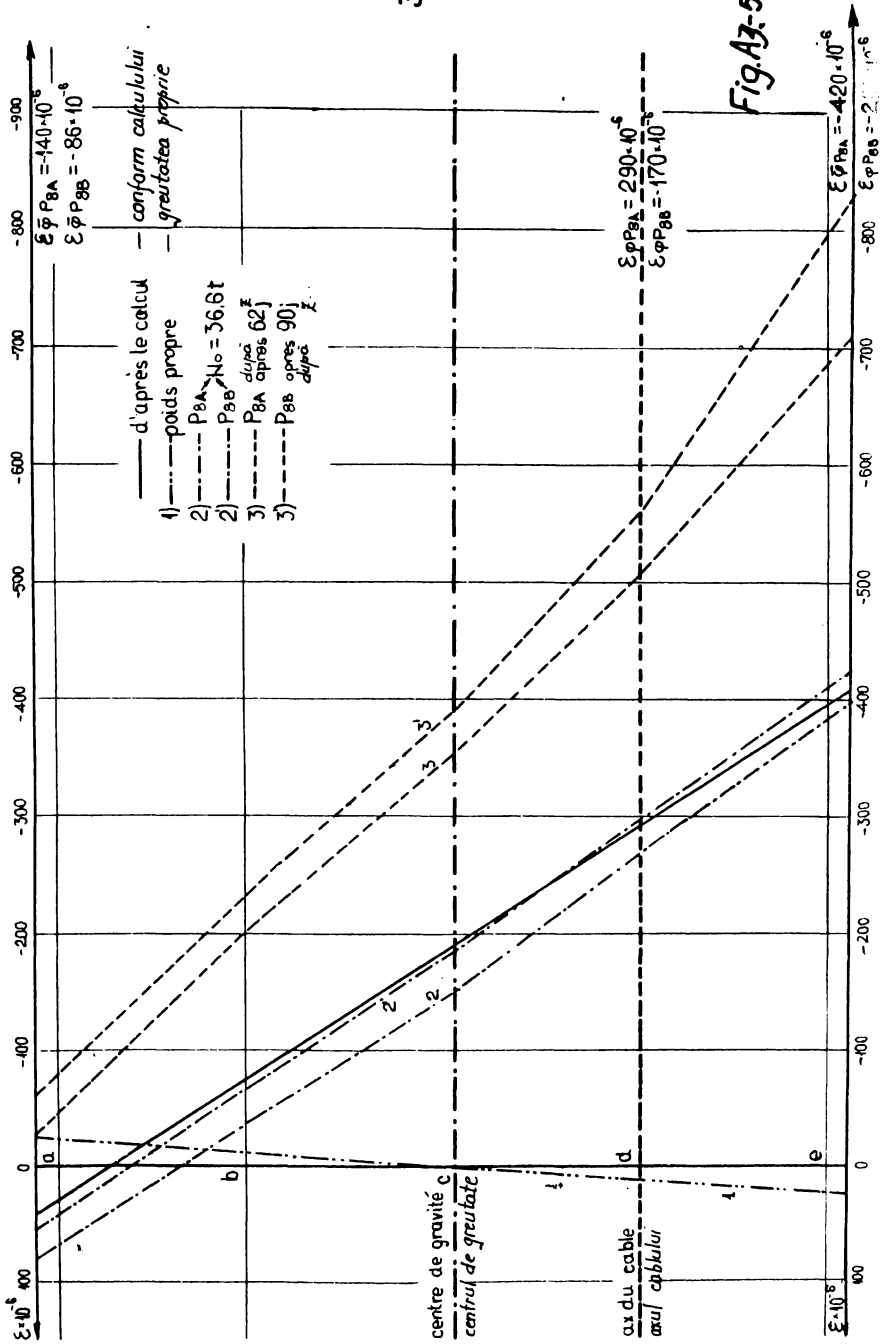


Fig. A3-52.

# DEFORMATION DE LA SECTION MEDIANE: MISE EN PRÉCONTRAINTE

## DEFORMATIA SECTIUNII MEDIANE LA PRECOMPRIMARE.





EFORTURILE IN ARMATURA PASIVĂ IN FUNCȚIE DE  
FORȚA DE PRECOMPRIMARE

LES CONTRAINTES DANS L'ARMATURE PASSIVE EN FONCTION  
DE LA CHARGE DE PRÉCONTRANTE

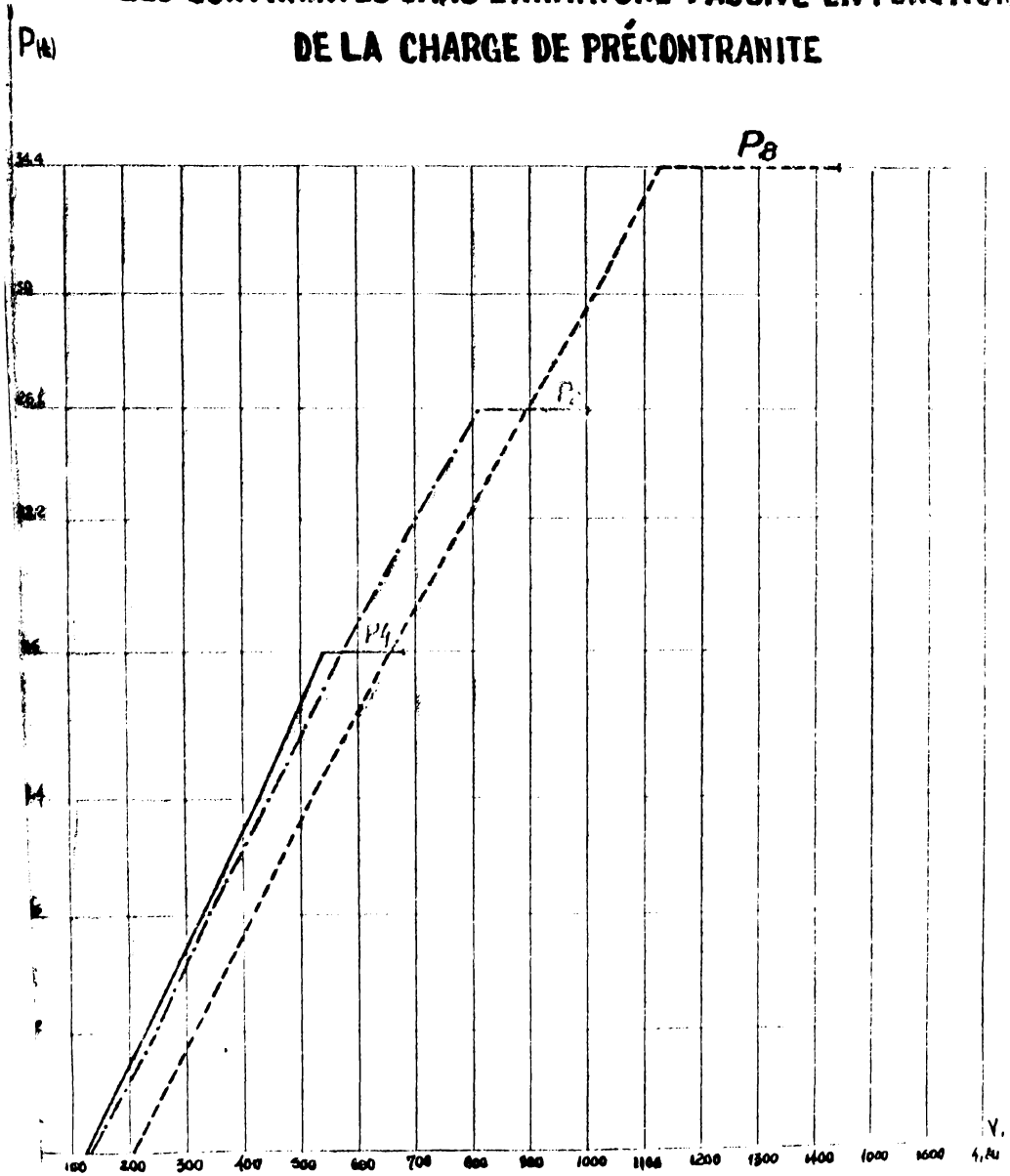


Fig. A7 6.

# DÉFORMATION DU BÉTON EN FONCTION DE LA CHARGE

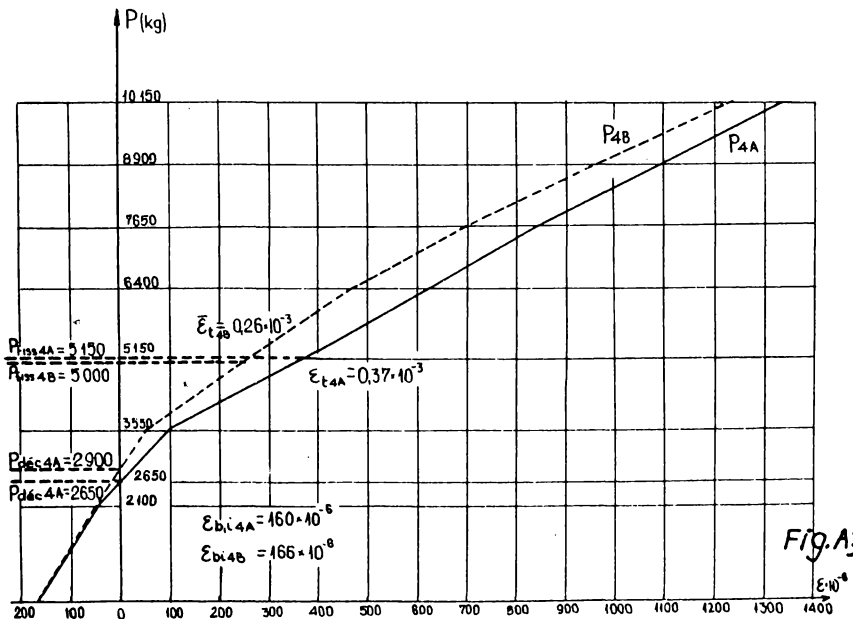
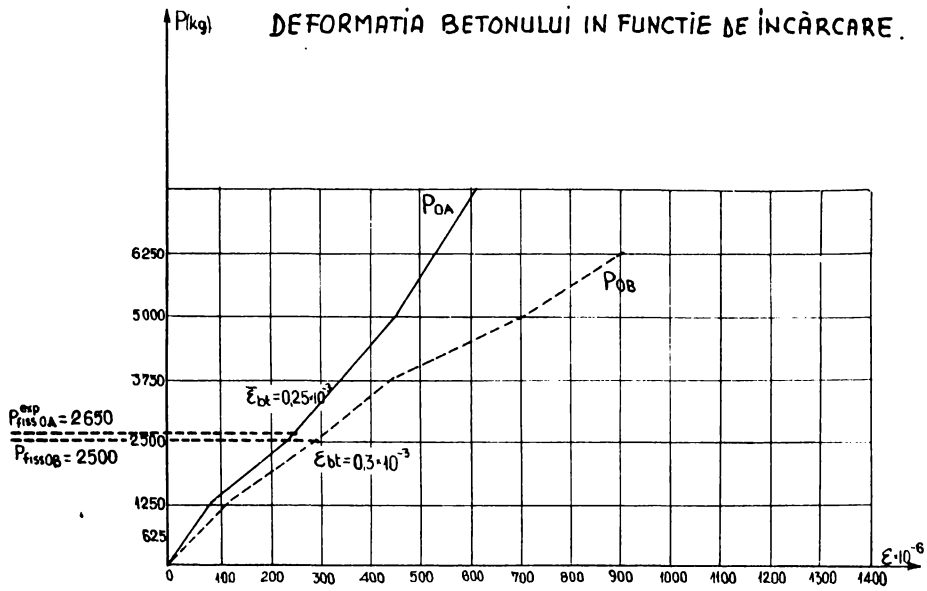


Fig. A3-7a

DEFORMATIA BETONULUI FUNCȚIE DE ÎNCĂRCARE.

# DÉFORMATION DU BÉTON EN FONCTION DE LA CHARGE

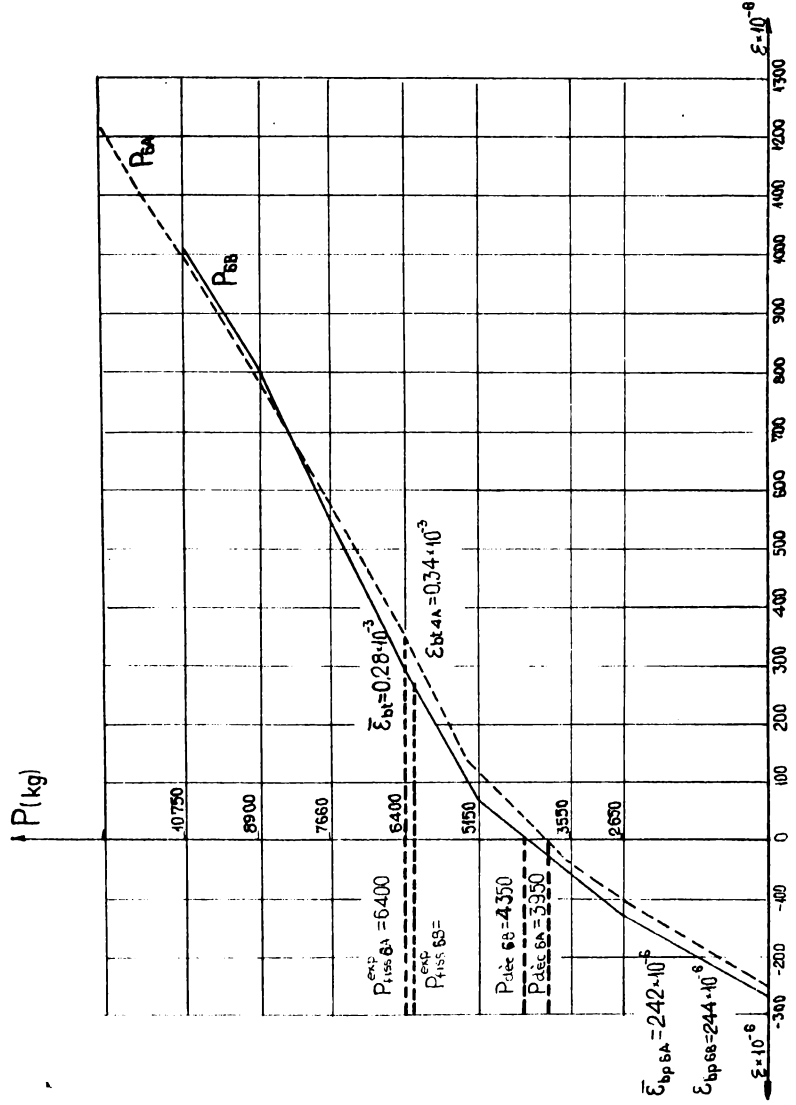


Fig. A3-7b.

DEFORMATIA BETONULUI IN FUNCTIE DE INCARCARE.

DÉFORMATION DU BÉTON EN FONCTION DE LA CHARGE.

FIBRE INFÉRIEURE  
FINA INFERIOARA.

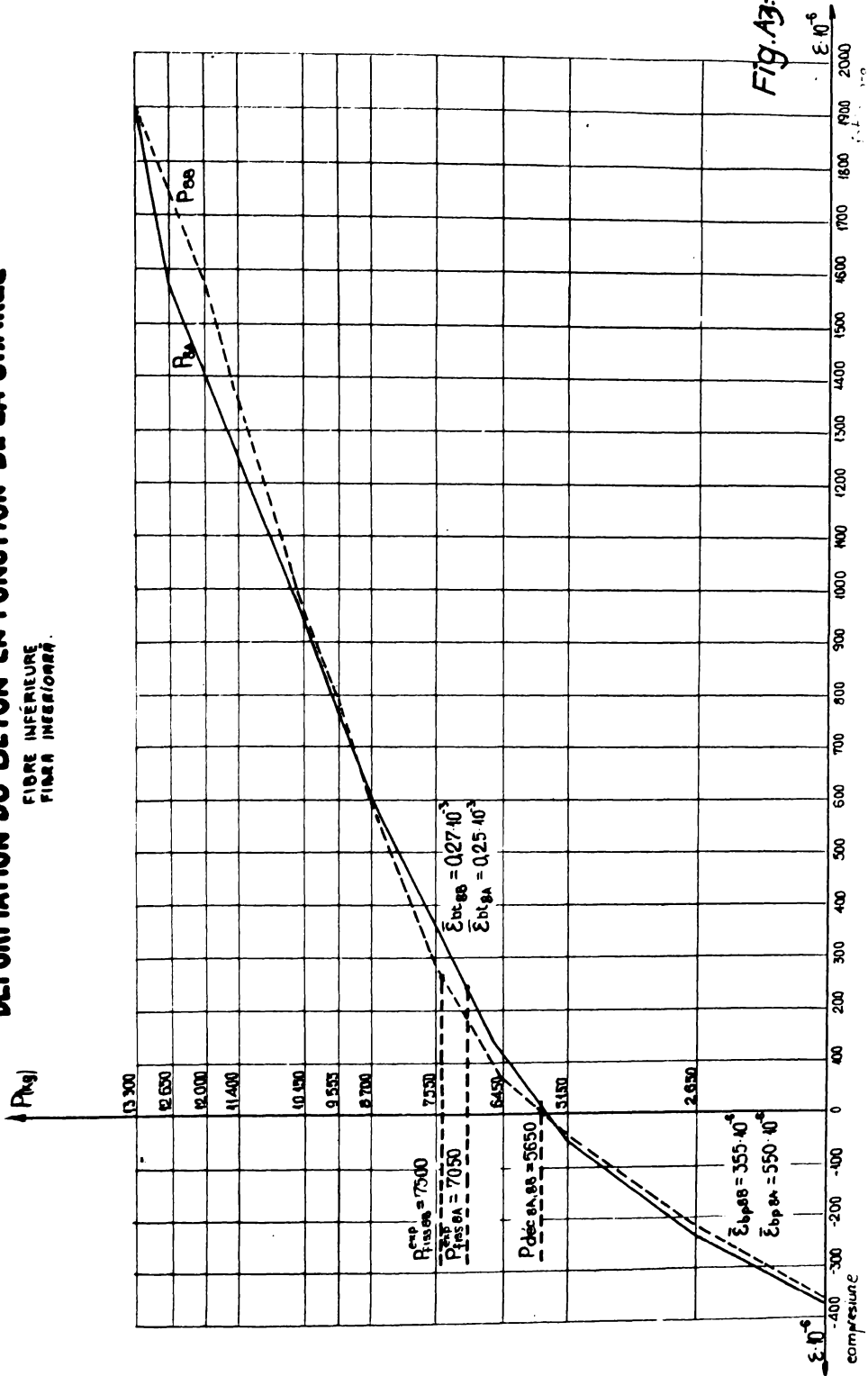


Fig. A3-7C.

# DÉFORMATION DU BÉTON EN FONCTION DE LA CHARGE

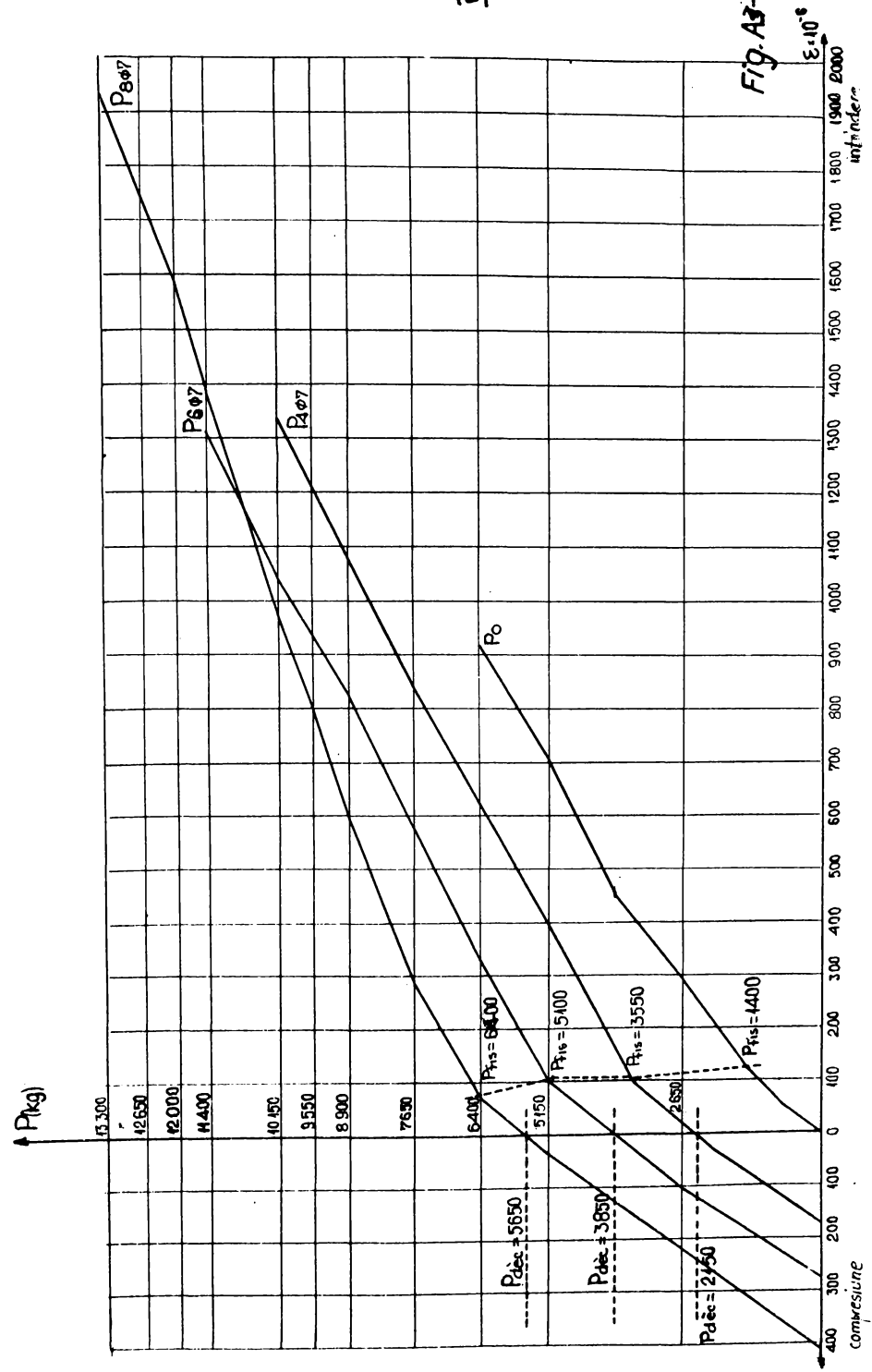


Fig. A3-8

# FLÉCHE EN FONCTION DE LA CHARGE

## SAGERATA IN FUNCTIE DE ÎNCARCARE

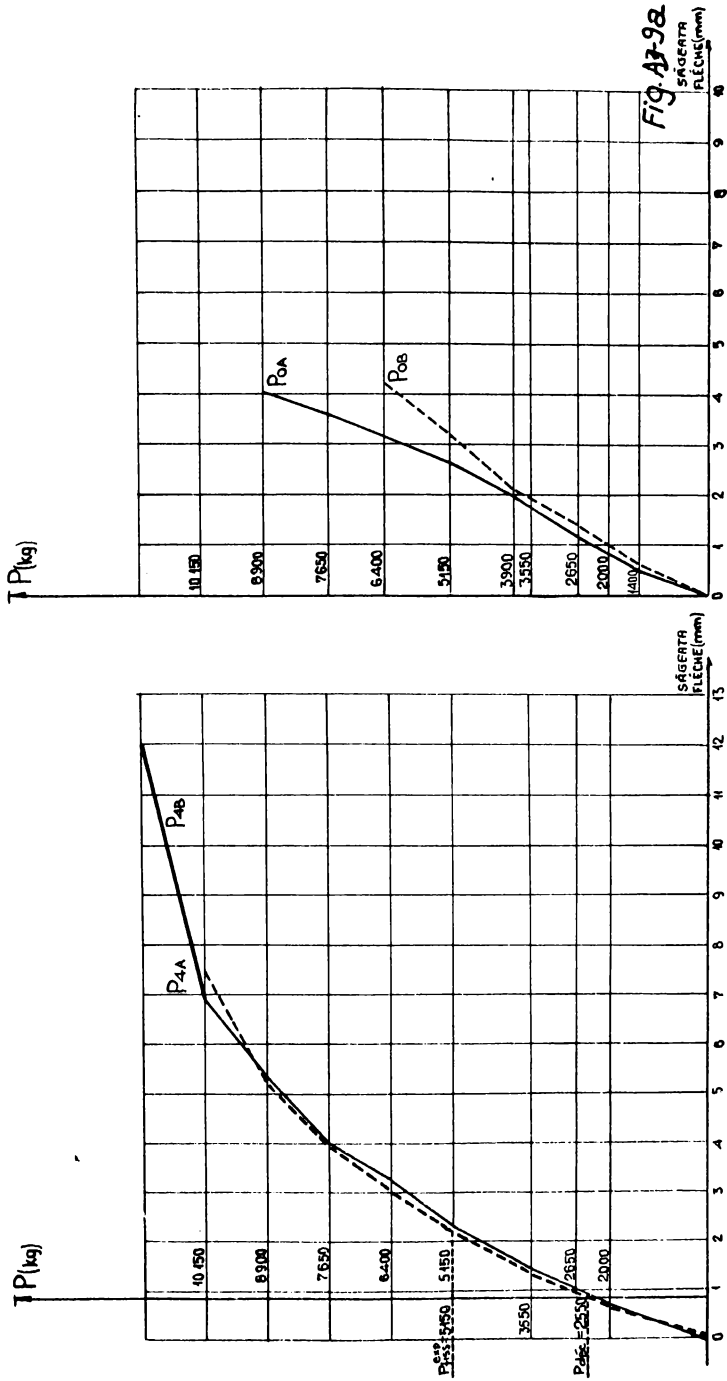


Fig. A7-98  
SAGERATA  
FLÉCHE (mm)

# FLÉCHE EN FONCTION DE LA CHARGE

## SĂGEATA ÎN FUNCȚIE DE ÎNCĂRCARE

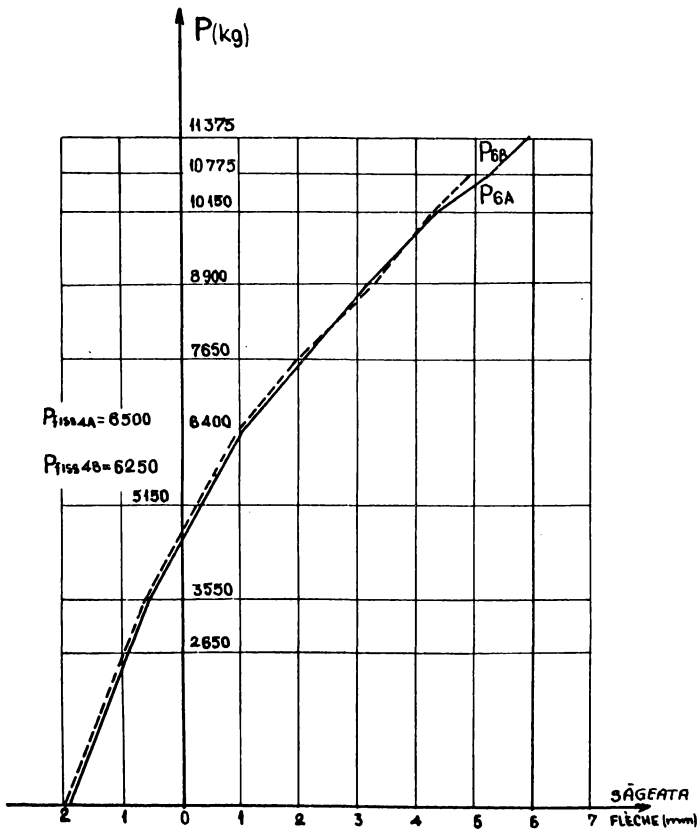
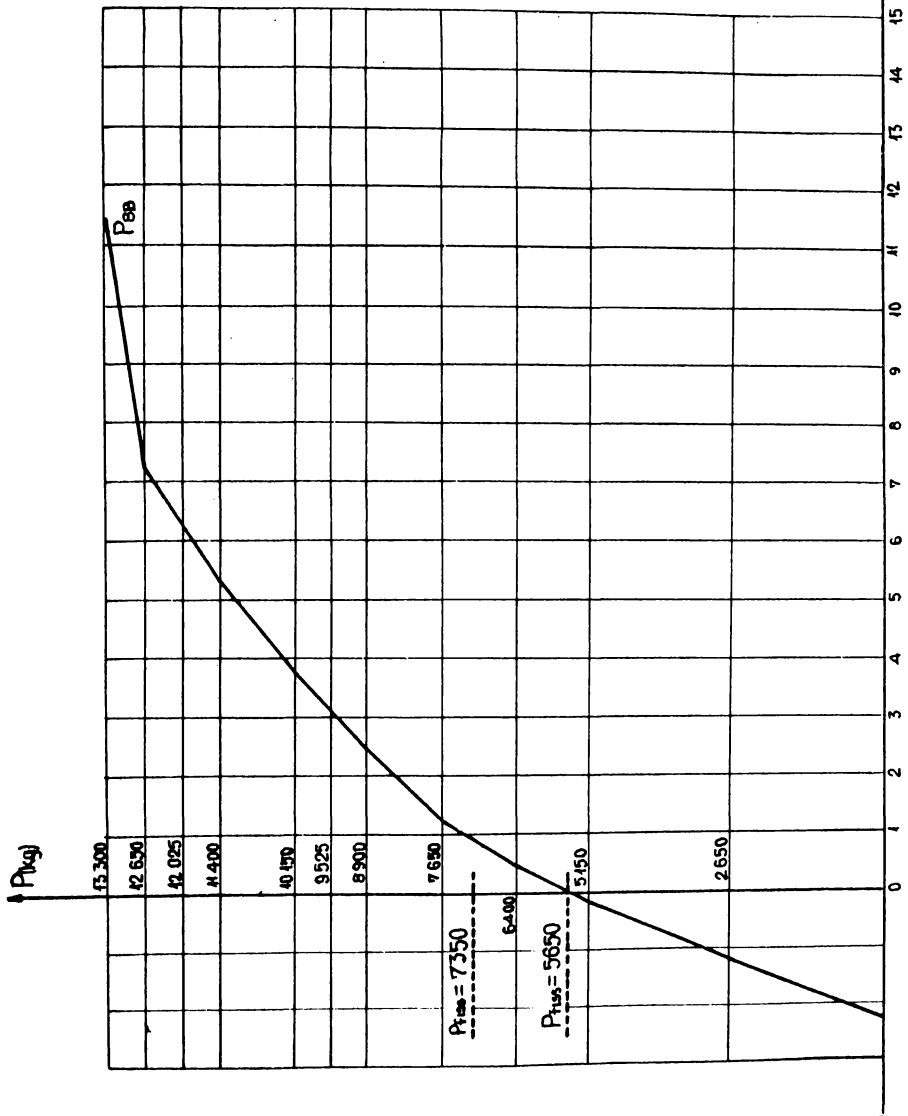


Fig. A3-9b.

**SAGERTA ÎN FUNCȚIE DE ÎNCĂRCĂRE**



**Fig. A3-9C**



# DÉFORMÉES

## DEFORMAȚII

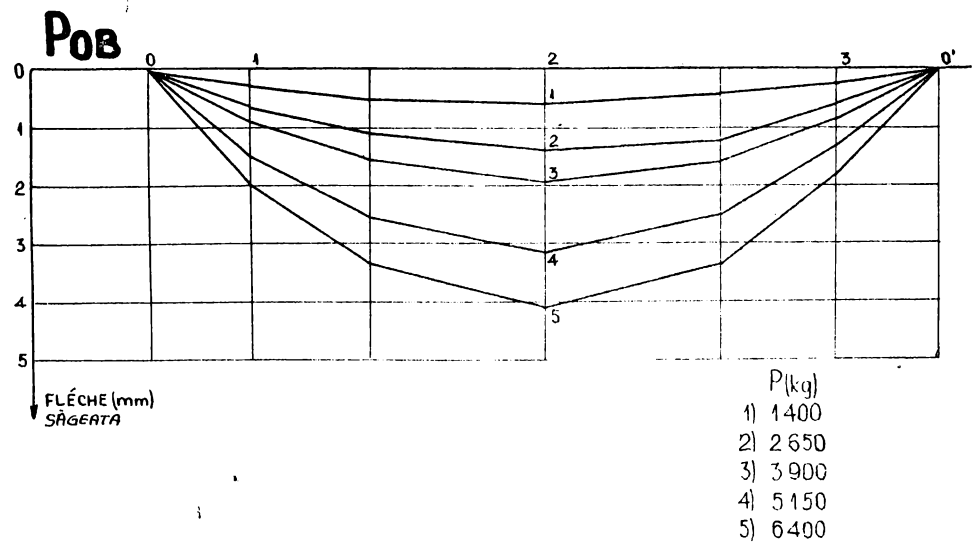
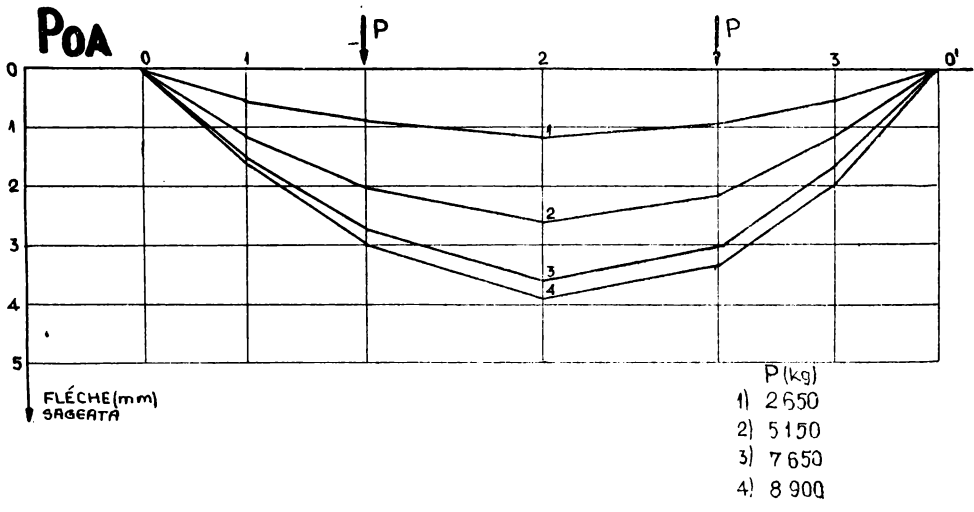


Fig. A3-10a

139

# DÉFORMÉES DEFORMAȚII

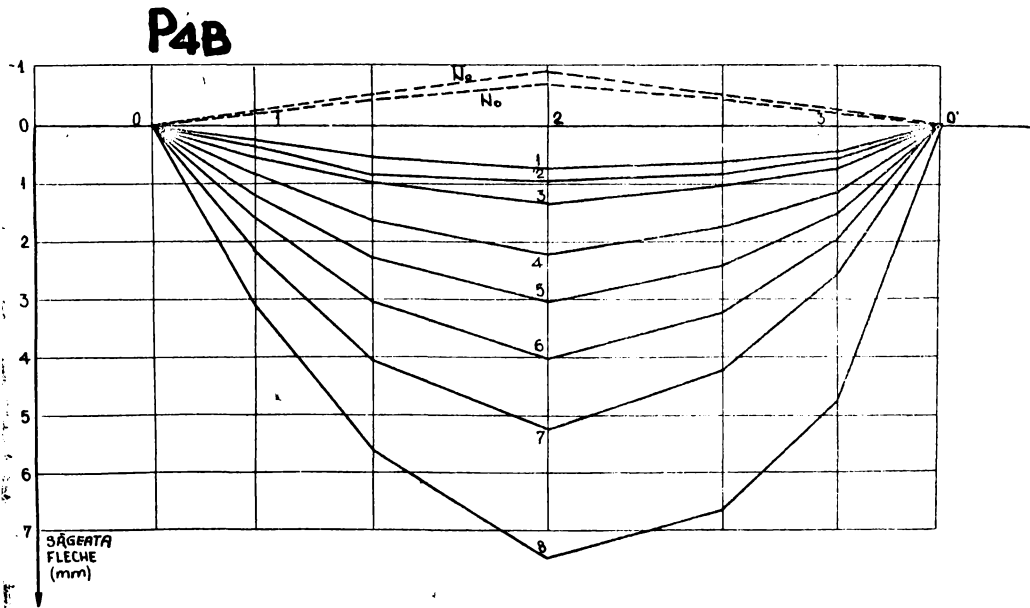
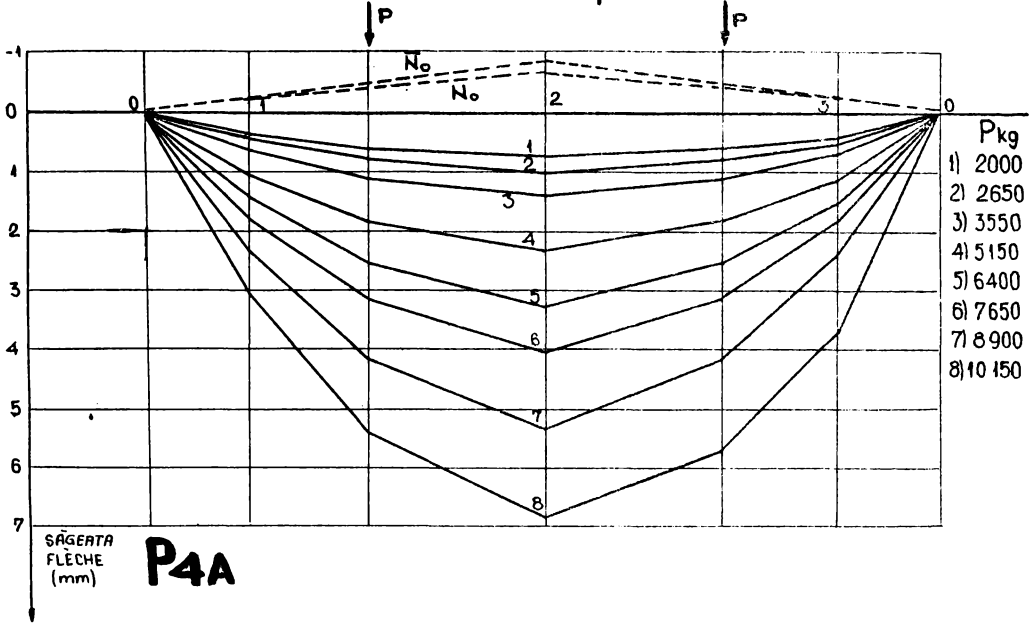


Fig. A3-10b.

141  
**DÉFORMÉES**  
 DEFORMAȚII

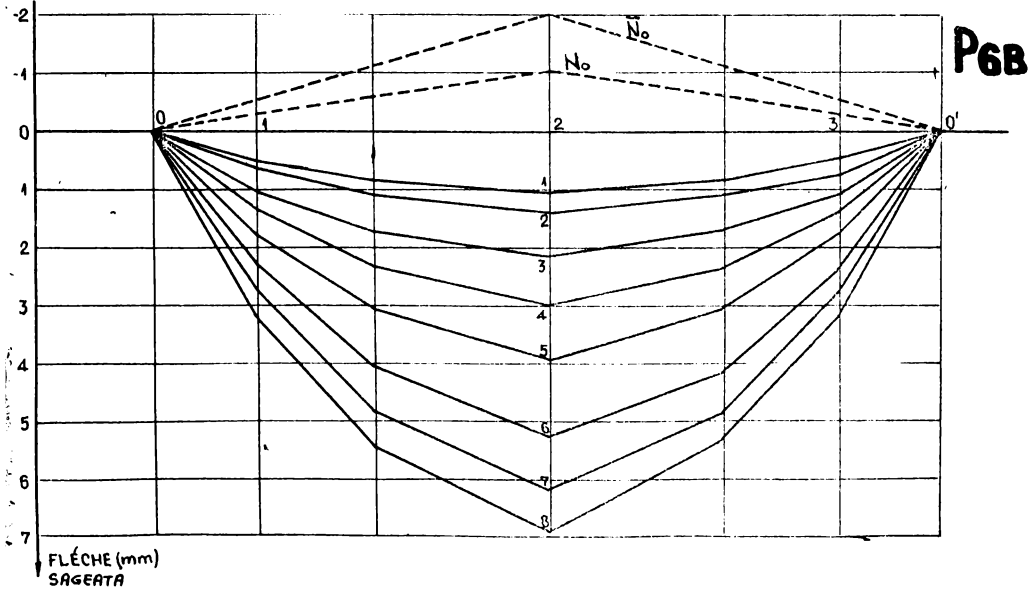
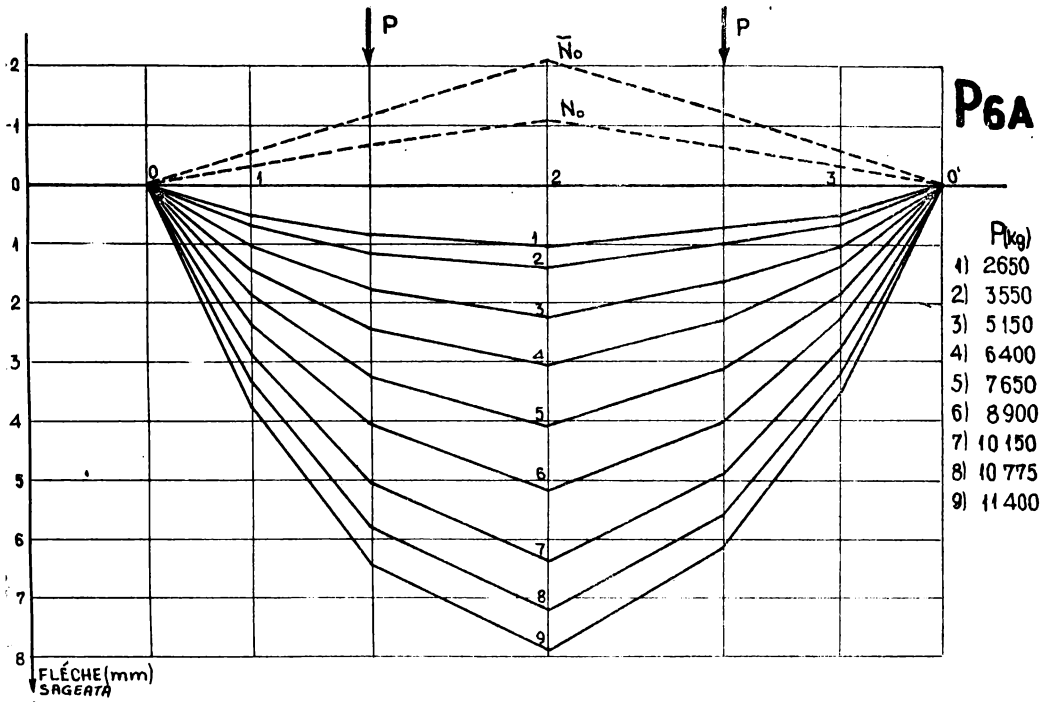
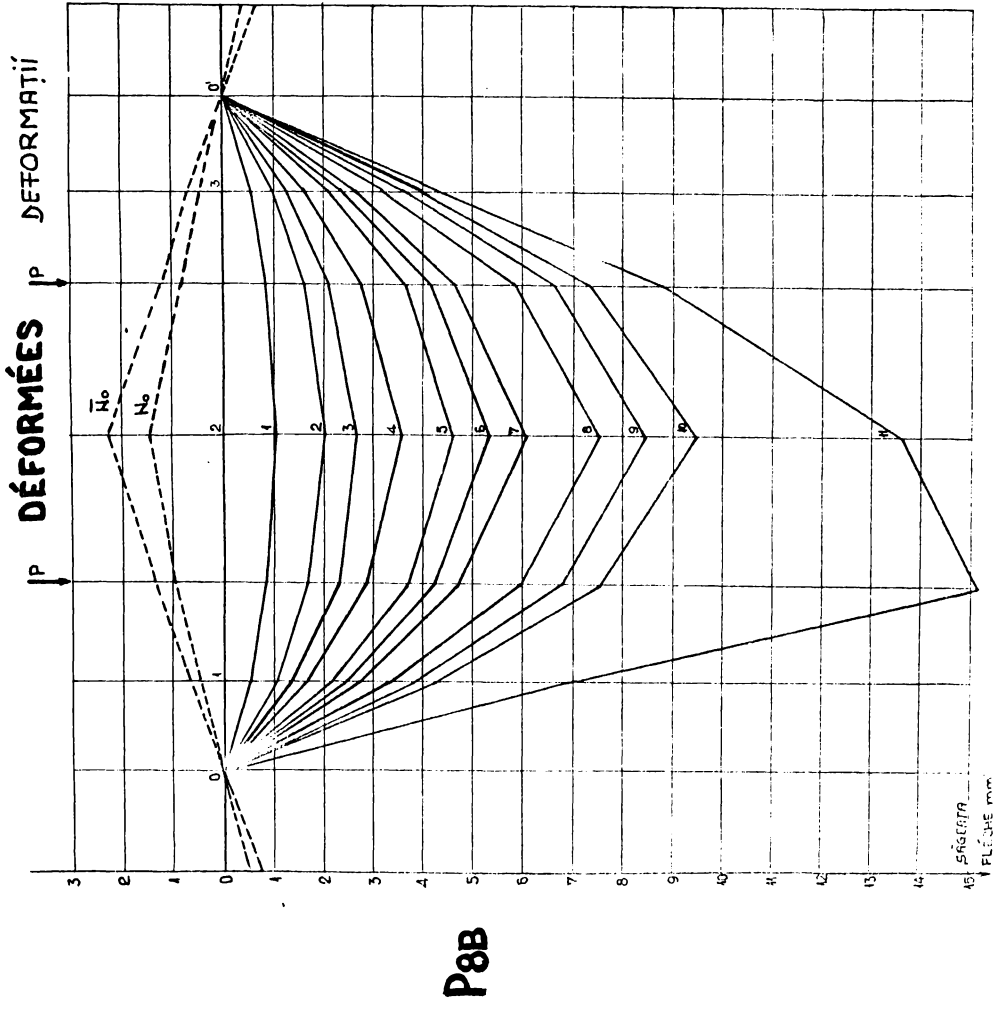


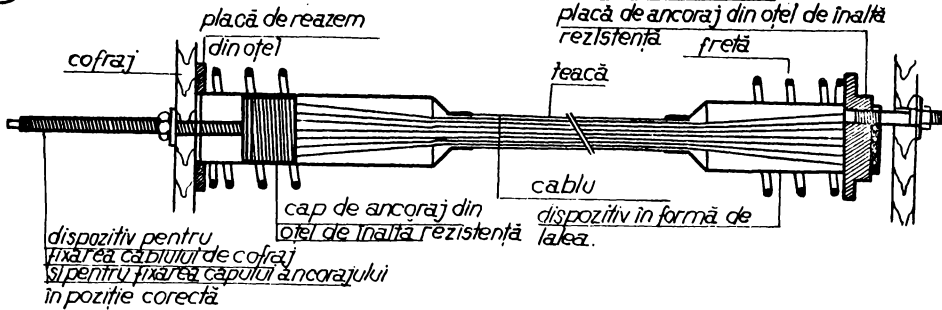
Fig. A3-10c.



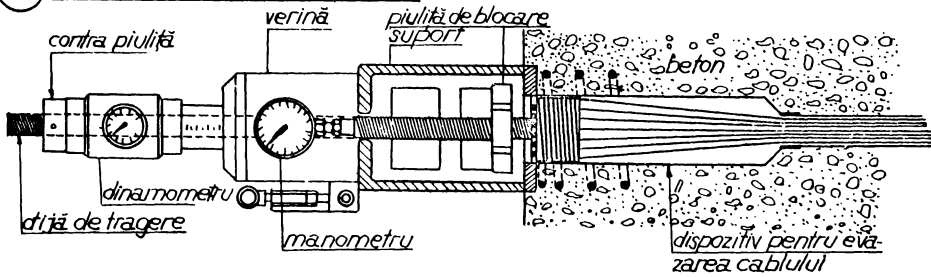
33

Fig. A3-10d

**I CABLUL ESTE POZAT - GAPURILE ANCORAJELOR SÎNT FIXATE PE COFRAJ**



**II PRECOMPRIAREA ÎN MAI MULTE FAZE**



**III INJECTAREA MORTARULUI ÎN CANAL**

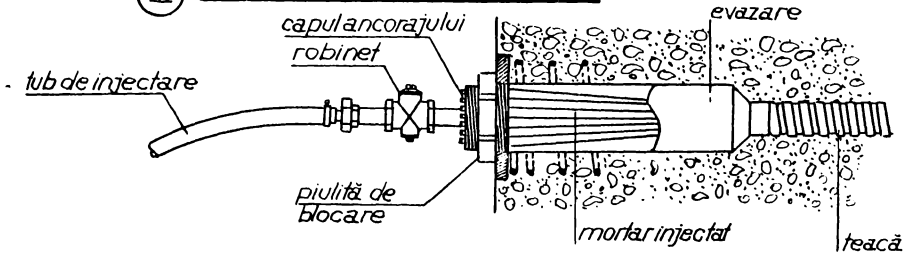
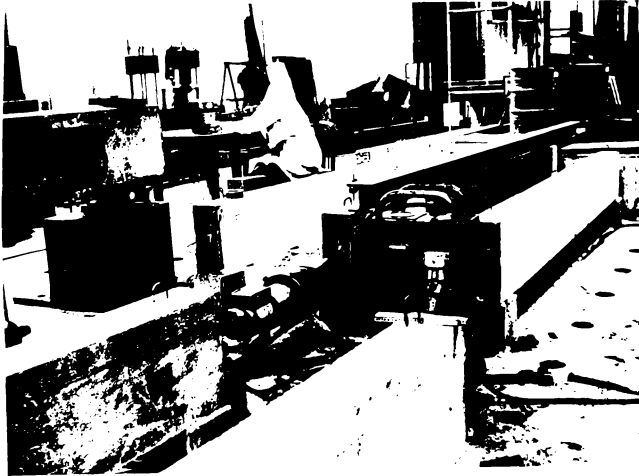
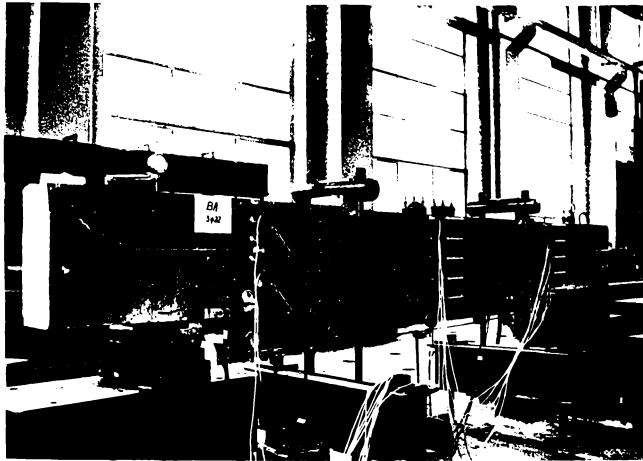


FIG A3-11

A N X A 3



A 3-12 Aspect de la presă în uză



A 3-13 Încalzirea grinziilor

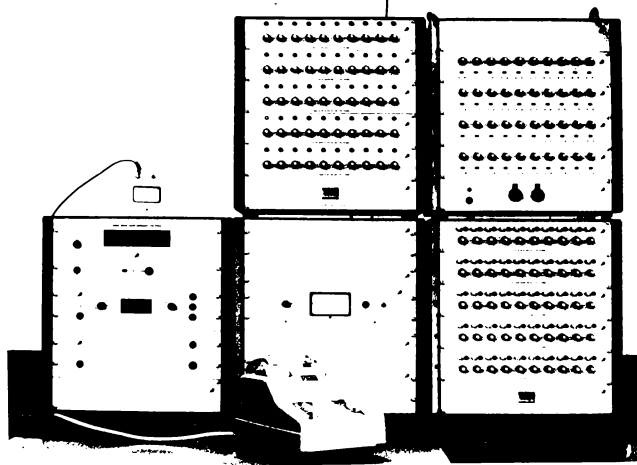


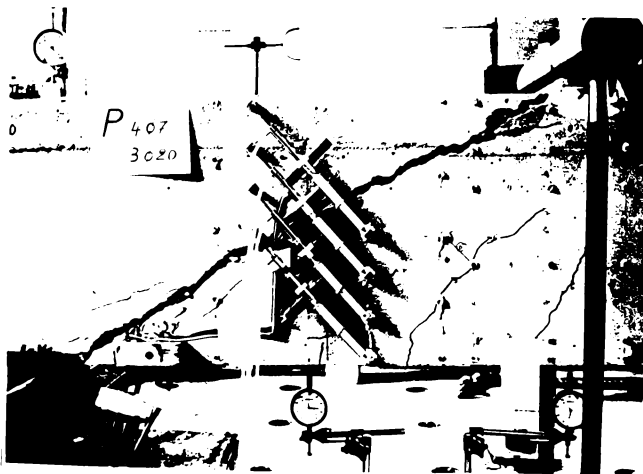
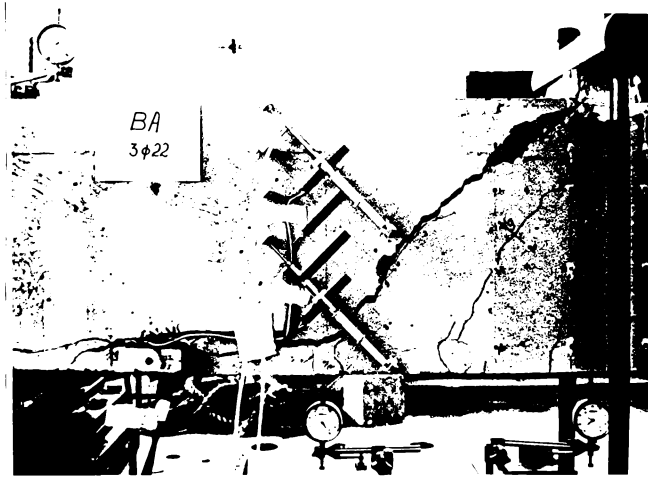
Fig. 3-14. Rack-mounted electronic device.



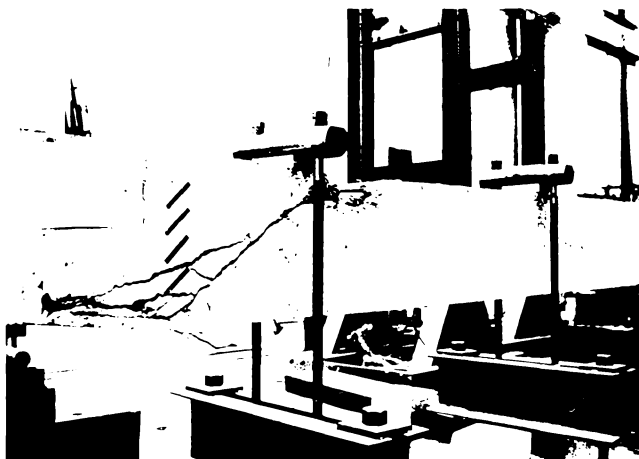
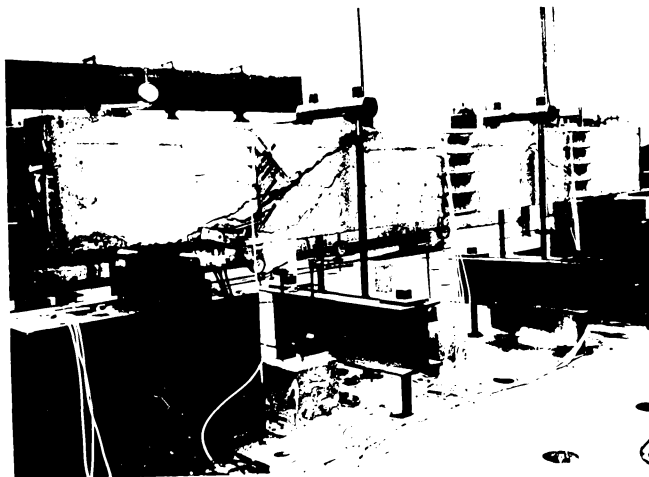
Fig. 3-15. Deformation indicator.

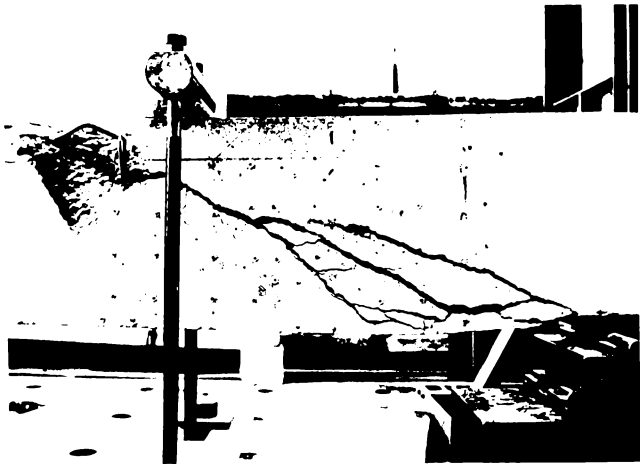
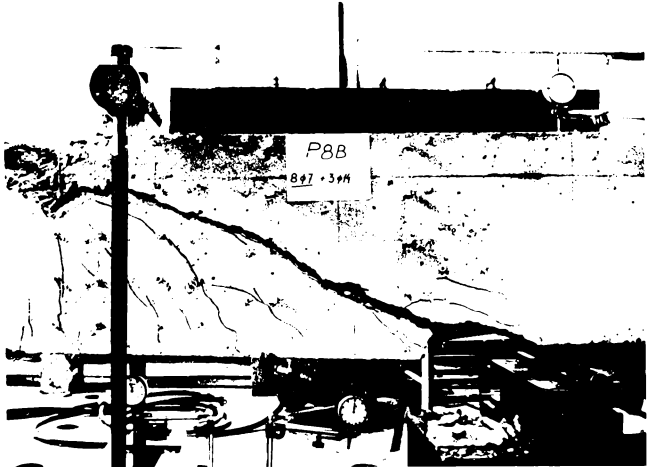
INS. TUTUL PC:TEHHC  
 Y. N. S. P. A.  
 3001

A 3-17 Grinzile după încercare

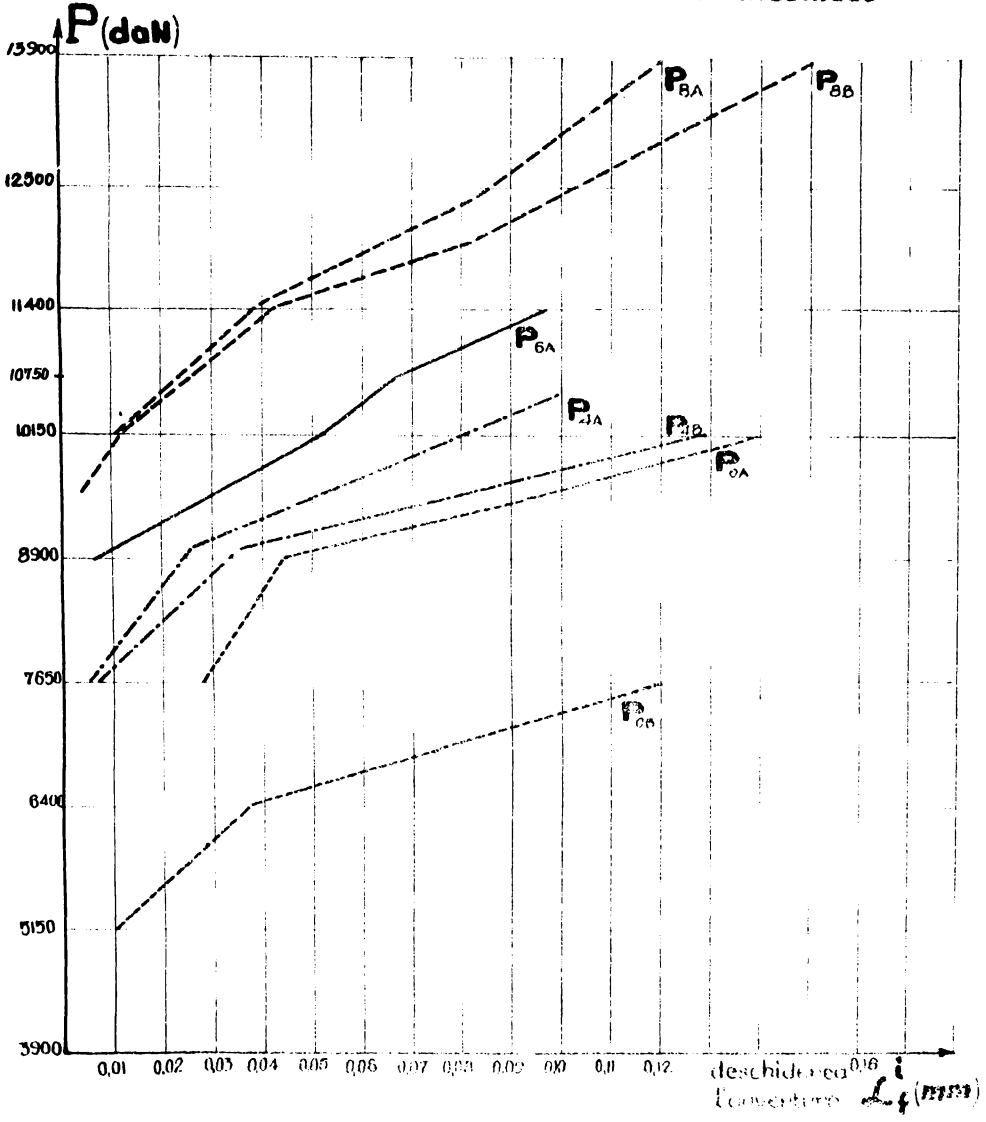








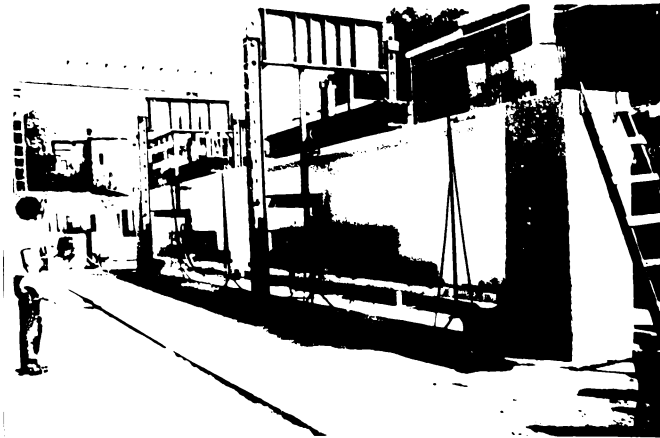
DESCHIDEREA MEDIE A FISURILOR INCLINATE.  
L'OUVERTURE MOYENNE DES FISURES INCLINEES



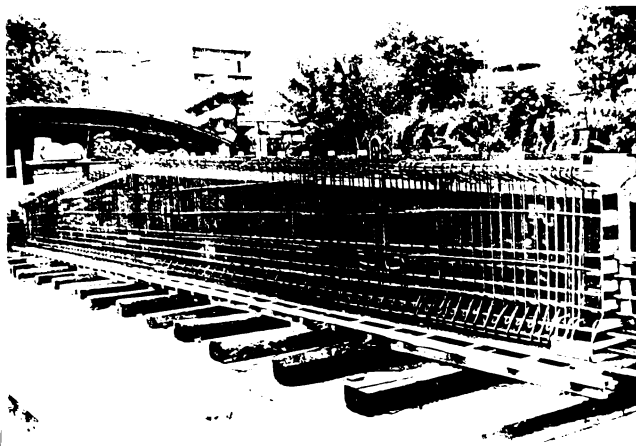
A3-18

A N E X A A 4

Grinzi de 12 - 18 m lungime



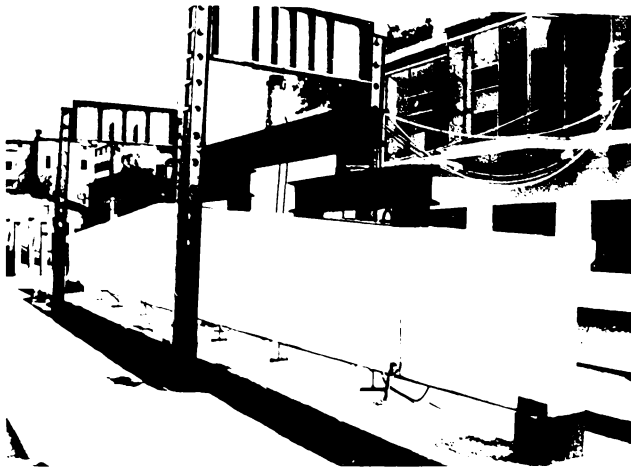
A 4-1 Grinda G 18-12-7 pe stand



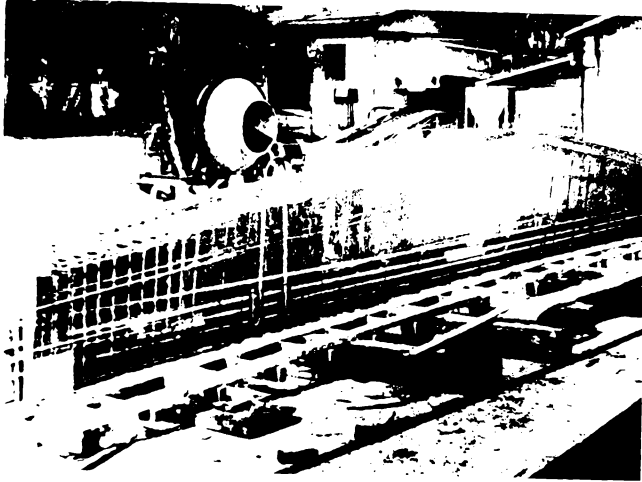
A 4-2 Armarea grinzii G 18-c cu PC9c



A 4-3 Detaliu ancadre rezor



A 4-4 Grinda G18-12-7 pe stnadul de incalziri



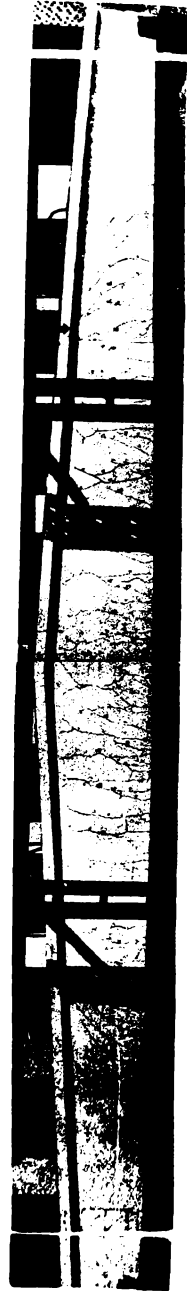
A 4-5 Intrarea materialului la sortare pe PC 3c



A 4-7 Intrarea barelor PC 3c la transfer



A4-9



A4-10