BOOK 3 OF 6

K-ELK RIVER 77(4)B
CORE SAMPLE
ANALYSES

VOLUME II

D.H.-41 TO D.H.-60

276

ELCO MINING LTD.

CORE SAMPLE ANALYSIS

HOLE NO.: DH - 41 - 1 Lab. No. 8237 DATE: Feb/77

HEAD RAW ANALYSIS						
R.M. %	ASH %	V.M. %	F.C. %	S. %	H.G.I.	REMARKS
0.7	22.5	25.9	51.9	0.79	85	Air Dried Basis
	22.7	25.1	52.2	0.80	--	Dry Basis

SIZE / RAW ANALYSES								
SIZE FRACTION	WT. %	R.M. %	ASH %	S. %	CUMULATIVE WT. %	CUMULATIVE ASH %	CUMULATIVE S. %	
1/4" x 65M	95.1	0.6	24.6	0.75	95.1	23.6	0.75	A.D.B.
	95.1		23.7	0.75	95.1	23.7	0.75	D.B.
65M x 0	4.9	0.9	16.9	0.76	100.0	23.3	0.75	A.D.B.
	4.9		17.1	0.77	100.0	23.4	0.75	D.B.

SINK - FLOAT ANALYSIS: 1/4" x 65M									
S. G.	WT. %	R.M. %	ASH %	V.M. %	F.C. %	S. %	CUMULATIVE WT. %	CUMULATIVE ASH %	
-1.40	62.0	0.7	6.9	27.7	64.7	0.81	62.0	6.9	A.D.B.
	62.0		6.9	27.9	65.2	0.82	62.0	6.7	D.B.
1.40-1.50	7.1	0.7	22.9	23.0	53.4	0.68	69.1	8.5	A.D.B.
	7.1		23.1	23.2	52.7	0.68	69.1	8.6	D.B.
1.50-1.60	5.1	0.7	32.3				74.2	10.2	A.D.B.
	5.1		32.5				74.2	10.2	D.B.
+1.60	25.8	0.5	62.5				100.0	23.7	A.D.B.
	25.8		62.8				100.0	23.8	D.B.

COMPOSITE 1/4" x 65M FLOATS @ 1.50 S.G., A.D.B.						
F.S.I.	P% ON COAL	DILATATION TEST: SOFTENING TEMP. (°C)	MAX. DIL. TEMP. (°C)	MAXIMUM CONTR. %	MAXIMUM DIL. %	G. NO.
8	.05	368	434	22	255	1.074

Birtley Engineering

Subsidiary of Great West Steel Industries

Lab. No. 8237 Date Feb. 10, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-41-1

Starting Temperature °C: 350

Softening Temperature °C: 368

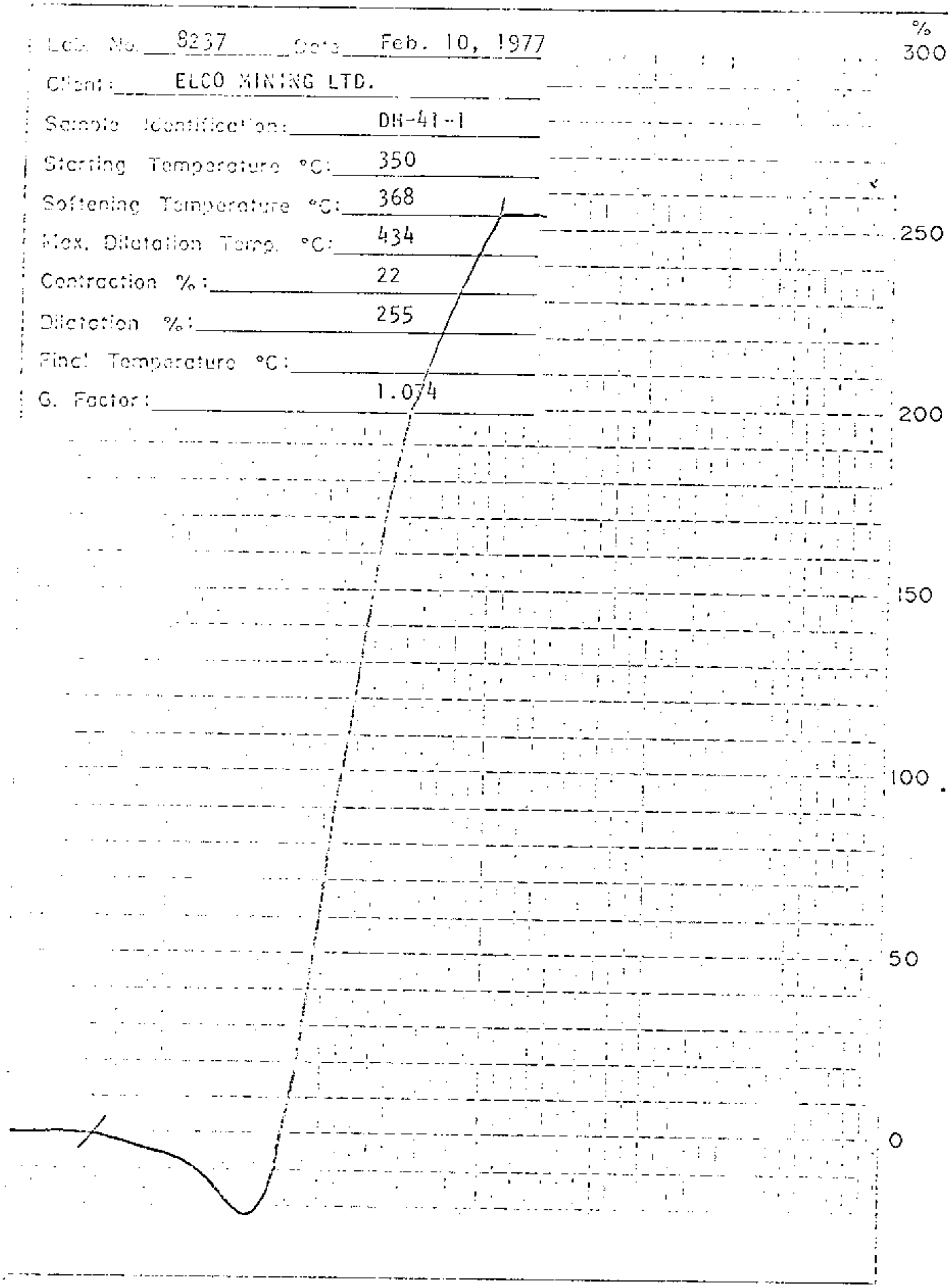
Max. Dilatation Temp. °C: 434

Contraction %: 22

Dilatation %: 255

Final Temperature °C:

G. Factor: 1.074



Title

RUHR DILATOMETER TEST

Date

Drawn

ELCO MINING LTD.

CORE SAMPLE ANALYSIS

HOLE NO.: DH - 41 - 2 Lab. No. 8238 DATE: Feb/77

HEAD RAW ANALYSIS						
R.M. %	ASH %	V.M. %	F.C. %	S. %	H.G.I.	REMARKS
0.9	9.3	25.8	64.0	1.06	90	Air Dried Basis
	9.4	26.0	64.6	1.07	--	Dry Basis

SIZE / RAW ANALYSES								
SIZE FRACTION	WT. %	R.M. %	ASH %	S. %	CUMULATIVE WT. %	CUMULATIVE ASH %	CUMULATIVE S. %	
1/4" x 65M	95.5	0.8	9.2	1.09	95.5	9.2	1.09	A.D.B.
	95.5		9.3	1.10	95.5	9.3	1.10	D.B.
65M x 0	4.5	1.0	7.9	0.98	100.0	9.1	1.09	A.D.B.
	4.5		8.0	0.99	100.0	9.2	1.10	D.B.

SINK - FLOAT ANALYSIS: 1/4" x 65M									
S. G.	WT. %	R.M. %	ASH %	V.M. %	F.C. %	S. %	CUMULATIVE WT. %	CUMULATIVE ASH %	
-1.40	82.7	1.1	3.7	26.8	68.4	0.92	82.7	3.7	A.D.B.
	82.7		3.7	27.1	69.2	0.93	82.7	3.7	D.B.
1.40-1.50	8.2	0.8	18.5	19.8	60.9	0.72	90.9	5.0	A.D.B.
	8.2		18.6	20.0	61.4	0.73	90.9	5.0	D.B.
1.50-1.60	2.8	0.9	28.8				93.7	5.7	A.D.B.
	2.8		29.1				93.7	5.8	D.B.
+1.60	6.3	0.4	57.6				100.0	9.0	A.D.B.
	6.3		57.8				100.0	9.0	D.B.

COMPOSITE 1/4" x 65M FLOATS @ 1.50 S.G., A.D.B.						
F.S.I.	P% ON COAL	DILATATION TEST				
		SOFTENING TEMP., (°C)	MAX. DIL. TEMP. (°C)	MAXIMUM CONTR. %	MAXIMUM DIL. %	G. NO.
9	.10	374	437	19	215	1.070

Birtley Engineering

Subsidiary of Great West Steel Industries

Lab. No. 8238 Date Feb. 10, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-41-2

Starting Temperature °C: 350

Softening Temperature °C: 374

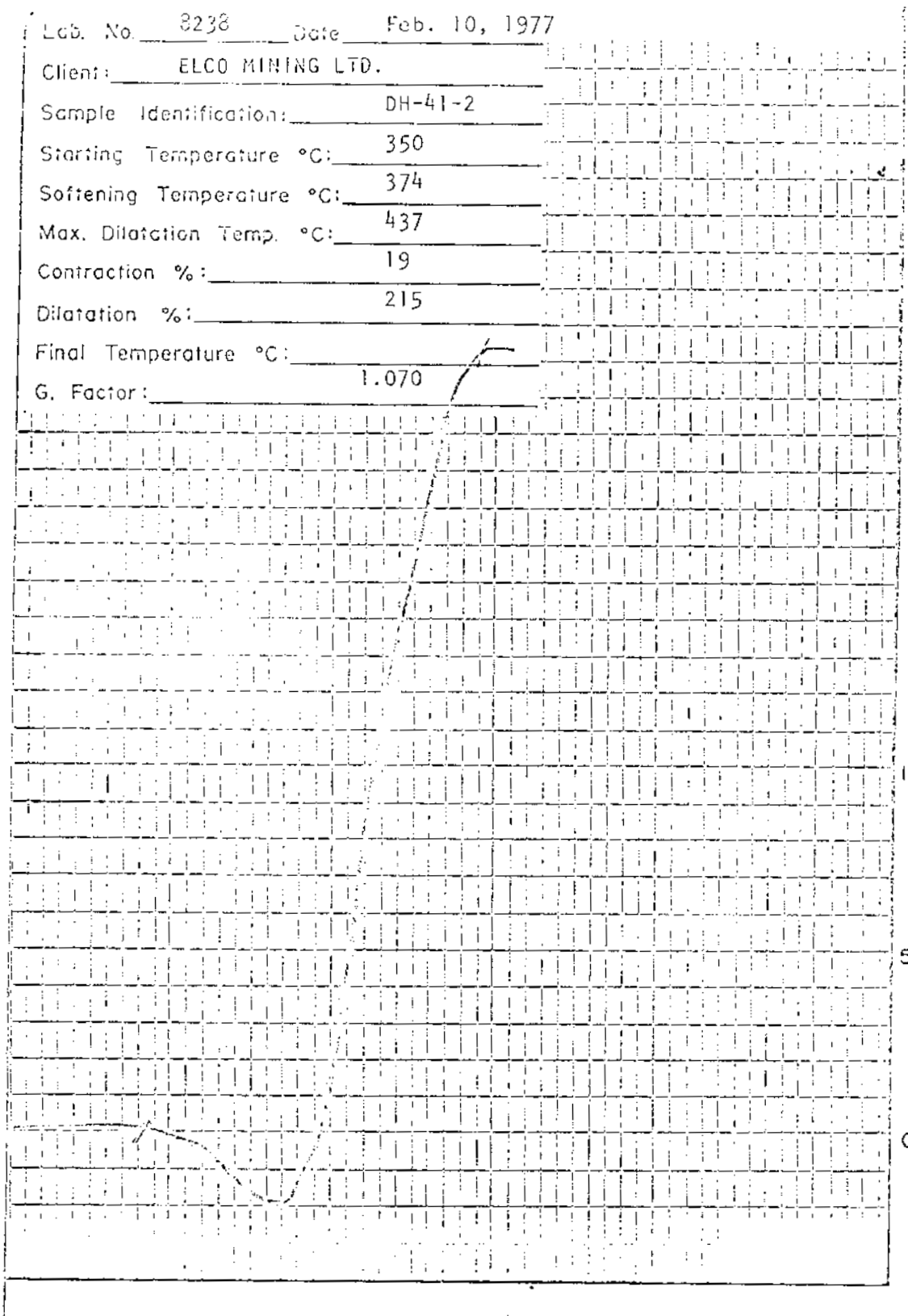
Max. Dilatation Temp. °C: 437

Contraction %: 19

Dilatation %: 215

Final Temperature °C:

G. Factor: 1.070



BARTLEY ENGINEERING (CANADA) LTD.

Title	Date
RUHR DILATOMETER TEST	
	Drawn

ELCO MINING LTD.

CORE SAMPLE ANALYSIS

HOLE NO.: DH - 41 - 3 Lab. No. 8239 DATE: Feb/77

HEAD RAW ANALYSIS						
R.M. %	ASH %	V.M. %	F.C. %	S. %	H.G.I.	REMARKS
0.8	17.4	23.6	58.2	0.68	107	Air Dried Basis
	17.5	23.8	58.7	0.69	---	Dry Basis

SIZE / RAW ANALYSES								
SIZE FRACTION	WT. %	R.M. %	ASH %	S. %	CUMULATIVE WT. %	CUMULATIVE ASH %	CUMULATIVE S. %	
1/4" x 65M	91.9	0.7	18.5	0.67	91.9	18.5	0.67	A.D.B.
	91.9		18.6	0.67	91.9	18.6	0.67	D.B.
65M x 0	8.1	0.9	12.5	0.74	100.0	18.0	0.68	A.D.B.
	8.1		12.6	0.75	100.0	18.1	0.68	D.B.

SINK - FLOAT ANALYSIS: 1/4" x 65M									
S. G.	WT. %	R.M. %	ASH %	V.M. %	F.C. %	S. %	CUMULATIVE WT. %	CUMULATIVE ASH %	
-1.40	67.9	0.9	4.1	26.2	68.8	0.81	67.9	4.1	A.D.B.
	68.0		7.1	26.4	69.5	0.82	68.0	4.1	D.B.
1.40-1.50	7.3	1.0	22.5	21.6	54.9	0.69	75.2	5.9	A.D.B.
	7.3		22.7	21.8	55.5	0.70	75.3	5.9	D.B.
1.50-1.60	5.8	1.5	30.4				81.0	7.6	A.D.B.
	5.8		30.9				81.1	7.7	D.B.
+1.60	19.0	1.5	62.4				100.0	18.0	A.D.B.
	18.9		63.4				100.0	18.2	D.B.

COMPOSITE 1/4" x 65M FLOATS @ 1.50 S.G., A.D.B.						
F.S.I.	P% ON COAL	DILATATION TEST SOFTENING TEMP. (°C)	MAX. DIL. TEMP. (°C)	MAXIMUM CONTR. %	MAXIMUM DIL. %	G. NO.
9	.05	359	432	23	292	1.086

Birtley Engineering

Subsidiary of Great West Steel Industries

Lab. No. 8239 Date Feb. 12, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-41-3

Starting Temperature °C: 350

Softening Temperature °C: 359

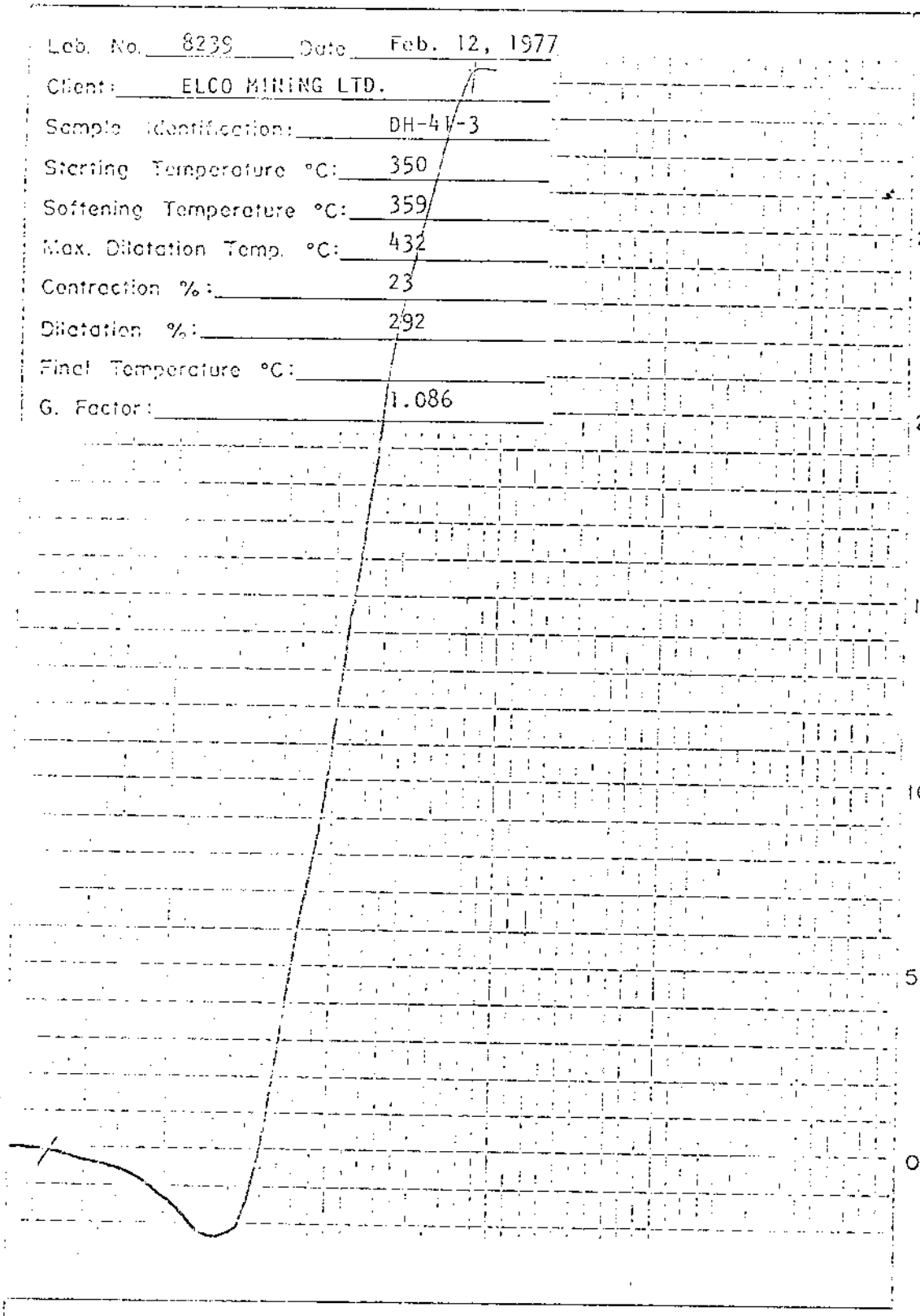
Max. Dilatation Temp. °C: 432

Contraction %: 23

Dilatation %: 292

Final Temperature °C:

G. Factor: 1.086



BRITTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

ELCO MINING LTD.

CORE SAMPLE ANALYSIS

HOLE NO.: DH - 41 - 4 Lab. no. 8240 DATE: Feb/77

HEAD RAW ANALYSIS						
R.M. %	ASH %	V.M. %	F.C. %	S. %	H.G.I.	REMARKS
0.8	11.7	27.5	60.0	1.12	91	Air Dried Basis
	11.8	27.7	60.5	1.13	--	Dry Basis

SIZE / RAW ANALYSES								
SIZE FRACTION	WT. %	R.M. %	ASH %	S. %	CUMULATIVE WT. %	CUMULATIVE ASH %	CUMULATIVE S. %	
1/4" x 65M	95.1	1.0	11.9	1.10	95.1	11.9	1.10	A.D.B.
	95.1		12.0	1.11	95.1	12.0	1.11	D.B.
65M x 0	4.9	0.9	15.8	0.95	100.0	12.1	1.09	A.D.B.
	4.9		15.9	0.96	100.0	12.2	1.10	D.B.

SINK - FLOAT ANALYSIS: 1/4" x 65M									
S. G.	WT. %	R.M. %	ASH %	V.M. %	F.C. %	S. %	CUMULATIVE WT. %	CUMULATIVE ASH %	
-1.40	81.6	0.9	3.0	27.9	68.2	1.06	81.6	3.0	A.D.B.
	81.5		3.0	28.2	68.8	1.07	81.5	3.0	D.B.
1.40-1.50	4.0	0.8	22.7	23.9	52.6	1.50	85.6	3.9	A.D.B.
	4.0		22.9	24.1	53.0	1.51	35.5	3.9	D.B.
1.50-1.60	2.2	0.7	33.1				87.8	4.7	A.D.B.
	2.2		33.3				87.7	4.7	D.B.
+1.60	12.2	0.4	62.1				100.0	11.7	A.D.B.
	12.3		62.3				100.0	11.8	D.B.

COMPOSITE 1/4" x 65M FLOATS @ 1.50 S.G., A.D.B.						
F.S.I.	P% ON COAL	DILATATION TEST SOFTENING TEMP. (°C)	MAX. DIL. TEMP. (°C)	MAXIMUM CONTR. %	MAXIMUM DIL. %	G. NO.
8 1/2	Trace	371	434	17	155	1.067

Birtley Engineering

Subsidiary of Great West Steel Industries

Lab. No. 8240 Date Feb. 12, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-41-4

Starting Temperature °C: 350

Softening Temperature °C: 371

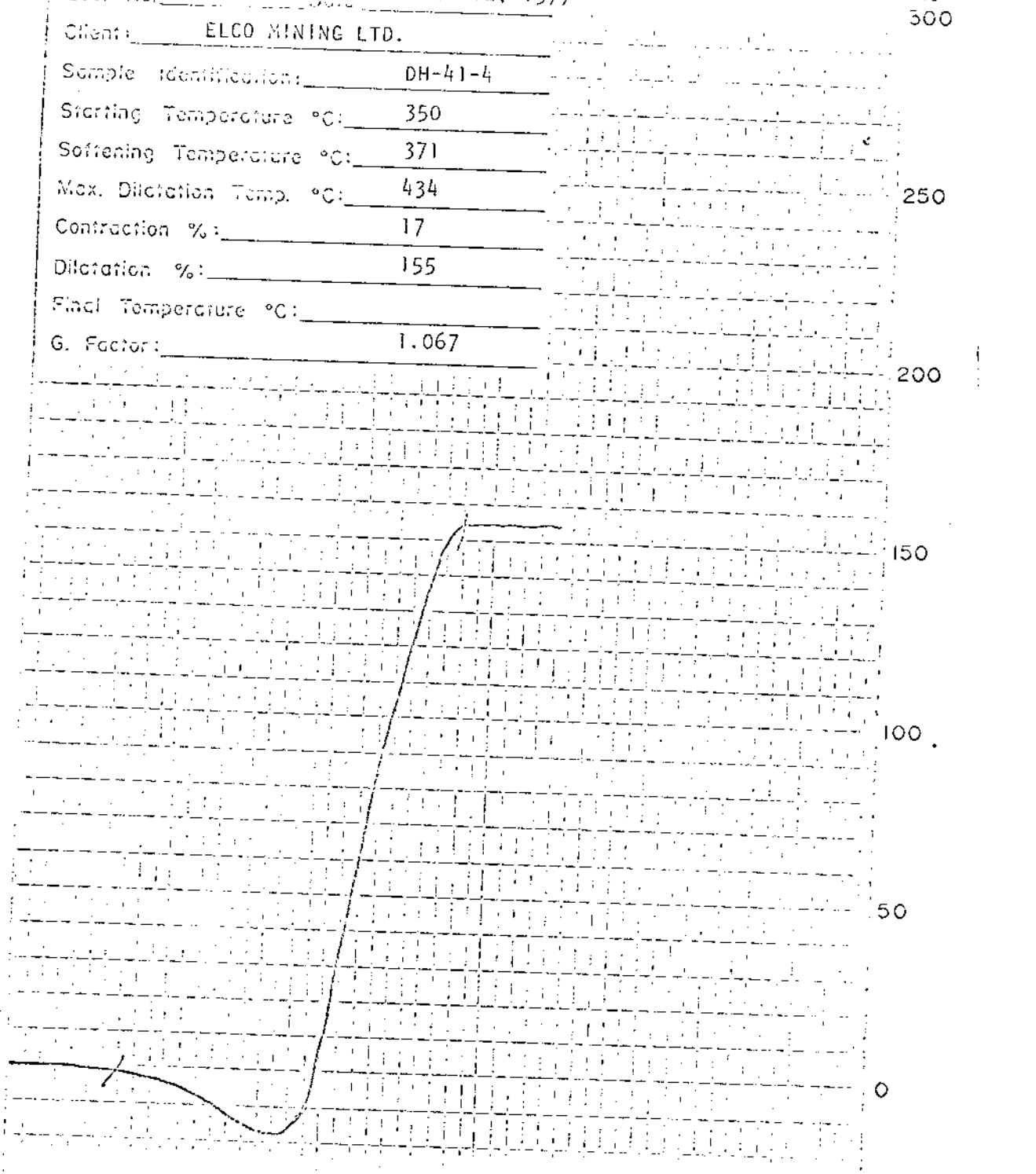
Max. Dilatation Temp. °C: 434

Contraction %: 17

Dilatation %: 155

Final Temperature °C:

G. Factor: 1.067



BARTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

ELCO MINING LTD.

CORE SAMPLE ANALYSIS

HOLE NO.: DH - 41 - 5 Lab. No. 8241 DATE: Feb/77

HEAD RAW ANALYSIS						
R.M. %	ASH %	V.M. %	F.C. %	S. %	H.G.I.	REMARKS
0.8	46.9	16.4	35.9	0.53	72	Air Dried Basis
	47.3	16.5	36.2	0.53	--	Dry Basis

SIZE/RAW ANALYSES								
SIZE FRACTION	WT. %	R.M. %	ASH %	S. %	CUMULATIVE WT. %	CUMULATIVE ASH %	CUMULATIVE S. %	
1/4" x 65M	93.2	1.0	49.3	0.48	93.2	49.3	0.48	A.D.B.
	93.2		49.8	0.48	93.2	49.8	0.48	D.B.
65M x 0	6.8	0.9	24.7	0.68	100.0	47.6	0.49	A.D.B.
	6.8		24.9	0.69	100.0	48.1	0.49	D.B.

SINK-FLOAT ANALYSIS: 1/4" x 65M									
S. G.	WT. %	R.M. %	ASH %	V.M. %	F.C. %	S. %	CUMULATIVE WT. %	CUMULATIVE ASH %	
-1.40	36.9	1.0	5.8	26.1	67.1	0.86	36.9	5.8	A.D.B.
	36.9		5.9	26.4	67.7	0.87	36.9	5.9	D.B.
1.40-1.50	4.4	1.1	20.9	21.9	56.1	0.63	41.3	7.4	A.D.B.
	4.4		21.1	22.1	56.8	0.64	41.3	7.5	D.B.
1.50-1.60	3.6	1.2	30.8				44.9	9.3	A.D.B.
	3.6		31.2				44.9	9.4	D.B.
+1.60	55.1	1.1	83.6				100.0	50.2	A.D.B.
	55.1		84.5				100.0	50.8	D.B.

COMPOSITE 1/4" x 65M FLOATS @ 1.50 S.G., A.D.B.						
F.S.I.	P% ON COAL	DILATATION TEST				
		SOFTENING TEMP. (°C)	MAX. DIL. TEMP. (°C)	MAXIMUM CONTR. %	MAXIMUM DIL. %	G. NO.
8 1/2	.06	365	428	23	243	1.070

Birtley Engineering

Subsidiary of Great West Steel Industries

Lab. No. 8241 Date Feb. 12, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-41-5

Starting Temperature °C: 350

Softening Temperature °C: 365

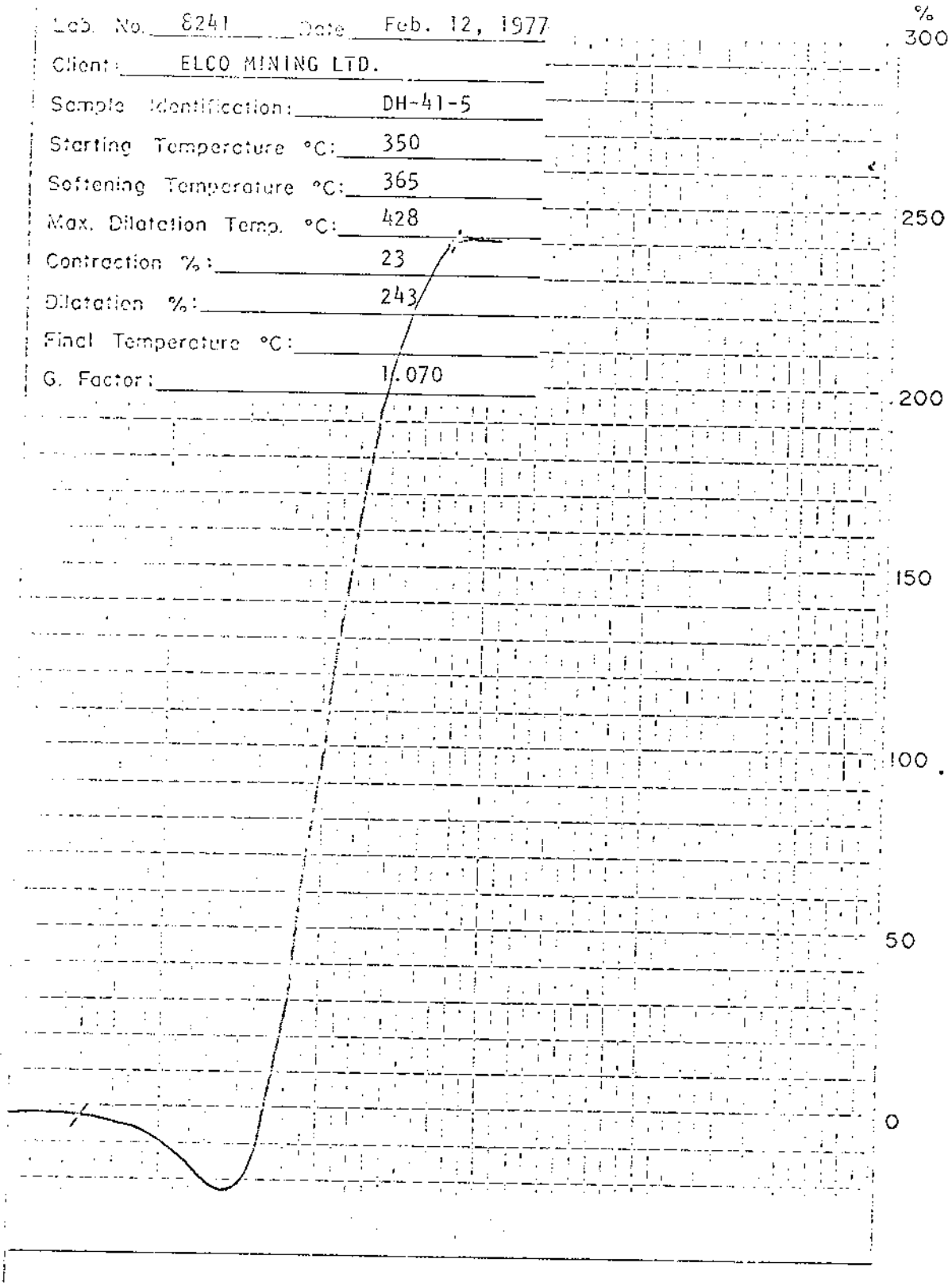
Max. Dilatation Temp. °C: 428

Contraction %: 23

Dilatation %: 243

Final Temperature °C:

G. Factor: 1.070



BUTLEY ENGINEERING (BARBADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

ELCO MINING LTD.

CORE SAMPLE ANALYSIS

HOLE NO.: DH - 41 - 6 Lab. No 8242 DATE: Feb/77

HEAD RAW ANALYSIS						
R.M. %	ASH %	V.M. %	F.C. %	S. %	H.G.I.	REMARKS
0.9	20.1	23.2	55.8	0.57	88	Air Dried Basis
	20.3	23.4	56.3	0.58	--	Dry Basis

SIZE / RAW ANALYSES								
SIZE FRACTION	WT. %	R.M. %	ASH %	S. %	CUMULATIVE WT. %	CUMULATIVE ASH %	CUMULATIVE S. %	
1/4" x 65M	93.5	0.7	20.2	0.51	93.5	20.2	0.51	A.D.B.
	93.5		20.3	0.51	93.5	20.3	0.51	D.B.
65M x 0	6.5	0.9	9.2	0.60	100.0	19.5	0.52	A.D.B.
	6.5		9.3	0.61	100.0	19.6	0.52	D.B.

SINK - FLOAT ANALYSIS: 1/4" x 65M									
S. G.	WT. %	R.M. %	ASH %	V.M. %	F.C. %	S. %	CUMULATIVE WT. %	CUMULATIVE ASH %	
-1.40	73.2	1.2	3.9	26.3	68.6	0.69	73.2	3.9	A.D.B.
	73.2		3.9	26.6	69.5	0.70	73.2	3.9	D.B.
1.40-1.50	4.1	1.4	20.5	23.5	54.6	0.58	77.3	4.8	A.D.B.
	4.1		20.8	23.8	55.4	0.59	77.3	4.8	D.B.
1.50-1.60	2.3	1.1	29.0				79.6	5.5	A.D.B.
	2.3		29.3				79.6	5.5	D.B.
+1.60	20.4	1.1	72.2				100.0	19.1	A.D.B.
	20.4		73.0				100.0	19.3	D.B.

COMPOSITE 1/4" x 65M FLOATS @ 1.50 S.G., A.D.B.						
F.S.I.	P% ON COAL	DILATATION TEST SOFTENING TEMP. (°C)	MAX. DIL. TEMP. (°C)	MAXIMUM CONTR. %	MAXIMUM DIL. %	G. NO.
8 1/2	.05	371	431	20	244	1.068

Birtley Engineering

Subsidiary of Great West Steel Industries

LCB. No. 8242 Date Feb. 12, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-41-6

Starting Temperature °C: 350

Softening Temperature °C: 371

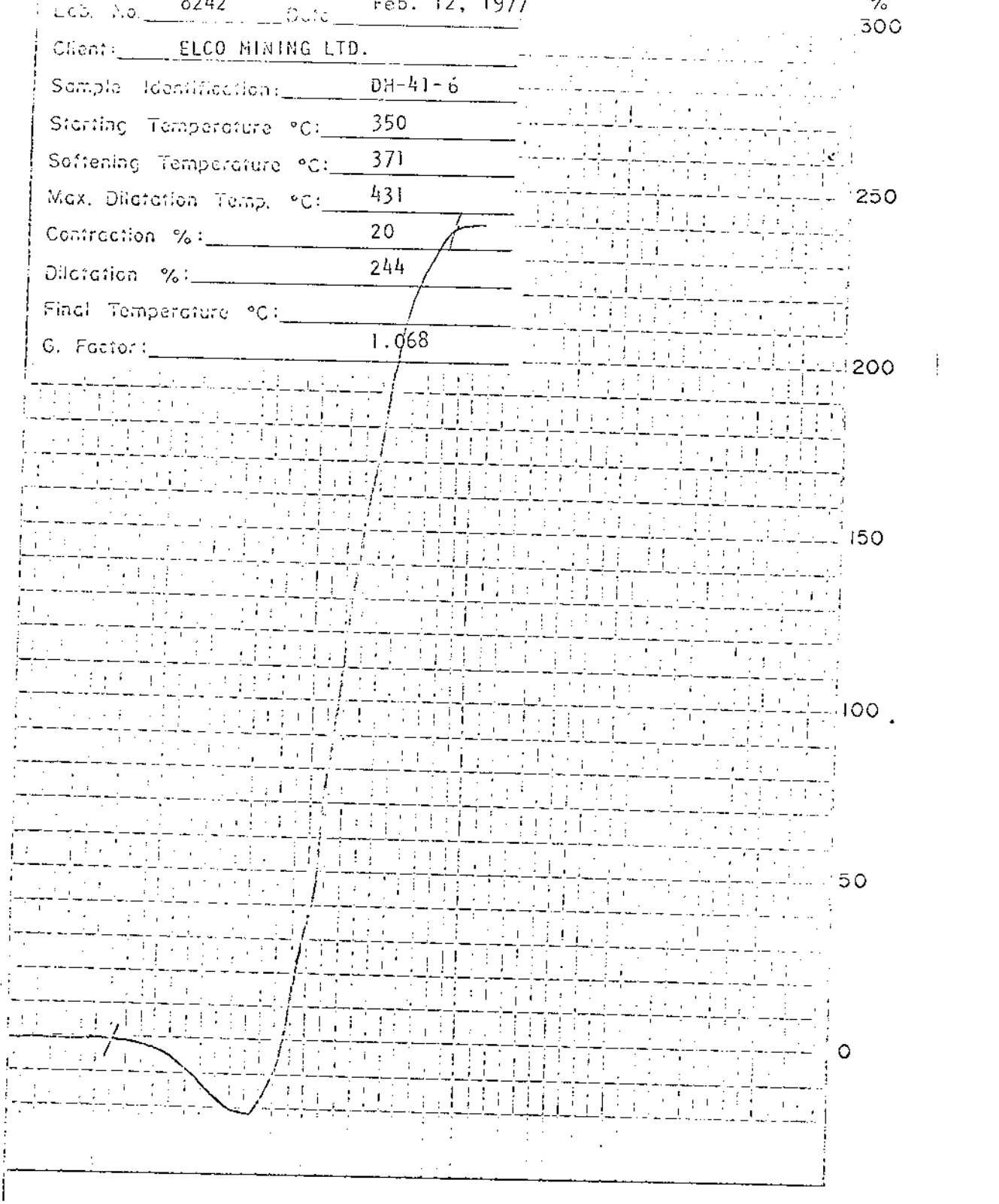
Max. Dilatation Temp. °C: 431

Contraction %: 20

Dilatation %: 244

Final Temperature °C:

G. Factor: 1.068



BARTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

ELCO MINING LTD.

CORE SAMPLE ANALYSIS

HOLE NO.: DH - 41 - 7 Lab. No. 8243 DATE: Feb/77

HEAD RAW ANALYSIS						
R.M. %	ASH %	V.M. %	F.C. %	S. %	H.G.I.	REMARKS
0.7	18.4	24.4	56.5	0.68	83	Air Dried Basis
	18.5	24.6	56.9	0.68	--	Dry Basis

SIZE / RAW ANALYSES								
SIZE FRACTION	WT. %	R.M. %	ASH %	S. %	CUMULATIVE WT. %	CUMULATIVE ASH %	CUMULATIVE S. %	
1/4" x 65M	94.2	0.5	18.6	0.64	94.2	18.6	0.64	A.D.B.
	94.2		18.7	0.64	94.2	18.7	0.64	D.B.
65M x 0	5.8	0.6	8.3	0.68	100.0	18.0	0.64	A.D.B.
	5.8		8.4	0.68	100.0	18.1	0.64	D.B.

SINK - FLOAT ANALYSIS: 1/4" x 65M									
S. G.	WT. %	R.M. %	ASH %	V.M. %	F.C. %	S. %	CUMULATIVE WT. %	CUMULATIVE ASH %	
-1.40	69.8	0.6	4.6	26.8	68.0	0.71	69.8	4.6	A.D.B.
	69.8		4.6	27.0	68.4	0.71	69.8	4.6	D.B.
1.40-1.50	8.3	0.5	25.0	22.3	52.2	0.53	78.1	6.8	A.D.B.
	8.3		25.1	22.4	52.5	0.53	78.1	6.8	D.B.
1.50-1.60	4.1	0.6	35.1				82.2	8.2	A.D.B.
	4.1		35.3				82.2	8.2	D.B.
+1.60	17.8	0.5	67.0				100.0	18.7	A.D.B.
	17.8		67.3				100.0	18.7	D.B.

COMPOSITE 1/4" x 65M FLOATS @ 1.50 S.G., A.D.B.						
F.S.I.	P% ON COAL	DILATATION TEST				
		SOFTENING TEMP. (°C)	MAX. DIL. TEMP. (°C)	MAXIMUM CONTR. %	MAXIMUM DIL. %	G. NO.
9	.07	362	436	20	289	1.088

Birtley Engineering

Subsidiary of Great West Steel Industries

Lab. No. 6243 Date Feb. 12, 1977

Client: ELCO MINING LTD.

Sample Identification: DR-41-7

Starting Temperature °C: 350

Softening Temperature °C: 362

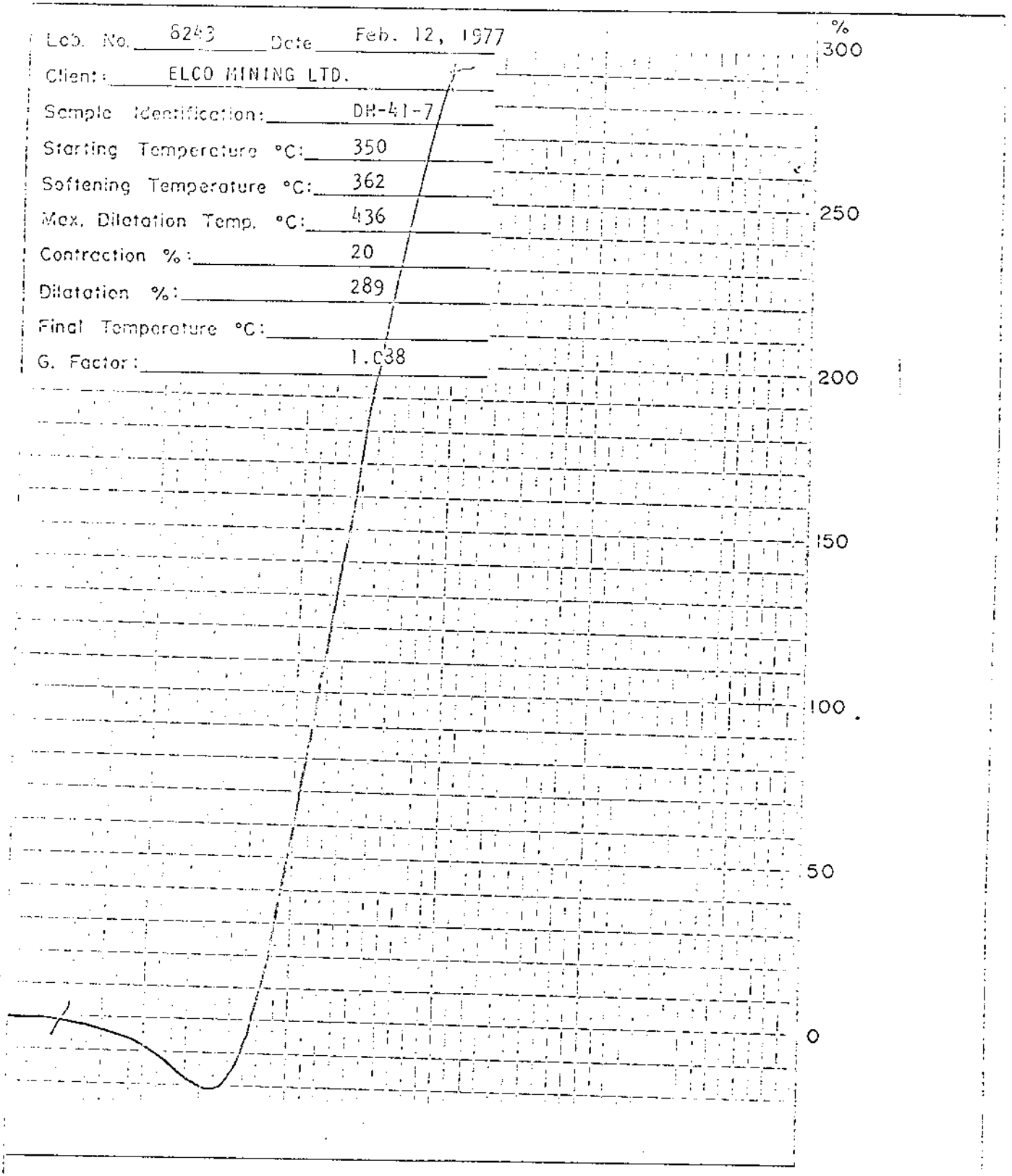
Max. Dilatation Temp. °C: 436

Contraction %: 20

Dilatation %: 289

Final Temperature °C:

G. Factor: 1.038



WHITLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

ELCO MINING LTD.

CORE SAMPLE ANALYSIS

HOLE NO.: DH - 41 - 8 Lab. No. 8244 DATE: Feb/77

HEAD RAW ANALYSIS						
R.M. %	ASH %	V.M. %	F.C. %	S. %	H.G.I.	REMARKS
0.7	15.9	23.8	59.6	0.67	112	Air Dried Basis
	16.0	24.0	60.0	0.67	---	Dry Basis

SIZE/RAW ANALYSES								
SIZE FRACTION	WT. %	R.M. %	ASH %	S. %	CUMULATIVE WT. %	CUMULATIVE ASH %	CUMULATIVE S. %	
1/4" x 65M	89.4	2.0	16.1	0.70	89.4	16.1	0.70	A.D.B.
	89.3		16.4	0.71	89.3	16.4	0.71	D.B.
65M x 0	10.6	0.7	10.4	0.68	100.0	15.5	0.70	A.D.B.
	10.7		10.5	0.68	100.0	15.8	0.71	D.B.

SINK-FLOAT ANALYSIS: 1/4" x 65M									
S. G.	WT. %	R.M. %	ASH %	V.M. %	F.C. %	S. %	CUMULATIVE WT. %	CUMULATIVE ASH %	
-1.40	73.6	2.2	4.6	25.5	67.7	0.73	73.6	4.6	A.D.B.
	73.5		4.7	26.1	69.2	0.75	73.5	4.7	D.B.
1.40-1.50	5.7	1.2	20.9	21.1	56.8	0.56	79.3	5.8	A.D.B.
	5.8		21.2	21.4	57.4	0.57	79.3	5.9	D.B.
1.50-1.60	2.1	1.8	28.0				81.4	6.3	A.D.B.
	2.1		28.5				81.4	6.5	D.B.
+1.60	18.6	1.6	61.6				100.0	16.6	A.D.B.
	18.6		62.6				100.0	16.9	D.B.

COMPOSITE 1/4" x 65M FLOATS @ 1.50 S.G., A.D.B.						
F.S.I.	P% ON COAL	DILATATION TEST				
		SOFTENING TEMP. (°C)	MAX. DIL. TEMP. (°C)	MAXIMUM CONTR. %	MAXIMUM DIL. %	G. NO.
9	.05	372	431	16	177	1.065

Birtley Engineering

Subsidiary of Great West Steel Industries

Lab. No. 8244 Date Feb. 12, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-41-8

Starting Temperature °C: 350

Softening Temperature °C: 372

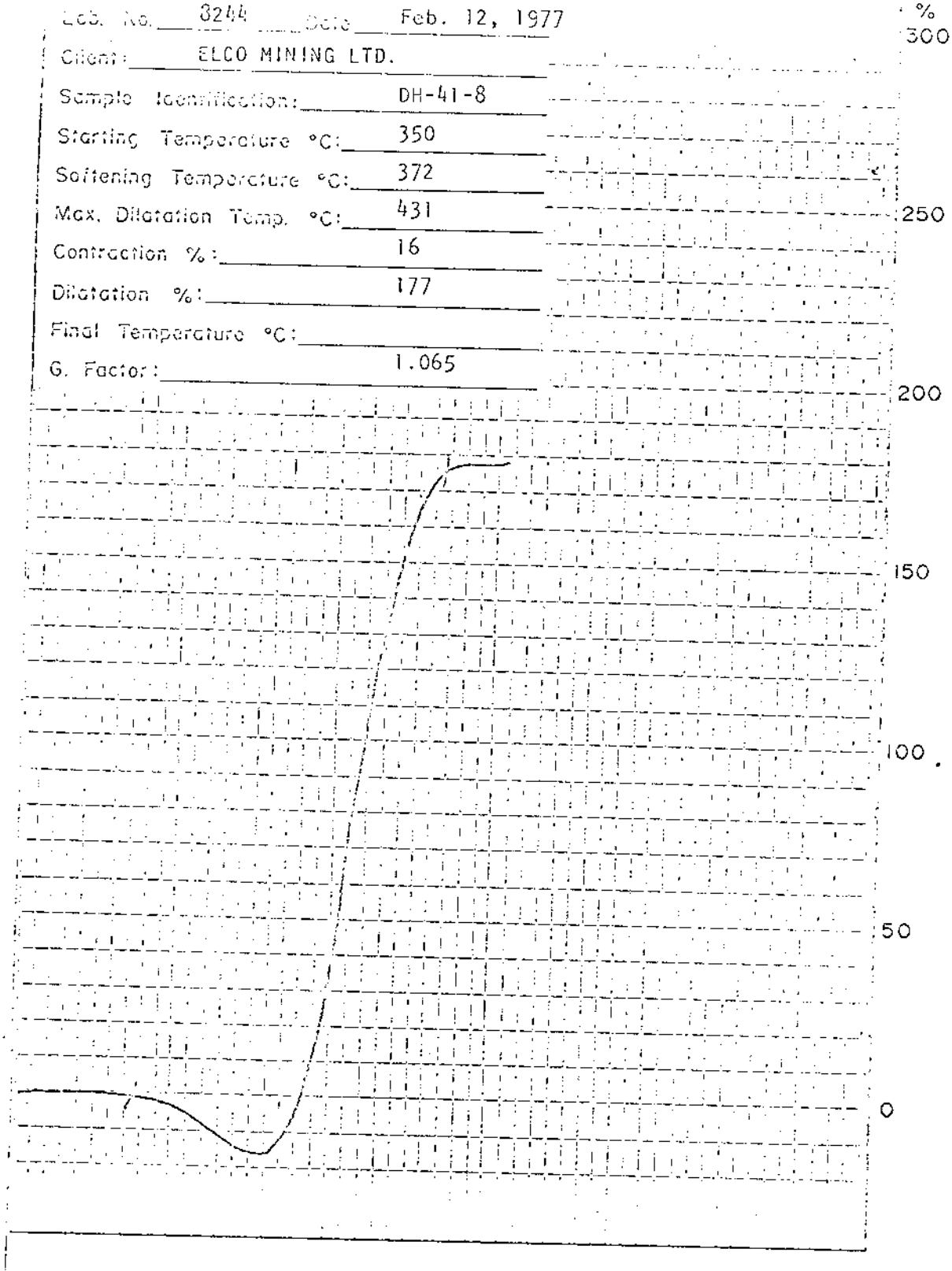
Max. Dilatation Temp. °C: 431

Contraction %: 16

Dilatation %: 177

Final Temperature °C:

G. Factor: 1.065



BARTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

ELCO MINING LTD.

CORE SAMPLE ANALYSIS

HOLE NO.: DH - 41 - 9 Lab. No. 8245 DATE: Feb/77

HEAD RAW ANALYSIS						
R.M. %	ASH %	V.M. %	F.C. %	S. %	H.G.I.	REMARKS
0.8	12.0	23.3	63.9	0.90	100	Air Dried Basis
	12.1	23.5	64.4	0.91	---	Dry Basis

SIZE / RAW ANALYSES								
SIZE FRACTION	WT. %	R.M. %	ASH %	S. %	CUMULATIVE WT. %	CUMULATIVE ASH %	CUMULATIVE S. %	
1/4" x 65M	94.8	1.1	12.9	0.86	94.8	12.9	0.86	A.D.B.
	94.7		13.0	0.87	94.7	13.0	0.87	D.B.
65M x 0	5.2	0.7	10.2	0.86	100.0	12.8	0.86	A.D.B.
	5.3		10.3	0.87	100.0	12.9	0.87	D.B.

SINK - FLOAT ANALYSIS: 1/4" x 65M									
S. G.	WT. %	R.M. %	ASH %	V.M. %	F.C. %	S. %	CUMULATIVE WT. %	CUMULATIVE ASH %	
-1.40	80.9	1.0	4.6	25.6	68.8	0.94	80.9	4.6	A.D.B.
	80.9		4.6	25.9	69.5	0.95	80.9	4.6	D.B.
1.40-1.50	4.2	1.1	23.6	21.6	53.7	0.75	85.1	5.5	A.D.B.
	4.2		23.9	21.8	54.3	0.76	85.1	5.6	D.B.
1.50-1.60	4.6	0.9	34.9				89.7	7.0	A.D.B.
	4.6		35.2				89.7	7.1	D.B.
+1.60	10.3	0.8	64.4				100.0	13.0	A.D.B.
	10.3		64.9				100.0	13.0	D.B.

COMPOSITE 1/4" x 65M FLOATS @ 1.50 S.G., A.D.B.						
F.S.I.	P% ON COAL	DILATATION TEST				
		SOFTENING TEMP. (°C)	MAX. DIL. TEMP. (°C)	MAXIMUM CONTR. %	MAXIMUM DIL. %	G. NO.
9	.03	371	428	18	230	1.065

Birtley Engineering

Subsidiary of Great West Steel Industries

Lab. No. 8245 Date Feb. 12, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-41-9

Starting Temperature °C: 350

Softening Temperature °C: 371

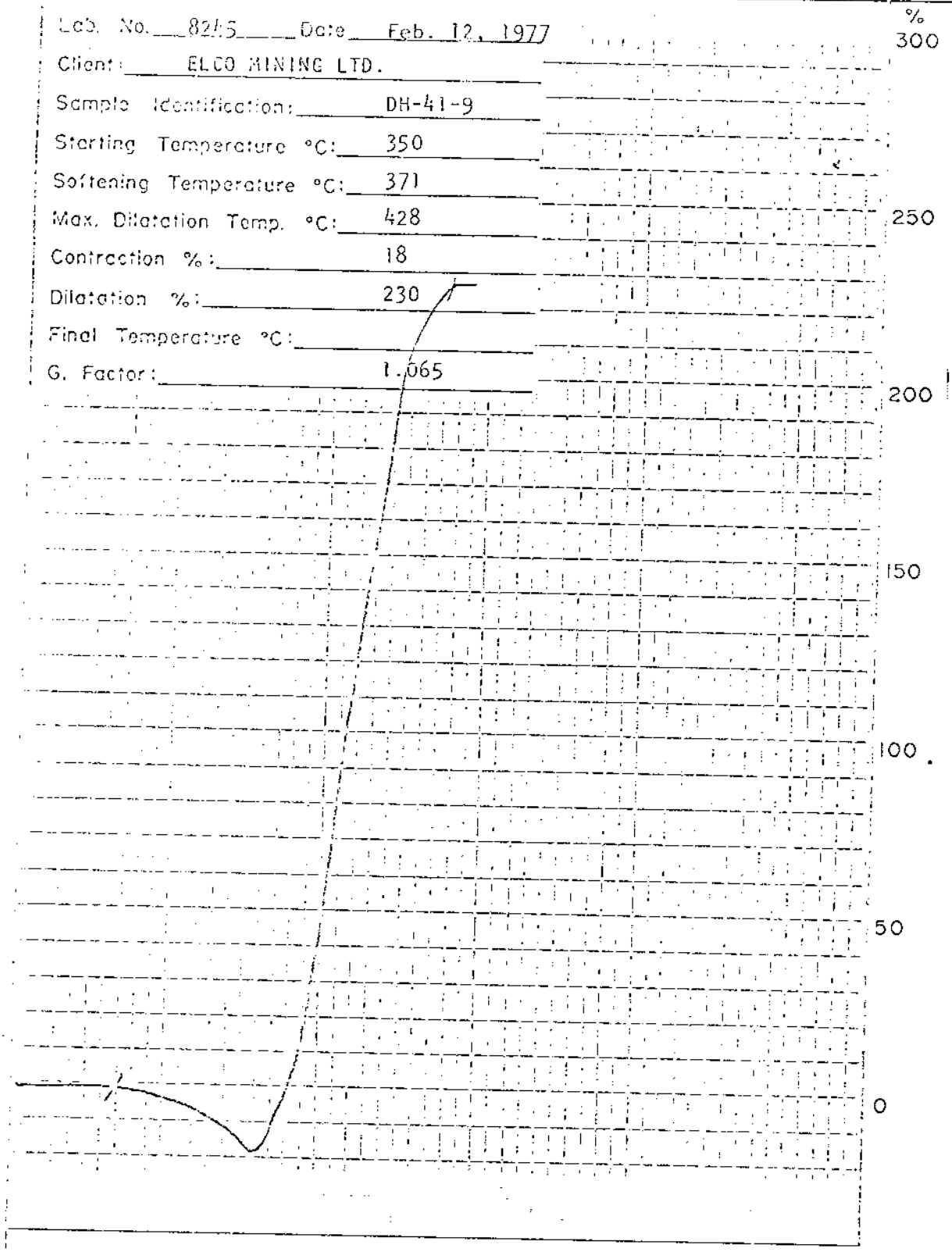
Max. Dilatation Temp. °C: 428

Contraction %: 18

Dilatation %: 230

Final Temperature °C:

G. Factor: 1.065



DIETLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

ELCO MINING LTD.

CORE SAMPLE ANALYSIS

HOLE NO.: DH - 41 - 11 Lab. No. 8246 DATE: Feb/77

HEAD RAW ANALYSIS						
R.M. %	ASH %	V.M. %	F.C. %	S. %	H.G.I.	REMARKS
1.1	38.7	17.3	42.9	0.78	74	Air Dried Basis
	39.1	17.5	43.4	0.79	--	Dry Basis

SIZE/RAW ANALYSES								
SIZE FRACTION	WT. %	R.M. %	ASH %	S. %	CUMULATIVE WT. %	CUMULATIVE ASH %	CUMULATIVE S. %	
1/4" x 65M	93.9	1.1	39.6	0.74	93.9	39.6	0.74	A.D.B.
	93.8		40.0	0.75	93.8	40.0	0.75	D.B.
65M x 0	6.1	0.7	23.1	0.89	100.0	38.6	0.75	A.D.B.
	6.2		23.3	0.90	100.0	39.0	0.76	D.B.

SINK-FLOAT ANALYSIS: 1/4" x 65M									
S. G.	WT. %	R.M. %	ASH %	V.M. %	F.C. %	S. %	CUMULATIVE WT. %	CUMULATIVE ASH %	
-1.40	27.1	0.9	6.6	24.3	68.2	1.05	27.1	6.6	A.D.B.
	27.2		6.7	24.5	68.8	1.06	27.2	6.7	D.B.
1.40-1.50	17.8	1.0	13.8	23.0	62.2	0.92	44.9	9.5	A.D.B.
	17.8		13.9	23.2	62.9	0.93	45.0	9.5	D.B.
1.50-1.60	6.1	1.0	30.5				51.0	12.0	A.D.B.
	6.1		30.8				51.1	12.1	D.B.
+1.60	49.0	1.2	67.2				100.0	39.0	A.D.B.
	48.9		68.0				100.0	39.4	D.B.

COMPOSITE 1/4" x 65M FLOATS @ 1.50 S.G., A.D.B.						
F.S.I.	P% ON COAL	DILATATION TEST				
		SOFTENING TEMP. (°C)	MAX. DIL. TEMP. (°C)	MAXIMUM CONTR. %	MAXIMUM DIL. %	G. NO.
9	.11	371	431	20	221	1.067

Birtley Engineering

Subsidiary of Great West Steel Industries

Lab. No. 8246 Date Feb. 12, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-41-11

Starting Temperature °C: 350

Softening Temperature °C: 371

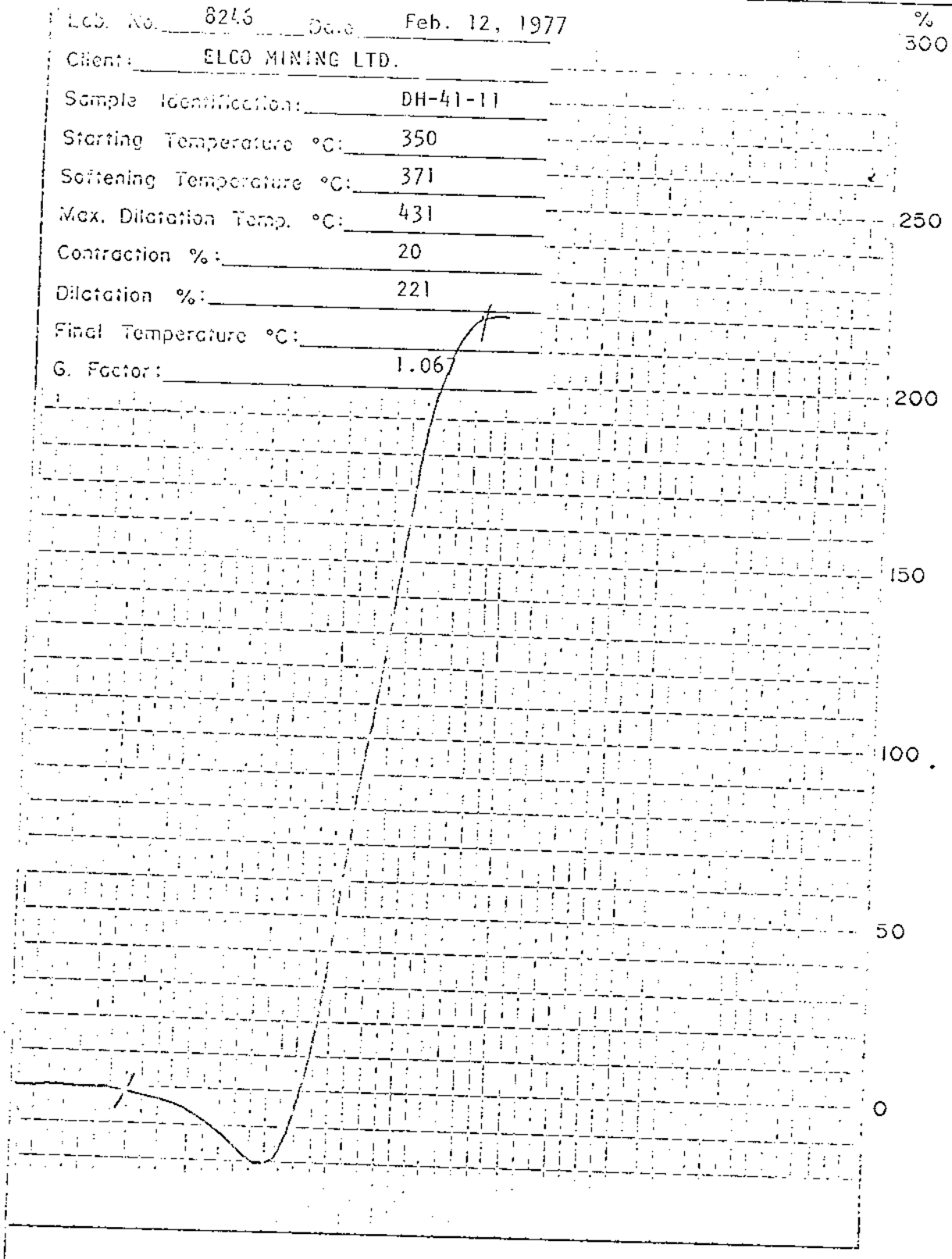
Max. Dilatation Temp. °C: 431

Contraction %: 20

Dilatation %: 221

Final Temperature °C:

G. Factor: 1.067



BIRTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. 7965 Date Jan 12, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-42-1

Starting Temperature °C: 350

Softening Temperature °C: 367

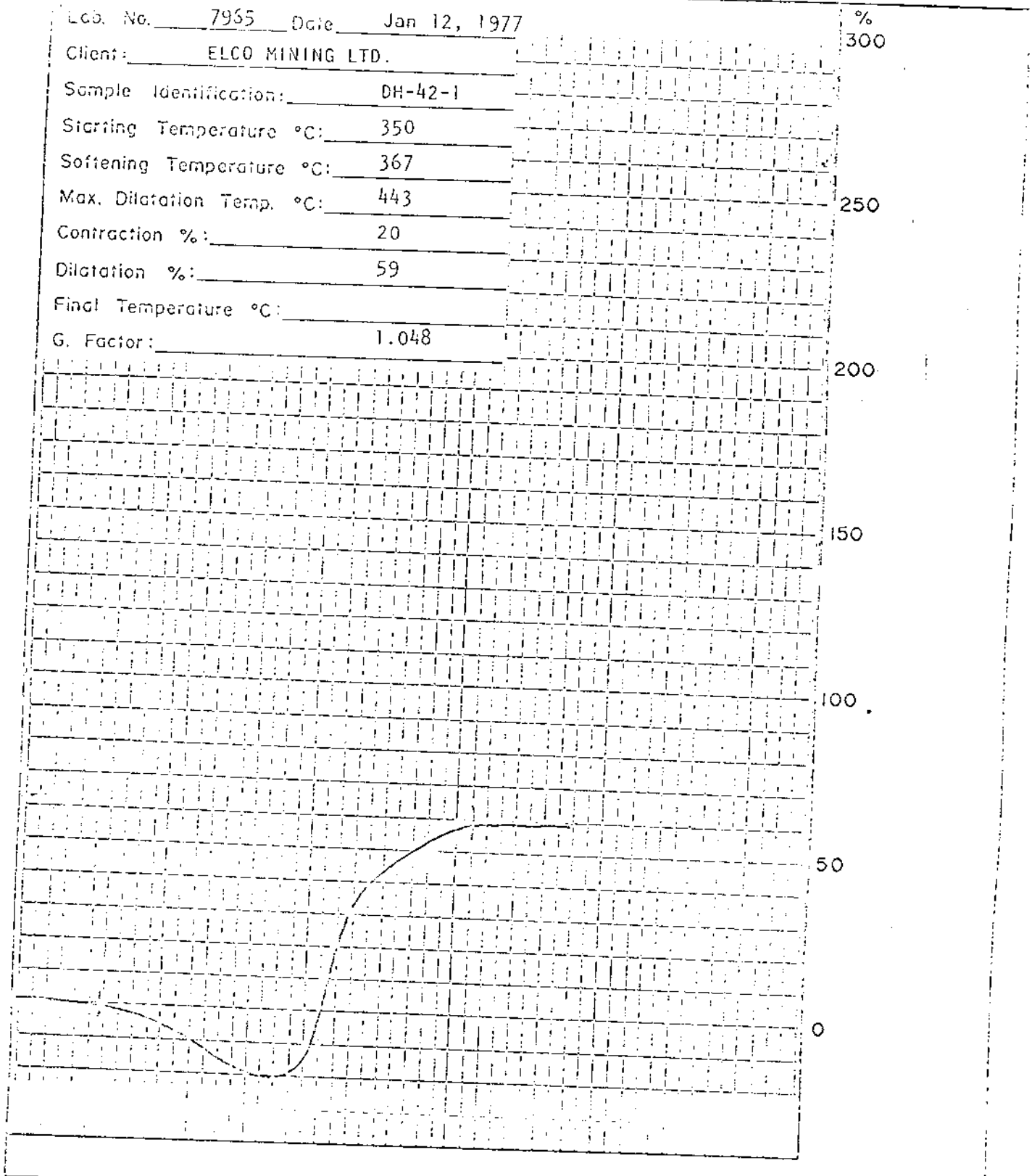
Max. Dilatation Temp. °C: 443

Contraction %: 20

Dilatation %: 59

Final Temperature °C:

G. Factor: 1.048



BARTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. 7966 Date Jan. 12, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-42-2

Starting Temperature °C: 350

Softening Temperature °C: 357

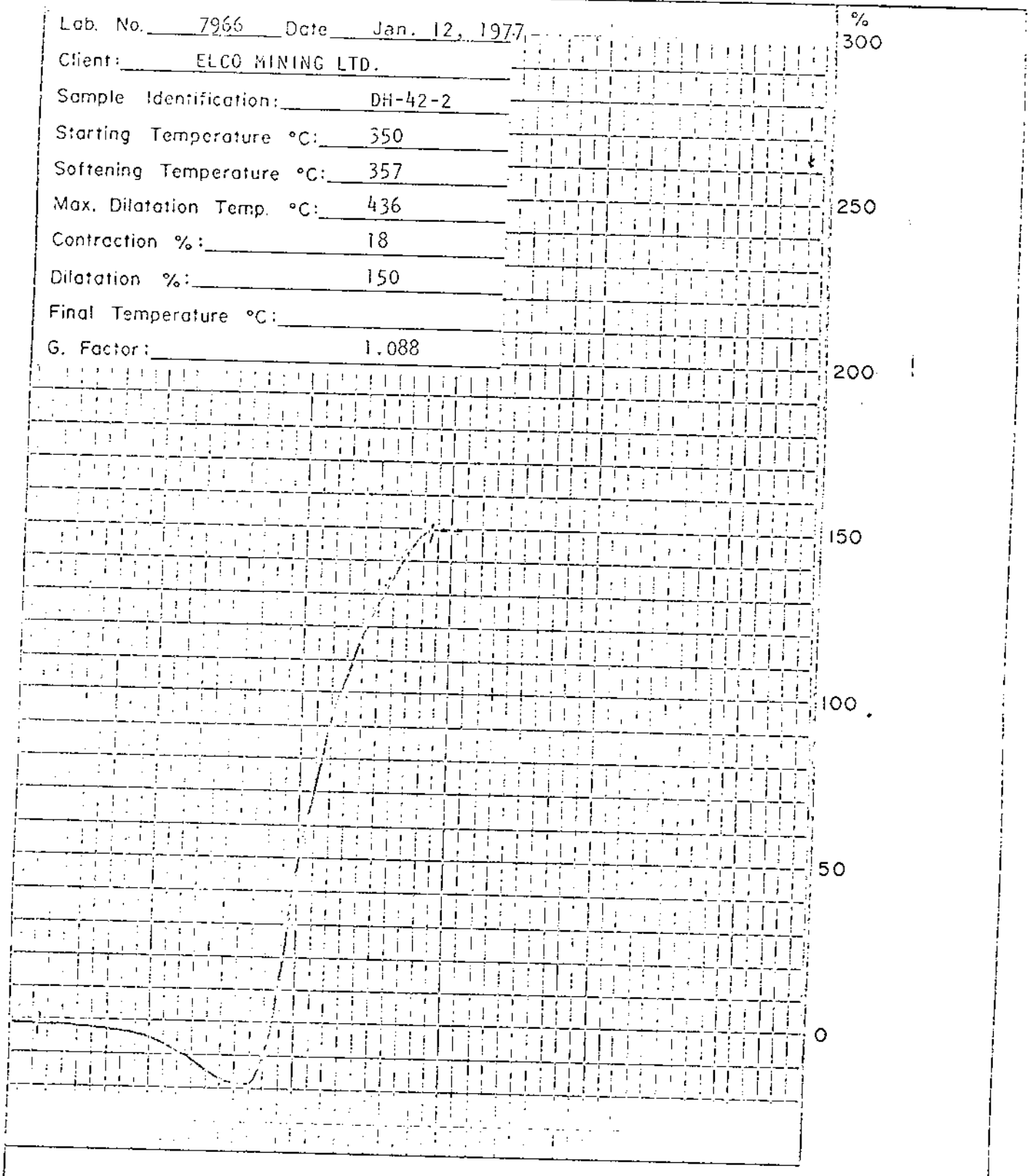
Max. Dilatation Temp. °C: 436

Contraction %: 18

Dilatation %: 150

Final Temperature °C:

G. Factor: 1.088



BIRTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. 7967 Date Jan. 12, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-42-3

Starting Temperature °C: 350

Softening Temperature °C: 364

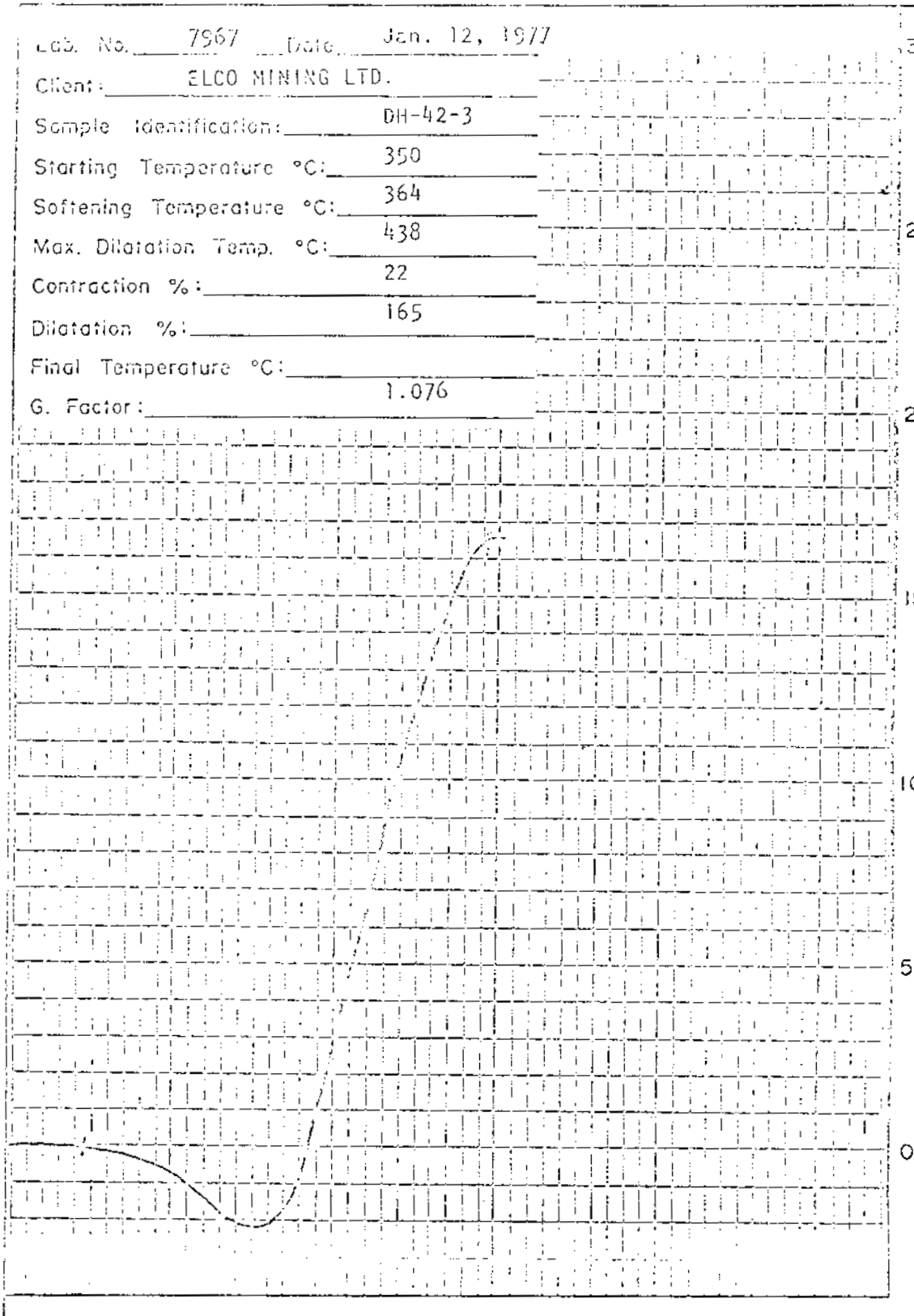
Max. Dilatation Temp. °C: 438

Contraction %: 22

Dilatation %: 165

Final Temperature °C:

G. Factor: 1.076



BIRTLEY ENGINEERING (CANADA) LTD.

Title	Date
RUHR DILATOMETER TEST	
	Drawn

Lab. No. 7968 Date Jan. 12, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-42-4

Starting Temperature °C: 350

Softening Temperature °C: 361

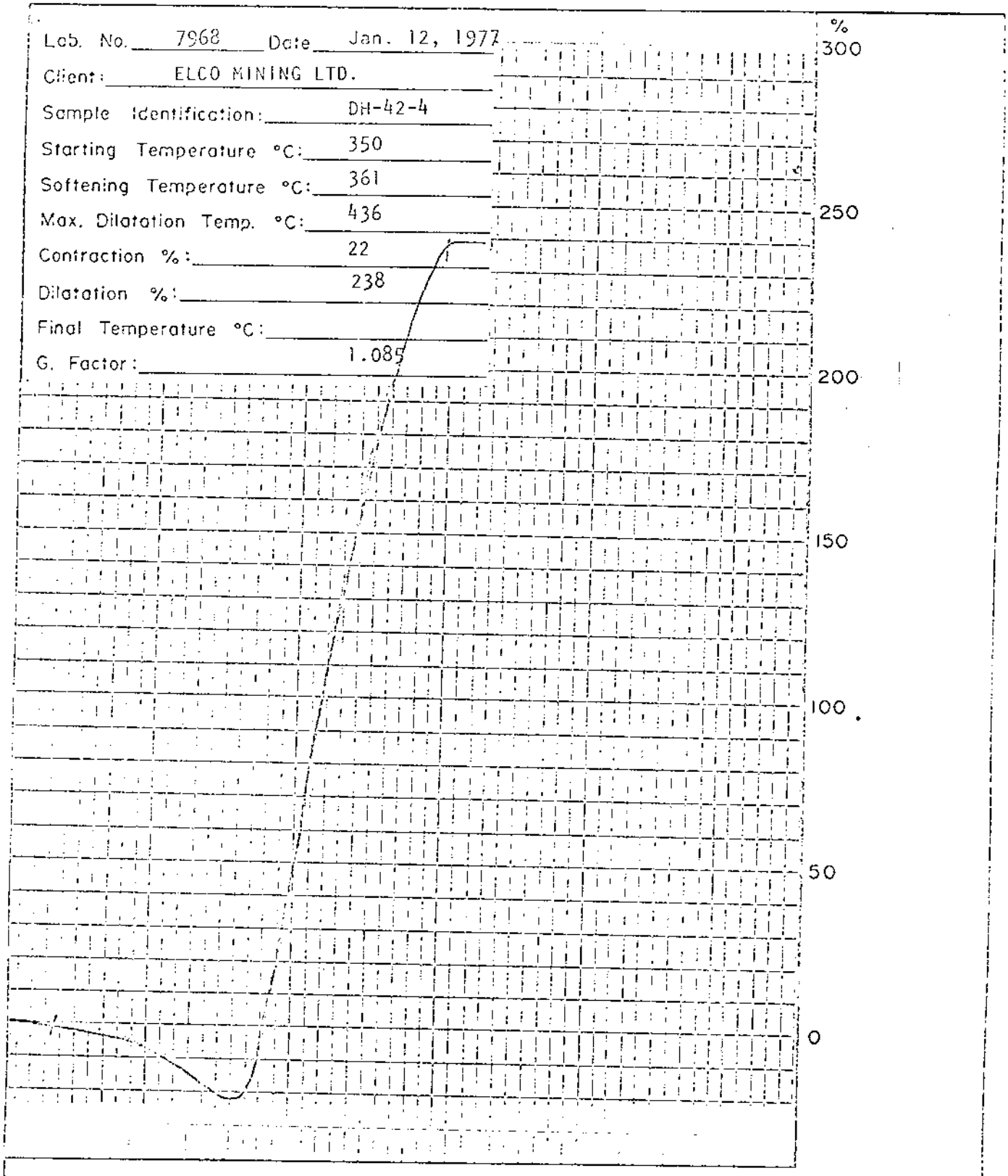
Max. Dilatation Temp. °C: 436

Contraction %: 22

Dilatation %: 238

Final Temperature °C:

G. Factor: 1.085



BIRTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. 7969 Date Jan 12, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-42-5

Starting Temperature °C: 350

Softening Temperature °C: 369

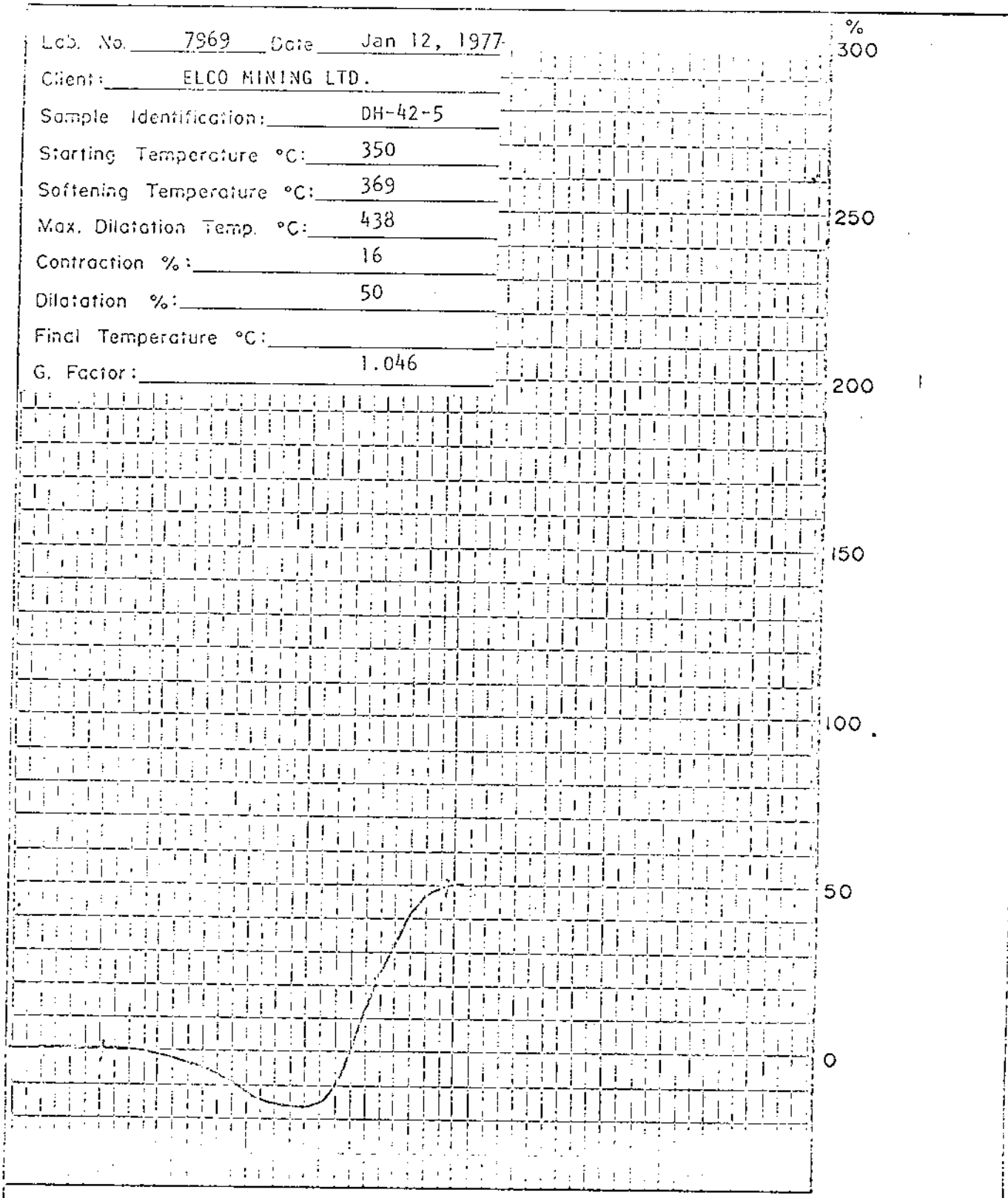
Max. Dilatation Temp. °C: 438

Contraction %: 16

Dilatation %: 50

Final Temperature °C:

G. Factor: 1.046



BARTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. 7970 Date Jan 12, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-4206

Starting Temperature °C: 350

Softening Temperature °C: 355

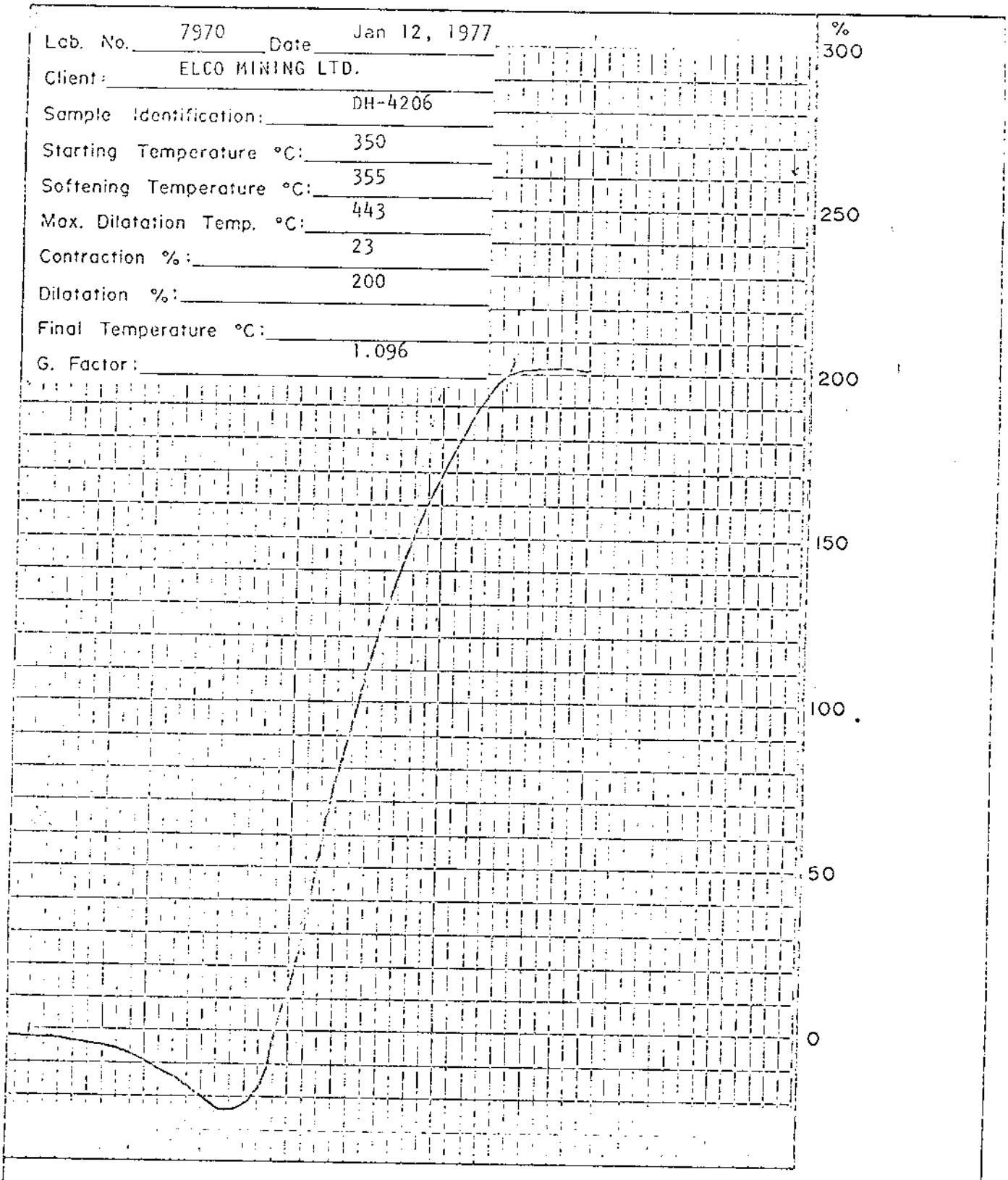
Max. Dilatation Temp. °C: 443

Contraction %: 23

Dilatation %: 200

Final Temperature °C:

G. Factor: 1.096



BIRTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. 7971 Date Jan 12, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-42-7

Starting Temperature °C: 350

Softening Temperature °C: 358

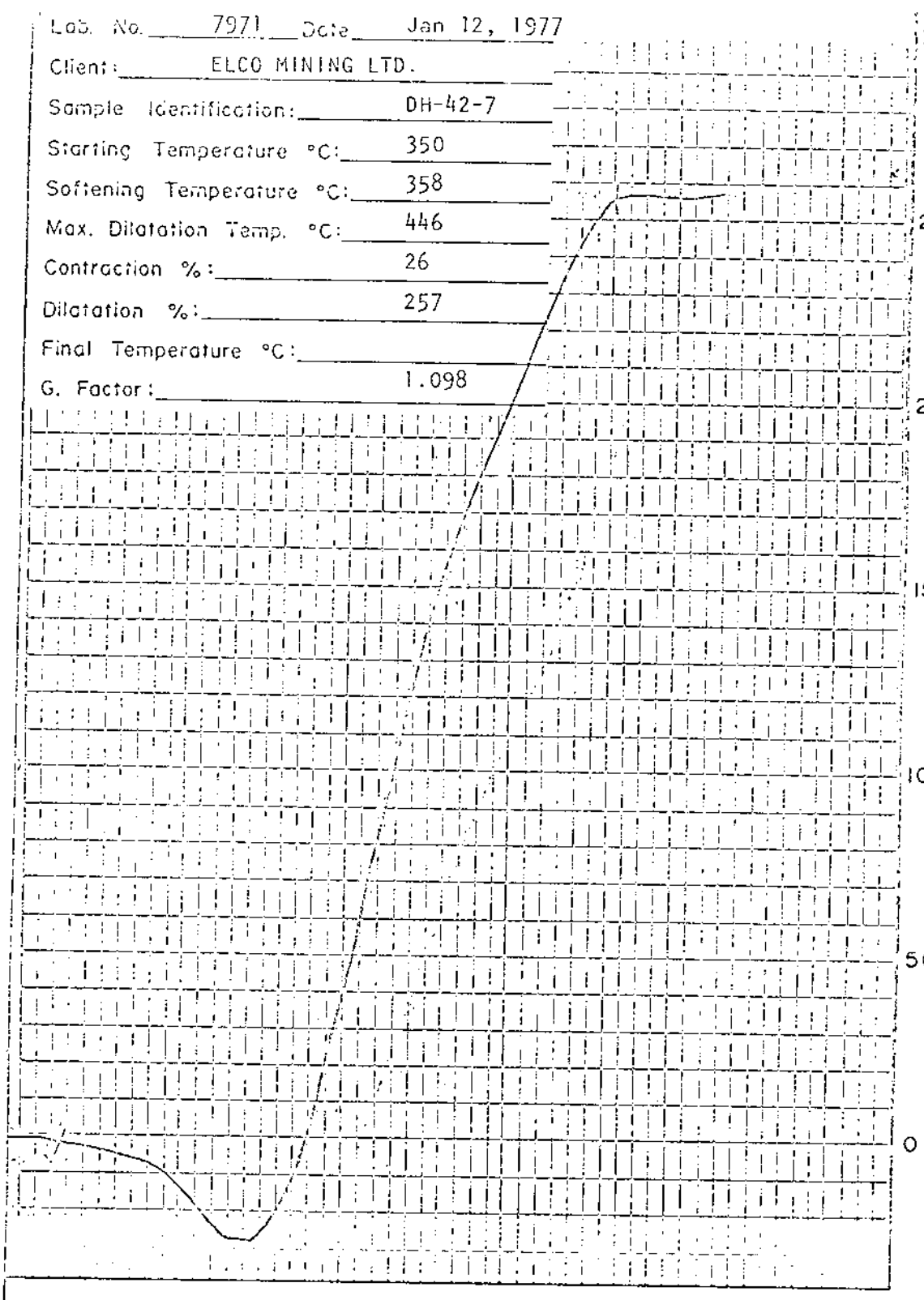
Max. Dilatation Temp. °C: 446

Contraction %: 26

Dilatation %: 257

Final Temperature °C:

G. Factor: 1.098



BIRTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. 8020 Date Jan 16, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-43-1

Starting Temperature °C: 350

Softening Temperature °C: 357

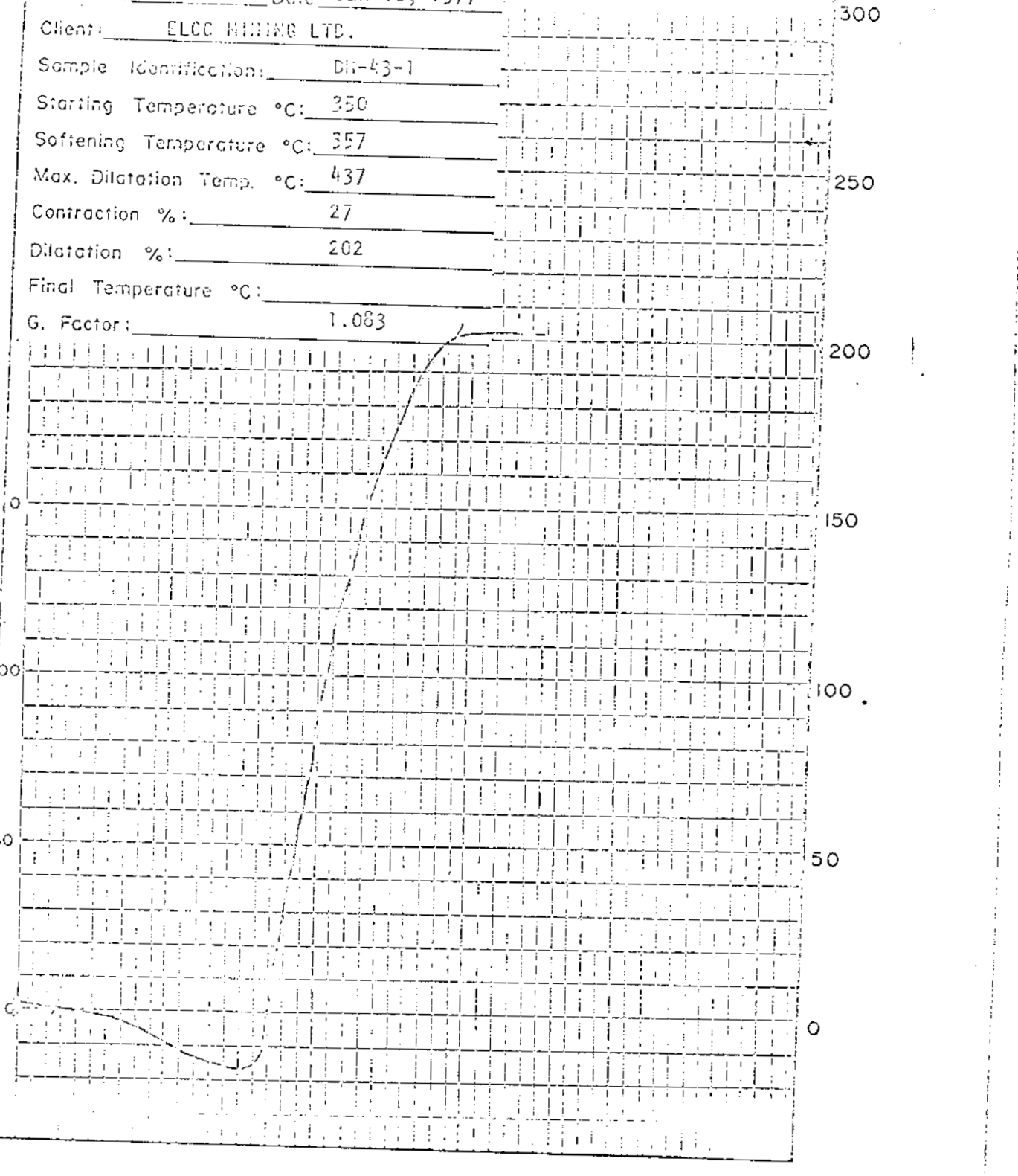
Max. Dilatation Temp. °C: 437

Contraction %: 27

Dilatation %: 202

Final Temperature °C:

G. Factor: 1.083



DIPTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. 6021 Date Jan 16, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-43-2

Starting Temperature °C: 350

Softening Temperature °C: 352

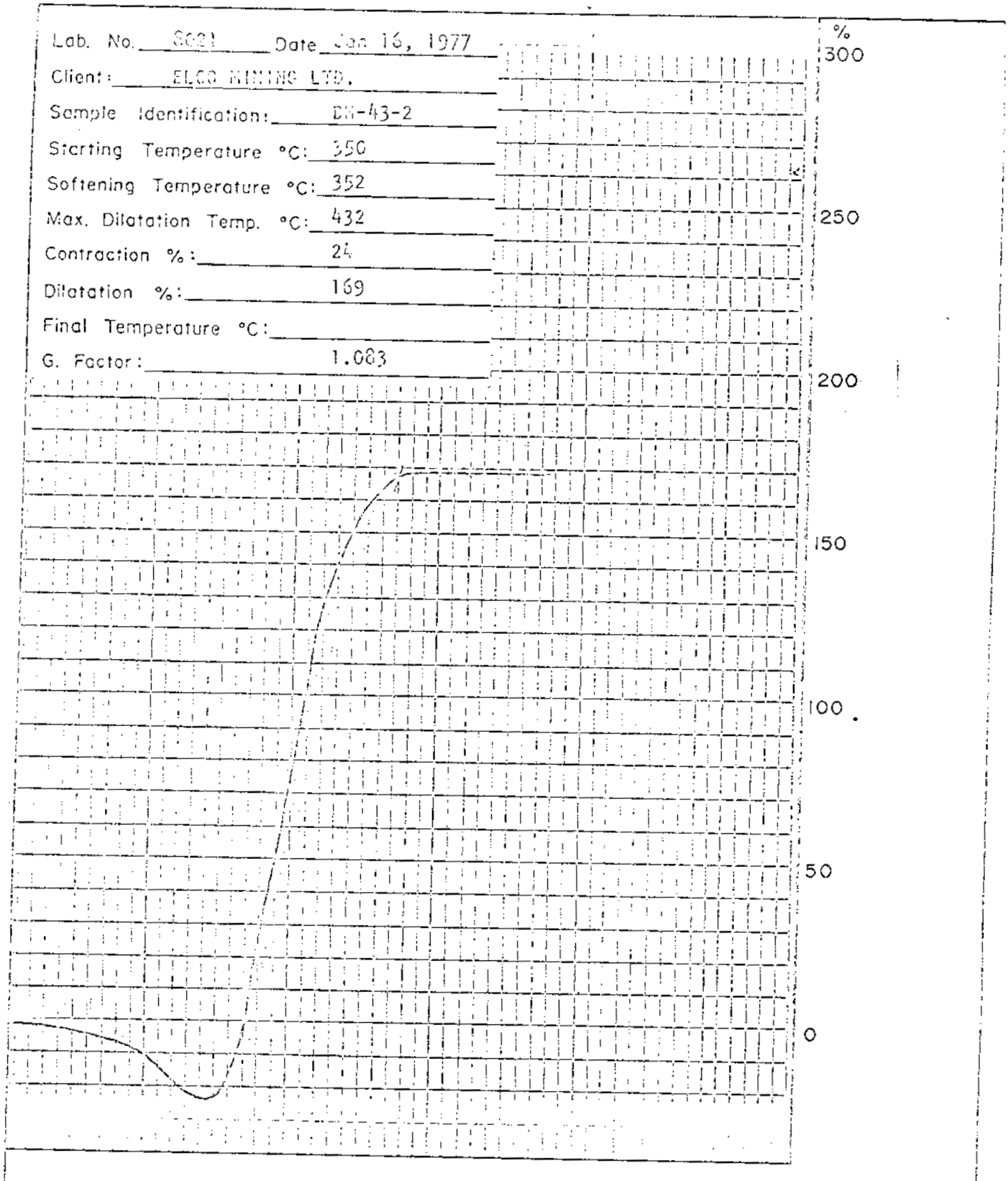
Max. Dilatation Temp. °C: 432

Contraction %: 24

Dilatation %: 169

Final Temperature °C:

G. Factor: 1.083



BARTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. 2022 Date Jan 16, 1977

Client: ELSO MINING LTD.

Sample Identification: DH-44-1

Starting Temperature °C: 350

Softening Temperature °C: 397

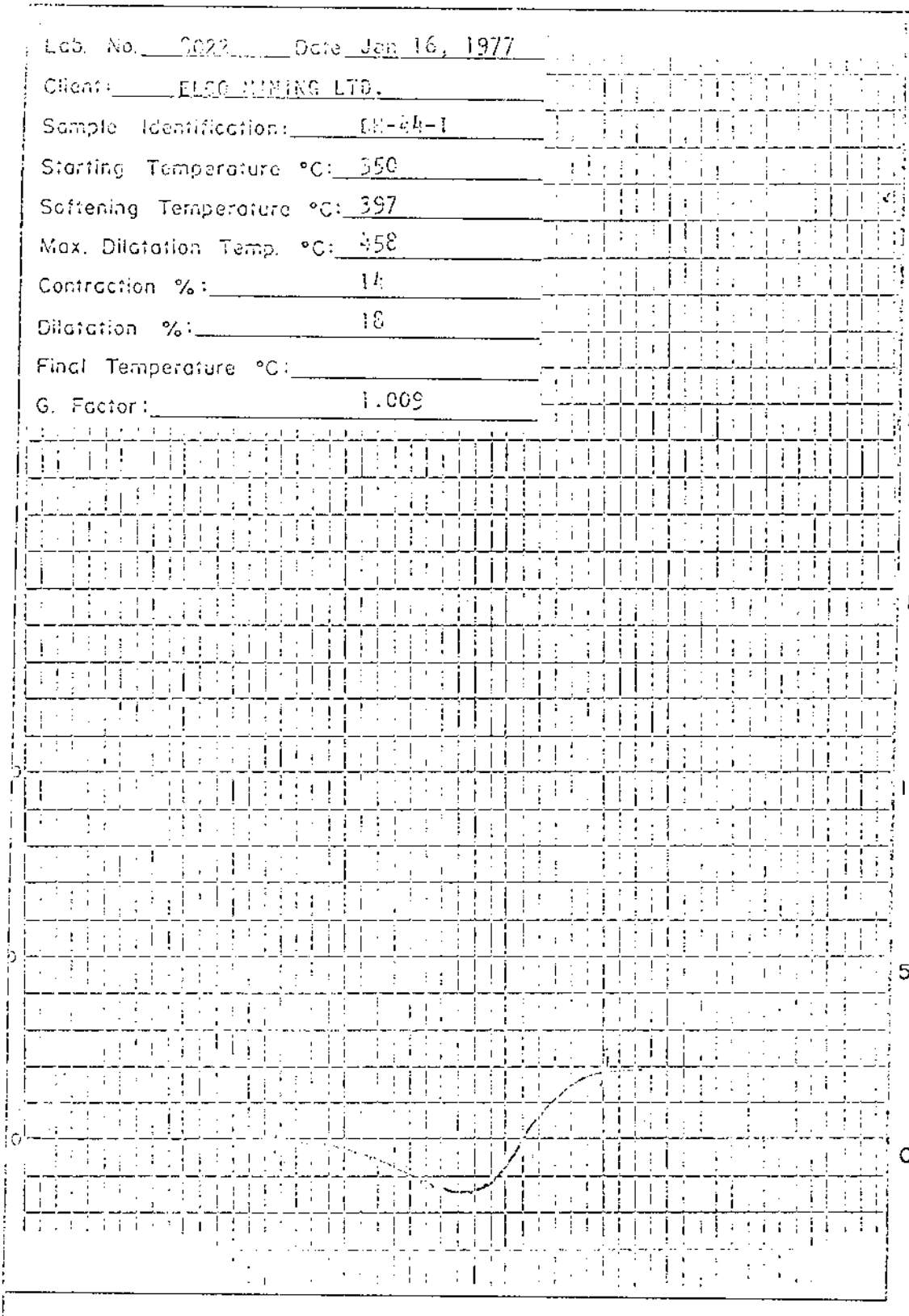
Max. Dilatation Temp. °C: 458

Contraction %: 14

Dilatation %: 18

Final Temperature °C:

G. Factor: 1.009



BARTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. 8022 Date Jan 16, 1977

Client: ELCO MINING LTD.

Sample Identification: BH-44-2

Starting Temperature °C: 350

Softening Temperature °C: 382

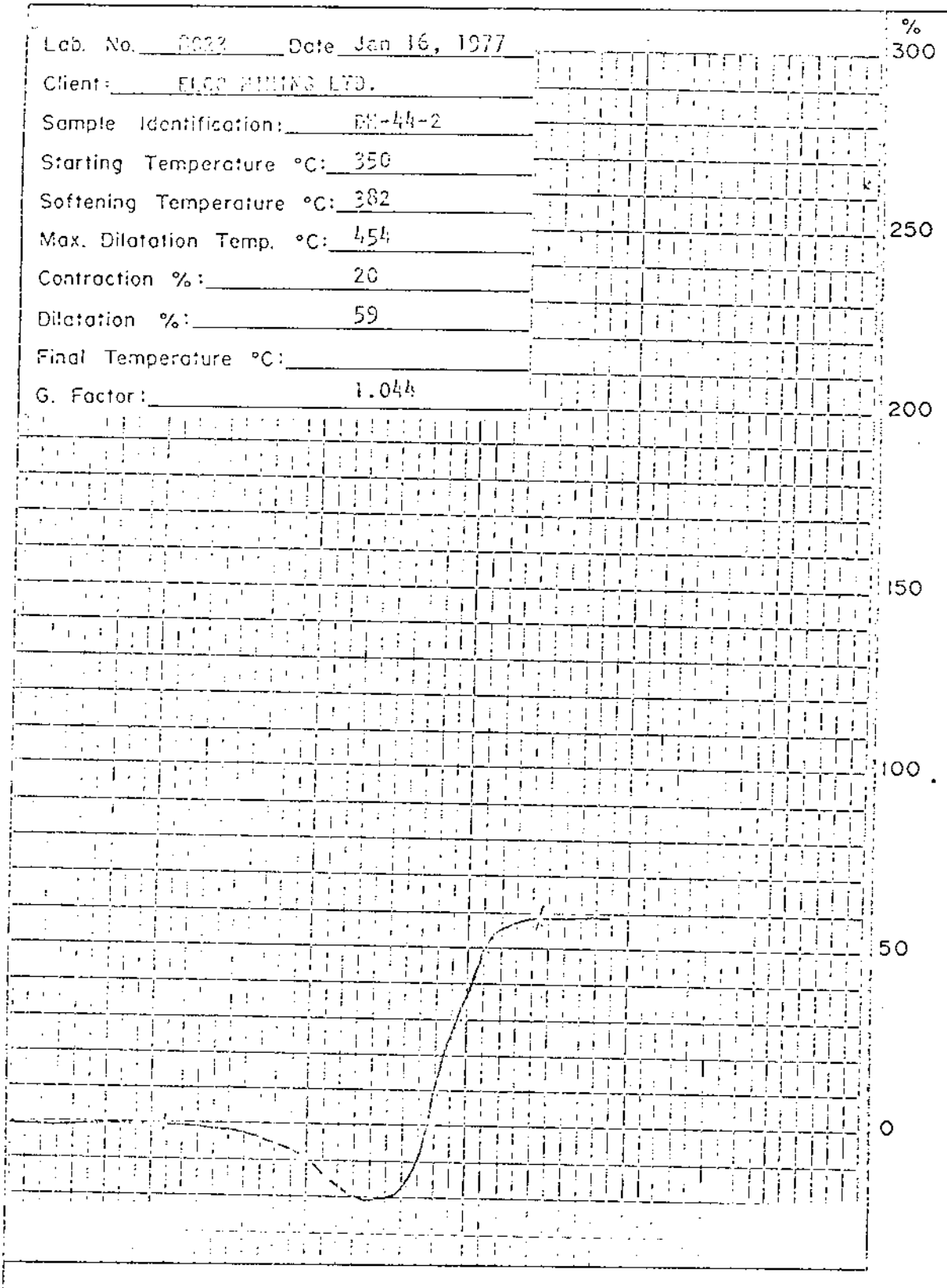
Max. Dilatation Temp. °C: 454

Contraction %: 20

Dilatation %: 59

Final Temperature °C:

G. Factor: 1.044



BARTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. 6821 Date Jan 16, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-44-3

Starting Temperature °C: 350

Softening Temperature °C: 384

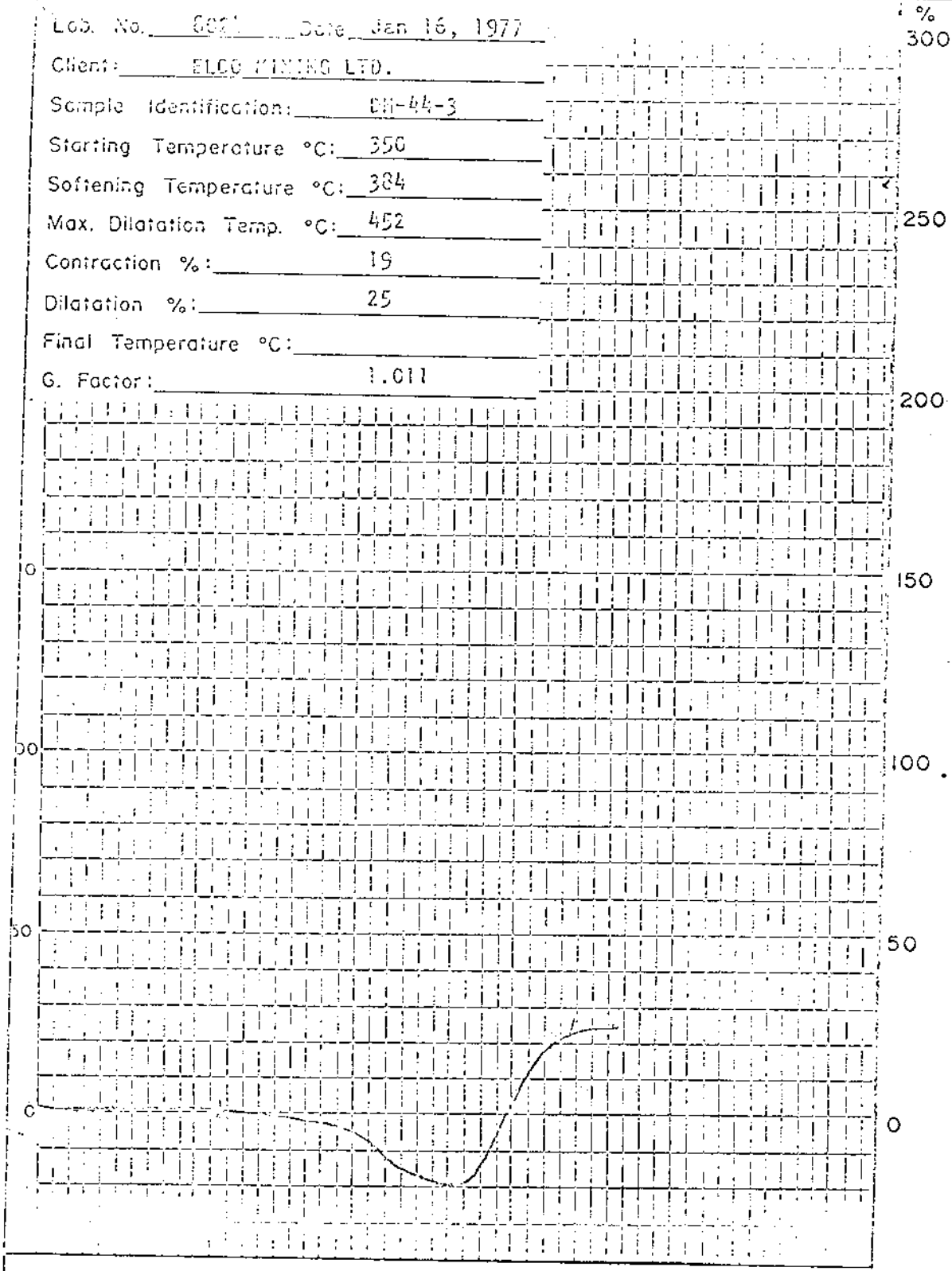
Max. Dilatation Temp. °C: 452

Contraction %: 19

Dilatation %: 25

Final Temperature °C:

G. Factor: 1.011



BARTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. 7972 Date Jan. 12, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-45-1

Starting Temperature °C: 350

Softening Temperature °C: 399

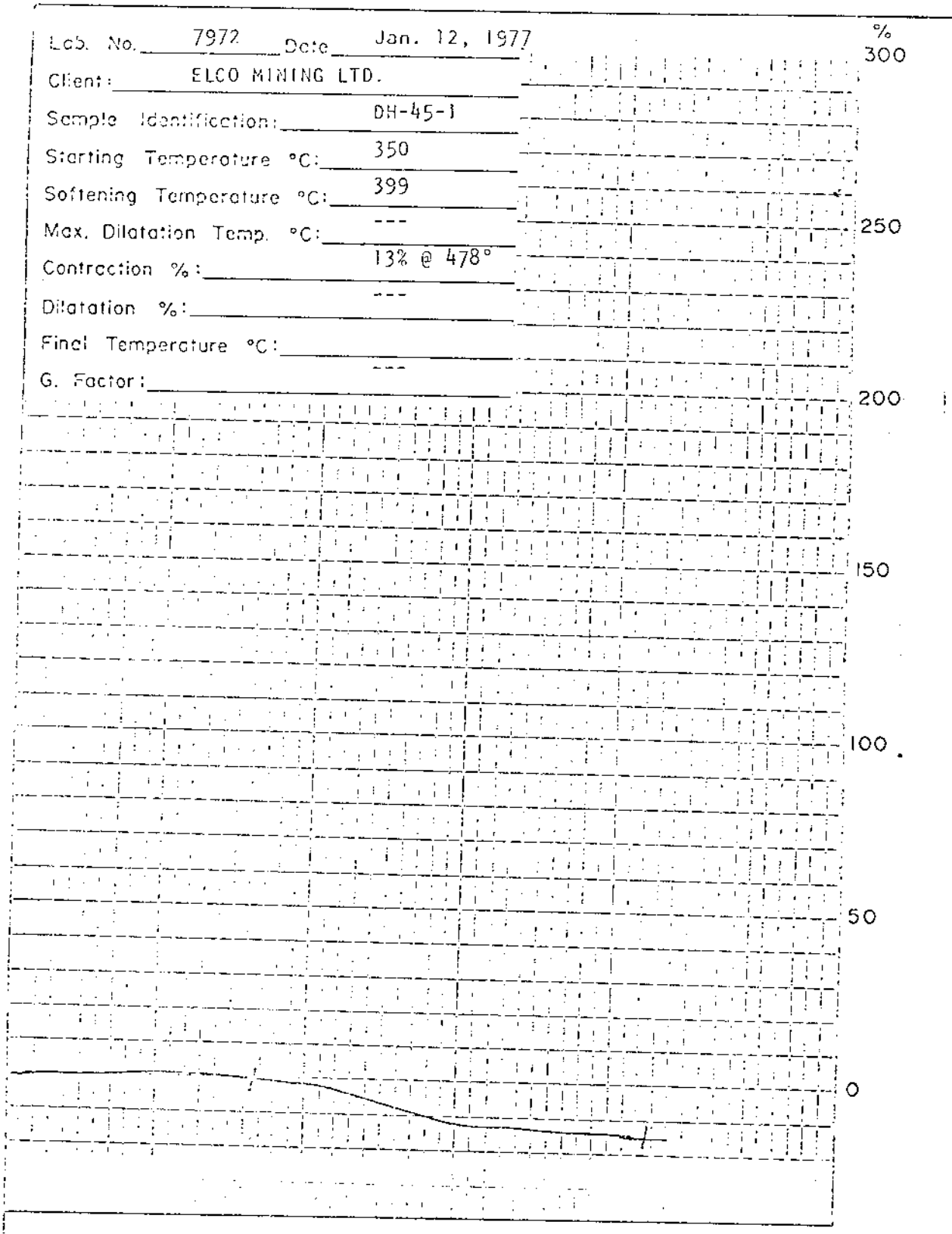
Max. Dilatation Temp. °C: ---

Contraction %: 13% @ 478°

Dilatation %: ---

Final Temperature °C: ---

G. Factor: ---



TURTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. 7973 Date Jan 12, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-45-2

Starting Temperature °C: 350

Softening Temperature °C: 391

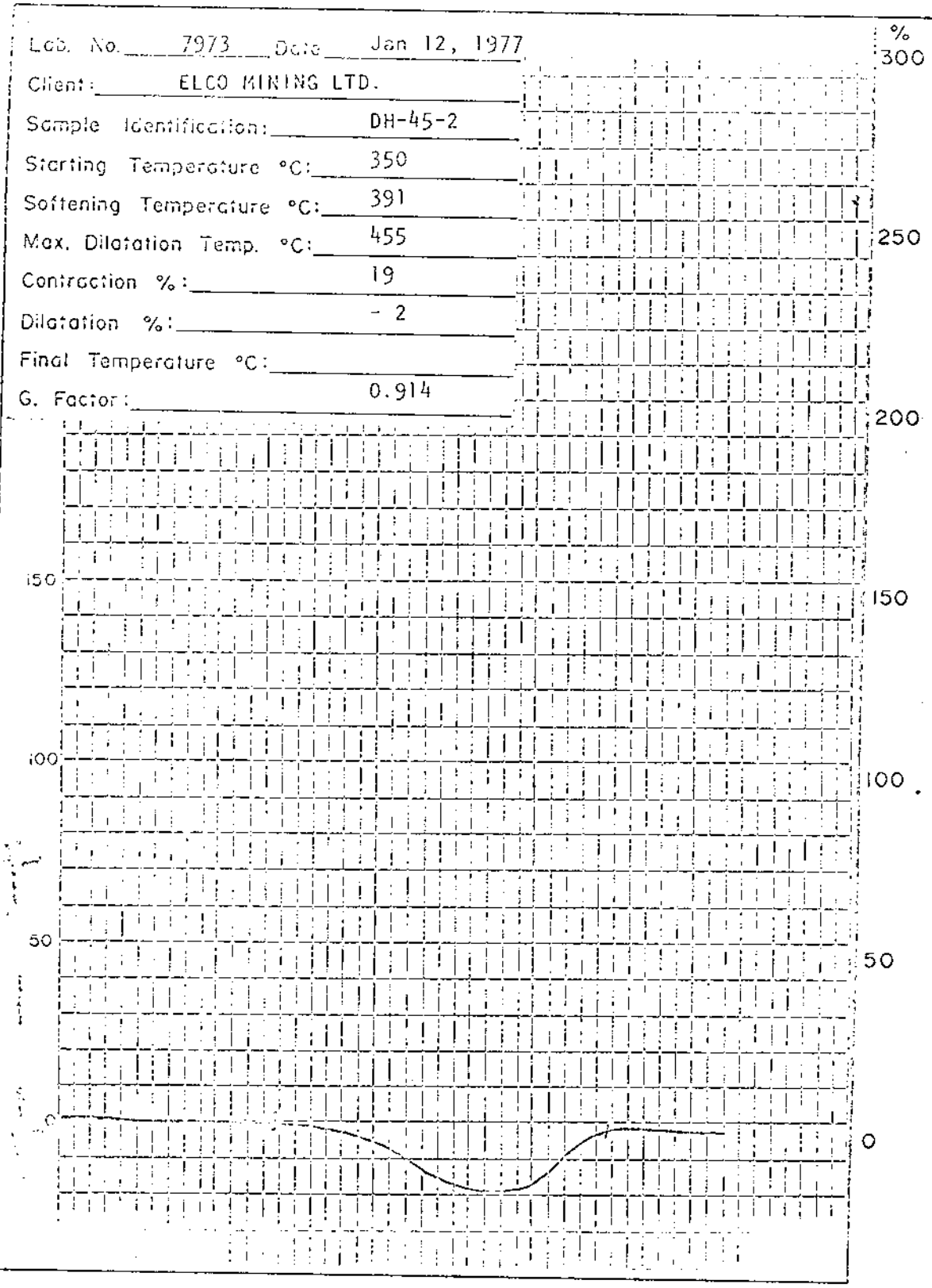
Max. Dilatation Temp. °C: 455

Contraction %: 19

Dilatation %: - 2

Final Temperature °C:

G. Factor: 0.914



BARTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. 7974 Date Jan 12, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-45-3

Starting Temperature °C: 350

Softening Temperature °C: 400

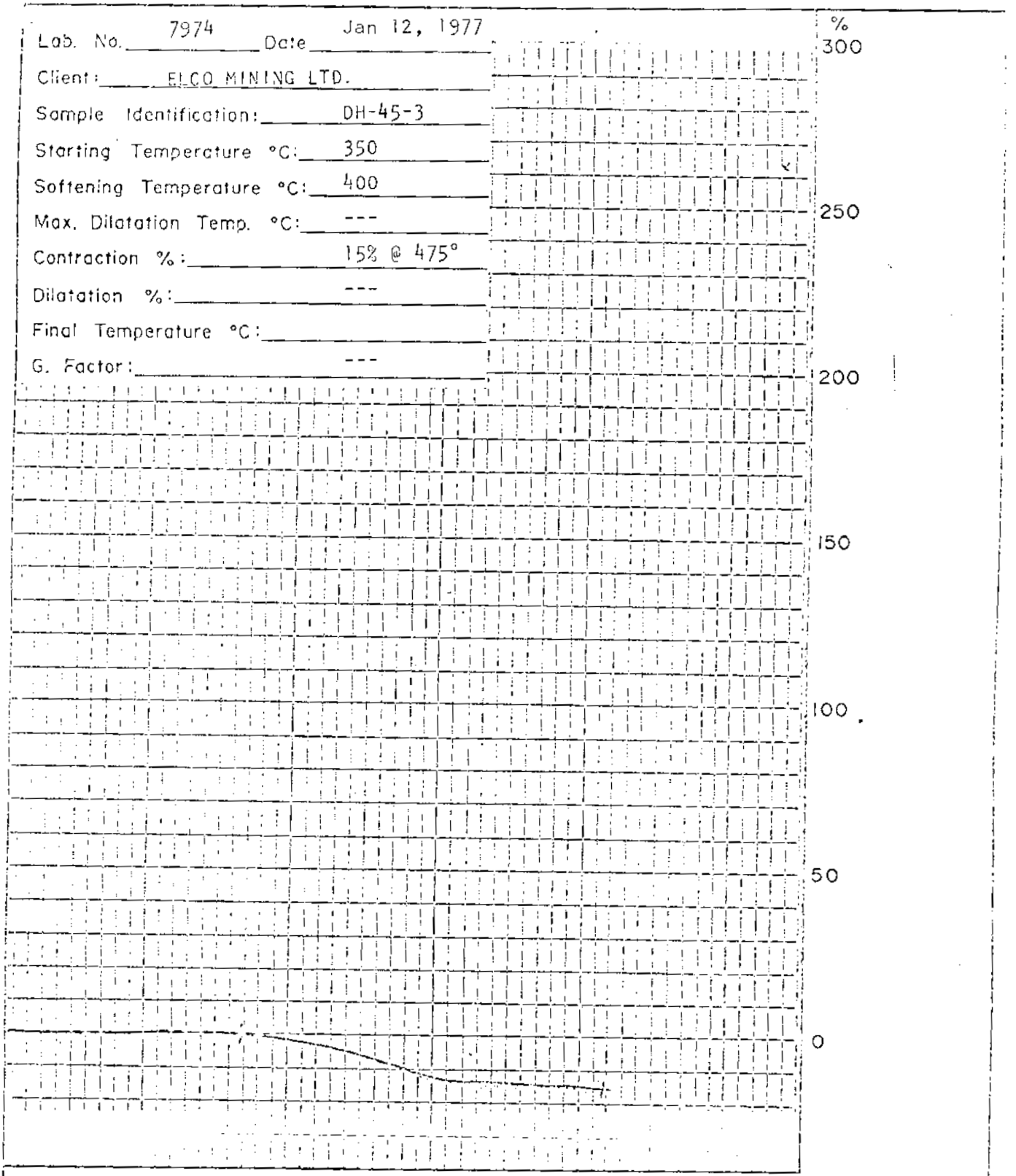
Max. Dilatation Temp. °C: ---

Contraction %: 15% @ 475°

Dilatation %: ---

Final Temperature °C:

G. Factor: ---



BIRTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. 7975 Date Jan 12, 1977

Client: ELCO MINING LTD.

Sample Identification: BR-45-4

Starting Temperature °C: 350

Softening Temperature °C: 364

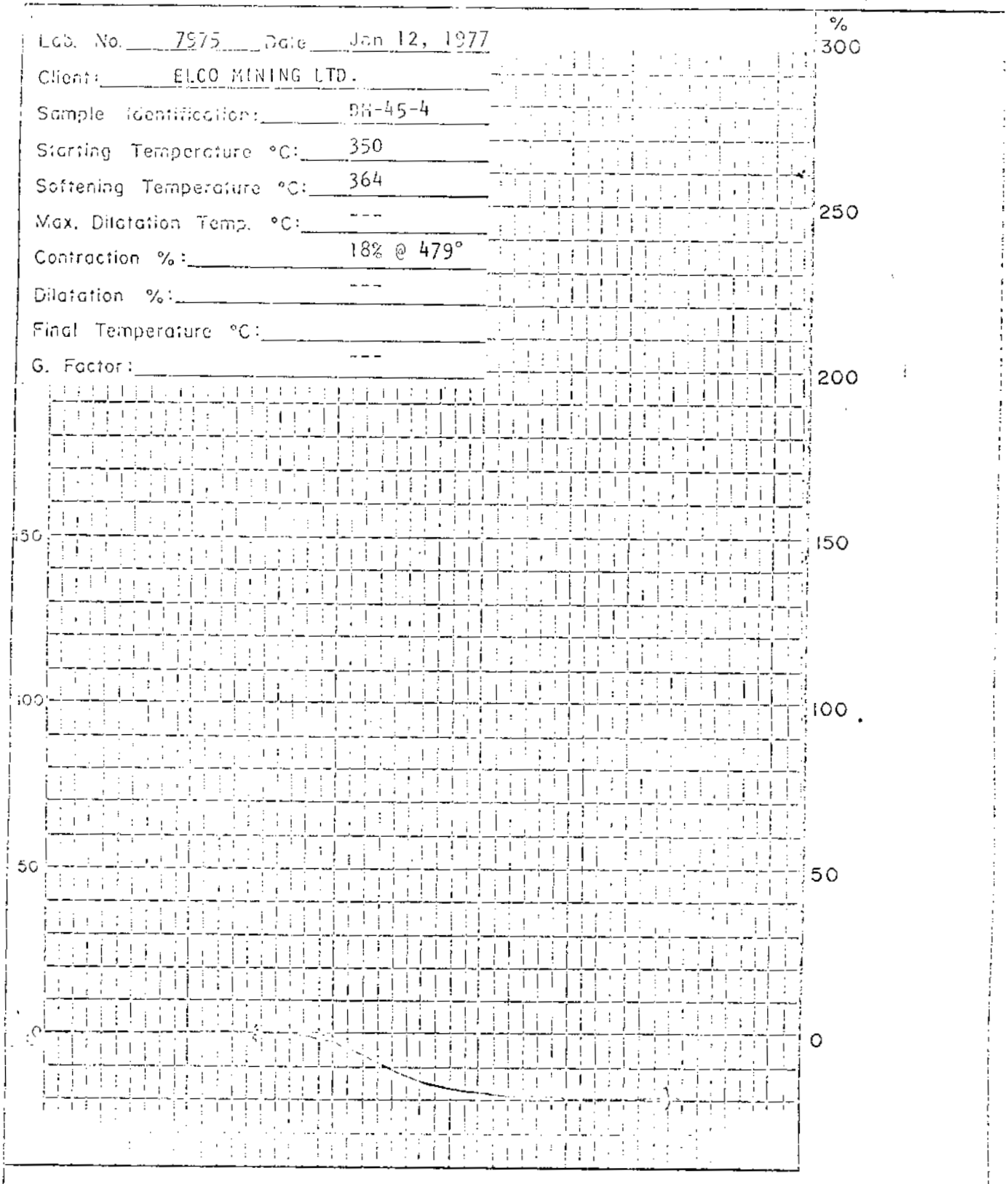
Max. Dilatation Temp. °C: ---

Contraction %: 18% @ 479°

Dilatation %: ---

Final Temperature °C:

G. Factor: ---



BIRTLEY ENGINEERING (CANADA) LTD.

Title	Date
RUHR DILATOMETER TEST	
	Drawn

Lab. No. 7976 Date Jan 13, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-45-5

Starting Temperature °C: 350

Softening Temperature °C: 393

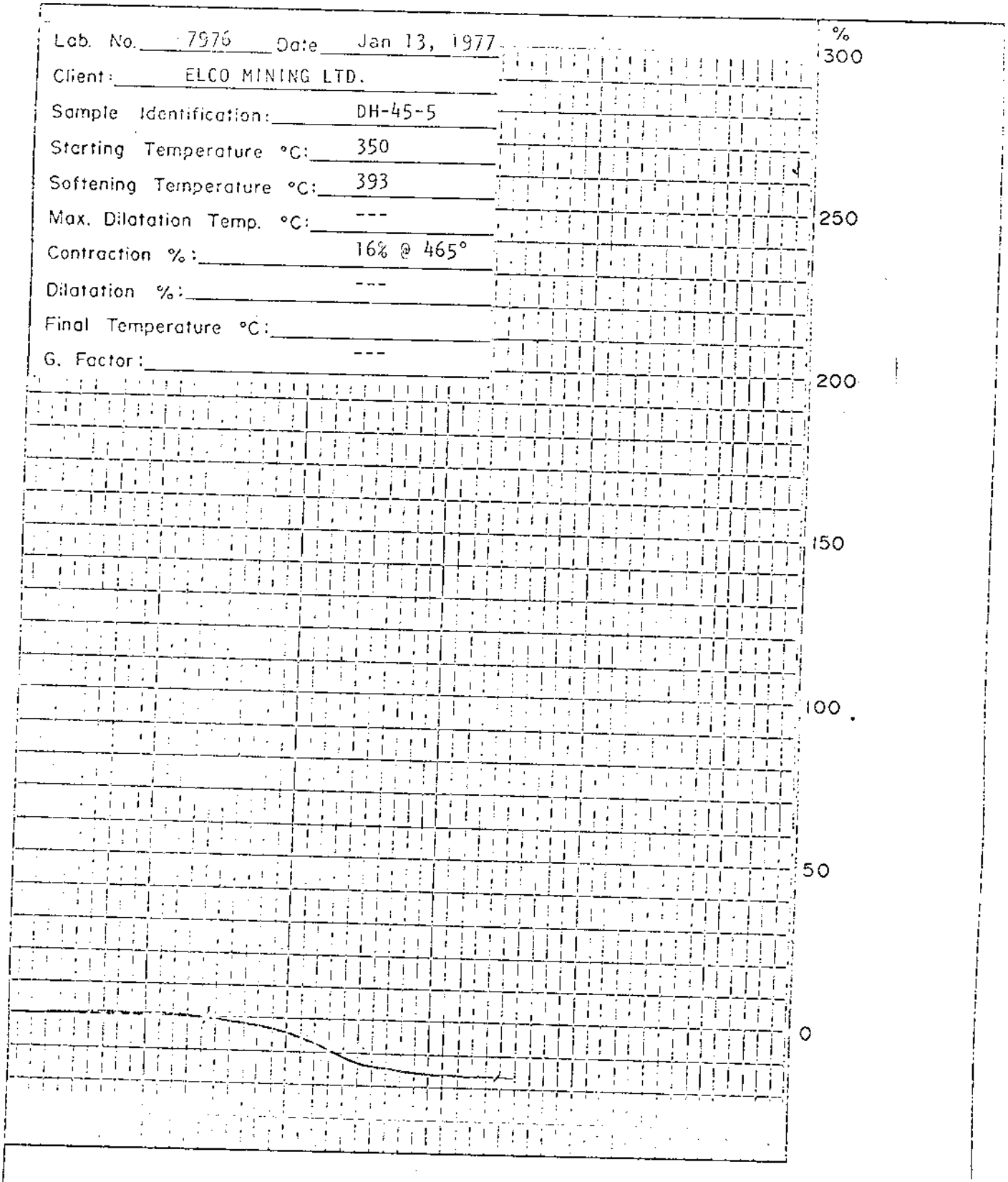
Max. Dilatation Temp. °C: ---

Contraction %: 16% @ 465°

Dilatation %: ---

Final Temperature °C:

G. Factor: ---



BARTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Warnock Hersey Professional Services Ltd.

ELCO MINING LTD.. Elk River Coal Project 1976-77

DRILL CORE ANALYSIS

Sample Identification: DH 46 - 1 Warnock Hersey Lab. No.: 76 - 1292

TABLE I Raw Coal Head Sample ¼" x 0

AIR DRIED BASIS						% DRY BASIS			
Moist.	Ash	V.M.	F. C.	Sulphur	H.G. I.	Ash	V. M.	F.C.	Sulphur
0.6	11.4	24.3	63.7	0.72	107.0	11.5	24.4	64.1	0.72

TABLE II Screen Analysis

	AIR DRIED BASIS				DRY BASIS	
Size	Weight %	Moisture	ASH	Sulphur	ASH	Sulphur
¼" x 65	70.2	0.7	11.3	0.69	11.3	0.70
65 x 0	29.8	1.2	11.3	0.78	11.4	0.79
TOTAL	100.0	--	--	--	11.3	0.73

TABLE III Float/Sink ¼" x 65 Fraction

Spec. Grav.		AIR DRIED BASIS						DRY BASIS			
Sink	Float	Weight%	Moist.	Ash	V.M.	F.C.	Sulphur	ASH	V.M.	F.C.	Sulphur
	1.40	81.2	0.6	3.9	27.4	68.1	0.65	3.9	27.6	68.5	0.65
1.40	1.50	5.2	0.9	12.4	22.4	64.3	0.62	12.5	22.6	64.9	0.63
1.50	1.60	1.1	0.7	23.2	19.9	56.2	0.47	23.4	20.1	56.5	0.47
1.60		12.5	--	--	--	--	--	61.5	--	--	--
TOTAL		100.0	--	--	--	--	--	11.8	--	--	--

TABLE IV Cumulative 1.60 Float

F.S.I.	Phosphorus (in coal)	DILATATION					"G" FACTOR
		TEMPERATURE °C			PER CENT		
		Initial	Softening	Maximum Dilatation	Maximum Contraction	Maximum Dilatation	
7½	0.021	350°C	371°C	433°C	23%	86%	1.051

Lab. No. 8167 Date Jan. 27/77

Client: Warnock Hersey

Sample Identification: 76-1292

Starting Temperature °C: 350

Softening Temperature °C: 371

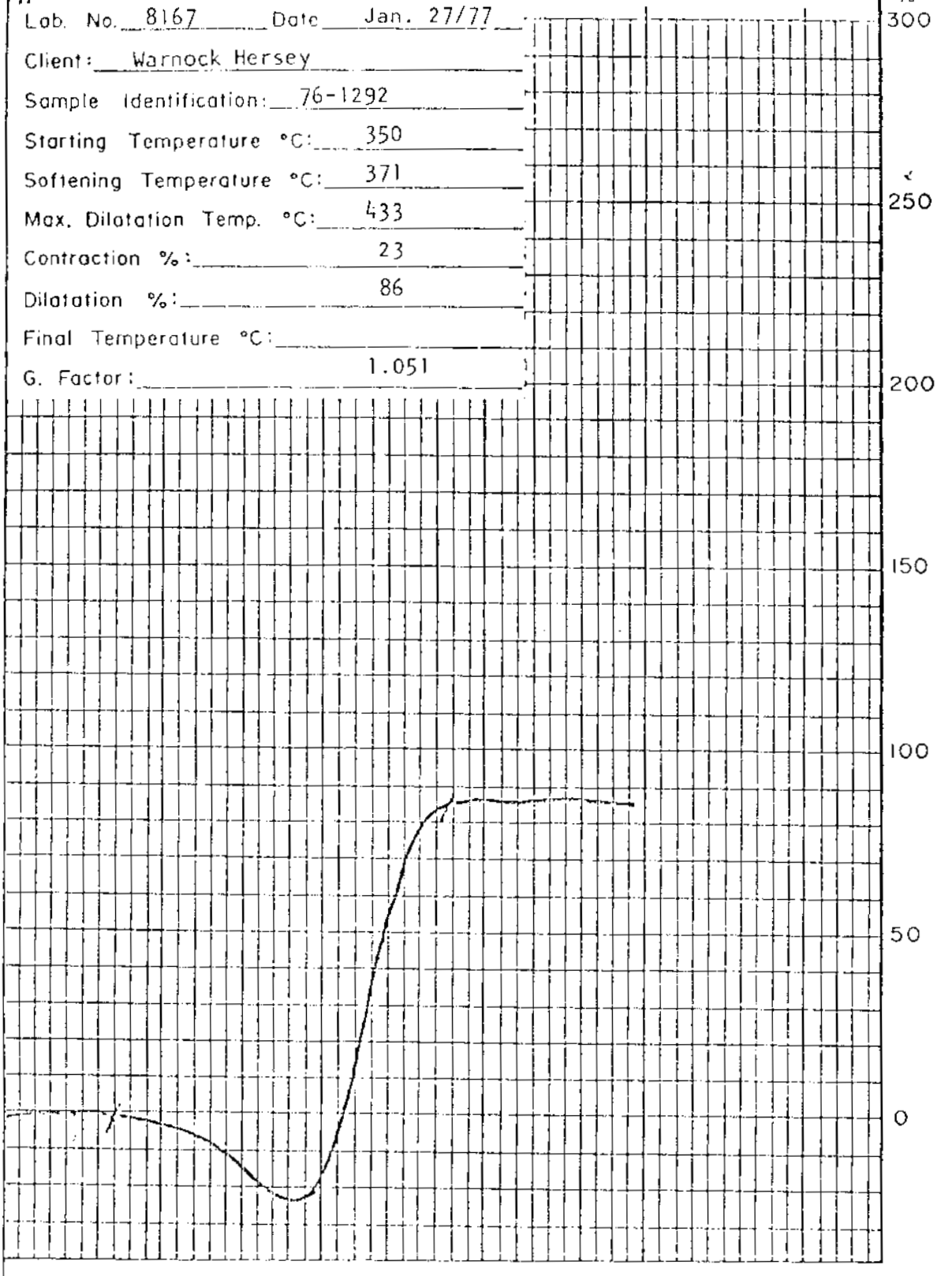
Max. Dilatation Temp. °C: 433

Contraction %: 23

Dilatation %: 86

Final Temperature °C:

G. Factor: 1.051



BIRTLEY ENGINEERING (CANADA) LTD.

Title	Date
RUHR DILATOMETER TEST	
	Drawn

Warnock Hersey Professional Services Ltd.

ELCO MINING LTD.. Elk River Coal Project 1976-77

DRILL CORE ANALYSIS

Sample Identification: DH 46 - 2 Warnock Hersey Lab. No.: 76 - 1293

TABLE I Raw Coal Head Sample ¼" x 0

AIR DRIED BASIS						% DRY BASIS			
Moist.	Ash	V.M.	F. C.	Sulphur	H.G. I.	Ash	V. M.	F.C.	Sulphur
0.6	21.4	23.0	55.0	0.90	130.8	21.5	23.1	55.4	0.91

TABLE II Screen Analysis

	AIR DRIED BASIS				DRY BASIS	
Size	Weight %	Moisture	ASH	Sulphur	ASH	Sulphur
¼" x 65	65.0	0.6	30.5	0.92	30.7	0.93
65 x 0	35.0	0.7	9.1	1.08	9.2	1.09
TOTAL	100.0	--	--	--	23.2	0.99

TABLE III Float/Sink ¼" x 65 Fraction

Spec. Grav.		AIR DRIED BASIS						DRY BASIS			
Sink	Float	Weight%	Moist.	Ash	V.M.	F.C.	Sulphur	ASH	V.M.	F C.	Sulphur
	1.40	40.9	0.6	3.2	26.4	69.8	0.91	3.2	26.5	70.3	0.92
1.40	1.50	8.2	1.0	6.5	26.3	66.2	0.84	6.6	26.5	66.9	0.85
1.50	1.60	4.3	0.7	14.0	24.5	60.8	0.74	14.1	24.6	61.3	0.74
1.60		46.6	--	--	--	--	--	60.1	--	--	--
TOTAL		100.0	--	--	--	--	--	30.5	--	--	--

TABLE IV Cumulative 1.60 Float

F.S.I.	Phosphorus (in coal)	DILATATION					
		TEMPERATURE °C			PER CENT		"G" FACTOR
		Initial	Softening	Maximum Dilatation	Maximum Contraction	Maximum Dilatation	
8	0.012	350°C	362°C	428°C	27%	260%	1.073

Lab. No. 8168 Date Jan. 27/77

Client: Warnock Hersey

Sample Identification: 76-1293

Starting Temperature °C: 350

Softening Temperature °C: 362

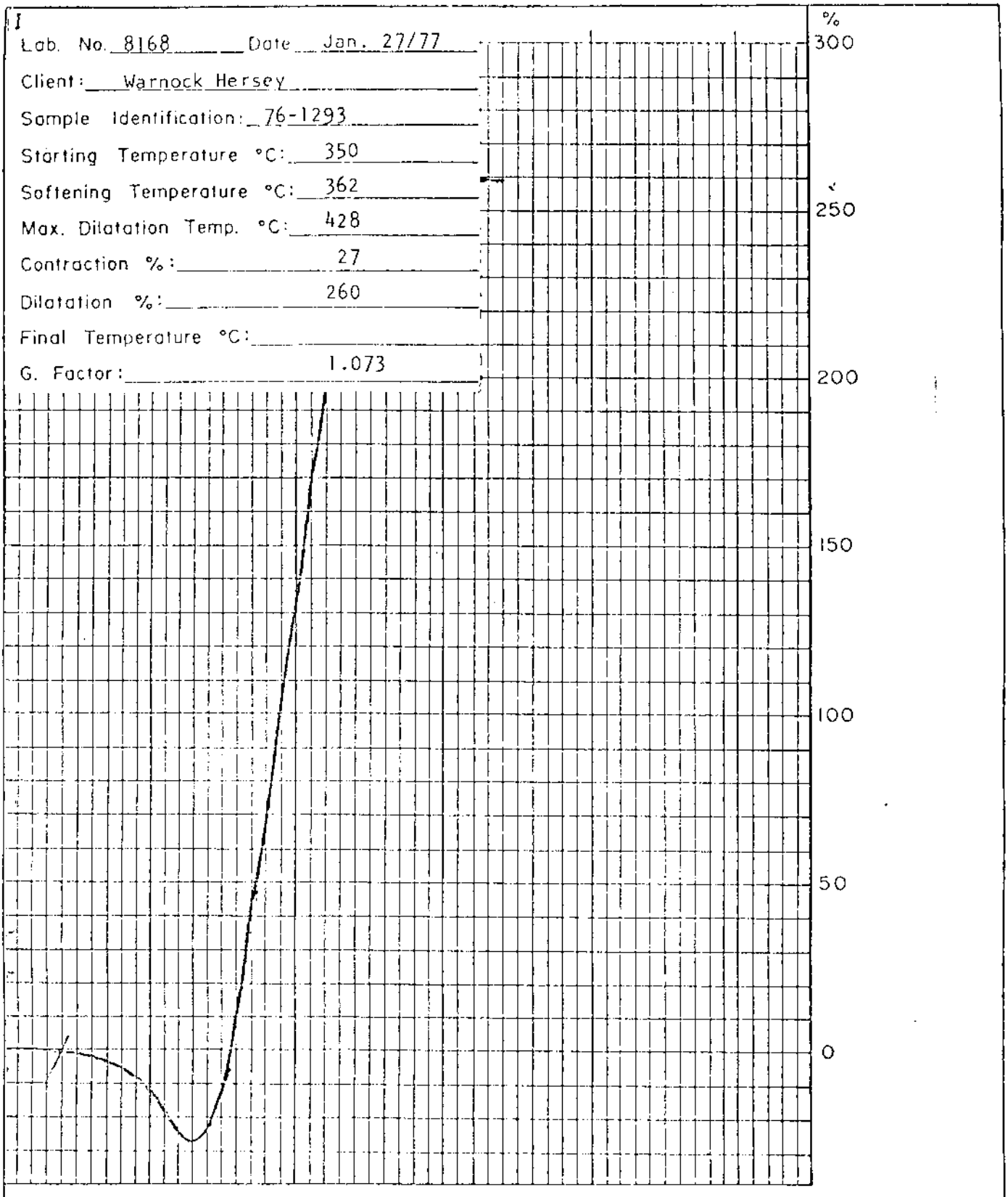
Max. Dilatation Temp. °C: 428

Contraction %: 27

Dilatation %: 260

Final Temperature °C:

G. Factor: 1.073



BIRTLEY ENGINEERING (CANADA) LTD.

Title	Date
RUHR DILATOMETER TEST	
	Drawn

Warnock Hersey Professional Services Ltd.

ELCO MINING LTD.. Elk River Coal Project 1976-77

DRILL CORE ANALYSIS

Sample Identification: DH 46 - 3 Warnock Hersey Lab. No.: 76 - 1294

TABLE I Raw Coal Head Sample ¼" x 0

AIR DRIED BASIS						% DRY BASIS			
Moist.	Ash	V.M.	F. C.	Sulphur	H.G.I.	Ash	V. M.	F.C.	Sulphur
0.9	37.1	18.7	43.3	0.46	94.8	37.4	18.9	43.7	0.46

TABLE II Screen Analysis

	AIR DRIED BASIS				DRY BASIS	
Size	Weight %	Moisture	ASH	Sulphur	ASH	Sulphur
¼" x 65	81.5	0.7	39.8	0.43	40.0	0.43
65 x 0	18.5	0.8	19.7	0.62	19.8	0.62
TOTAL	100.0	--	--	--	36.3	0.46

TABLE III Float/Sink ¼" x 65 Fraction

Spec. Grav.		AIR DRIED BASIS						DRY BASIS			
Sink	Float	Weight%	Moist.	Ash	V.M.	F.C.	Sulphur	ASH	V.M.	F C.	Sulphur
	1.40	43.4	0.7	4.1	26.1	69.1	0.54	4.1	26.3	69.6	0.54
1.40	1.50	3.9	0.9	15.0	23.1	61.0	0.45	15.1	23.3	61.6	0.45
1.50	1.60	2.8	0.7	27.5	19.7	52.1	0.45	27.7	19.8	52.5	0.45
1.60		49.9	--	--	--	--	--	75.2	--	--	--
TOTAL		100.0	--	--	--	--	--	40.7	--	--	--

TABLE IV Cumulative 1.60 Float

F.S.I.	Phosph-orus (in coal)	DILATATION					
		TEMPERATURE °C			PER CENT		"G" FACTOR
		Initial	Softening	Maximum Dilatation	Maximum Contraction	Maximum Dilatation	
7½	0.022	350°C	377°C	431°C	18%	110%	1.050

Lab. No. 8169 Date Jan. 27/77

Client: Warnock Hersey

Sample Identification: 76-1294

Starting Temperature °C: 350

Softening Temperature °C: 377

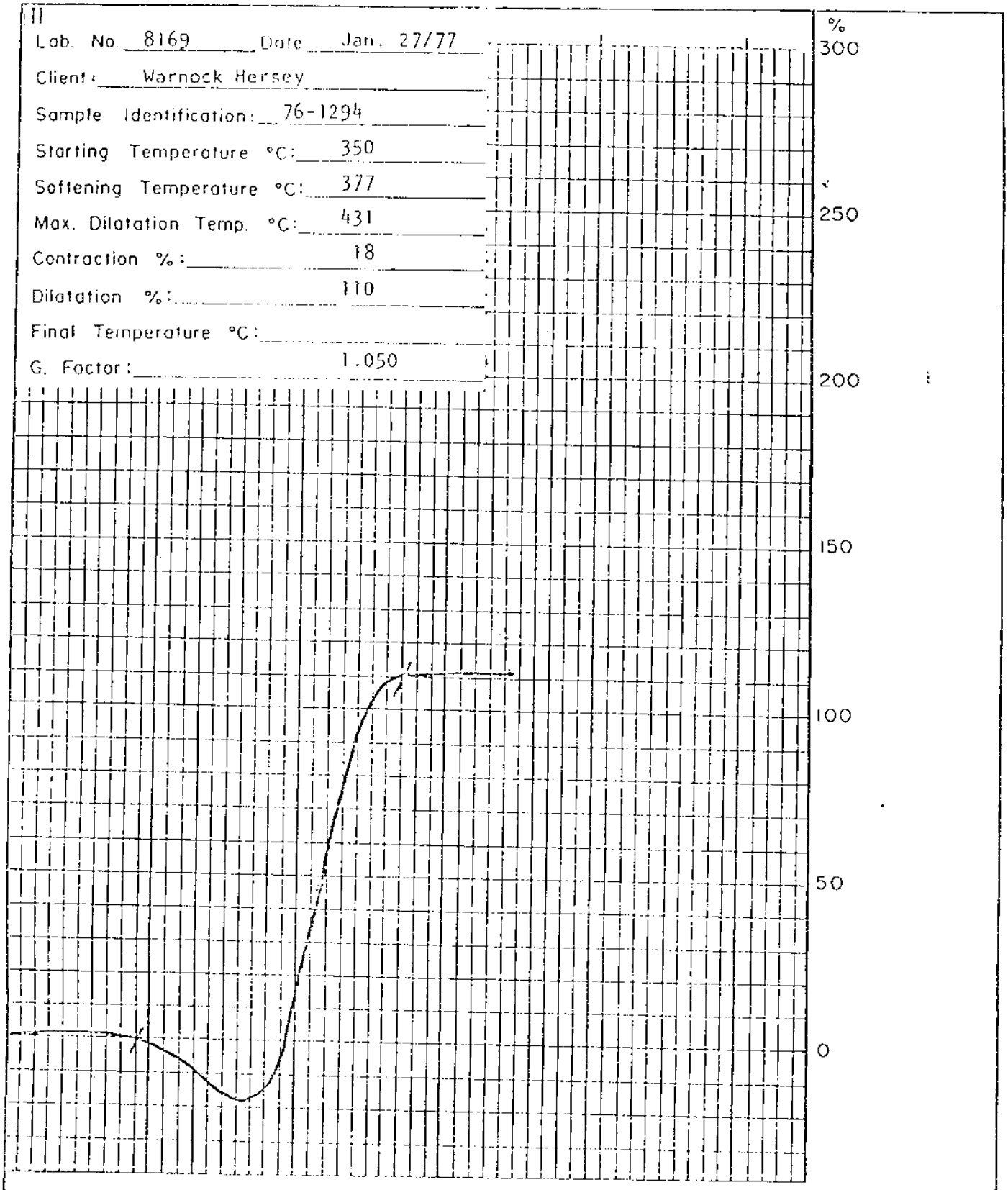
Max. Dilatation Temp. °C: 431

Contraction %: 18

Dilatation %: 110

Final Temperature °C:

G. Factor: 1.050



BIRTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Warnock Hersey Professional Services Ltd.

ELCO MINING LTD.. Elk River Coal Project 1976-77

DRILL CORE ANALYSIS

Sample Identification: DH 46 - 4 Warnock Hersey Lab. No.: 76 - 1295

TABLE I Raw Coal Head Sample ¼" x 0

AIR DRIED BASIS						% DRY BASIS			
Moist.	Ash	V.M.	F. C.	Sulphur	H.G.I.	Ash	V. M.	F.C.	Sulphur
0.8	35.9	19.5	43.8	0.60	102.4	36.2	19.6	44.2	0.60

TABLE II Screen Analysis

	AIR DRIED BASIS				DRY BASIS	
Size	Weight %	Moisture	ASH	Sulphur	ASH	Sulphur
¼" x 65	79.8	0.7	42.1	0.55	42.4	0.55
65 x 0	20.2	0.8	16.2	0.81	16.3	0.82
TOTAL	100.0	--	--	--	37.1	0.60

TABLE III Float/Sink ¼" x 65 Fraction

Spec. Grav.		AIR DRIED BASIS						DRY BASIS			
Sink	Float	Weight%	Moist.	Ash	V.M.	F.C.	Sulphur	ASH	V.M.	F C.	Sulphur
	1.40	44.9	0.7	5.1	32.7	61.5	0.75	5.2	32.9	61.9	0.76
1.40	1.50	5.0	0.9	17.9	23.4	57.8	0.65	18.0	23.6	58.4	0.66
1.50	1.60	3.2	0.7	25.9	21.2	52.2	0.67	26.1	21.4	52.5	0.68
1.60		46.9	--	--	--	--	--	84.8	--	--	--
TOTAL		100.0	--	--	--	--	--	43.2	--	--	--

TABLE IV Cumulative 1.60 Float

F.S.I.	Phosphorus (in coal)	DILATATION					
		TEMPERATURE °C			PER CENT		"G" FACTOR
		Initial	Softening	Maximum Dilatation	Maximum Contraction	Maximum Dilatation	
8	0.015	350°C	368°C	431°C	22%	230%	1.070

Lab. No. 8170 Date Jan. 28/77

Client: Warnock Hersey

Sample Identification: 76-1295

Starting Temperature °C: 350

Softening Temperature °C: 368

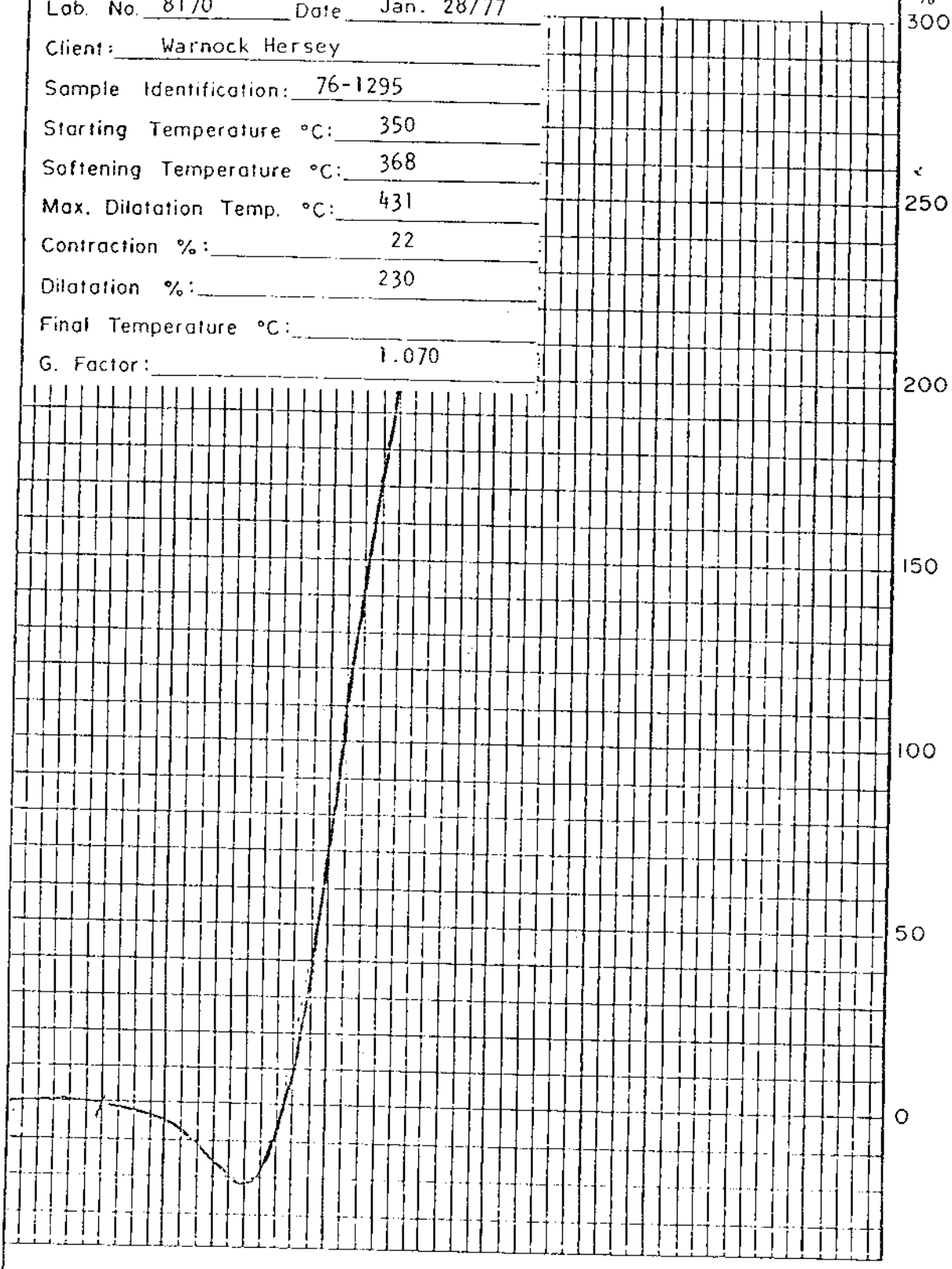
Max. Dilatation Temp. °C: 431

Contraction %: 22

Dilatation %: 230

Final Temperature °C:

G. Factor: 1.070



BIRTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Warnock Hersey Professional Services Ltd.

ELCO MINING LTD.. Elk River Coal Project 1976-77

DRILL CORE ANALYSIS

Sample Identification: DH 46 - 5 Warnock Hersey Lab. No.: 76 - 1296

TABLE I Raw Coal Head Sample ¼" x 0

AIR DRIED BASIS						% DRY BASIS			
Moist.	Ash	V.M.	F. C.	Sulphur	H.G. I.	Ash	V. M.	F.C.	Sulphur
0.7	30.7	20.2	48.4	0.67	105.2	30.9	20.3	48.8	0.67

TABLE II Screen Analysis

	AIR DRIED BASIS				DRY BASIS	
Size	Weight %	Moisture	ASH	Sulphur	ASH	Sulphur
¼" x 65	72.4	0.6	33.3	0.60	33.5	0.60
65 x 0	27.6	0.8	16.7	0.97	16.9	0.98
TOTAL	100.0	--	--	--	28.9	0.70

TABLE III Float/Sink ¼" x 65 Fraction

Spec. Grav.		AIR DRIED BASIS						DRY BASIS			
Sink	Float	Weight%	Moist.	Ash	V.M.	F.C.	Sulphur	ASH	V.M.	F.C.	Sulphur
	1.40	48.9	0.7	5.0	25.9	68.4	0.76	5.1	26.1	68.8	0.76
1.40	1.50	10.8	0.8	16.9	23.5	58.8	0.59	17.0	23.7	59.3	0.59
1.50	1.60	3.9	0.7	26.6	20.3	52.4	0.62	26.8	20.4	52.8	0.62
1.60		36.4	--	--	--	--	--	78.7	--	--	--
TOTAL		100.0	--	--	--	--	--	34.0	--	--	--

TABLE IV Cumulative 1.60 Float

F.S.I.	Phosph-orus (in coal)	DILATATION					
		TEMPERATURE °C			PER CENT		"G" FACTOR
		Initial	Softening	Maximum Dilatation	Maximum Contraction	Maximum Dilatation	
7½	0.014	350°C	377°C	437°C	16%	150%	1.063

Lab. No. 8171 Date Jan. 28/77

Client: Warnock Hersey

Sample Identification: 76-1296

Starting Temperature °C: 350

Softening Temperature °C: 377

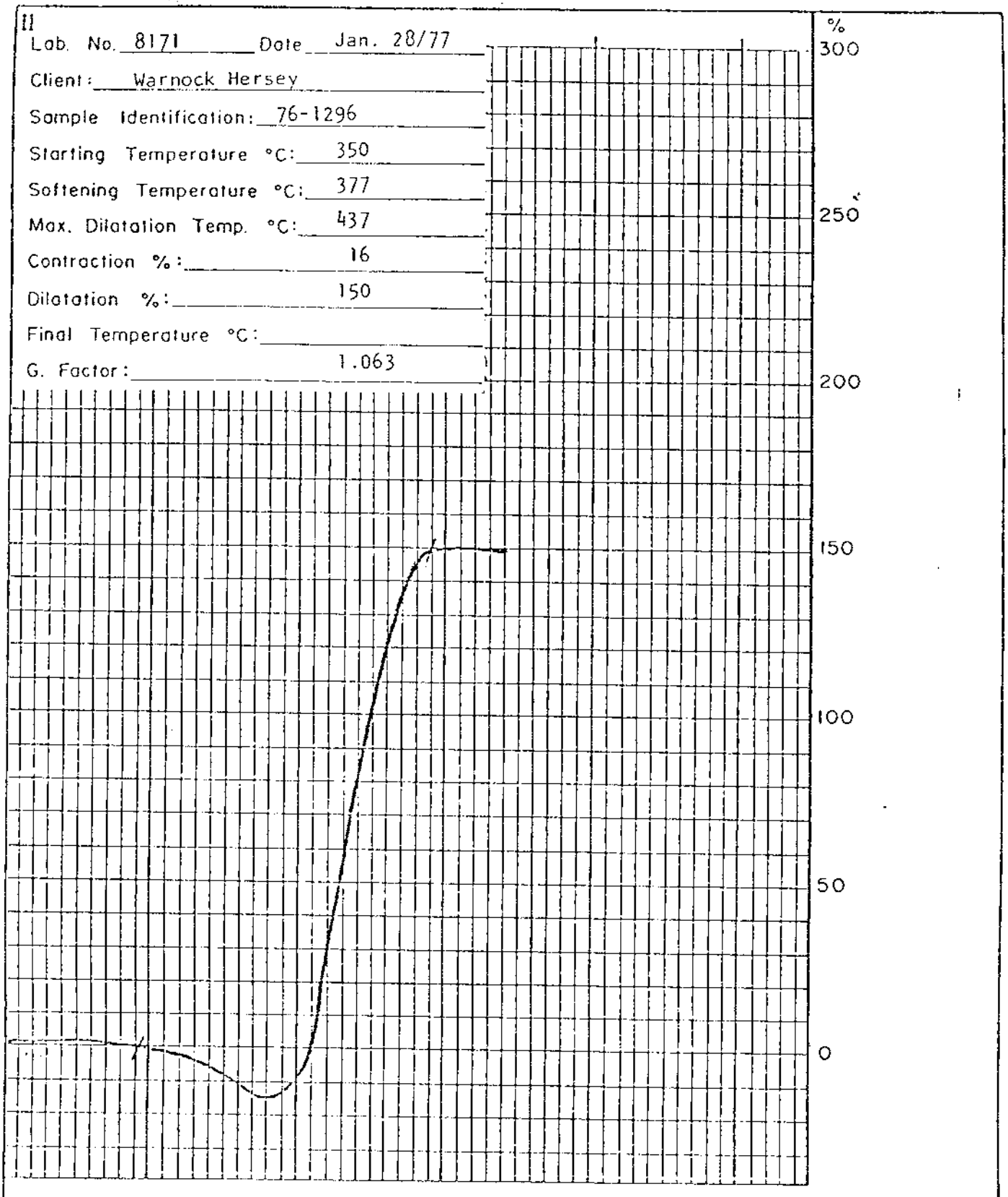
Max. Dilatation Temp. °C: 437

Contraction %: 16

Dilatation %: 150

Final Temperature °C:

G. Factor: 1.063



BIRTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Warnock Hersey Professional Services Ltd.

ELCO MINING LTD.. Elk River Coal Project 1976-77

DRILL CORE ANALYSIS

Sample Identification: DH 46 - 6 Warnock Hersey Lab. No.: 76 - 1297

TABLE I Raw Coal Head Sample ¼" x 0

AIR DRIED BASIS						% DRY BASIS			
Moist.	Ash	V.M.	F. C.	Sulphur	H.G. I.	Ash	V. M.	F.C.	Sulphur
0.7	37.9	17.9	43.5	0.68	92.7	38.2	18.0	43.8	0.68

TABLE II Screen Analysis

	AIR DRIED BASIS				DRY BASIS	
Size	Weight %	Moisture	ASH	Sulphur	ASH	Sulphur
¼" x 65	83.6	0.7	39.2	0.63	39.5	0.63
65 x 0	16.4	0.7	25.3	0.84	25.5	0.85
TOTAL	100.0	--	--	--	37.2	0.67

TABLE III Float/Sink ¼" x 65 Fraction

Spec. Grav.		AIR DRIED BASIS						DRY BASIS			
Sink	Float	Weight%	Moist.	Ash	V.M.	F.C.	Sulphur	ASH	V.M.	F.C.	Sulphur
	1.40	43.8	0.6	4.6	25.2	69.6	0.87	4.6	25.3	70.1	0.88
1.40	1.50	5.6	0.6	14.1	21.5	63.8	0.68	14.2	21.6	64.2	0.68
1.50	1.60	3.1	0.6	25.6	18.3	55.5	0.69	25.8	18.4	55.8	0.69
1.60		47.5	--	--	--	--	--	77.8	--	--	--
TOTAL		100.0	--	--	--	--	--	40.6	--	--	--

TABLE IV Cumulative 1.60 Float

F.S.I.	Phosph-orus (in coal)	DILATATION					
		TEMPERATURE °C			PER CENT		"G" FACTOR
		Initial	Softening	Maximum Dilatation	Maximum Contraction	Maximum Dilatation	
7½	0.015	350°C	377°C	440°C	22%	136%	1.059

Lab. No. 8172 Date Jan. 27/77

Client: Warnock Hersey

Sample Identification: 76-1297

Starting Temperature °C: 350

Softening Temperature °C: 377

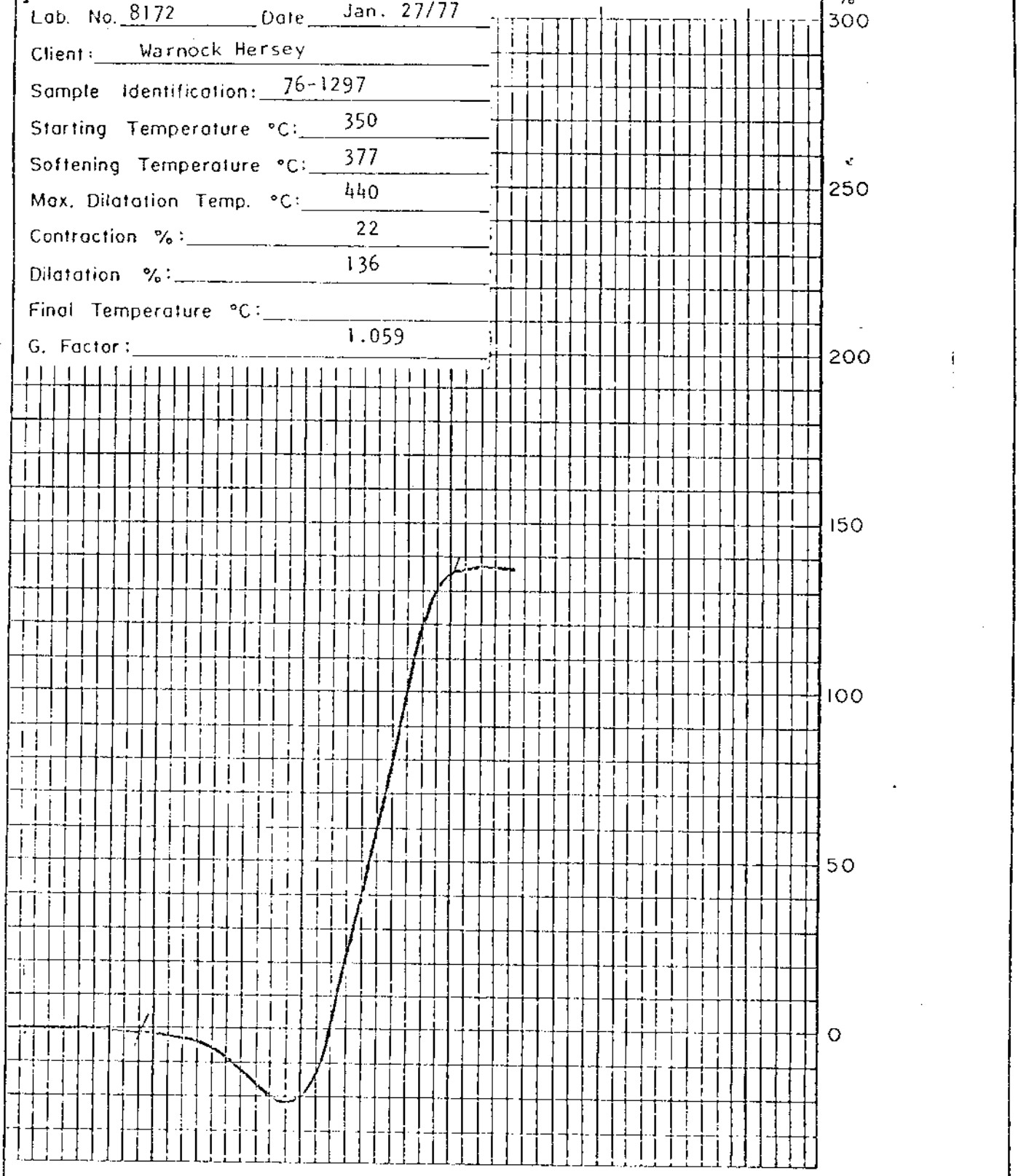
Max. Dilatation Temp. °C: 440

Contraction %: 22

Dilatation %: 136

Final Temperature °C:

G. Factor: 1.059



BIRTLEY ENGINEERING (CANADA) LTD.

Title	Date
RUHR DILATOMETER TEST	
	Drawn

Warnock Hersey Professional Services Ltd.

ELCO MINING LTD.. Elk River Coal Project 1976-77

DRILL CORE ANALYSIS

Sample Identification: DH 46 - 7 Warnock Hersey Lab. No.: 76 - 1299

TABLE I Raw Coal Head Sample ¼" x 0

AIR DRIED BASIS						% DRY BASIS			
Moist.	Ash	V.M.	F. C.	Sulphur	H.G.I.	Ash	V. M.	F.C.	Sulphur
0.7	32.8	19.0	47.5	0.54	93.4	33.0	19.1	47.9	0.54

TABLE II Screen Analysis

	AIR DRIED BASIS				DRY BASIS	
Size	Weight %	Moisture	ASH	Sulphur	ASH	Sulphur
¼" x 65	83.4	0.7	36.2	0.54	36.5	0.54
65 x 0	16.6	0.8	18.2	0.66	18.4	0.67
TOTAL	100.0	--	--	--	33.5	0.56

TABLE III Float/Sink ¼" x 65 Fraction

Spec. Grav.		AIR DRIED BASIS						DRY BASIS			
Sink	Float	Weight%	Moist.	Ash	V.M.	F.C.	Sulphur	ASH	V.M.	F.C.	Sulphur
	1.40	45.0	0.9	4.9	24.8	69.4	0.71	4.9	25.0	70.1	0.72
1.40	1.50	8.2	0.8	13.6	21.5	64.1	0.56	13.8	21.6	64.6	0.56
1.50	1.60	3.7	0.7	26.2	18.0	55.1	0.57	26.4	18.1	55.5	0.57
1.60		43.1	--	--	--	---	--	75.7	--	--	--
TOTAL		100.0	--	--	--	--	--	36.9	--	--	--

TABLE IV Cumulative 1.60 Float

F.S.I.	Phosphorus (in coal)	DILATATION					
		TEMPERATURE °C			PER CENT		"G" FACTOR
		Initial	Softening	Maximum Dilatation	Maximum Contraction	Maximum Dilatation	
8	0.030	350°C	386°C	437°C	18%	68%	1.037

II

Lab. No. 8173 Date Jan. 27/77

Client: Warnock Hersey

Sample Identification: 76-1298

Starting Temperature °C: 350

Softening Temperature °C: 386

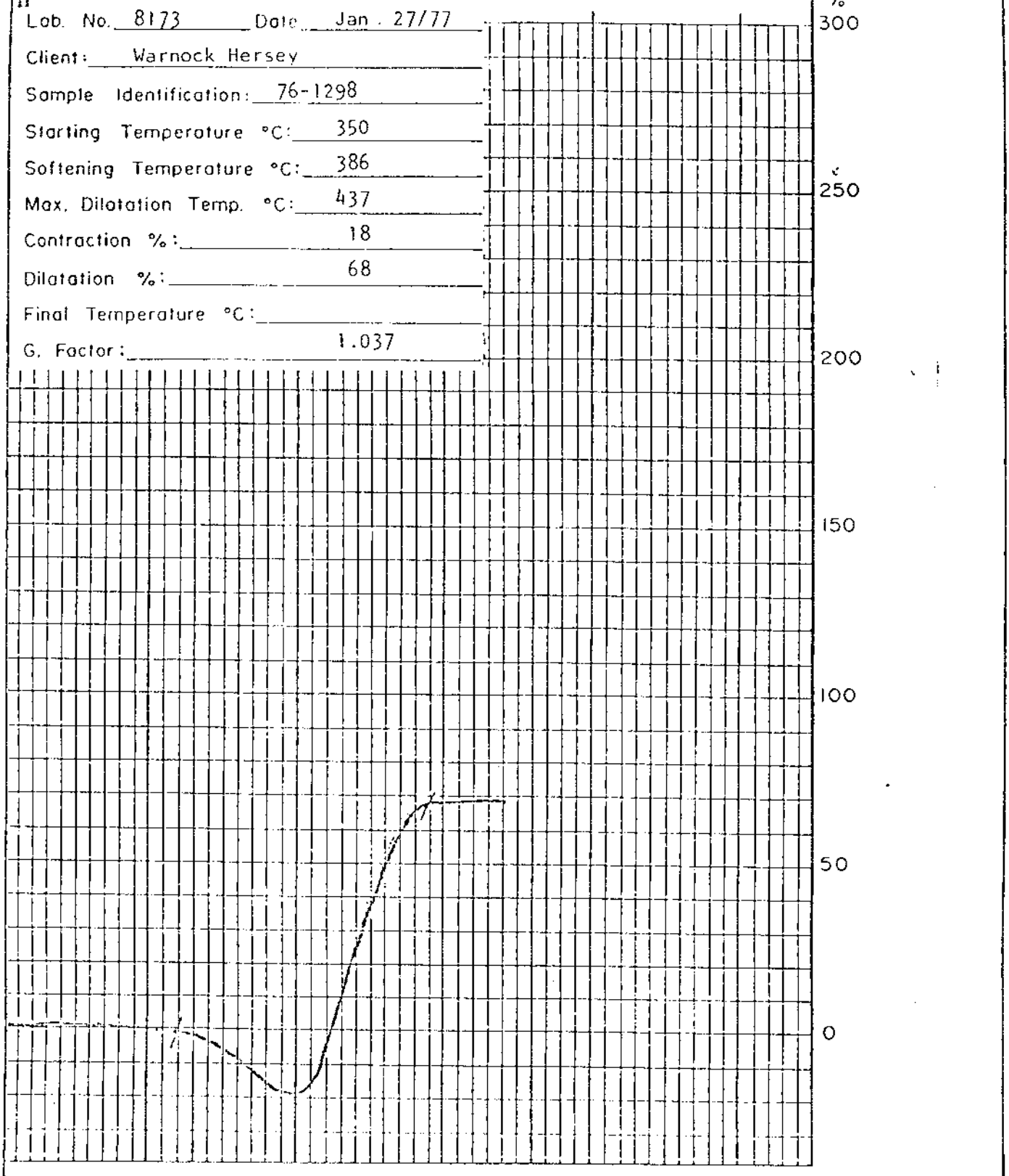
Max. Dilatation Temp. °C: 437

Contraction %: 18

Dilatation %: 68

Final Temperature °C:

G. Factor: 1.037



BIRTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Warnock Hersey Professional Services Ltd.

ELCO MINING LTD.. Elk River Coal Project 1976-77

DRILL CORE ANALYSIS

Sample Identification: DH 46 - 8 Warnock Hersey Lab. No.: 76 - 1299

TABLE I Raw Coal Head Sample ¼" x 0

AIR DRIED BASIS						% DRY BASIS			
Moist.	Ash	V.M.	F. C.	Sulphur	H.G.I.	Ash	V. M.	F.C.	Sulphur
0.8	44.6	16.7	37.9	0.64	93.4	45.0	16.9	38.1	0.65

TABLE II Screen Analysis

	AIR DRIED BASIS				DRY BASIS	
Size	Weight %	Moisture	ASH	Sulphur	ASH	Sulphur
¼" x 65	85.3	0.8	46.7	0.61	47.1	0.62
65 x 0	14.7	0.8	32.6	0.73	32.8	0.73
TOTAL	100.0	--	--	--	45.0	0.64

TABLE III Float/Sink ¼" x 65 Fraction

Spec. Grav.		AIR DRIED BASIS						DRY BASIS			
Sink	Float	Weight%	Moist.	Ash	V.M.	F.C.	Sulphur	ASH	V.M.	F.C.	Sulphur
	1.40	32.6	0.8	6.8	24.4	68.0	0.85	6.8	24.6	68.6	0.86
1.40	1.50	10.5	0.7	17.0	22.1	60.2	0.76	17.1	22.2	60.7	0.76
1.50	1.60	5.7	0.7	24.3	20.0	55.0	0.76	24.5	20.1	55.4	0.76
1.60		51.3	--	--	--	--	--	79.7	--	--	--
TOTAL		100.0	--	--	--	--	--	46.3	--	--	--

TABLE IV Cumulative 1.60 Float

F.S.I.	Phosphorus (in coal)	DILATATION					
		TEMPERATURE °C			PER CENT		"C" FACTOR
		Initial	Softening	Maximum Dilatation	Maximum Contraction	Maximum Dilatation	
7½	0.065	350°C	371°C	437°C	21%	134%	1.063

I

Lab. No. 8174 Date Jan. 27/77

Client: Warnock Hersey

Sample Identification: 76-1299

Starting Temperature °C: 350

Softening Temperature °C: 371

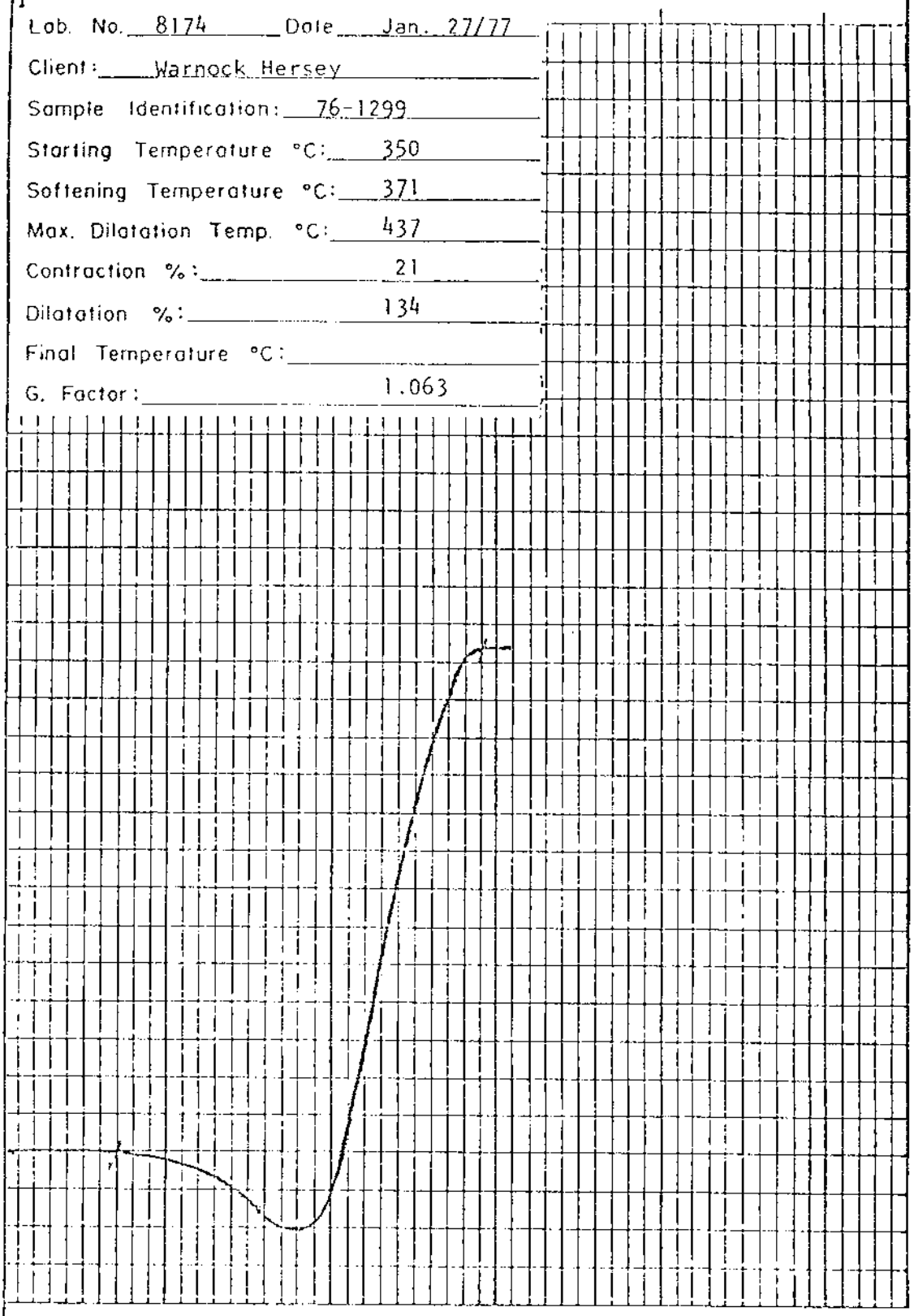
Max. Dilatation Temp. °C: 437

Contraction %: 21

Dilatation %: 134

Final Temperature °C:

G. Factor: 1.063



BIRTLEY ENGINEERING (CANADA) LTD.

Title	Date
RUHR DILATOMETER TEST	
	Drawn

Warnock Hersey Professional Services Ltd.

ELCO MINING LTD.. Elk River Coal Project 1976-77

DRILL CORE ANALYSIS

Sample Identification: DH 46 - 9 Warnock Hersey Lab. No.: 76 - 12100

TABLE I Raw Coal Head Sample ¼" x 0

AIR DRIED BASIS						% DRY BASIS			
Moist.	Ash	V.M.	F. C.	Sulphur	H.G.I.	Ash	V. M.	F.C.	Sulphur
0.6	21.3	18.6	59.5	0.79	140.5	21.4	18.7	59.9	0.79

TABLE II Screen Analysis

	AIR DRIED BASIS				DRY BASIS	
Size	Weight %	Moisture	ASH	Sulphur	ASH	Sulphur
¼" x 65	69.8	0.6	22.8	0.74	23.0	0.74
65 x 0	30.2	0.4	10.9	1.07	11.0	1.07
TOTAL	100.0	- -	- -	- -	19.4	0.84

TABLE III Float/Sink ¼" x 65 Fraction

Spec. Grav.		AIR DRIED BASIS						DRY BASIS			
Sink	Float	Weight%	Moist.	Ash	V.M.	F.C.	Sulphur	ASH	V.M.	F.C.	Sulphur
	1.40	66.4	0.8	3.1	28.6	67.5	0.95	3.1	28.9	68.0	0.96
1.40	1.50	4.4	0.7	6.6	22.7	70.0	0.75	6.6	22.8	70.6	0.76
1.50	1.60	1.6	0.7	10.3	21.4	67.6	0.71	10.4	21.5	68.1	0.72
1.60		27.6	- -	- -	- -	- -	- -	79.8	- -	- -	- -
TOTAL		100.0	- -	- -	- -	- -	- -	24.5	- -	- -	- -

TABLE IV Cumulative 1.60 Float

F.S.I.	Phosphorus (in coal)	DILATATION					
		TEMPERATURE °C			PER CENT		"G" FACTOR
		Initial	Softening	Maximum Dilatation	Maximum Contraction	Maximum Dilatation	
8½	0.013	350°C	368°C	437°C	20%	38%	1.027

II

Lab. No. 8175 Date Jan. 27/77

Client: Warnock Hersey

Sample Identification: 76-12100

Starting Temperature °C: 350

Softening Temperature °C: 368

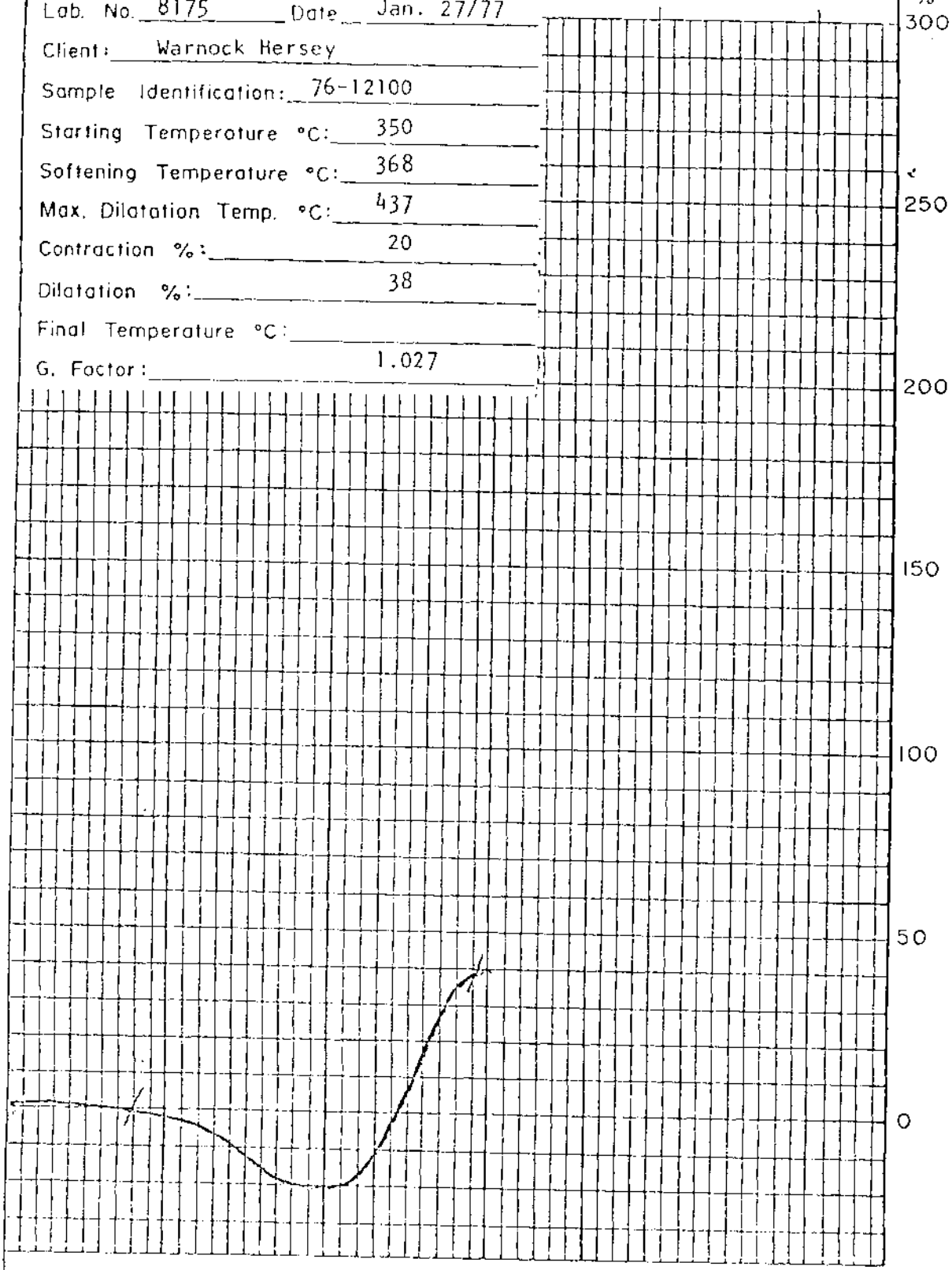
Max. Dilatation Temp. °C: 437

Contraction %: 20

Dilatation %: 38

Final Temperature °C:

G. Factor: 1.027



BIRTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Warnock Hersey Professional Services Ltd.

ELCO MINING LTD.. Elk River Coal Project 1976-77

DRILL CORE ANALYSIS

Sample Identification: DH 46 - 10 Warnock Hersey Lab. No.: 76 - 12101

TABLE I Raw Coal Head Sample ¼" x 0

AIR DRIED BASIS						% DRY BASIS			
Moist.	Ash	V.M.	F. C.	Sulphur	H.G.I.	Ash	V. M.	F.C.	Sulphur
0.7	35.8	17.1	46.4	0.61	96.9	36.0	17.2	46.8	0.61

TABLE II Screen Analysis

	AIR DRIED BASIS				DRY BASIS	
Size	Weight %	Moisture	ASH	Sulphur	ASH	Sulphur
¼" x 65	80.8	0.6	41.0	0.56	41.2	0.56
65 x 0	19.2	0.7	18.9	0.75	19.0	0.76
TOTAL	100.0	--	--	--	36.9	0.60

TABLE III Float/Sink ¼" x 65 Fraction

Spec. Grav.		AIR DRIED BASIS						DRY BASIS			
Sink	Float	Weight%	Moist.	Ash	V.M.	F.C.	Sulphur	ASH	V.M.	F.C.	Sulphur
	1.40	36.0	0.8	4.9	28.1	66.2	0.95	5.0	28.3	66.7	0.96
1.40	1.50	6.2	0.8	14.3	21.9	63.0	0.76	14.4	22.1	63.5	0.77
1.50	1.60	6.3	0.7	18.0	21.1	60.2	0.69	18.1	21.2	60.7	0.70
1.60		51.5	--	--	--	--	--	71.8	--	--	--
TOTAL		100.0	--	--	--	--	--	40.8	--	--	--

TABLE IV Cumulative 1.60 Float

F.S.I.	Phosphorus (in coal)	DILATATION					
		TEMPERATURE °C			PER CENT		"G" FACTOR
		Initial	Softening	Maximum Dilatation	Maximum Contraction	Maximum Dilatation	
8	0.031	350°C	381°C	440°C	20%	57%	1.036

Lab. No. 8176 Date Jan. 27/77

Client: Warnock Hersey

Sample Identification: 76-12101

Starting Temperature °C: 350

Softening Temperature °C: 381

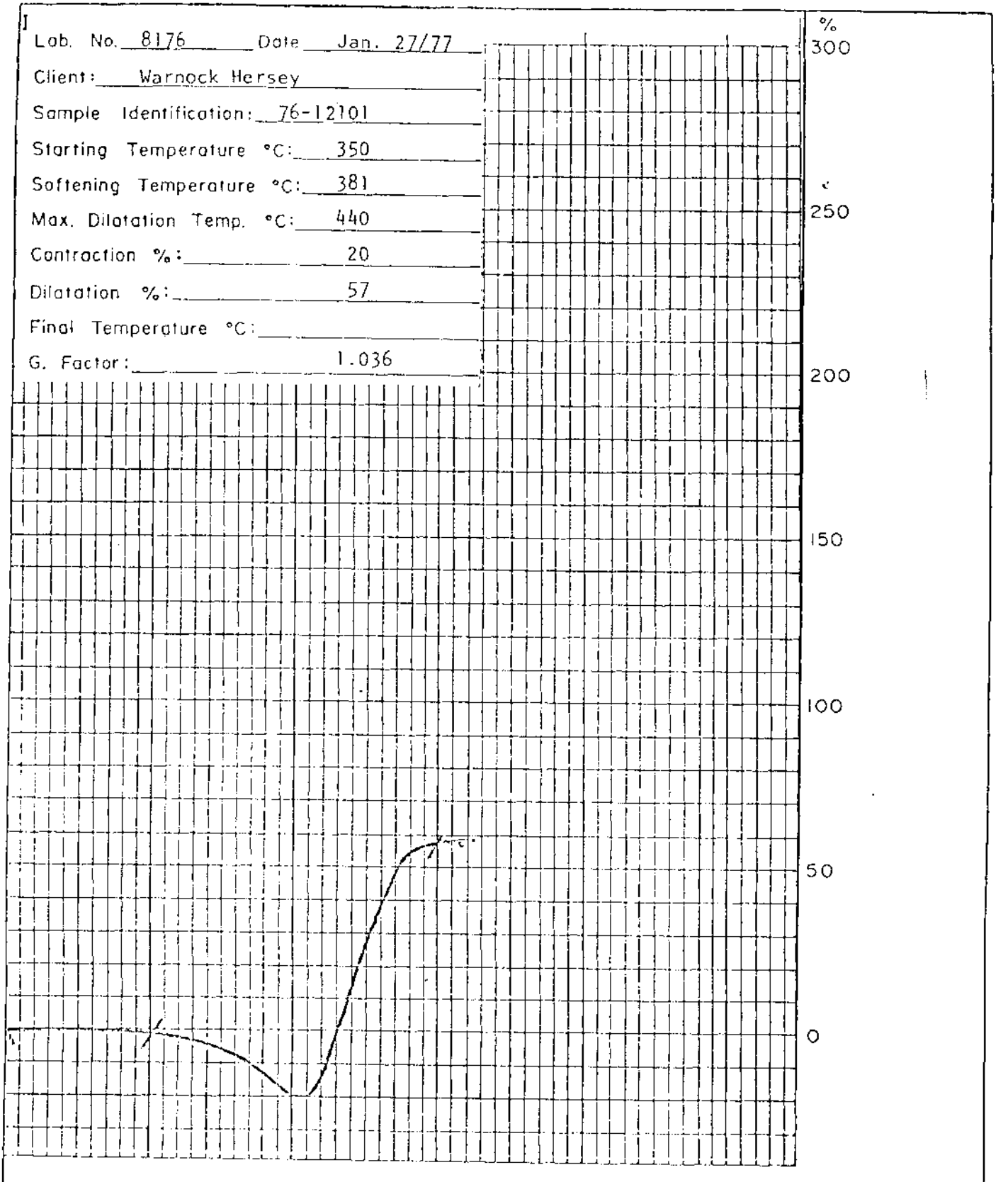
Max. Dilatation Temp. °C: 440

Contraction %: 20

Dilatation %: 57

Final Temperature °C:

G. Factor: 1.036



BIRTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Warnock Hersey Professional Services Ltd.

ELCO MINING LTD.. Elk River Coal Project 1976-77

DRILL CORE ANALYSIS

Sample Identification: DH 46 - 11 Warnock Hersey Lab. No.: 76 - 12102

TABLE I Raw Coal Head Sample ¼" x 0

AIR DRIED BASIS						% DRY BASIS			
Moist.	Ash	V.M.	F. C.	Sulphur	H.G. I.	Ash	V. M.	F.C.	Sulphur
0.6	22.4	19.4	57.6	0.74	100.3	22.5	19.6	57.9	0.74

TABLE II Screen Analysis

	AIR DRIED BASIS				DRY BASIS	
Size	Weight %	Moisture	ASH	Sulphur	ASH	Sulphur
¼" x 65	80.4	0.5	24.3	0.72	24.4	0.72
65 x 0	19.6	0.6	15.6	0.87	15.7	0.88
TOTAL	100.0	--	--	--	22.7	0.75

TABLE III Float/Sink ¼" x 65 Fraction

Spec. Grav.		AIR DRIED BASIS						DRY BASIS			
Sink	Float	Weight%	Moist.	Ash	V.M.	F.C.	Sulphur	ASH	V.M.	F.C.	Sulphur
	1.40	54.4	0.8	5.5	23.2	70.5	0.79	5.5	23.4	71.1	0.80
1.40	1.50	11.8	0.7	14.3	20.4	64.6	0.82	14.4	20.6	65.0	0.83
1.50	1.60	8.2	0.6	22.3	18.3	58.8	0.80	22.4	18.5	59.1	0.80
1.60		25.6	--	--	--	--	--	64.0	--	--	--
TOTAL		100.0	--	--	--	--	--	22.9	--	--	--

TABLE IV Cumulative 1.60 Float

F.S.I.	Phosphorus (in coal)	DILATATION					
		TEMPERATURE °C			PER CENT		"G" FACTOR
		Initial	Softening	Maximum Dilatation	Maximum Contraction	Maximum Dilatation	
8	0.017	350°C	389°C	443°C	20%	32%	1.015

II

Lab. No. 8177 Date Jan. 27/77

Client: Warnock Hersey

Sample Identification: 76-12102

Starting Temperature °C: 350

Softening Temperature °C: 389

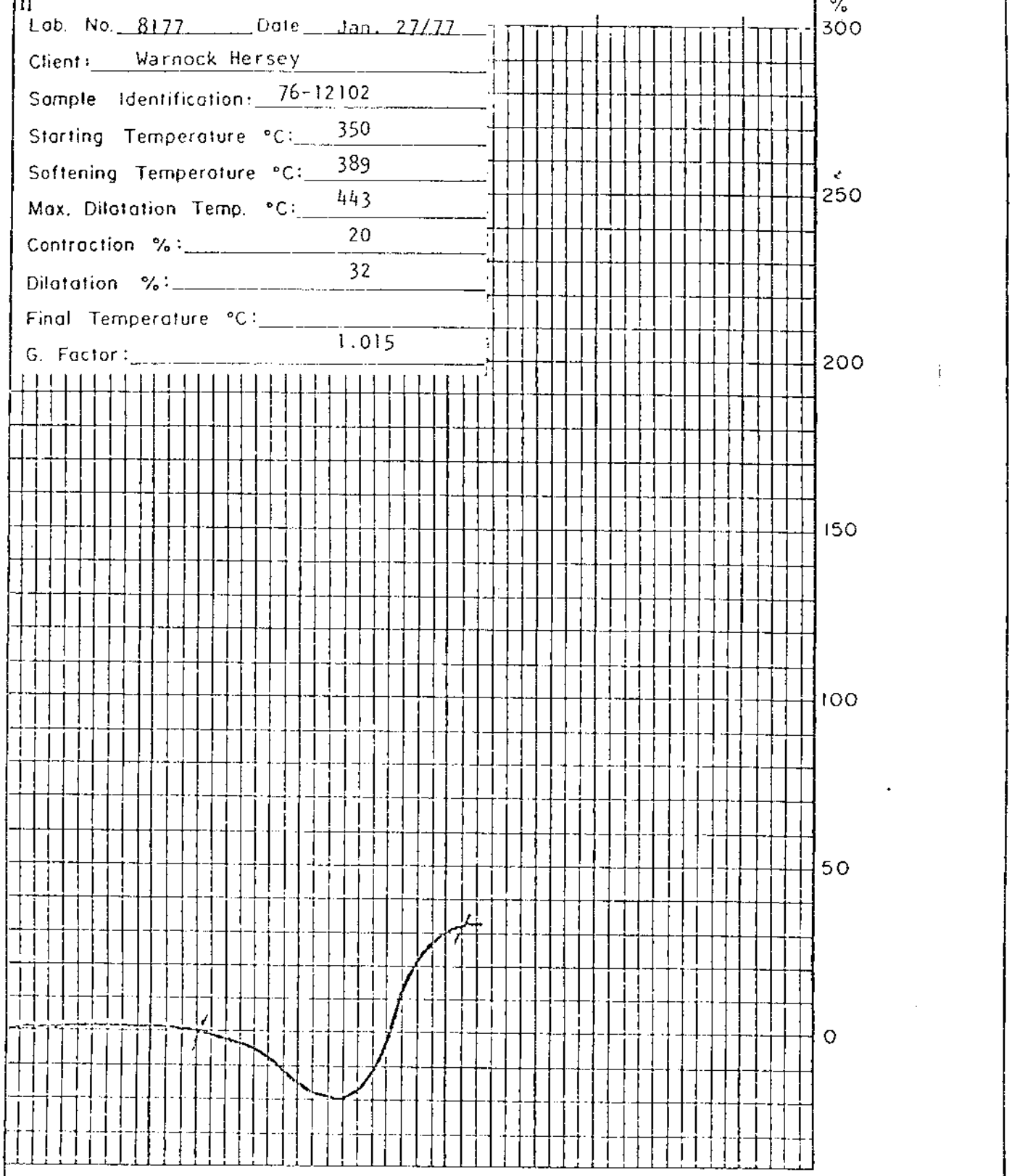
Max. Dilatation Temp. °C: 443

Contraction %: 20

Dilatation %: 32

Final Temperature °C:

G. Factor: 1.015



BIRTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. 8089 Date Jan. 16, 1977

Client: SLOCO MINING LTD.

Sample Identification: DH-47-1

Starting Temperature °C: 350

Softening Temperature °C: 360

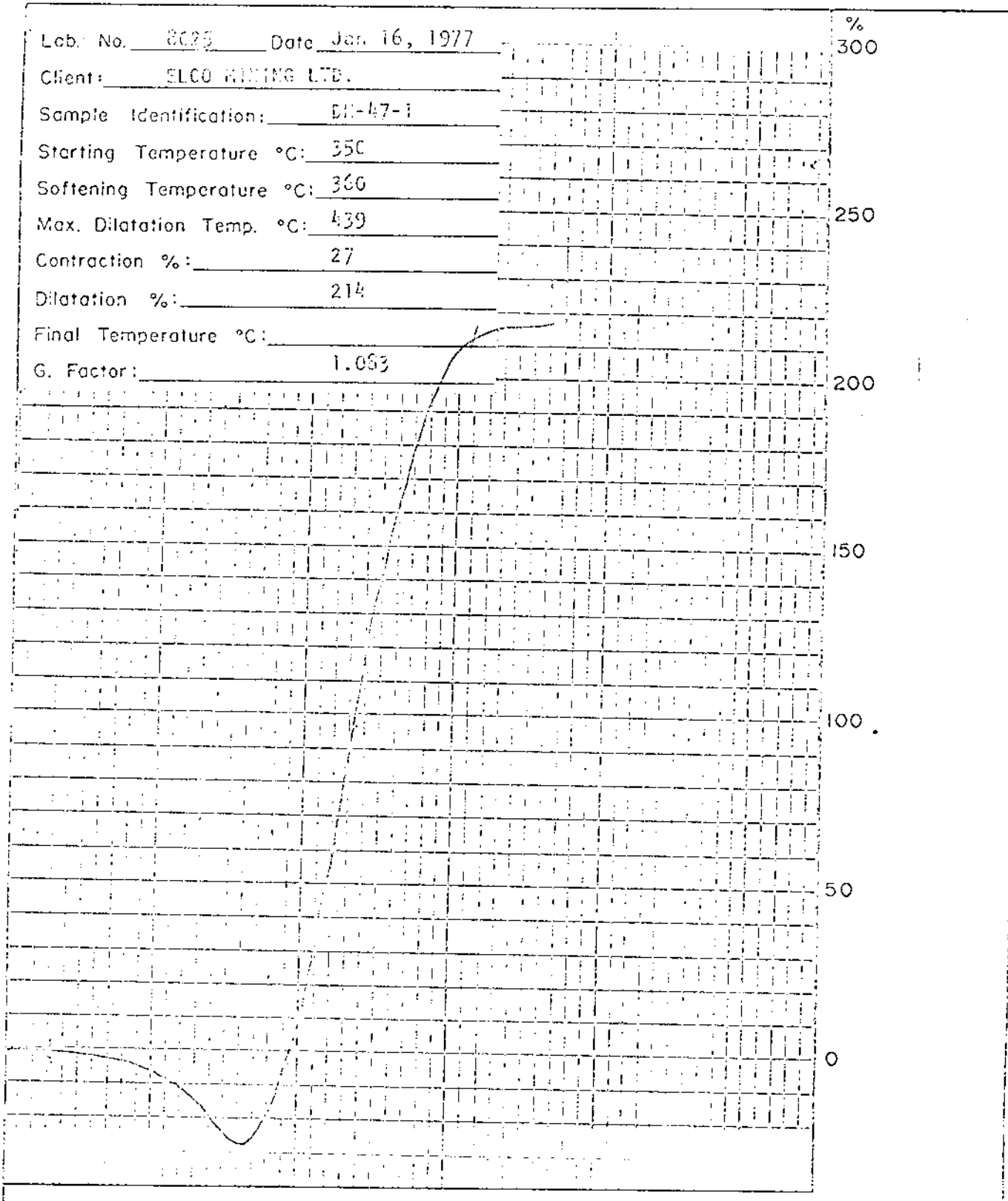
Max. Dilatation Temp. °C: 439

Contraction %: 27

Dilatation %: 214

Final Temperature °C:

G. Factor: 1.093



BUTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. 3027 Date Jan 17, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-47-1

Starting Temperature °C: 350

Softening Temperature °C: 405

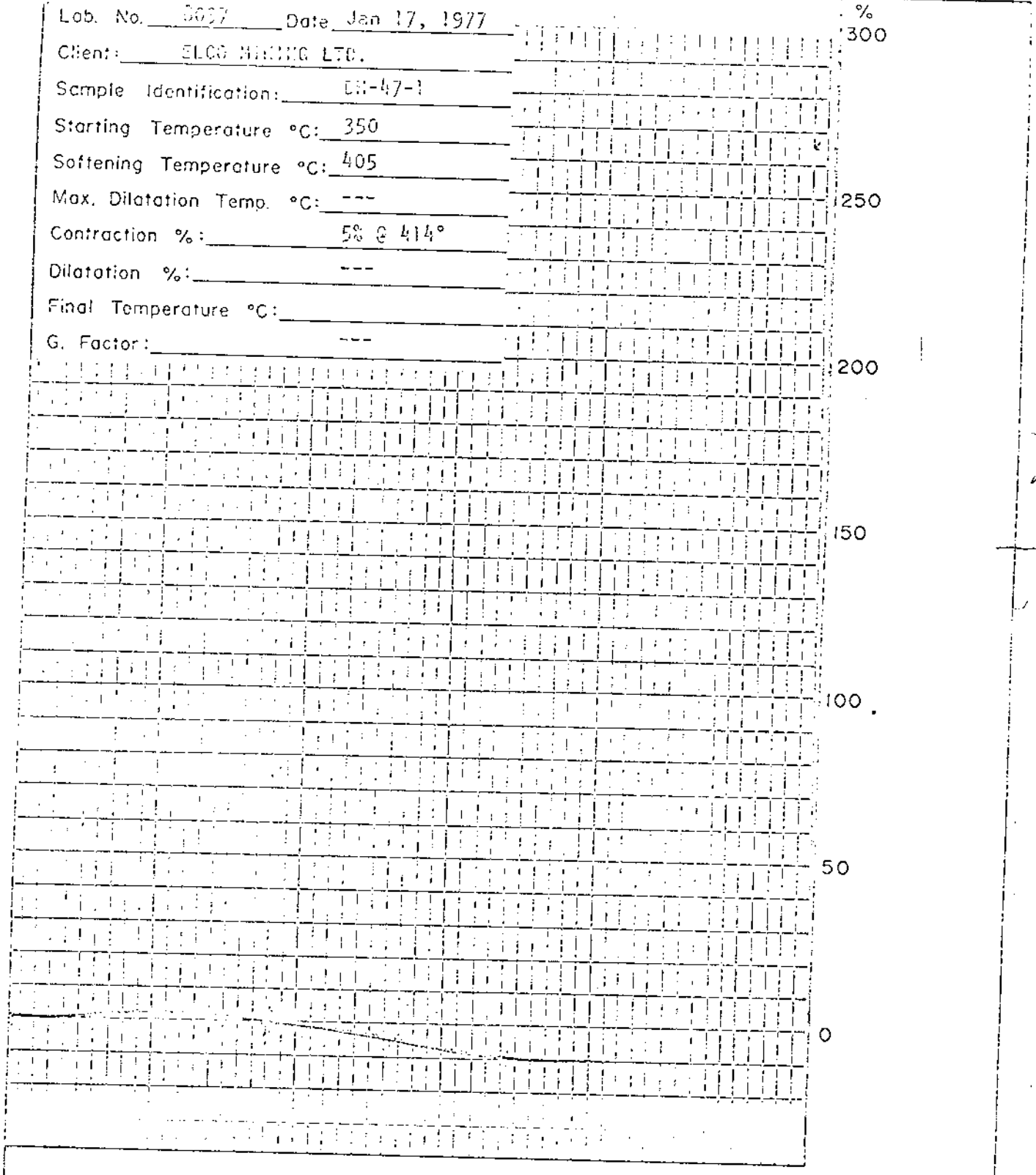
Max. Dilatation Temp. °C: ---

Contraction %: 5% @ 414°

Dilatation %: ---

Final Temperature °C:

G. Factor: ---



BARTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. 8026 Date Jan 18, 1977

Client: ELCO MINING LTD.

Sample Identification: DR-47-2

Starting Temperature °C: 350

Softening Temperature °C: 365

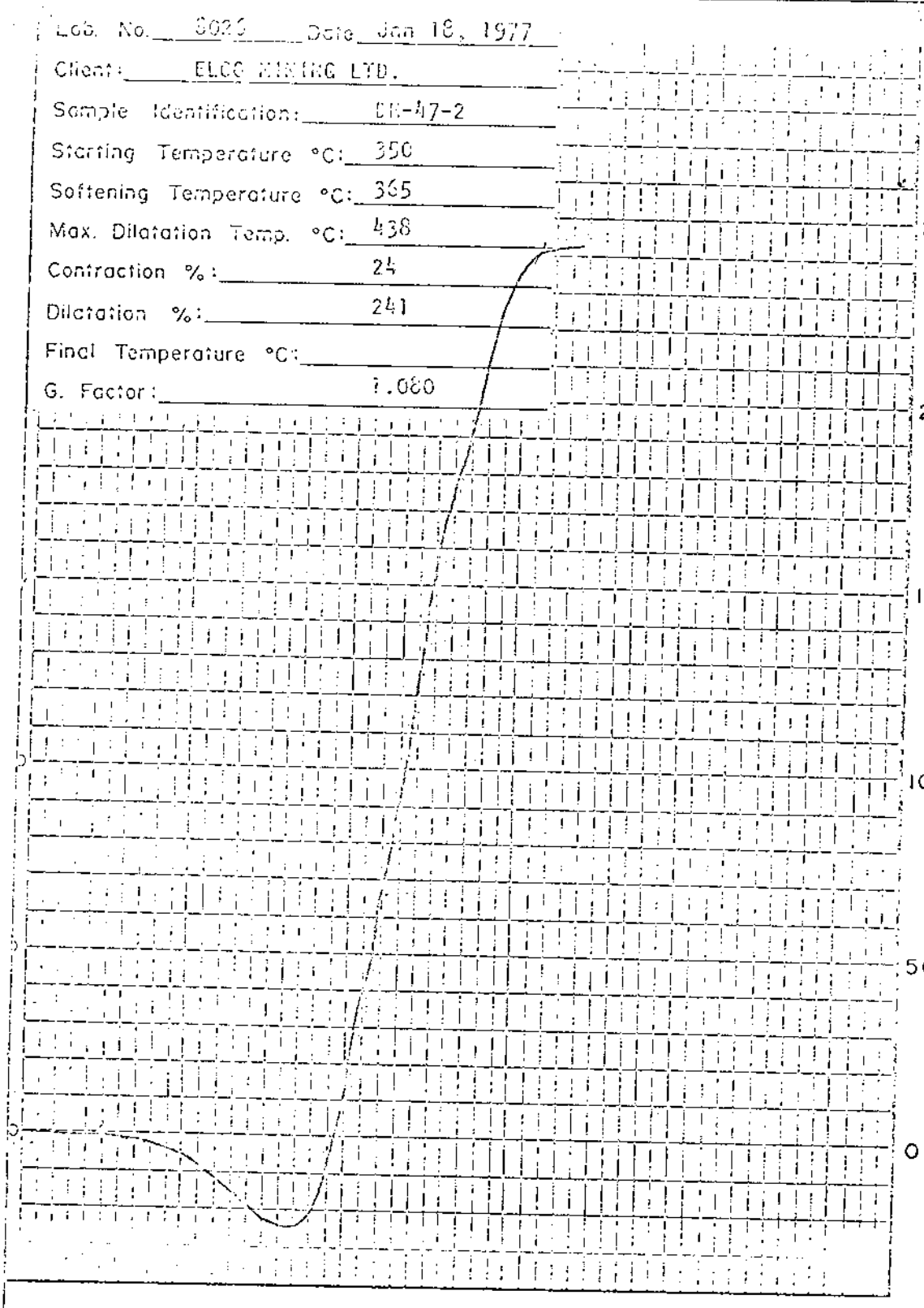
Max. Dilatation Temp. °C: 438

Contraction %: 24

Dilatation %: 241

Final Temperature °C:

G. Factor: 1.080



BARTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. 8027 Date Jan 17, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-47-3

Starting Temperature °C: 350

Softening Temperature °C: 368

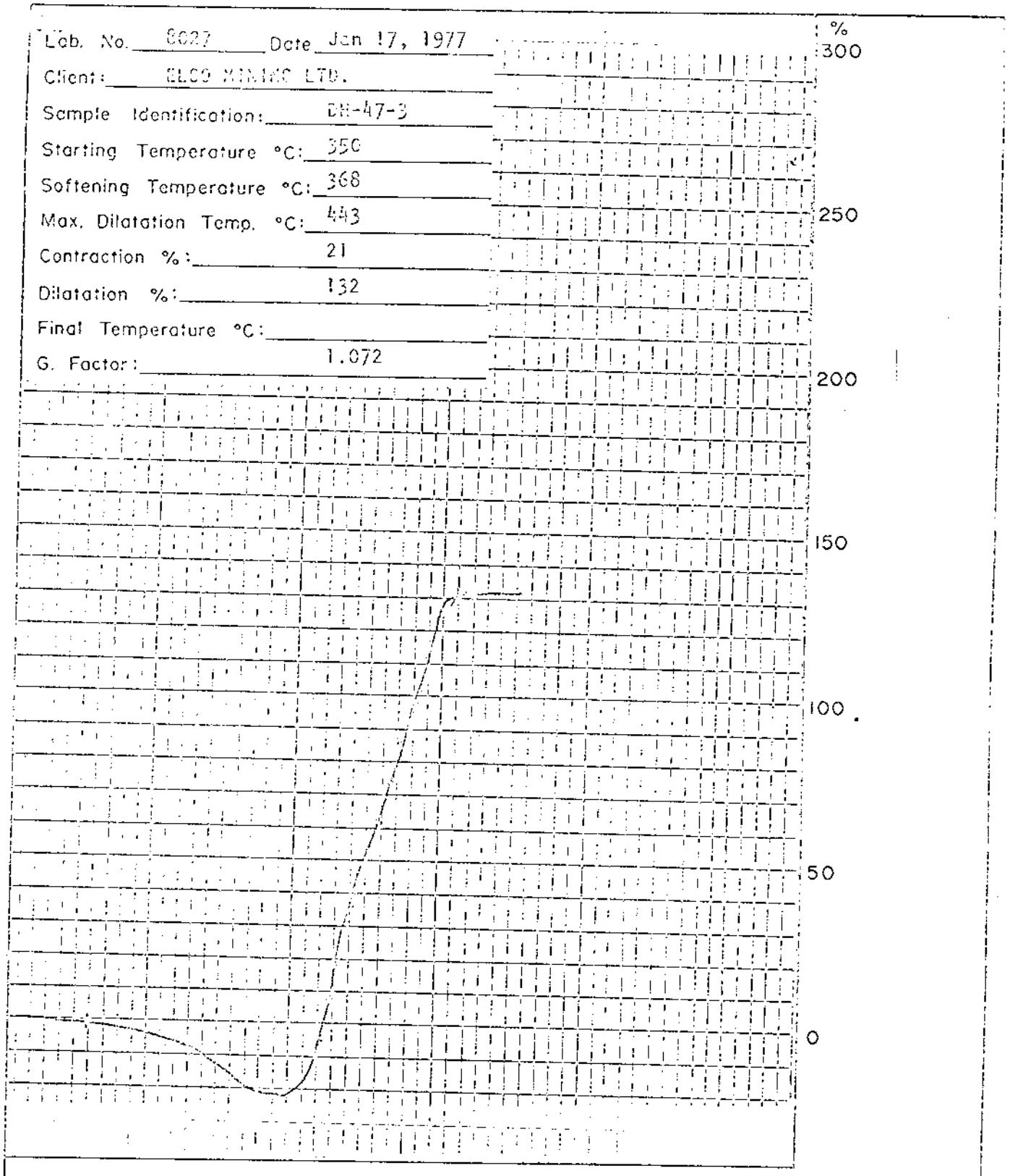
Max. Dilatation Temp. °C: 443

Contraction %: 21

Dilatation %: 132

Final Temperature °C:

G. Factor: 1.072



BARTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. 8229 Date Jan 17, 1977

Client: ELGIN MINING LTD.

Sample Identification: DR-47-4

Starting Temperature °C: 350

Softening Temperature °C: 362

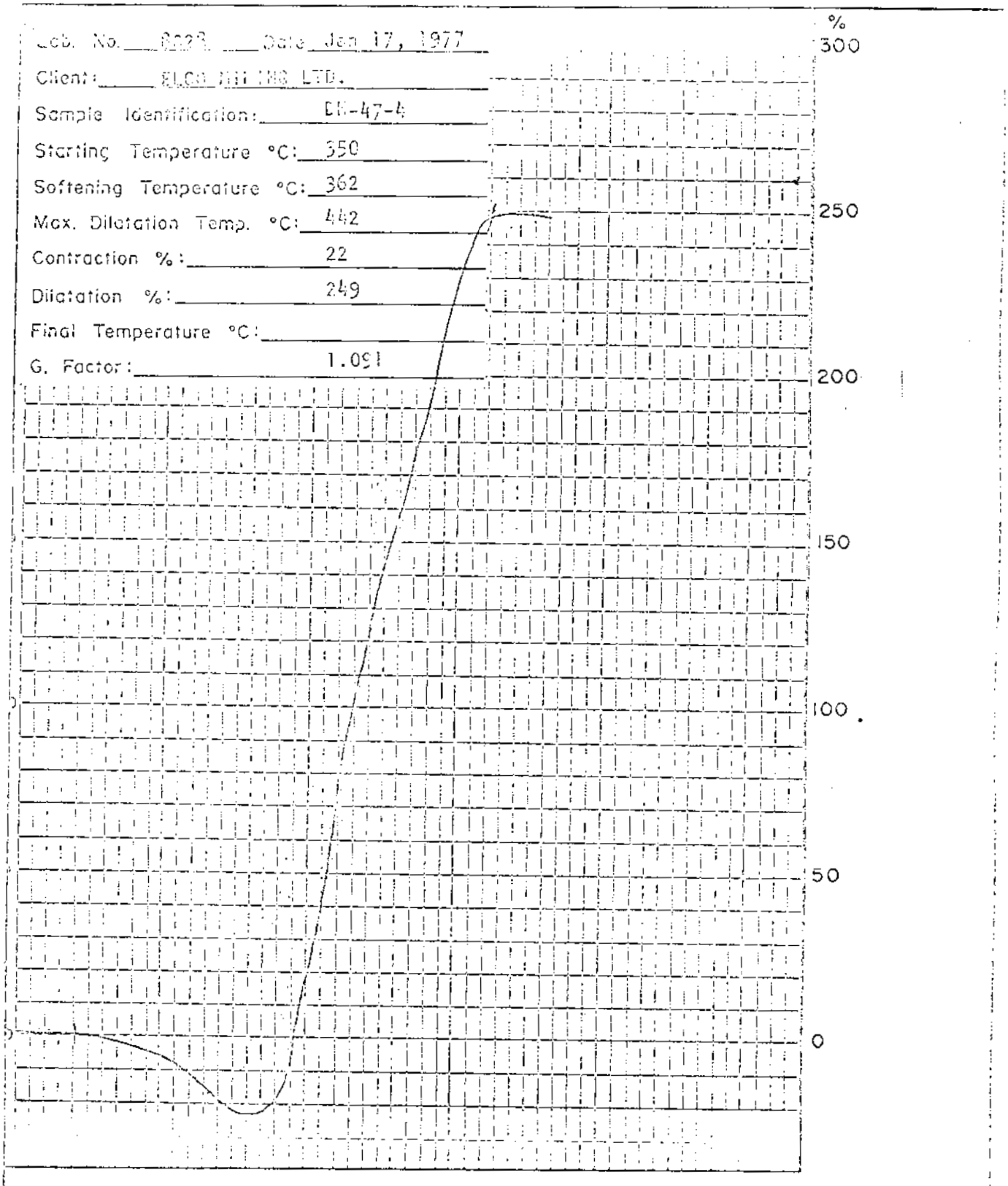
Max. Dilatation Temp. °C: 442

Contraction %: 22

Dilatation %: 249

Final Temperature °C:

G. Factor: 1.091



BARLEY ENGINEERING (CANADA) LTD.

Title	Date
RUHR DILATOMETER TEST	
	Drawn

Lab. No. [illegible] Date [illegible] 17, 1977

Client: ELGO [illegible] LTD.

Sample Identification: [illegible]1-47-5

Starting Temperature °C: 350

Softening Temperature °C: 360

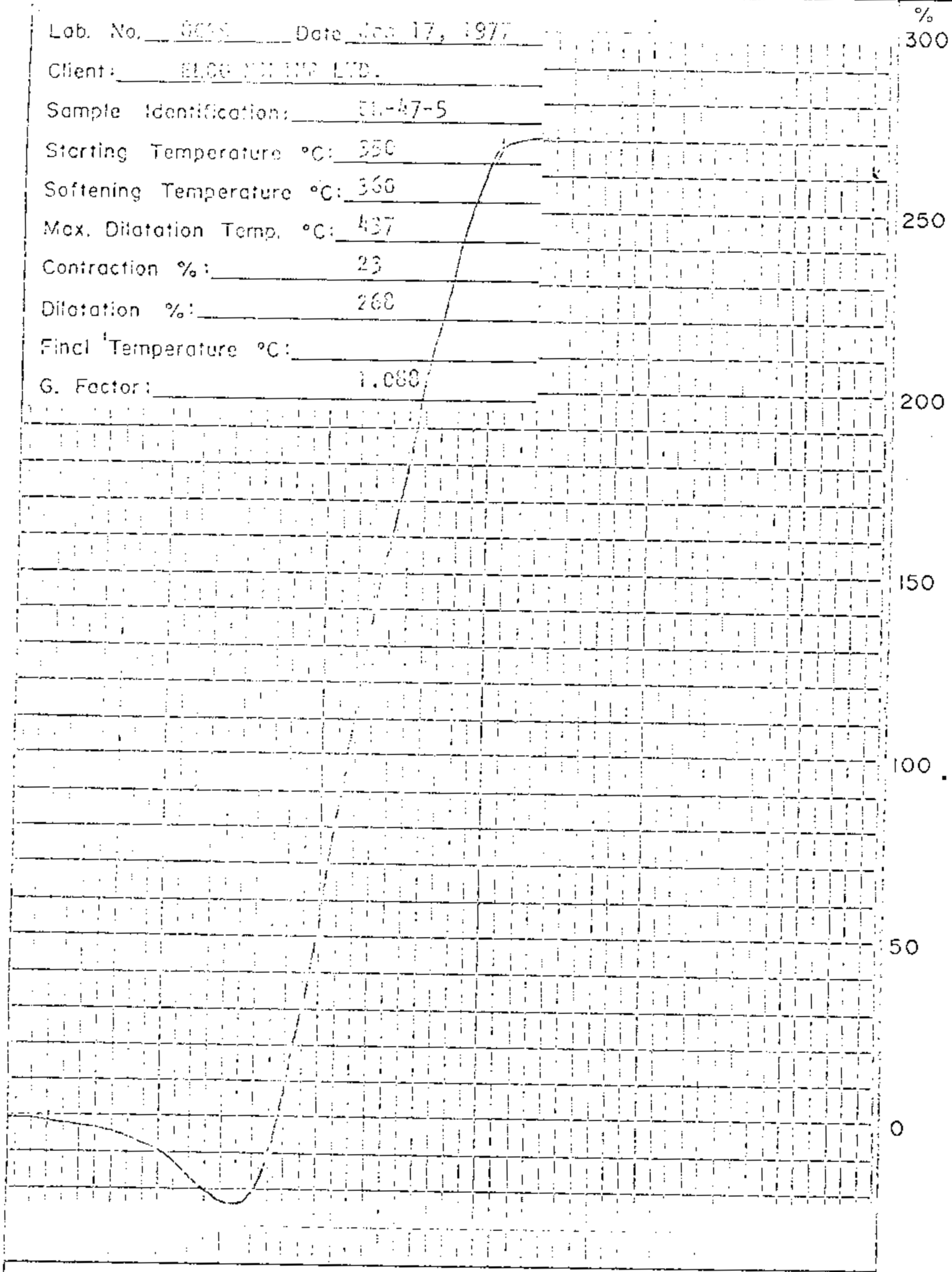
Max. Dilatation Temp. °C: 437

Contraction %: 23

Dilatation %: 268

Final Temperature °C:

G. Factor: 1.080



BIRTLEY ENGINEERING (CANADA) LTD.

Title	Date
RUHR DILATOMETER TEST	Drawn

Lab. No. 6630 Date Jan 17, 1977

Client: [illegible] MINING LTD.

Sample Identification: BR-47-6

Starting Temperature °C: 350

Softening Temperature °C: 371

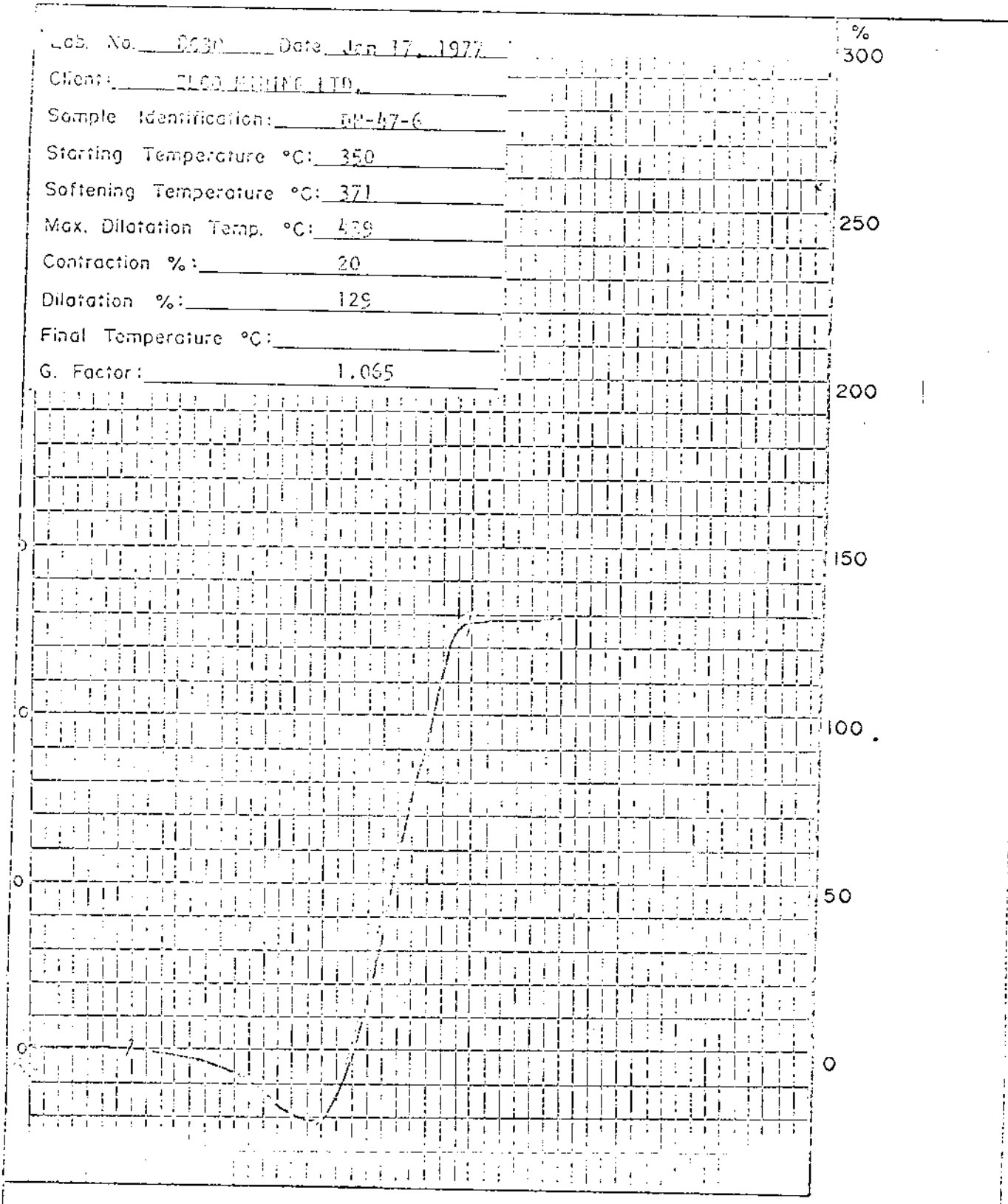
Max. Dilatation Temp. °C: 439

Contraction %: 20

Dilatation %: 129

Final Temperature °C:

G. Factor: 1.065



BARTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. 6631 Date Jan 17, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-47-7

Starting Temperature °C: 350

Softening Temperature °C: 376

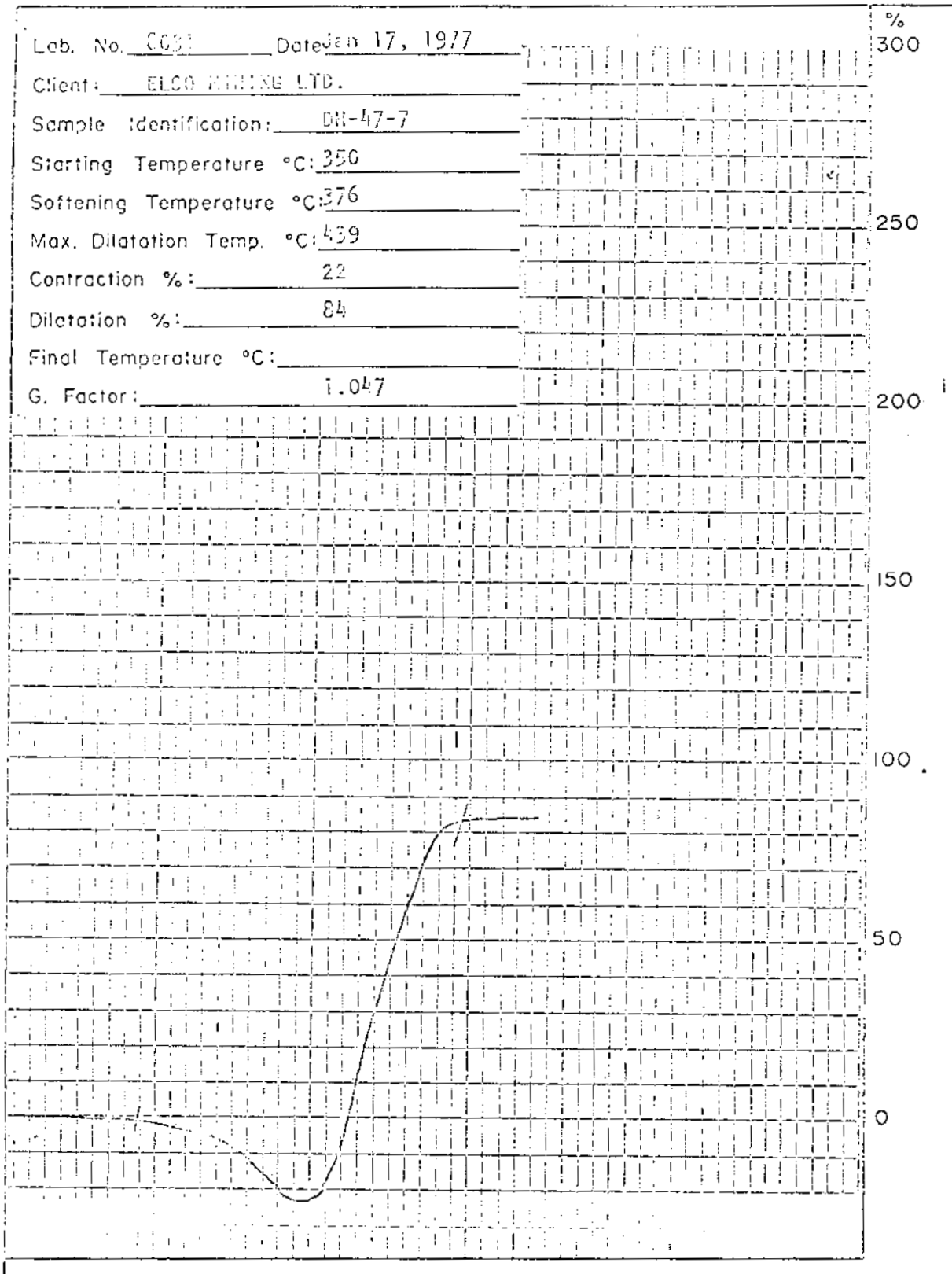
Max. Dilatation Temp. °C: 439

Contraction %: 22

Dilatation %: 84

Final Temperature °C:

G. Factor: 1.047



BIRTLEY ENGINEERING (CANADA) LTD.

Title	Date
RUHR DILATOMETER TEST	
	Drawn

Lab. No. 8032 Date Jan 17, 1977

Client: ELCO MINING LTD.

Sample Identification: DR-47-8

Starting Temperature °C: 350

Softening Temperature °C: 360

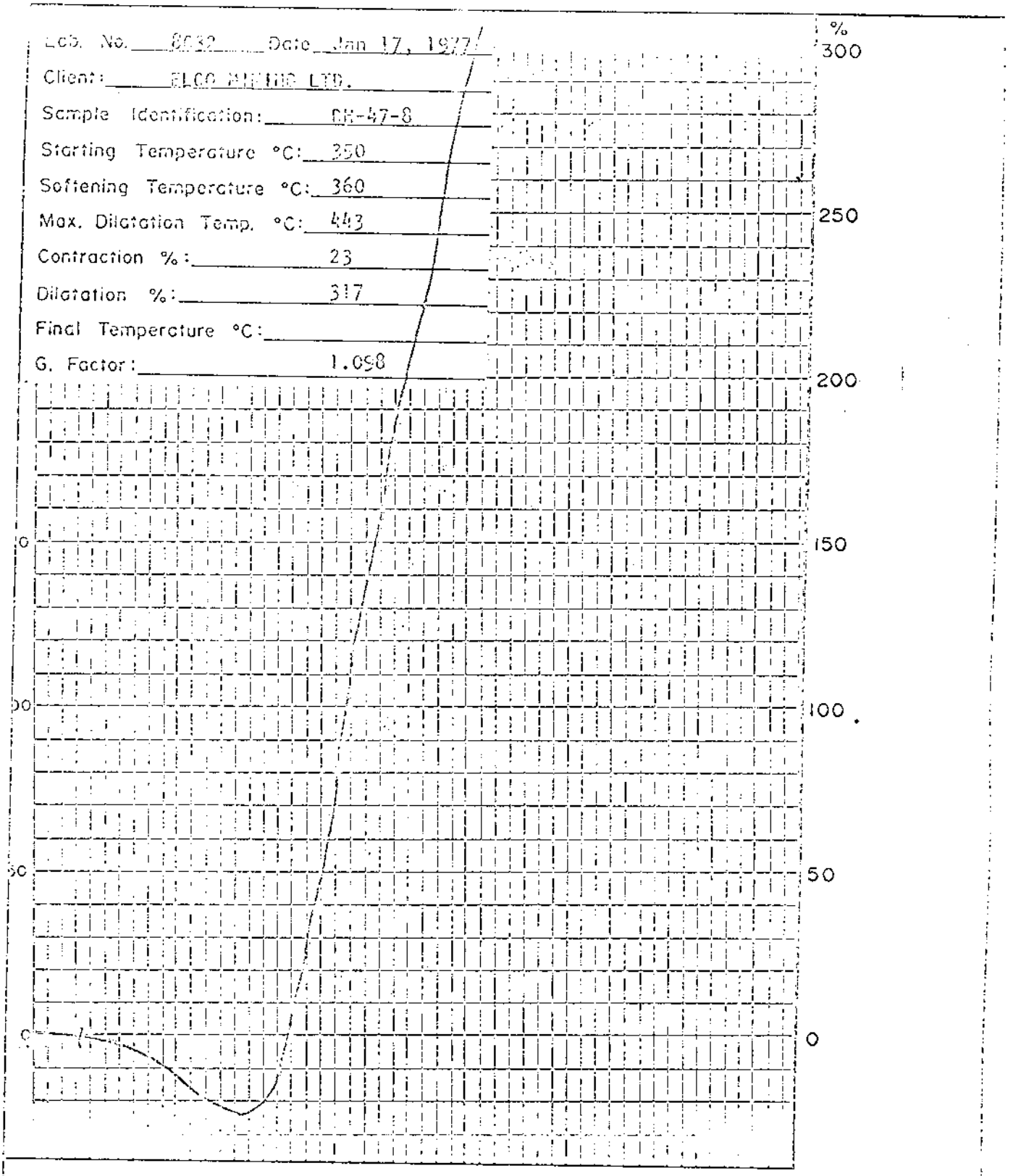
Max. Dilatation Temp. °C: 443

Contraction %: 23

Dilatation %: 317

Final Temperature °C:

G. Factor: 1.098



BATTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. 3693 Date Jan 17, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-47-9

Starting Temperature °C: 350

Softening Temperature °C: 369

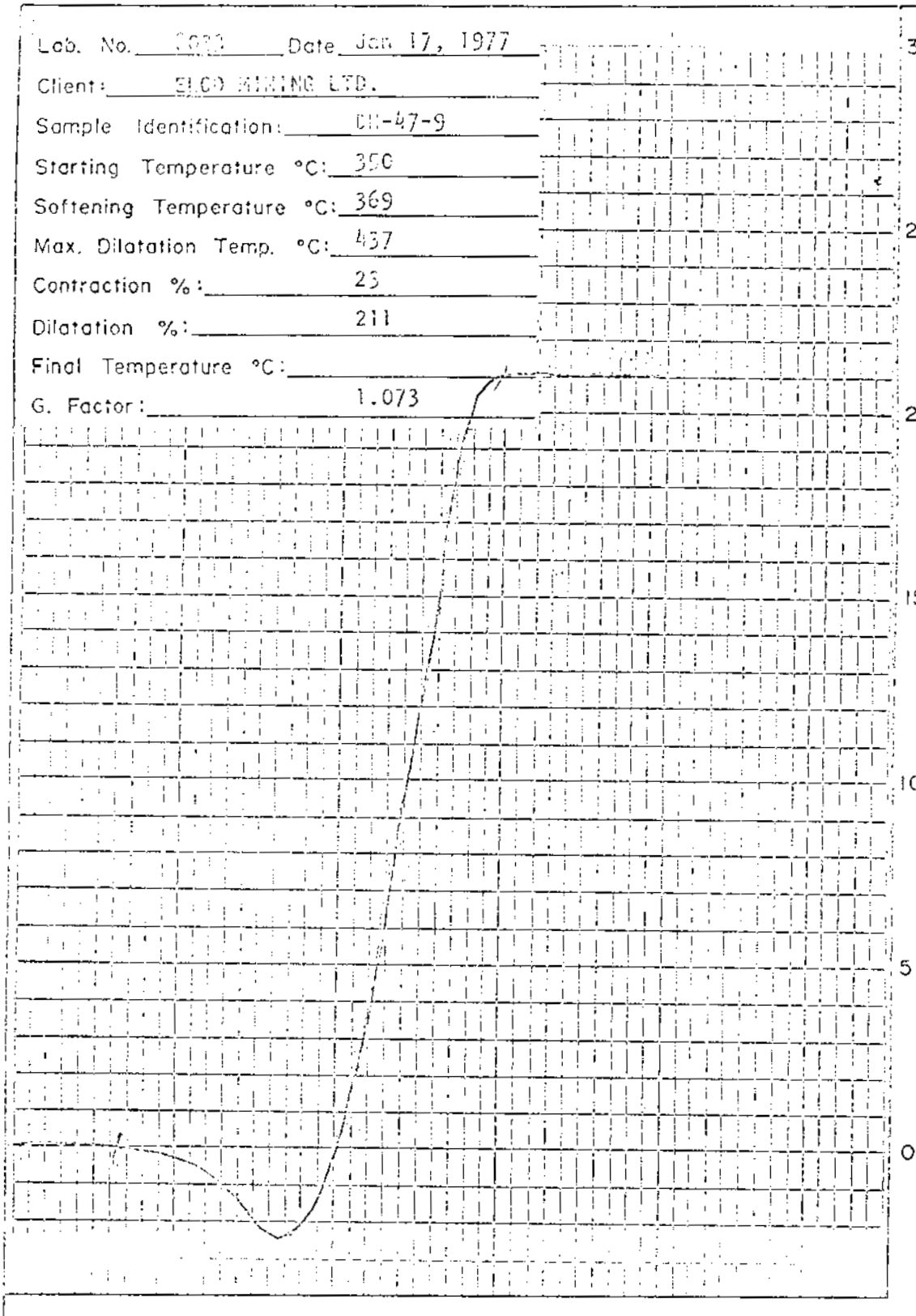
Max. Dilatation Temp. °C: 437

Contraction %: 23

Dilatation %: 211

Final Temperature °C:

G. Factor: 1.073



BIRTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. 6035 Date Jan 17, 1977

Client: ELCO MINING LTD.

Sample Identification: DI-47-10

Starting Temperature °C: 350

Softening Temperature °C: 372

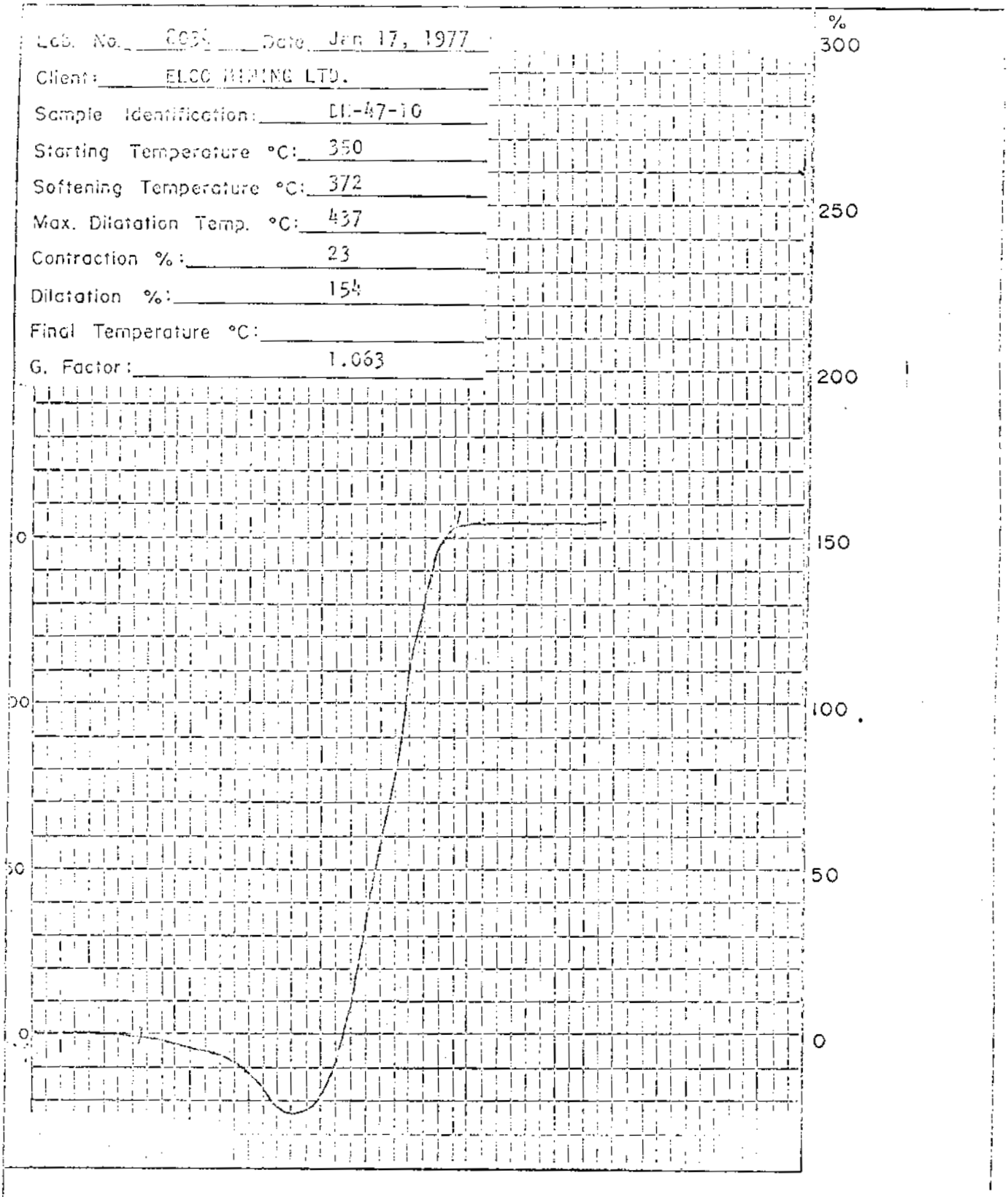
Max. Dilatation Temp. °C: 437

Contraction %: 23

Dilatation %: 154

Final Temperature °C:

G. Factor: 1.063



BARTLEY ENGINEERING (CANADA) LTD.

Title	Date
RUHR DILATOMETER TEST	
	Drawn

Lab. No. 0136 Date Jan 17, 1977

Client: ELCO MINING LTD.

Sample Identification: EM-47-11

Starting Temperature °C: 350

Softening Temperature °C: 365

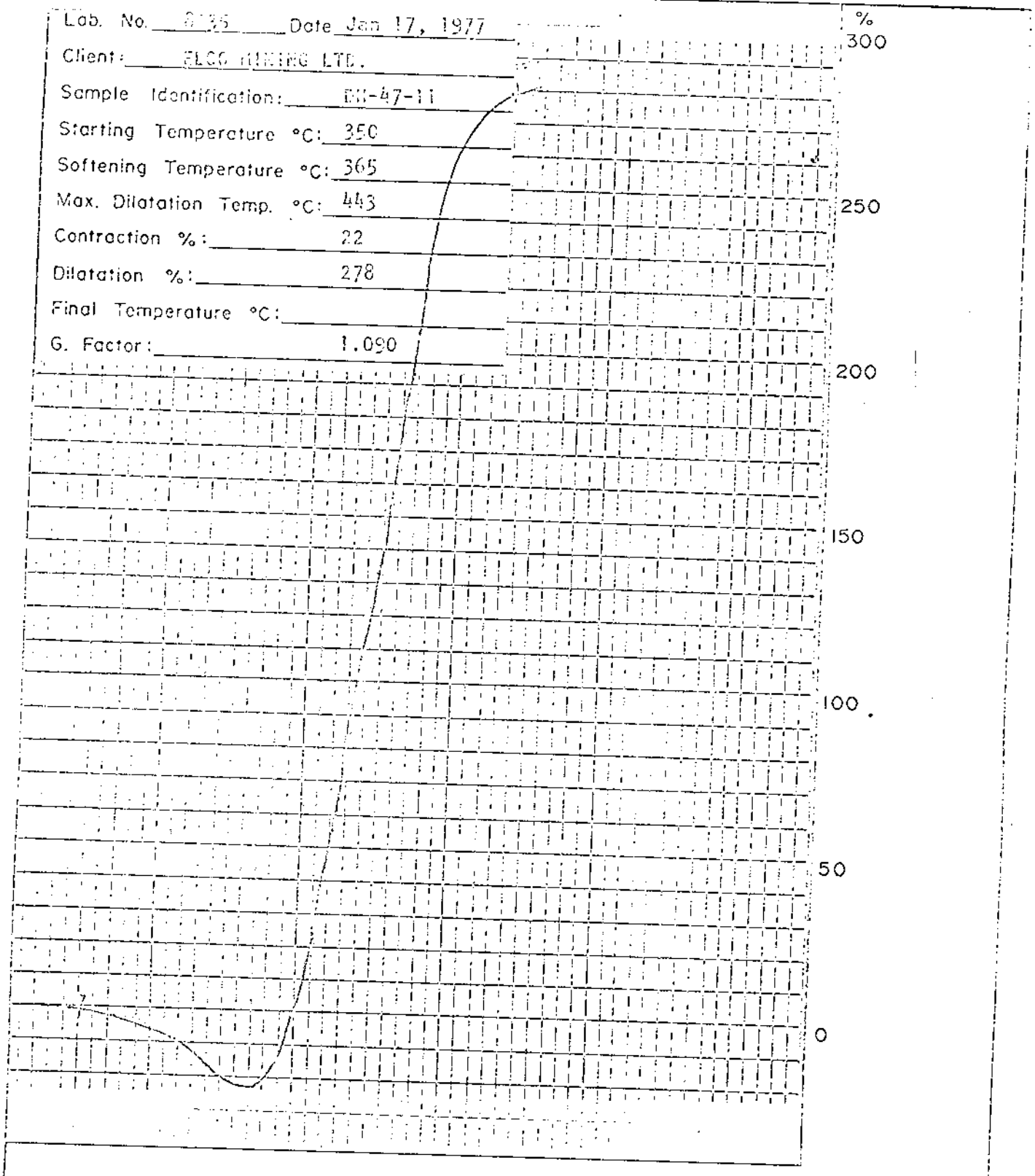
Max. Dilatation Temp. °C: 443

Contraction %: 22

Dilatation %: 278

Final Temperature °C:

G. Factor: 1.090



BIRTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. 8036 Date Jan 17, 1977

Client: ELCO MINING LTD.

Sample Identification: EM-47-12

Starting Temperature °C: 350

Softening Temperature °C: 374

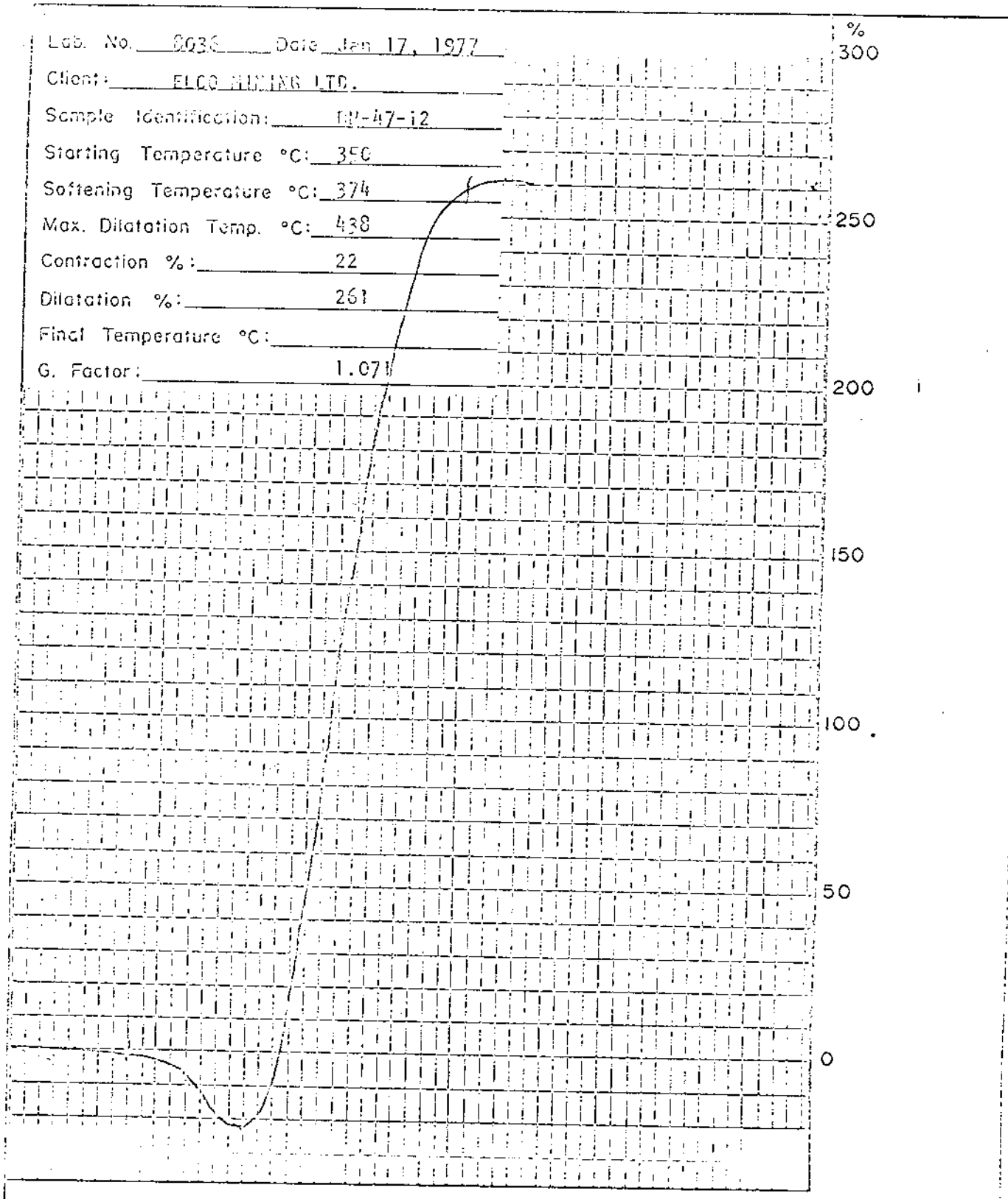
Max. Dilatation Temp. °C: 438

Contraction %: 22

Dilatation %: 261

Final Temperature °C:

G. Factor: 1.071



BARTLEY ENGINEERING (CANADA) LTD.

Title	Date
RUHR DILATOMETER TEST	
	Drawn

Lab. No. 7977 Date Jan 13, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-48-1

Starting Temperature °C: 350

Softening Temperature °C: 360

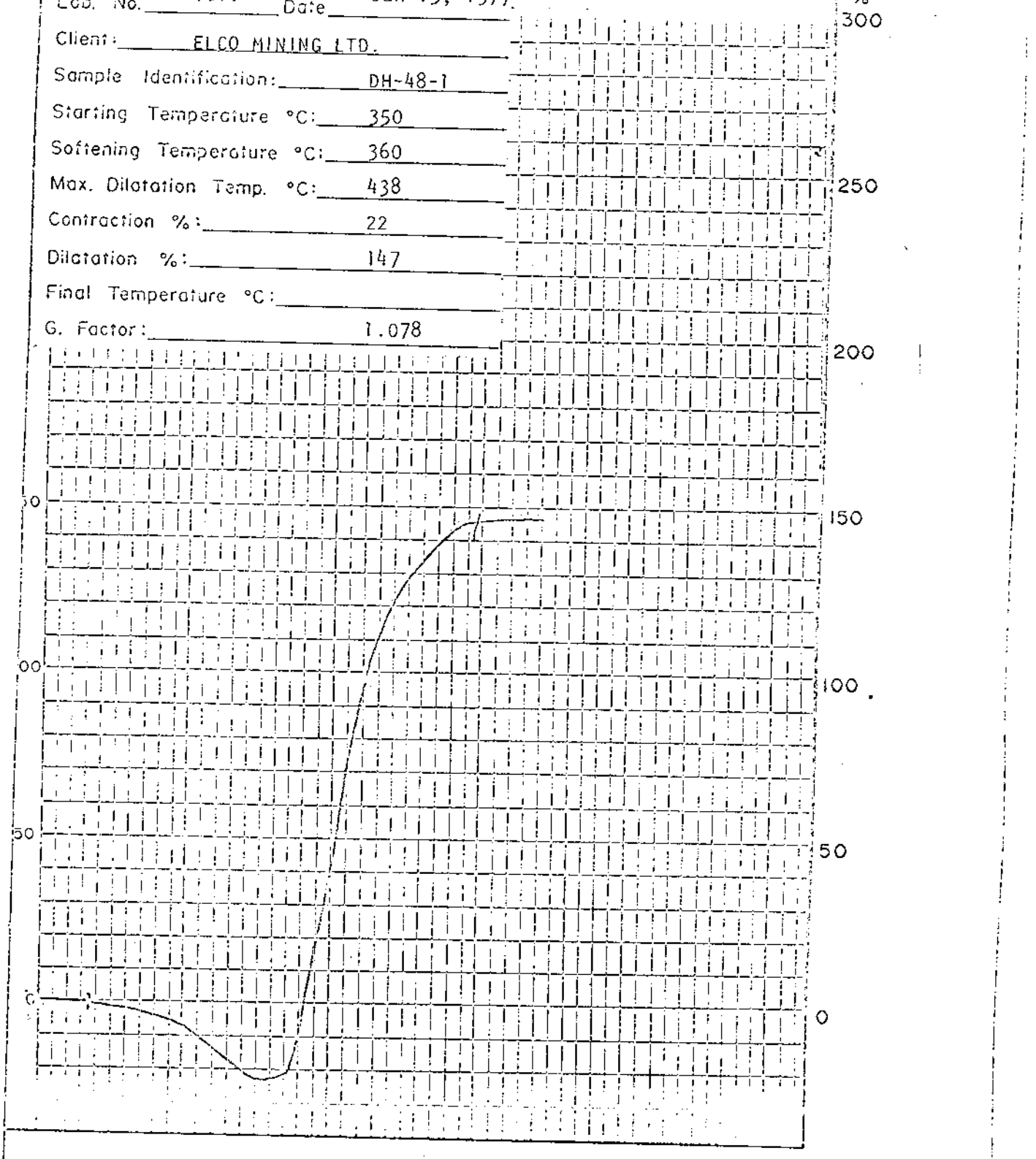
Max. Dilatation Temp. °C: 438

Contraction %: 22

Dilatation %: 147

Final Temperature °C:

G. Factor: 1.078



BIRTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. 7978 Date Jan 13, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-48-2

Starting Temperature °C: 350

Softening Temperature °C: 352

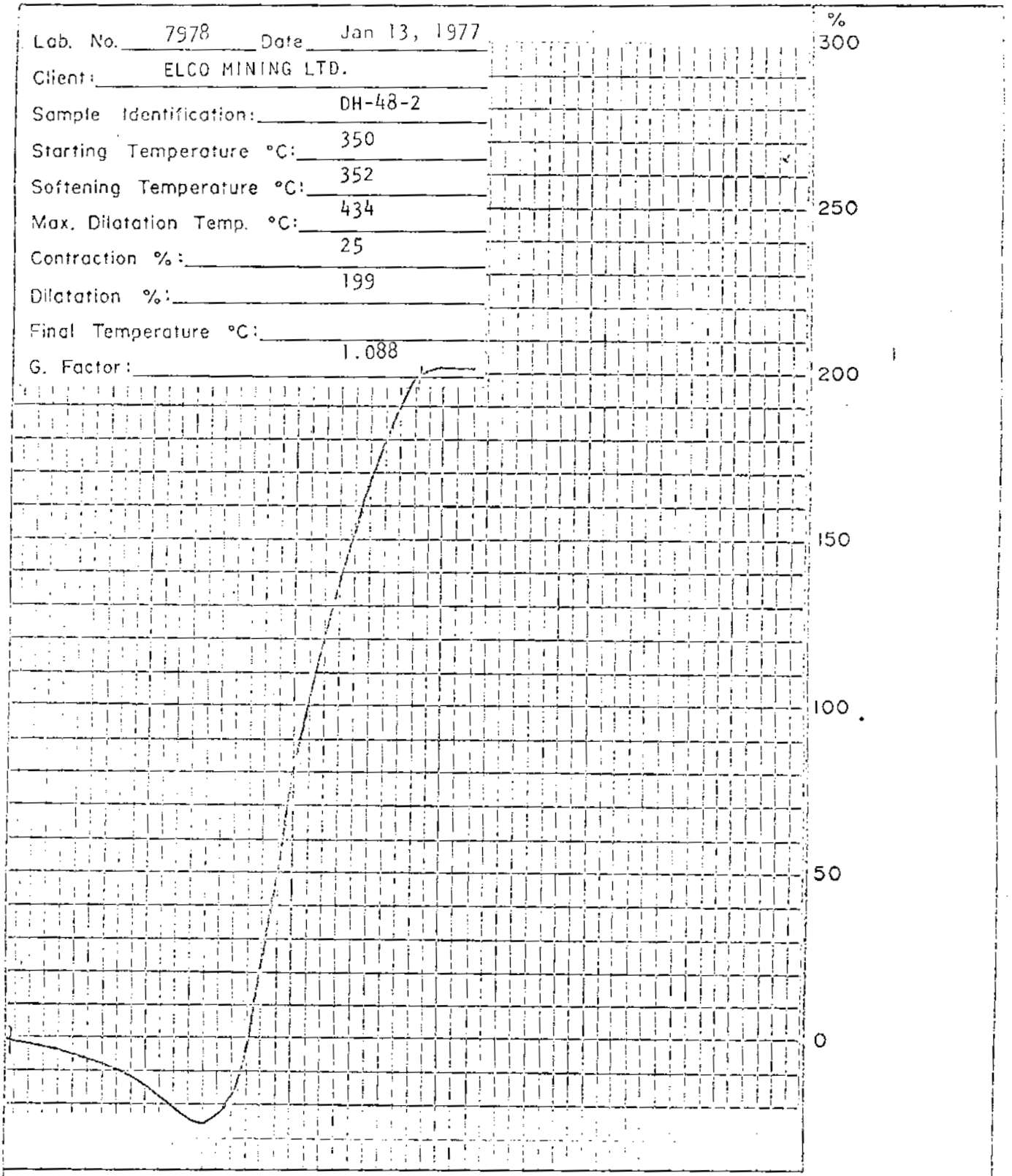
Max. Dilatation Temp. °C: 434

Contraction %: 25

Dilatation %: 199

Final Temperature °C:

G. Factor: 1.088



BIRTLEY ENGINEERING (CANADA) LTD.

Title	Date
RUHR DILATOMETER TEST	
	Drawn

Lab. No. 7979 Date Jan 13, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-48-3

Starting Temperature °C: 350

Softening Temperature °C: 358

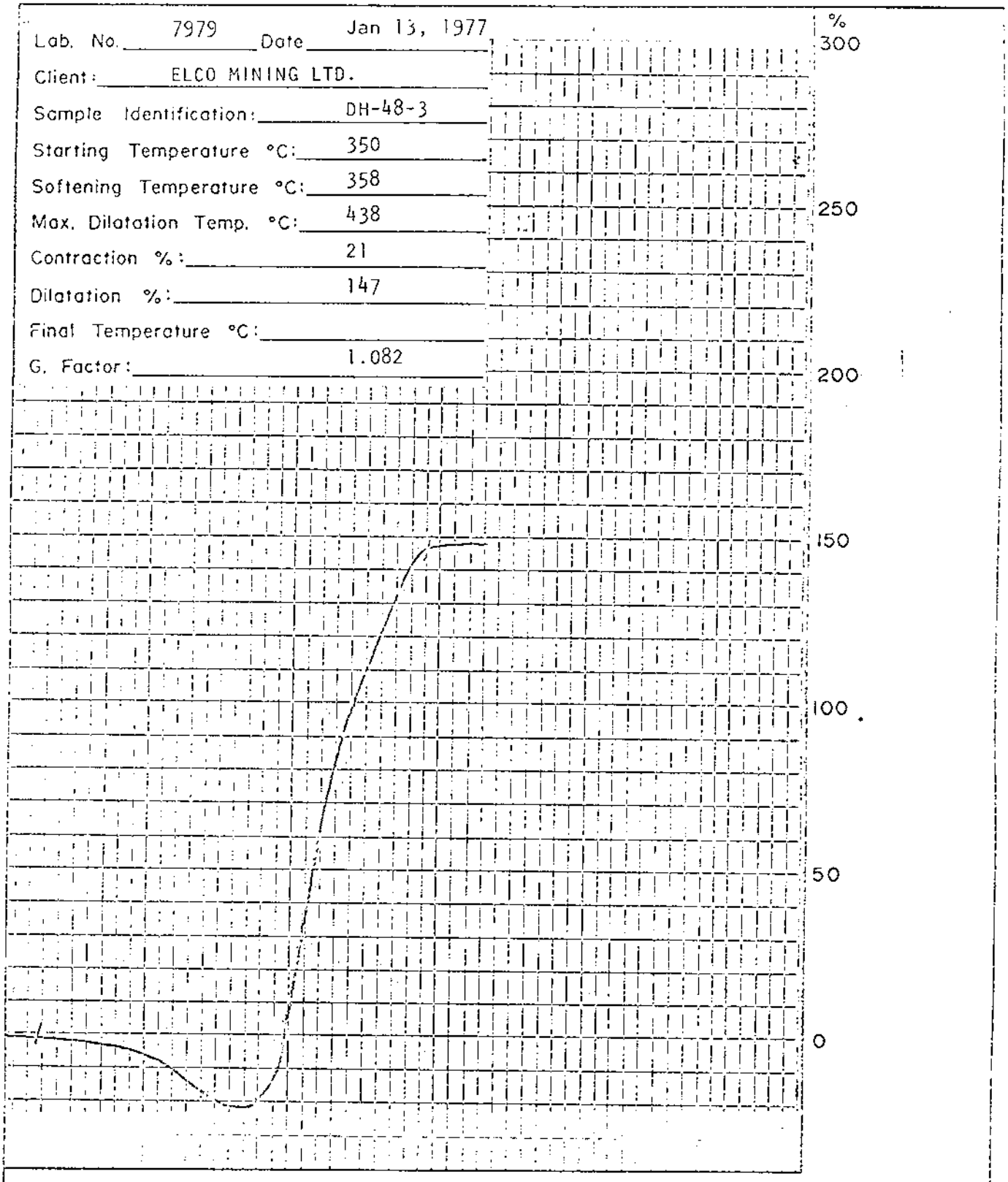
Max. Dilatation Temp. °C: 438

Contraction %: 21

Dilatation %: 147

Final Temperature °C:

G. Factor: 1.082



BIRTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. 8050 Date Jan 17, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-49-2

Starting Temperature °C: 350

Softening Temperature °C: 388

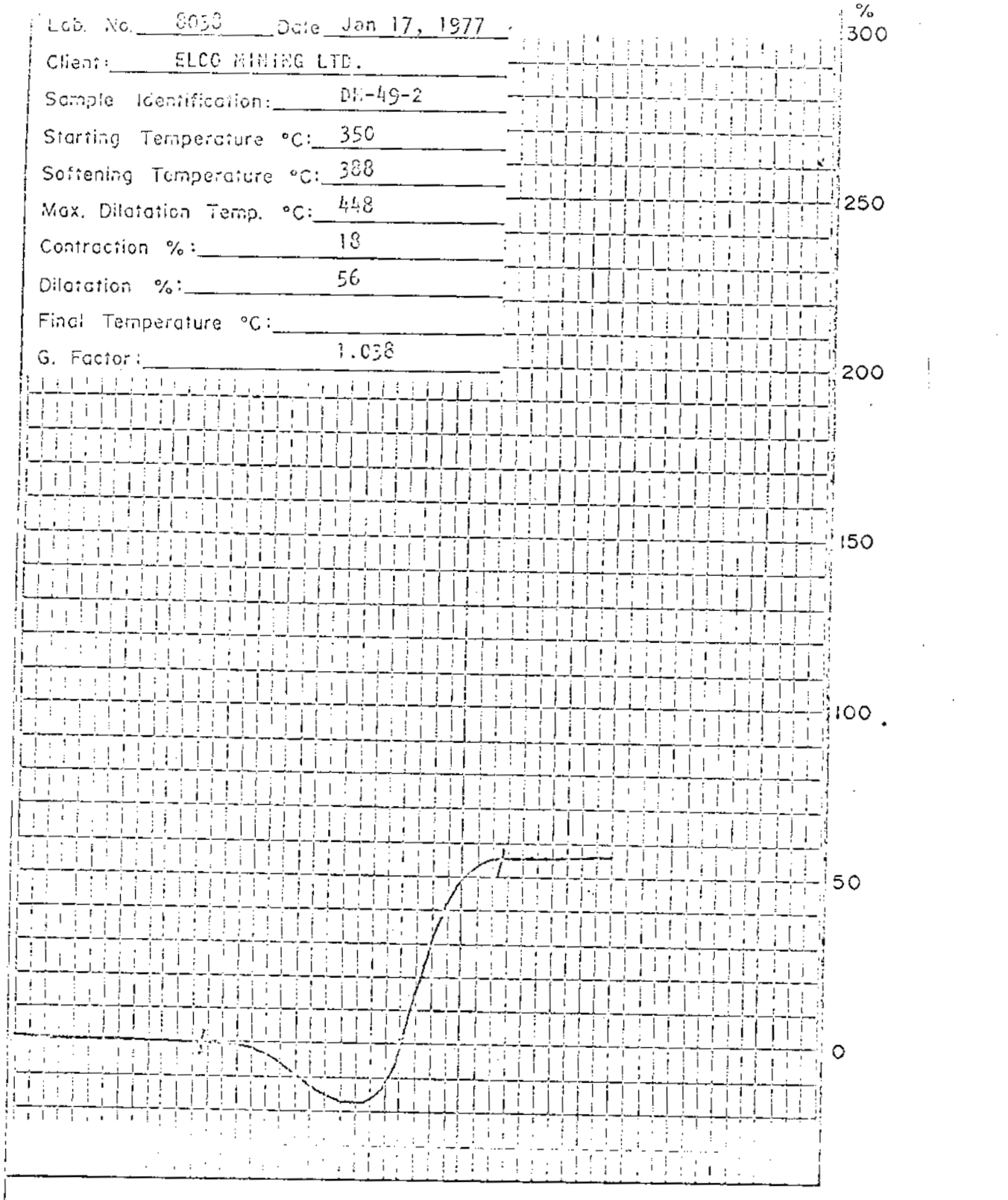
Max. Dilatation Temp. °C: 448

Contraction %: 18

Dilatation %: 56

Final Temperature °C:

G. Factor: 1.038



BIRTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. 6029 Date Jan 17, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-49-3

Starting Temperature °C: 350

Softening Temperature °C: 358

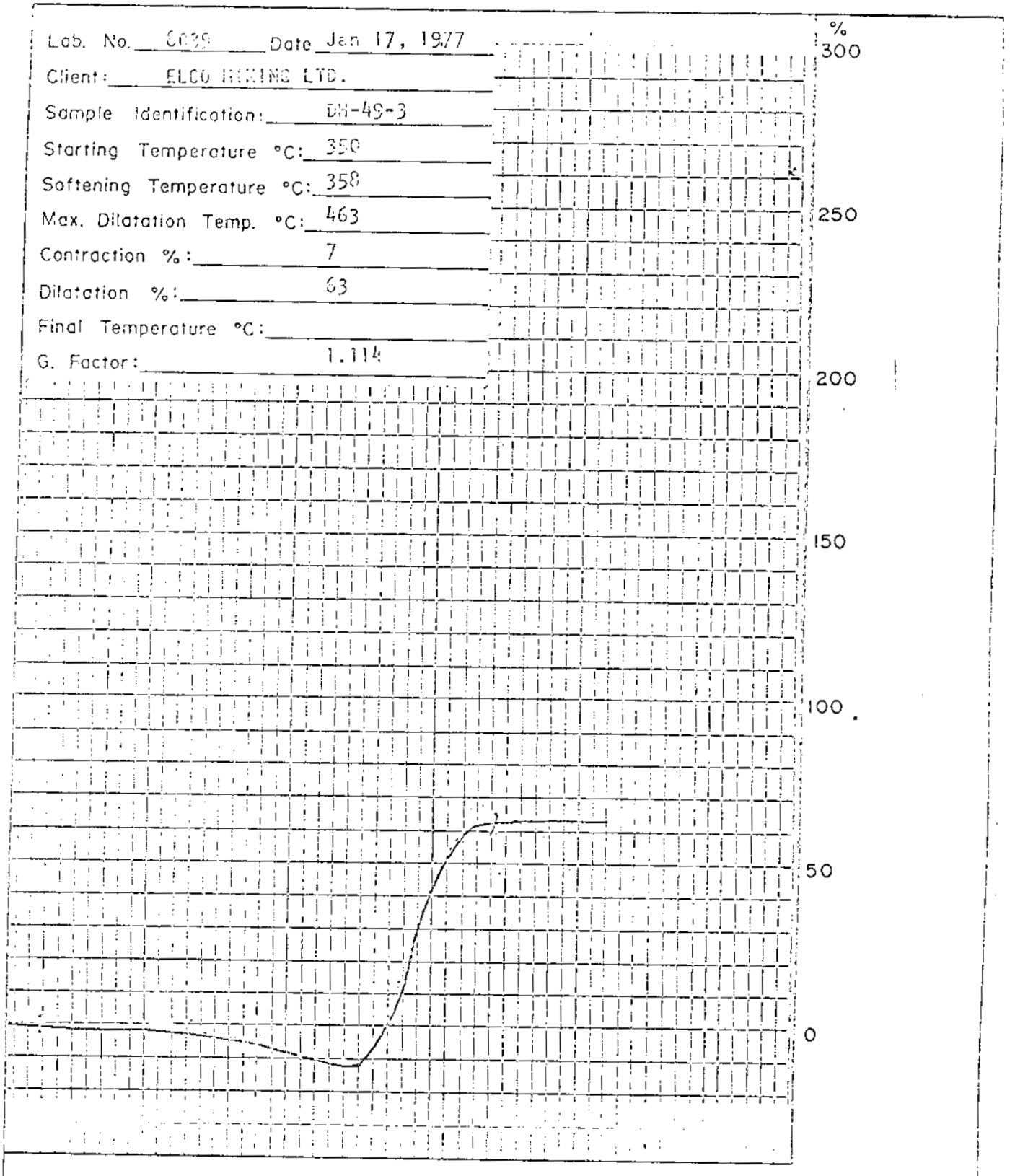
Max. Dilatation Temp. °C: 463

Contraction %: 7

Dilatation %: 63

Final Temperature °C:

G. Factor: 1.114



BIRTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. 8040 Date Jan 17, 1977

Client: ELCO MINING LTD.

Sample Identification: EM-49-4

Starting Temperature °C: 350

Softening Temperature °C: 388

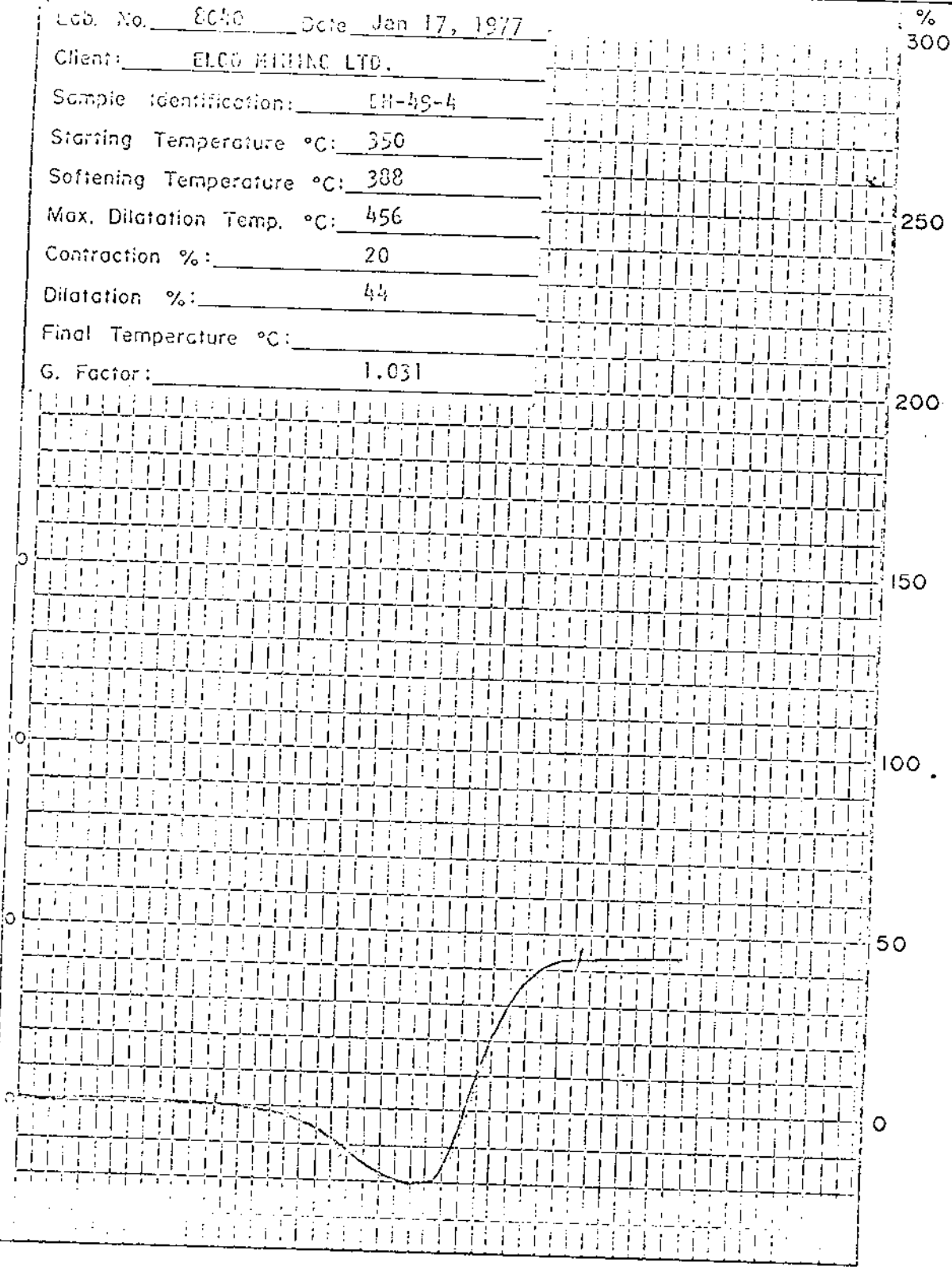
Max. Dilatation Temp. °C: 456

Contraction %: 20

Dilatation %: 44

Final Temperature °C:

G. Factor: 1.031



BIRTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Warnock Hersey Professional Services Ltd.

ELCO MINING LTD. CORE SAMPLE ANALYSIS

Hole No.: DH 50 - 1 Lab. No.: 76 - 12103 Date: Red'd December 16, 1976

HEAD RAW ANALYSIS						
R.M.%	Ash%	V.M.%	F.C.%	S.%	H.G.I.	REMARKS
0.8	51.1	13.1	35.0	0.36	99	Air Dried Basis
- -	51.5	13.2	35.3	0.36	- -	Dry Basis

SIZE / RAW ANALYSES								
Size Fraction	Wt. %	R.M.%	Ash %	S. %	CUMULATIVE			
					Wt. %	Ash %	S. %	
¼" x 65 m	84.1	0.7	54.8	0.37	84.1	54.8	0.37	A.D.B.
	84.1	- -	55.2	0.37	84.1	55.2	0.37	D.B.
65 m x 0	15.9	0.9	37.7	0.39	100.0	52.3	0.37	A.D.B.
	15.9	- -	38.0	0.39	100.0	52.5	0.37	D.B.

SINK - FLOAT ANALYSIS: ¼" x 65 M									
S. G.	Wt.%	R.M%	Ash %	V.M%	F.C%	S.%	Cumulative		
							Wt. %	Ash %	
-1.40	22.7	0.8	4.8	21.7	72.7	0.56	22.7	4.8	A.D.B.
	22.7	- -	4.8	21.9	73.3	0.56	22.7	4.8	D.B.
1.40-1.50	9.1	0.7	13.9	19.4	66.0	0.53	31.8	7.4	A.D.B.
	9.1	- -	14.0	19.6	66.4	0.53	31.8	7.4	D.B.
1.50-1.60	3.8	0.7	21.6	17.2	60.5	0.50	35.6	8.9	A.D.B.
	3.8	- -	21.8	17.3	60.9	0.50	35.6	9.0	D.B.
+1.60	64.4	0.8	81.7	- -	- - -	- -	100.0	56.0	A.D.B.
	64.4	- -	82.4	- -	- -	- -	100.0	56.2	D.B.

COMPOSITE ¼" x 65 m FLOATS @ 1.50 S.G., A.D.B.						
F.S.I.	P % on Coal	DILATATION TESTS				
		Softening Temp.(°C)	Max. Dil. Temp.(°C)	Maximum Contr. %	Maximum Dil. %	G.No.
4½	0.016					

Lab. No. 8325 Date Feb. 7/77

Client: Warnock Hersey

Sample Identification: 76-12103

Starting Temperature °C: 350

Softening Temperature °C: 383

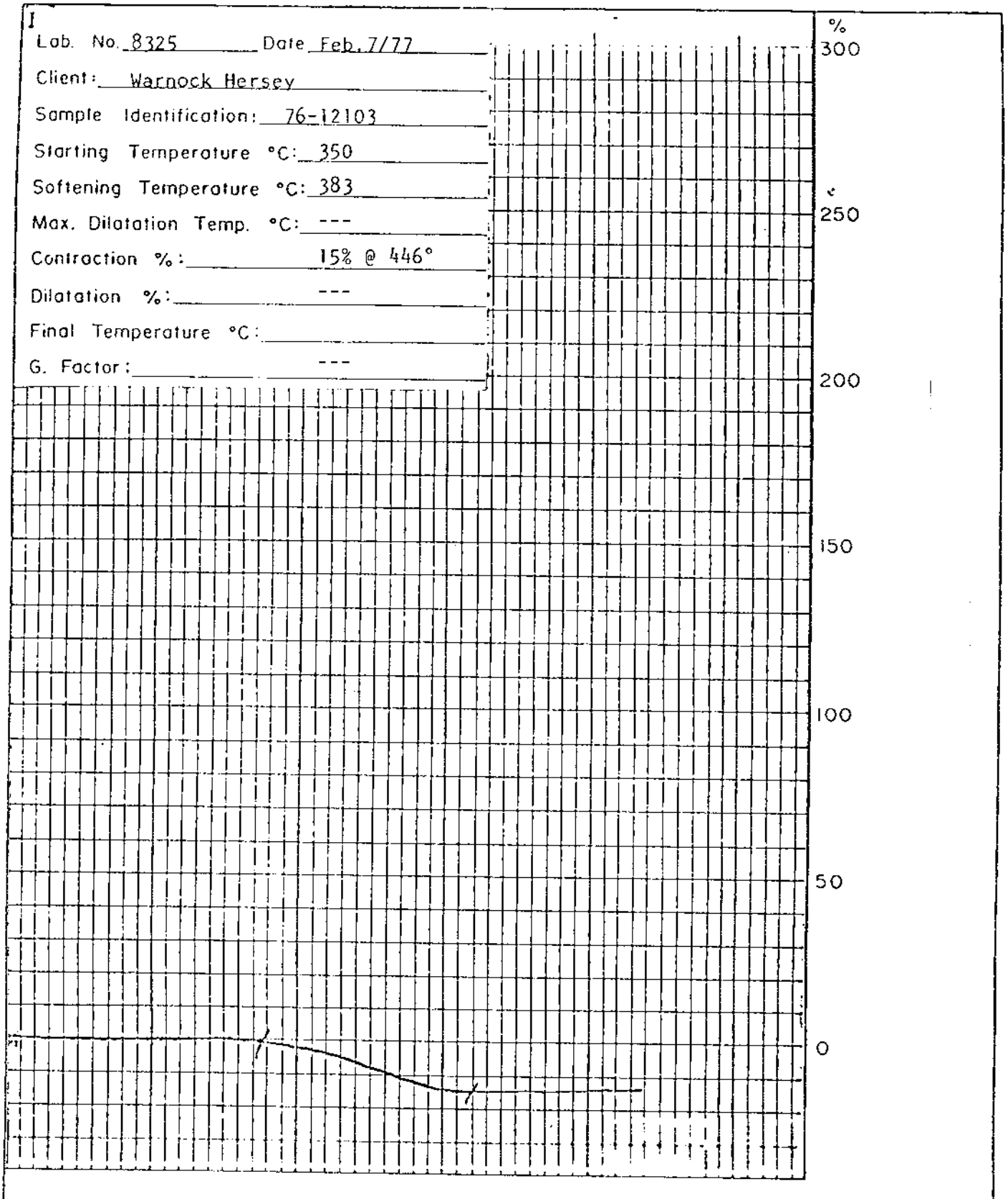
Max. Dilatation Temp. °C: ---

Contraction %: 15% @ 446°

Dilatation %: ---

Final Temperature °C:

G. Factor: ---



BIRTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Warnock Hersey Professional Services Ltd.

ELCO MINING LTD. CORE SAMPLE ANALYSIS

Hole No.: DH 50 - 2 Lab. No.: 76 - 12104 Date: Rec'd December 16, 1976

HEAD RAW ANALYSIS						
R.M.%	Ash%	V.M.%	F.C %	S.%	H.G.I.	REMARKS
0.6	43.5	14.3	41.6	0.42	99	Air Dried Basis
	43.7	14.4	41.9	0.42	- -	Dry Basis

SIZE / RAW ANALYSES								
Size Fraction	Wt. %	R.M.%	Ash %	S. %	CUMULATIVE			
					Wt. %	Ash %	S. %	
¼" x 65m	80.1	0.5	45.5	0.39	80.1	45.5	0.39	A.D.B.
	80.1	- -	45.8	0.39	80.1	45.8	0.39	D.B.
65m x 0	19.9	0.6	24.9	0.48	100.0	41.5	0.41	A.D.B.
	19.9	- -	25.1	0.48	100.0	41.7	0.41	D.B.

SINK - FLOAT ANALYSIS: ¼" x 65 M									
S. G.	Wt.%	R.M%	Ash %	V.M%	F.C%	S.%	Cumulative		
							Wt. %	Ash %	
-1.40	30.5	0.6	5.6	20.0	73.8	0.70	30.5	5.6'	A.D.B.
	30.5	- -	5.6	20.1	74.3	0.70	30.5	5.6	D.B.
1.40-1.50	7.7	0.7	12.0	18.9	68.4	0.50	38.2	6.9	A.D.B.
	7.7	- -	12.1	19.1	68.8	0.50	38.2	6.9	D.B.
1.50-1.60	7.1	0.6	16.4	17.9	65.1	0.45	45.3	8.3	A.D.B.
	7.1	- -	16.5	18.0	65.5	0.45	45.3	8.4	D.B.
+1.60	54.7	0.7	73.0	- -	- -	- -	100.0	46.6	A.D.B.
	54.7	- -	78.6	- -	- -	- -	100.0	46.8	D.B.

COMPOSITE ¼" x 65 m FLOATS @ 1.50 S.G., A.D.B.						
F.S.I.	P % on Coal	DILATATION TESTS				
		Softening Temp.(°C)	Max. Dil. Temp.(°C)	Maximum Contr. %	Maximum Dil. %	G.No.
1½	0.018					

Lab. No. 8326 Date Feb. 8/77

Client: Warnock Hersey

Sample Identification: 76-12104

Starting Temperature °C: 350

Softening Temperature °C: 413

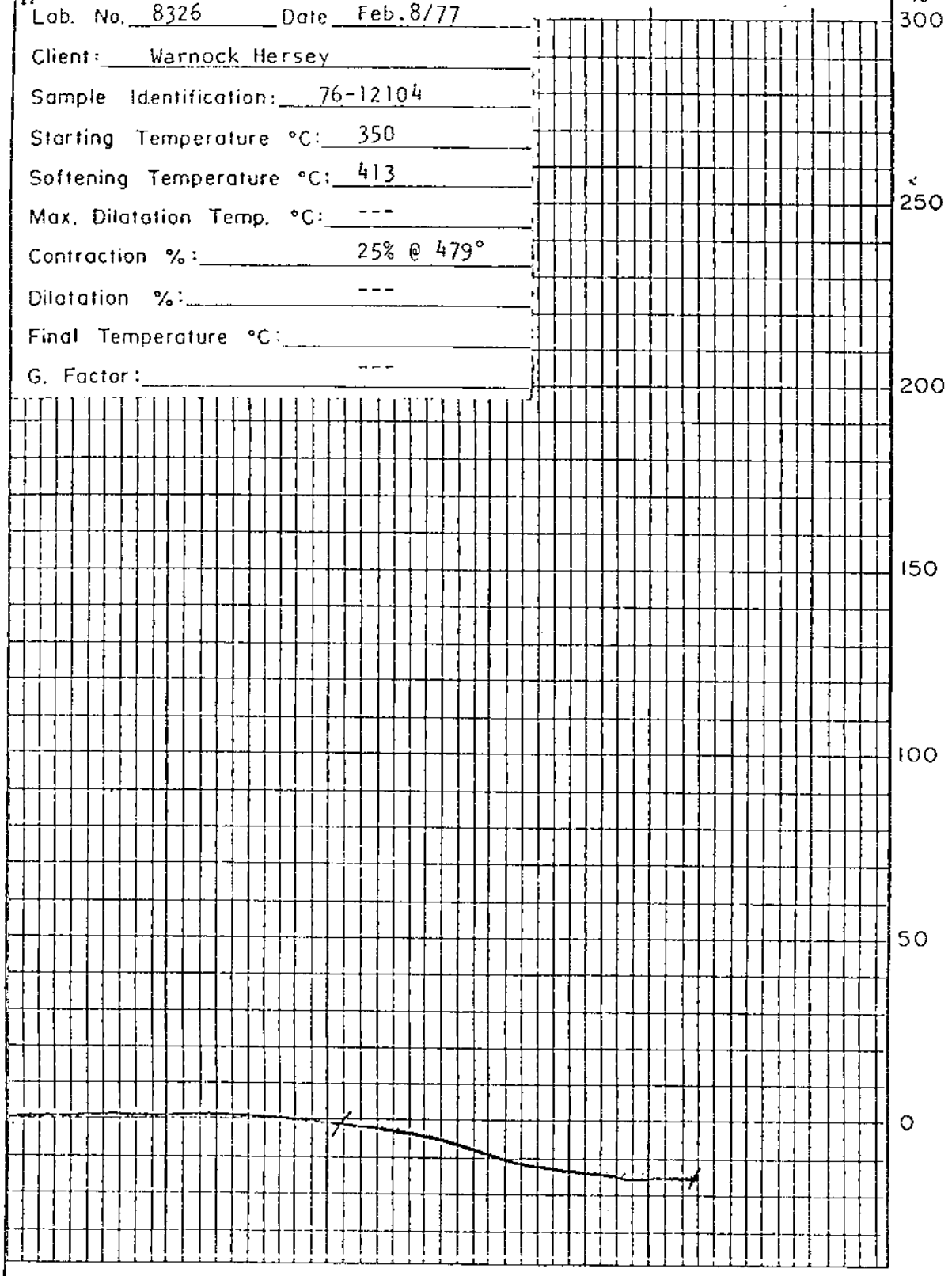
Max. Dilatation Temp. °C: ---

Contraction %: 25% @ 479°

Dilatation %: ---

Final Temperature °C:

G. Factor: ---



BIRTLEY ENGINEERING (CANADA) LTD.

Title	Date
RUHR DILATOMETER TEST	
	Drawn

Warnock Hersey Professional Services Ltd.

ELCO MINING LTD. CORE SAMPLE ANALYSIS

Hole No.: DH 50 - 3 Lab. No.: 76 - 12105 Date: Rec'd December 16, 1976

HEAD RAW ANALYSIS						
R.M.%	Ash%	V.M.%	F.C.%	S.%	H.G.I.	REMARKS
0.5	25.1	17.4	57.0	0.61	107	Air Dried Basis
- -	25.2	17.5	57.3	0.61	- -	Dry Basis

SIZE / RAW ANALYSES								
Size Fraction	Wt. %	R.M.%	Ash %	S. %	CUMULATIVE			
					Wt. %	Ash %	S. %	
¼" x 65 m	80.1	0.5	26.7	0.62	80.1	26.7	0.62	A.D.B.
	80.1	- -	26.8	0.62	80.1	26.8	0.62	D.B.
65 m x 0	19.9	0.5	15.0	0.70	100.0	24.4	0.64	A.D.B.
	19.9	- -	15.1	0.70	100.0	24.5	0.64	D.B.

SINK - FLOAT ANALYSIS: ¼" x 65 M									
S. G.	Wt.%	R.M%	Ash %	V.M%	F.C%	S.%	Cumulative		
							Wt. %	Ash %	
-1.40	37.8	0.6	5.4	24.8	69.2	0.78	37.8	5.4	A.D.B.
	37.8	- -	5.4	24.9	69.7	0.78	37.8	5.4	D.B.
1.40-1.50	20.0	0.6	14.0	19.2	66.2	0.52	59.8	8.4	A.D.B.
	20.0	- -	14.0	19.3	66.7	0.52	57.8	8.4	D.B.
1.50-1.60	14.1	0.5	23.0	17.0	59.5	0.53	71.9	11.3	A.D.B.
	14.1	- -	23.1	17.1	59.8	0.53	71.9	11.3	D.B.
+1.60	28.1	0.5	63.7	- -	- -	- -	100.0	26.0	A.D.B.
	28.1	- -	64.0	- -	- -	- -	100.0	26.1	D.B.

COMPOSITE ¼" x 65 m FLOATS @ 1.50 S.G., A.D.B.						
F.S.I.	P % on Coal	DILATATION TESTS				
		Softening Temp.(°C)	Max. Dil. Temp.(°C)	Maximum Contr. %	Maximum Dil. %	G.No.
4	0.031					

Lab. No. 8327 Date Feb. 8/77

Client: Warnock Hersey

Sample Identification: 76-12105

Starting Temperature °C: 350

Softening Temperature °C: 395

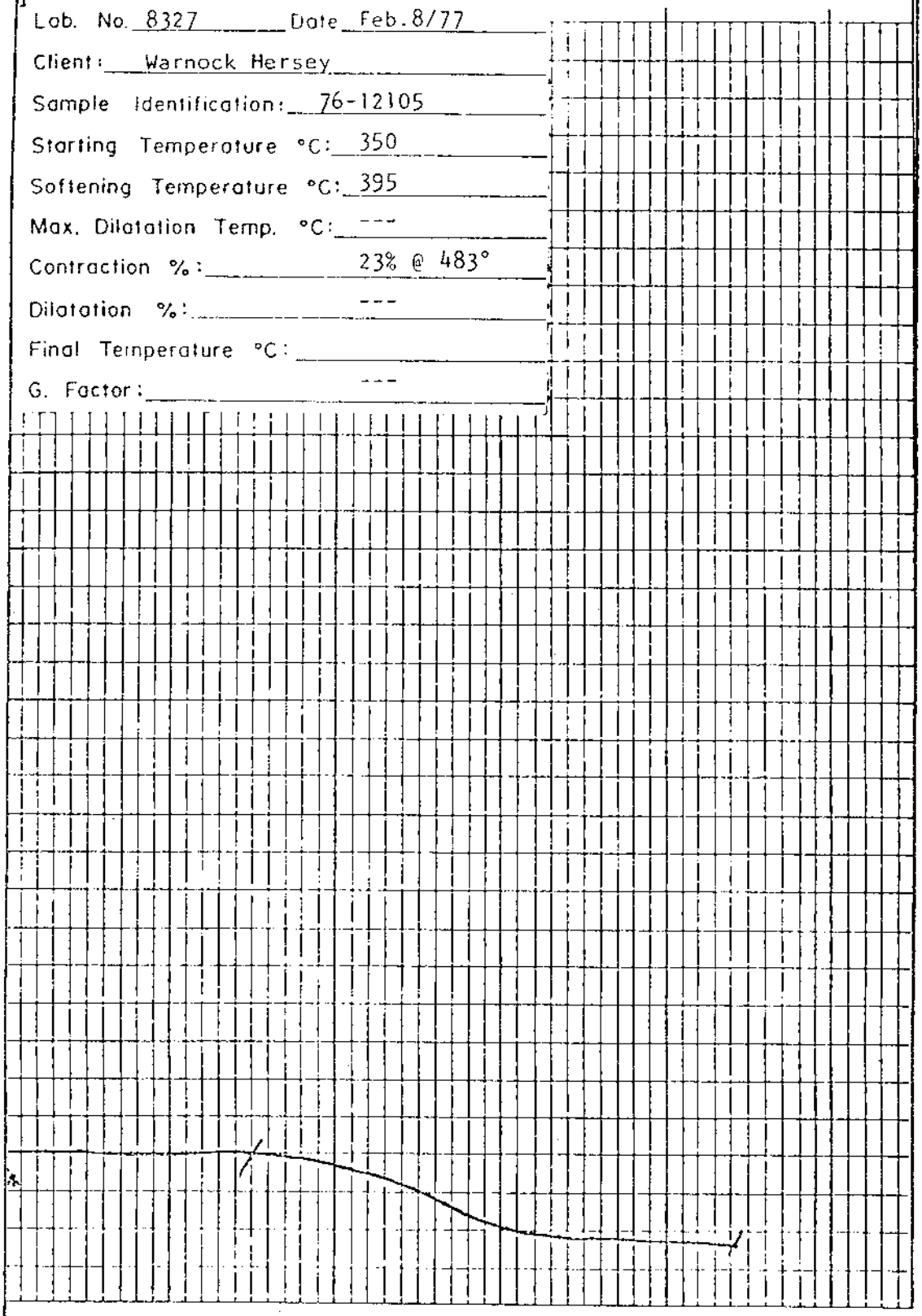
Max. Dilatation Temp. °C: ---

Contraction %: 23% @ 483°

Dilatation %: ---

Final Temperature °C:

G. Factor: ---



BIRTLEY ENGINEERING (CANADA) LTD.

Title	Date
RUHR DILATOMETER TEST	
	Drawn

Warnock Hersey Professional Services Ltd.

ELCO MINING LTD. CORE SAMPLE ANALYSIS

Hole No.: DH 50 - 4 Lab. No.: 76 - 12106 Date: Rec'd December 16, 1976

HEAD RAW ANALYSIS						
R.M.%	Ash%	V.M.%	F.C.%	S.%	H.G.I.	REMARKS
0.4	24.3	16.4	58.9	0.70	100	Air Dried Basis
- -	24.4	16.5	59.1	0.70	- -	Dry Basis

SIZE / RAW ANALYSES								
Size Fraction	Wt. %	R.M.%	Ash %	S. %	CUMULATIVE			
					Wt. %	Ash %	S. %	
¼" x 65 m	86.5	0.4	25.3	0.70	86.5	25.3	0.70	A.D.B.
	86.5	- -	25.6	0.70	86.5	25.6	0.70	D.B.
65m x 0	13.5	0.4	18.3	0.72	100.0	24.5	0.70	A.D.B.
	13.5	- -	18.4	0.72	100.0	24.6	0.70	D.B.

SINK - FLOAT ANALYSIS: ¼" x 65 M									
S. G.	Wt.%	R.M%	Ash %	V.M%	F.C%	S.%	Cumulative		
							Wt. %	Ash %	
-1.40	41.7	0.5	8.1	19.8	71.6	0.76	41.7	8.1	A.D.B.
	41.7	- -	8.1	19.9	72.0	0.76	41.7	8.1	D.B.
1.40-1.50	25.9	0.6	14.0	18.7	66.7	0.63	67.6	10.4	A.D.B.
	25.9	- -	14.0	18.8	67.2	0.63	67.6	10.4	D.B.
1.50-1.60	8.9	0.5	25.1	16.1	58.3	0.60	76.5	12.0	A.D.B.
	8.9	- -	25.2	16.2	58.6	0.60	76.5	12.1	D.B.
+1.60	23.5	0.6	64.1	- -	- -	- -	100.0	24.2	A.D.B.
	23.5	- -	64.5	- -	- -	- -	100.0	24.4	D.B.

COMPOSITE ¼" x 65 m FLOATS @ 1.50 S.G., A.D.B.						
F.S.I.	P % on Coal	DILATATION TESTS				
		Softening Temp.(°C)	Max. Dil. Temp.(°C)	Maximum Contr. %	Maximum Dil. %	G.No.
5½	0.058					

II

Lab. No. 8328 Date Feb. 8/77

Client: Warnock Hersey

Sample Identification: 76-12106

Starting Temperature °C: 350

Softening Temperature °C: 395

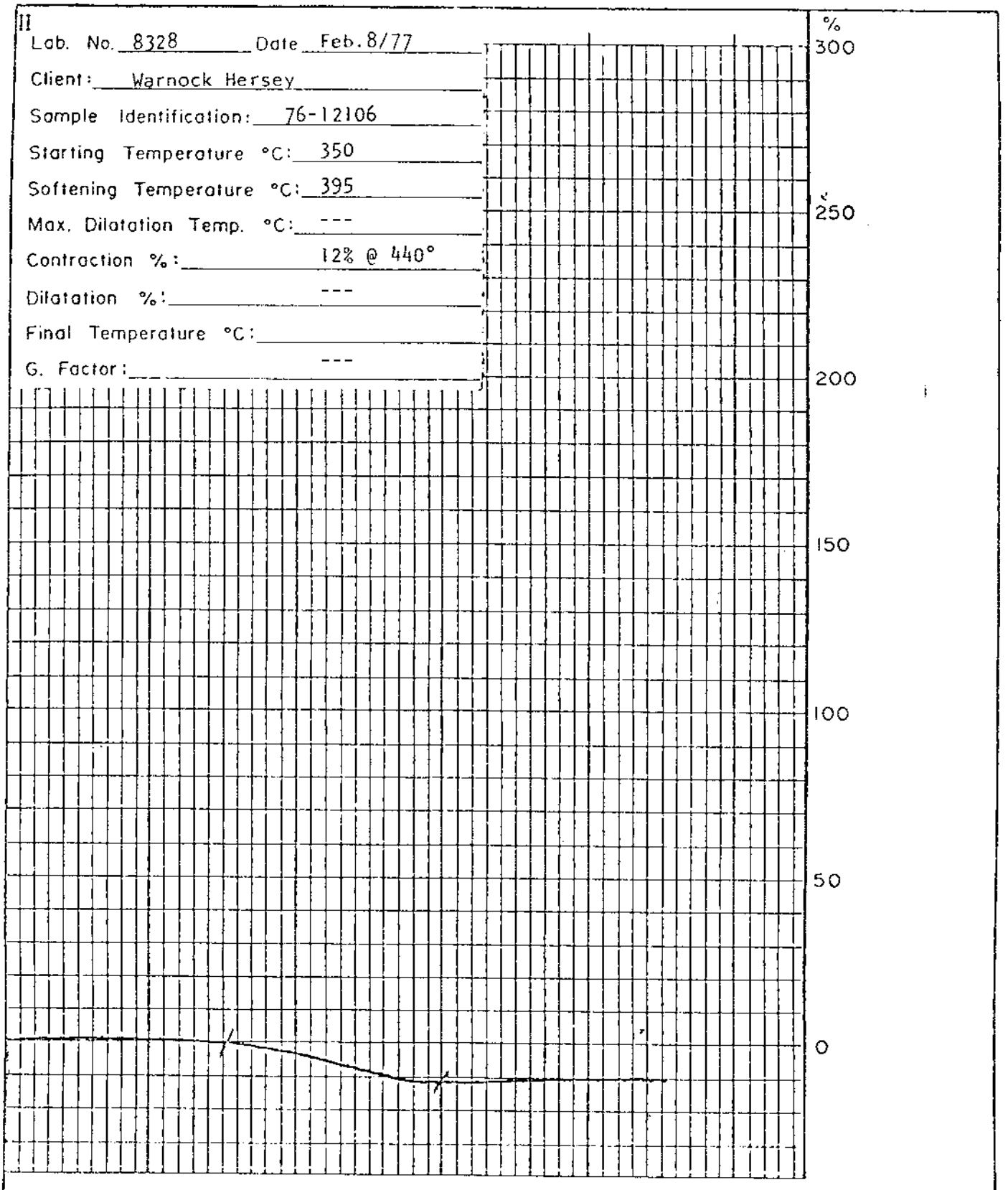
Max. Dilatation Temp. °C: ---

Contraction %: 12% @ 440°

Dilatation %: ---

Final Temperature °C:

G. Factor: ---



BIRTLEY ENGINEERING (CANADA) LTD.

Title	Date
RUHR DILATOMETER TEST	
	Drawn

Warnock Hersey Professional Services Ltd.

ELCO MINING LTD — CORE SAMPLE ANALYSIS

Hole No.: DH 50 - 5 Lab. No.: 76 - 12107 Date: Rec'd December 16, 1976

HEAD RAW ANALYSIS						
R.M.%	Ash%	V.M.%	F.C.%	S.%	H.G.I.	REMARKS
0.6	23.2	17.1	59.1	0.38	115	Air Dried Basis
--	23.3	17.2	59.5	0.38	--	Dry Basis

SIZE / RAW ANALYSES								
Size Fraction	Wt. %	R.M.%	Ash %	S. %	CUMULATIVE			
					Wt. %	Ash %	S. %	
¼" x 65 m	76.1	0.5	24.2	0.42	76.1	24.2	0.42	A.D.B.
	76.1	--	24.4	0.42	76.1	24.4	0.42	D.B.
65m x 0	23.9	0.7	21.3	0.38	100.0	23.5	0.41	A.D.B.
	23.9	--	21.5	0.38	100.0	23.7	0.41	D.B.

SINK - FLOAT ANALYSIS: ¼" x 65 M									
S. G.	Wt.%	R.M%	Ash %	V.M%	F.C%	S.%	Cumulative		
							Wt. %	Ash %	
-1.40	44.8	0.5	5.5	19.9	74.1	0.44	44.8	5.5	A.D.B.
	44.8	--	5.5	20.0	74.5	0.44	44.8	5.5	D.B.
1.40-1.50	17.3	0.5	12.8	18.2	68.5	0.42	62.1	7.6	A.D.B.
	17.3	--	12.9	18.3	68.8	0.42	62.1	7.6	D.B.
1.50-1.60	7.3	0.5	19.3	16.8	63.4	0.40	69.4	8.7	A.D.B.
	7.3	--	19.4	16.9	63.7	0.40	69.4	8.8	D.B.
+1.60	30.6	0.4	62.4	--	--	--	100.0	23.6	A.D.B.
	30.6	--	62.7	--	--	--	100.0	23.9	D.B.

COMPOSITE ¼" x 65 m FLOATS @ 1.50 S.G., A.D.B.						
F.S.I.	P % on Coal	DILATATION TESTS				
		Softening Temp. (°C)	Max. Dil. Temp. (°C)	Maximum Contr. %	Maximum Dil. %	G.No.
1½	0.017					

I

Lab. No. 8329 Date Feb. 8/77

Client: Warnock Hersey

Sample Identification: 76-12107

Starting Temperature °C: 350

Softening Temperature °C: 416

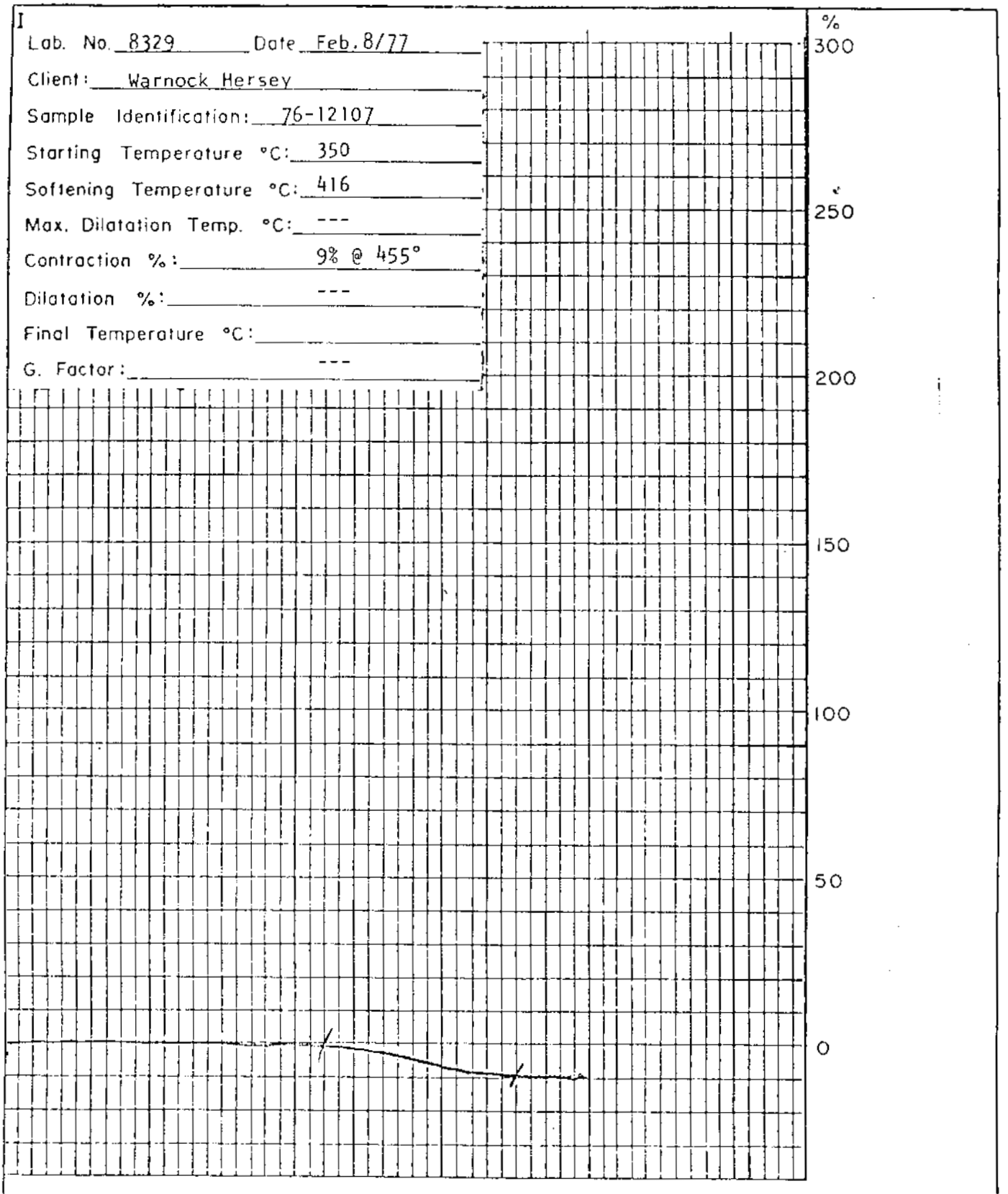
Max. Dilatation Temp. °C: ---

Contraction %: 9% @ 455°

Dilatation %: ---

Final Temperature °C:

G. Factor: ---



BIRTLEY ENGINEERING (CANADA) LTD.

Title	Date
RUHR DILATOMETER TEST	
	Drawn

Warnock Hersey Professional Services Ltd.

ELCO MINING LTD. CORE SAMPLE ANALYSIS

Hole No.: DH 50 - 6 Lab. No.: 76 - 12108 Date: Rec'd December 16, 1976

HEAD RAW ANALYSIS						
R.M.%	Ash%	V.M.%	F.C.%	S.%	H.G.I.	REMARKS
0.4	12.0	18.2	69.4	0.64	123	Air Dried Basis
- -	12.0	18.2	69.8	0.64	- -	Dry Basis

SIZE / RAW ANALYSES								
Size Fraction	Wt. %	R.M.%	Ash %	S. %	CUMULATIVE			
					Wt. %	Ash %	S. %	
¼" x 65 m	84.2	0.4	11.2	0.66	84.2	11.2	0.66	A.D.B.
	84.2	- -	11.3	0.66	84.2	11.3	0.66	D.B.
65m x 0	15.8	0.5	11.2	0.59	100.0	11.2	0.65	A.D.B.
	15.8	- -	11.3	0.59	100.0	11.3	0.65	D.B.

SINK - FLOAT ANALYSIS: ¼" x 65 M									
S. G.	Wt.%	R.M%	Ash %	V.M%	F.C%	S.%	Cumulative		
							Wt. %	Ash %	
-1.40	81.9	0.5	4.0	21.5	74.0	0.67	81.9	4.0	A.D.B.
	81.9	- -	4.0	21.6	74.4	0.67	81.9	4.0	D.B.
1.40-1.50	7.9	0.5	15.1	18.3	66.1	0.52	89.8	5.0	A.D.B.
	7.9	- -	15.2	18.4	66.4	0.52	89.8	5.0	D.B.
1.50-1.60	1.8	0.5	18.8	17.1	63.6	0.51	91.6	5.2	A.D.B.
	1.8	- -	18.9	17.2	63.9	0.51	91.6	5.3	D.B.
+1.60	8.4	0.4	66.5	- -	- -	- -	100.0	10.4	A.D.B.
	8.4	- -	66.8	- -	- -	- -	100.0	10.5	D.B.

COMPOSITE ¼" x 65 m FLOATS @ 1.50 S.G., A.D.B.							
F.S.I.	P % on Coal	DILATATION TESTS					
		Softening Temp.(°C)	Max. Dil. Temp.(°C)	Maximum Contr. %	Maximum Dil. %	G.No.	
7	0.011						

Lab. No. 8330 Date Feb. 8/77

Client: Warnock Hersey

Sample Identification: 76-12108

Starting Temperature °C: 350

Softening Temperature °C: 398

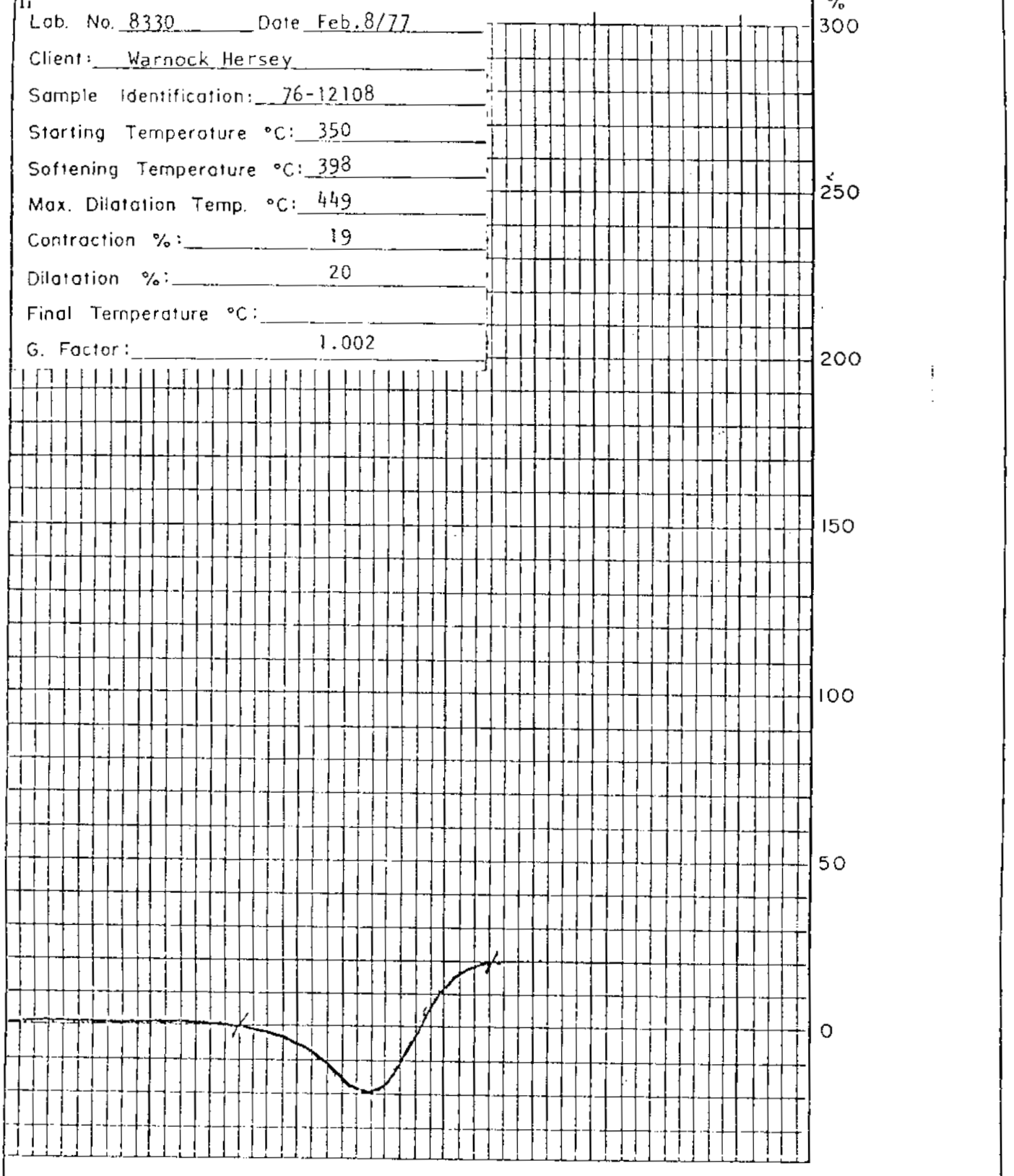
Max. Dilatation Temp. °C: 449

Contraction %: 19

Dilatation %: 20

Final Temperature °C:

G. Factor: 1.002



BIRTLEY ENGINEERING (CANADA) LTD.

Title	Date
RUHR DILATOMETER TEST	
	Drawn

Warnock Hersey Professional Services Ltd.

ELCO MINING LTD. CORE SAMPLE ANALYSIS

Hole No.: DH 51 - 1 Lab. No.: 76 - 12109 Date: Rec'd December 16, 1976

HEAD RAW ANALYSIS						
R.M.%	Ash%	V.M.%	F.C %	S.%	H.G.I.	REMARKS
0.5	30.3	20.2	49.0	0.61	89	Air Dried Basis
- -	30.5	20.3	49.2	0.61	- -	Dry Basis

SIZE / RAW ANALYSES								
Size Fraction	Wt. %	R.M.%	Ash %	S. %	CUMULATIVE			
					Wt. %	Ash %	S. %	
¼" x 65 m	85.3	0.5	33.2	0.56	85.3	33.2	0.56	A.D.B.
	85.3	-	33.2	0.56	85.3	33.3	0.56	D.B.
65 m x 0	14.7	0.7	25.0	0.58	100.0	32.0	0.56	A.D.B.
	14.7	- -	25.2	0.58	100.0	32.1	0.56	D.B.

SINK - FLOAT ANALYSIS: ¼" x 65 M									
S. G.	Wt.%	R.M%	Ash %	V.M%	F.C%	S.%	Cumulative		
							Wt. %	Ash %	
-1.40	42.6	0.6	6.5	22.7	70.2	0.72	42.6	6.5	A.D.B.
	42.6	- -	6.5	22.8	70.7	0.72	42.6	6.5	D.B.
1.40-1.50	11.0	0.6	17.0	20.7	61.7	0.57	53.6	8.7	A.D.B.
	11.0	- -	17.1	20.8	62.1	0.57	53.6	8.7	D.B.
1.50-1.60	6.1	0.6	25.8	18.2	55.4	0.55	59.7	10.3	A.D.B.
	6.1	- -	26.0	18.3	55.7	0.55	59.7	10.4	D.B.
+1.60	40.3	0.6	67.1	- -	- -	- -	100.0	33.2	A.D.B.
	40.3	- -	67.5	- -	- -	- -	100.0	33.4	D.B.

COMPOSITE ¼" x 65 m FLOATS @ 1.50 S.G., A.D.B.						
F.S.I.	P % on Coal	DILATATION TESTS				
		Softening Temp.(°C)	Max. Dil. Temp.(°C)	Maximum Contr. %	Maximum Dil. %	G.No.
8½	0.010					

Lab. No. 8331 Date Feb. 8/77

Client: Warnock Hersey

Sample Identification: 76-12109

Starting Temperature °C: 350

Softening Temperature °C: 380

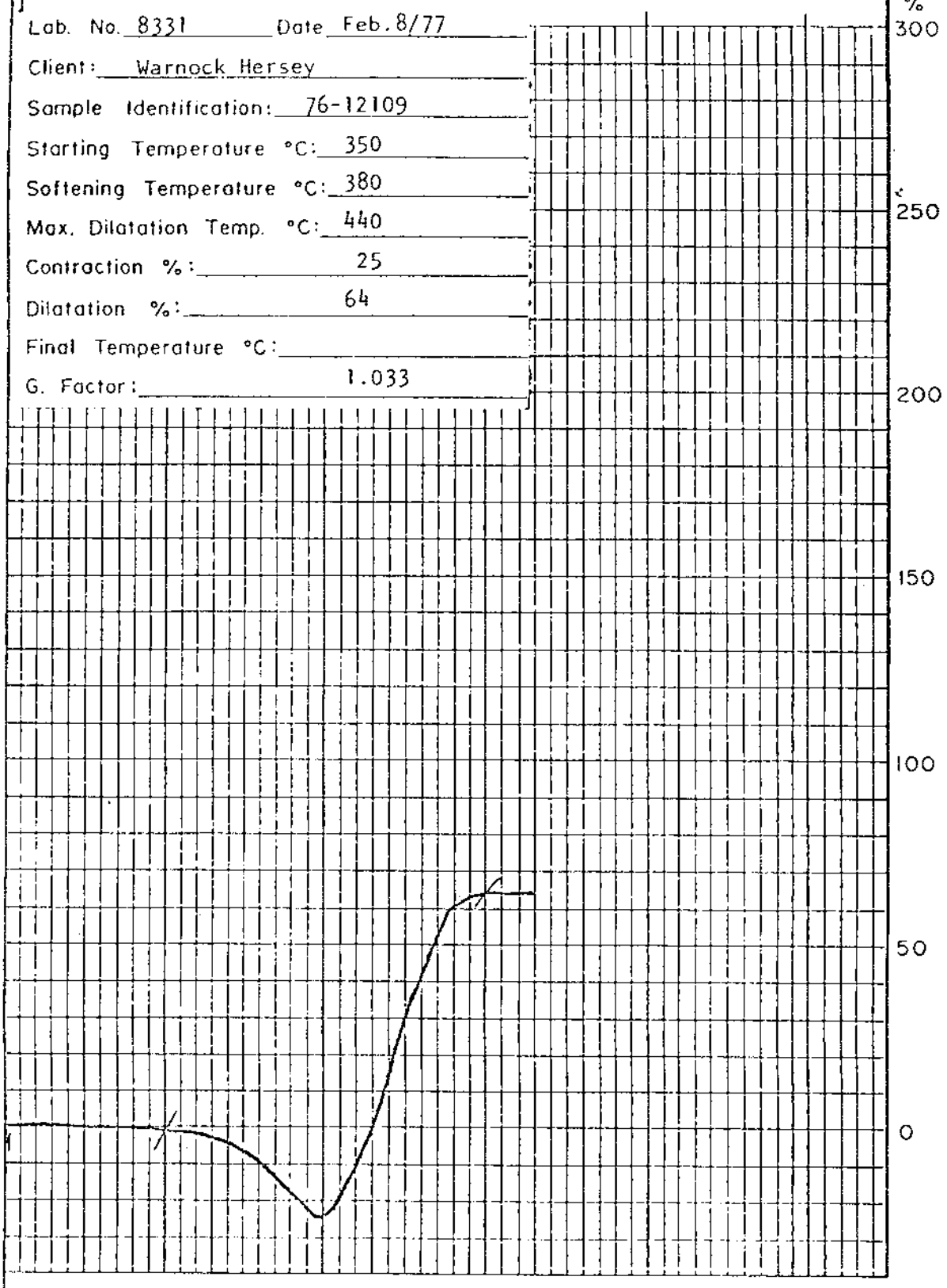
Max. Dilatation Temp. °C: 440

Contraction %: 25

Dilatation %: 64

Final Temperature °C:

G. Factor: 1.033



BIRTLEY ENGINEERING (CANADA) LTD.

Title	Date
RUHR DILATOMETER TEST	
	Drawn

Warnock Hersey Professional Services Ltd.

ELCO MINING LTD. CORE SAMPLE ANALYSIS

Hole No.: DH 51 - 2 Lab. No.: 76 - 12110 Date: Rec'd December 16, 1976

HEAD RAW ANALYSIS						
R.M.%	Ash%	V.M.%	F.C.%	S.%	H.G.I.	REMARKS
0.5	26.4	19.4	53.7	0.64	107	Air Dried Basis
--	26.5	19.5	54.0	0.64	--	Dry Basis

SIZE / RAW ANALYSES								
Size Fraction	Wt. %	R.M.%	Ash %	S. %	CUMULATIVE			
					Wt. %	Ash %	S. %	
¼" x 65 m	79.6	0.6	29.0	0.58	79.6	29.0	0.58	A.D.B.
	79.6	--	29.2	0.58	79.6	29.2	0.58	D.B.
65 m x 0	20.4	0.7	18.3	0.75	100.0	26.8	0.61	A.D.B.
	20.4	--	18.4	0.76	100.0	27.0	0.61	D.B.

SINK - FLOAT ANALYSIS: ¼" x 65 M									
S. G.	Wt.%	R.M%	Ash %	V.M%	F.C%	S.%	Cumulative		
							Wt. %	Ash %	
-1.40	58.4	0.7	4.4	24.8	70.1	0.72	58.4	4.4	A.D.B.
	58.4	--	4.5	24.9	70.6	0.72	58.4	4.5	D.B.
1.40-1.50	8.8	0.6	12.7	20.6	66.1	0.55	67.2	5.5	A.D.B.
	8.8	--	12.8	20.7	66.5	0.55	67.2	5.6	D.B.
1.50-1.60	2.5	0.6	24.3	17.6	57.5	0.53	69.7	6.2	A.D.B.
	2.5	--	24.5	17.7	57.8	0.53	69.7	6.3	D.B.
+1.60	30.3	0.6	76.9	--	--	--	100.0	27.5	A.D.B.
	30.3	--	77.4	--	--	--	100.0	27.8	D.B.

COMPOSITE ¼" x 65 m FLOATS @ 1.50 S.G., A.D.B.						
F.S.I.	P % on Coal	DILATATION TESTS				
		Softening Temp.(°C)	Max. Dil. Temp.(°C)	Maximum Contr. %	Maximum Dil. %	G.No.
8½	0.017					

Lab. No. 8332 Date Feb. 8/77

Client: Warnock Hersey

Sample Identification: 76-12110

Starting Temperature °C: 350

Softening Temperature °C: 386

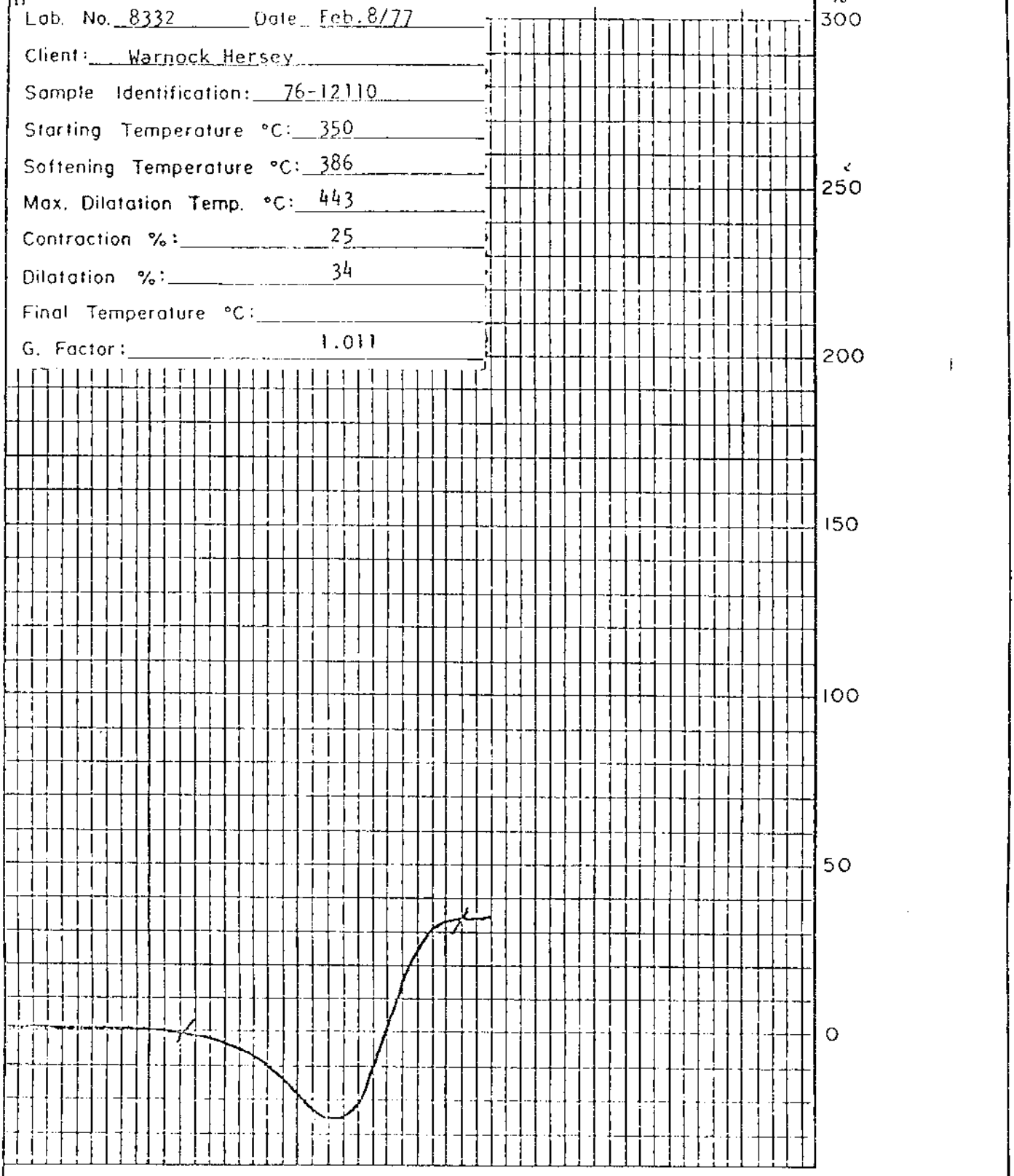
Max. Dilatation Temp. °C: 443

Contraction %: 25

Dilatation %: 34

Final Temperature °C:

G. Factor: 1.011



BIRTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Warnock Hersey Professional Services Ltd.

ELCO MINING LTD. CORE SAMPLE ANALYSIS

Hole No.: DH 51 - 3 Lab. No.: 76 - 12111 Date: Rec'd December 16, 1976

HEAD RAW ANALYSIS						
R.M.%	Ash%	V.M.%	F.C.%	S.%	H.G.I.	REMARKS
0.9	19.3	18.4	61.4	0.37	99	Air Dried Basis
--	19.5	18.6	61.9	0.37	--	Dry Basis

SIZE / RAW ANALYSES								
Size Fraction	Wt. %	R.M.%	Ash %	S. %	CUMULATIVE Wt. %	CUMULATIVE Ash %	CUMULATIVE S. %	
¼" x 65 m	82.0	0.5	19.1	0.41	82.0	19.1	0.41	A.D.B.
	82.0	--	19.2	0.41	82.0	19.2	0.41	D.B.
65m x0	18.0	0.8	11.2	0.47	100.0	17.7	0.42	A.D.B.
	18.0	--	11.3	0.47	100.0	17.8	0.42	D.B.

SINK - FLOAT ANALYSIS: ¼" x 65 M									
S. G.	Wt.%	R.M%	Ash %	V.M%	F.C%	S.%	Cumulative Wt. %	Cumulative Ash %	
-1.40	62.2	0.8	4.6	21.2	73.4	0.58	62.2	4.6	A.D.B.
	62.2	--	4.7	21.4	73.9	0.58	62.2	4.7	D.B.
1.40-1.50	11.4	0.7	13.1	19.2	67.0	0.33	73.6	5.9	A.D.B.
	11.4	--	13.2	19.4	67.4	0.33	73.6	6.0	D.B.
1.50-1.60	5.6	0.7	21.2	17.6	60.5	0.30	79.2	7.0	A.D.B.
	5.6	--	21.3	17.7	61.0	0.30	79.2	7.1	D.B.
+1.60	20.8	0.7	68.4	--	--	--	100.0	19.8	A.D.B.
	20.8	--	68.9	--	--	--	100.0	20.0	D.B.

COMPOSITE ¼" x 65 m FLOATS @ 1.50 S.G., A.D.B.						
F.S.I.	P % on Coal	DILATATION TESTS Softening Temp. (°C)	Max. Dil. Temp. (°C)	Maximum Contr. %	Maximum Dil. %	G.No.
3½	0.021					

Lab. No. 8333 Date Feb. 8/77

Client: Warnock Hersey

Sample Identification: 76-12111

Starting Temperature °C: 350

Softening Temperature °C: 407

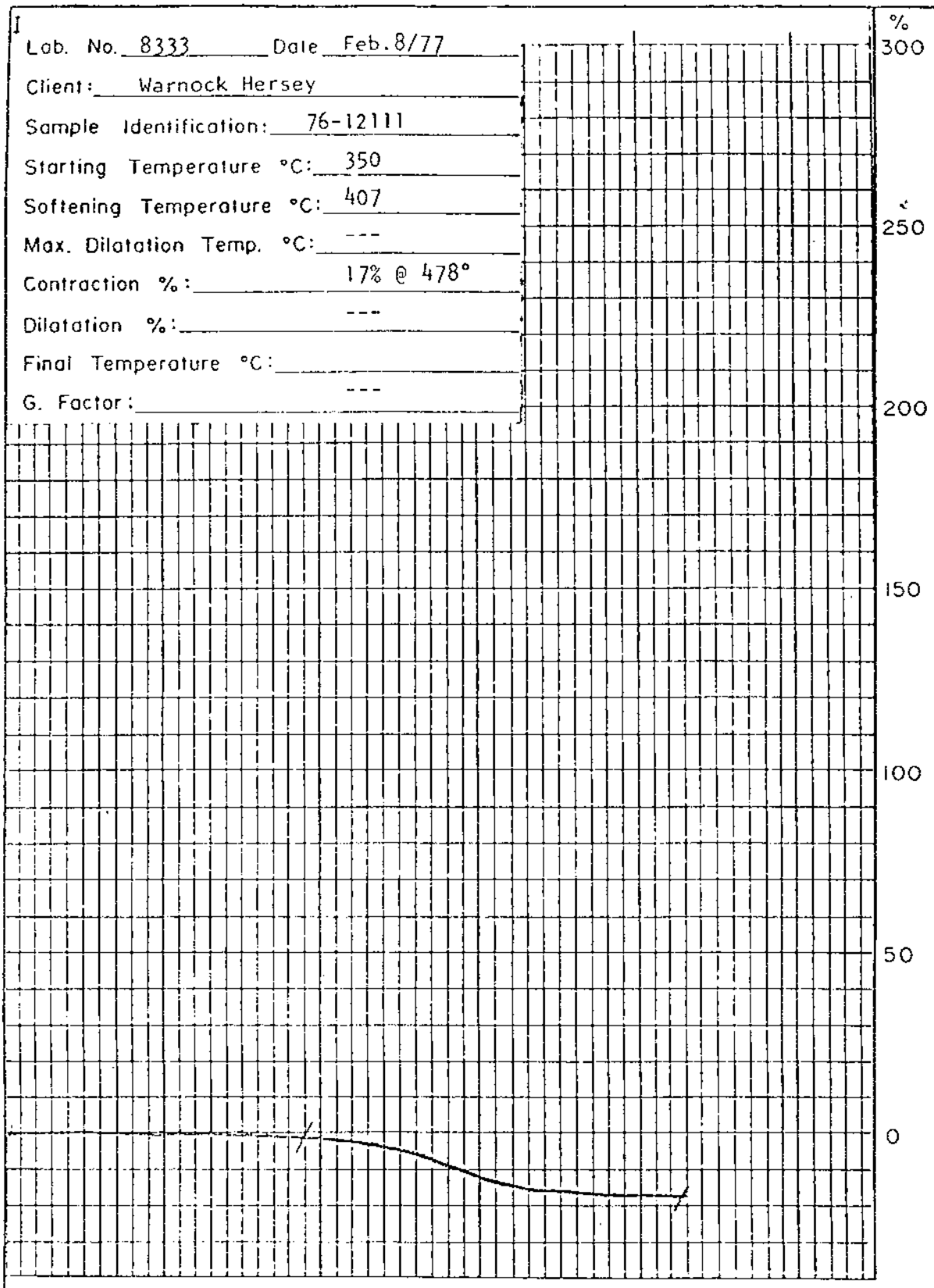
Max. Dilatation Temp. °C: ---

Contraction %: 17% @ 478°

Dilatation %: ---

Final Temperature °C:

G. Factor: ---



BIRTLEY ENGINEERING (CANADA) LTD.

Title	Date
RUHR DILATOMETER TEST	
	Drawn

Warnock Hersey Professional Services Ltd.

ELCO MINING LTD. CORE SAMPLE ANALYSIS

Hole No.: DH 51 - 4 Lab. No.: 76 - 12112 Date: Rec'd December 16, 1976

HEAD RAW ANALYSIS						
R.M.%	Ash%	V.M.%	F.C.%	S.%	H.G.I.	REMARKS
0.6	31.0	17.6	50.8	0.49	88	Air Dried Basis
--	31.2	17.8	51.0	0.49	--	Dry Basis

SIZE / RAW ANALYSES								
Size Fraction	Wt. %	R.M.%	Ash %	S. %	CUMULATIVE Wt. %	CUMULATIVE Ash %	CUMULATIVE S. %	
¼" x 65 m	84.0	0.5	31.6	0.51	84.0	31.6	0.51	A.D.B.
	84.0	--	31.8	0.51	84.0	31.8	0.51	D.B.
65m x 0	16.0	0.7	20.8	0.58	100.0	29.9	0.52	A.D.B.
	16.0	--	21.0	0.58	100.0	30.1	0.52	D.B.

SINK - FLOAT ANALYSIS: ¼" x 65 M.									
S. G.	Wt.%	R.M%	Ash %	V.M%	F.C%	S.%	Cumulative Wt. %	Cumulative Ash %	
-1.40	48.3	0.6	5.9	19.8	73.7	0.67	48.3	5.9	A.D.B.
	48.3	--	5.9	19.9	74.2	0.67	48.3	5.9	D.B.
1.40-1.50	7.3	0.5	15.0	18.0	66.5	0.44	55.6	7.1	A.D.B.
	7.3	--	15.1	18.1	66.8	0.44	55.6	7.1	D.B.
1.50-1.60	5.0	0.5	24.6	16.0	58.9	0.41	60.6	8.6	A.D.B.
	5.0	--	24.7	16.1	59.2	0.41	60.6	8.6	D.B.
+1.60	39.4	0.5	70.0	--	--	--	100.0	32.7	A.D.B.
	39.4	--	70.4	--	--	--	100.0	32.9	D.B.

COMPOSITE ¼" x 65 m FLOATS @ 1.50 S.G., A.D.B.						
F.S.I.	P % on Coal	DILATATION TESTS Softening Temp.(°C)	Max. Dil. Temp.(°C)	Maximum Contr. %	Maximum Dil. %	G.No.
3	0.022					

Lab. No. 8334 Date Feb. 8/77

Client: Warnock Hersey

Sample Identification: 76-12112

Starting Temperature °C: 350

Softening Temperature °C: 404

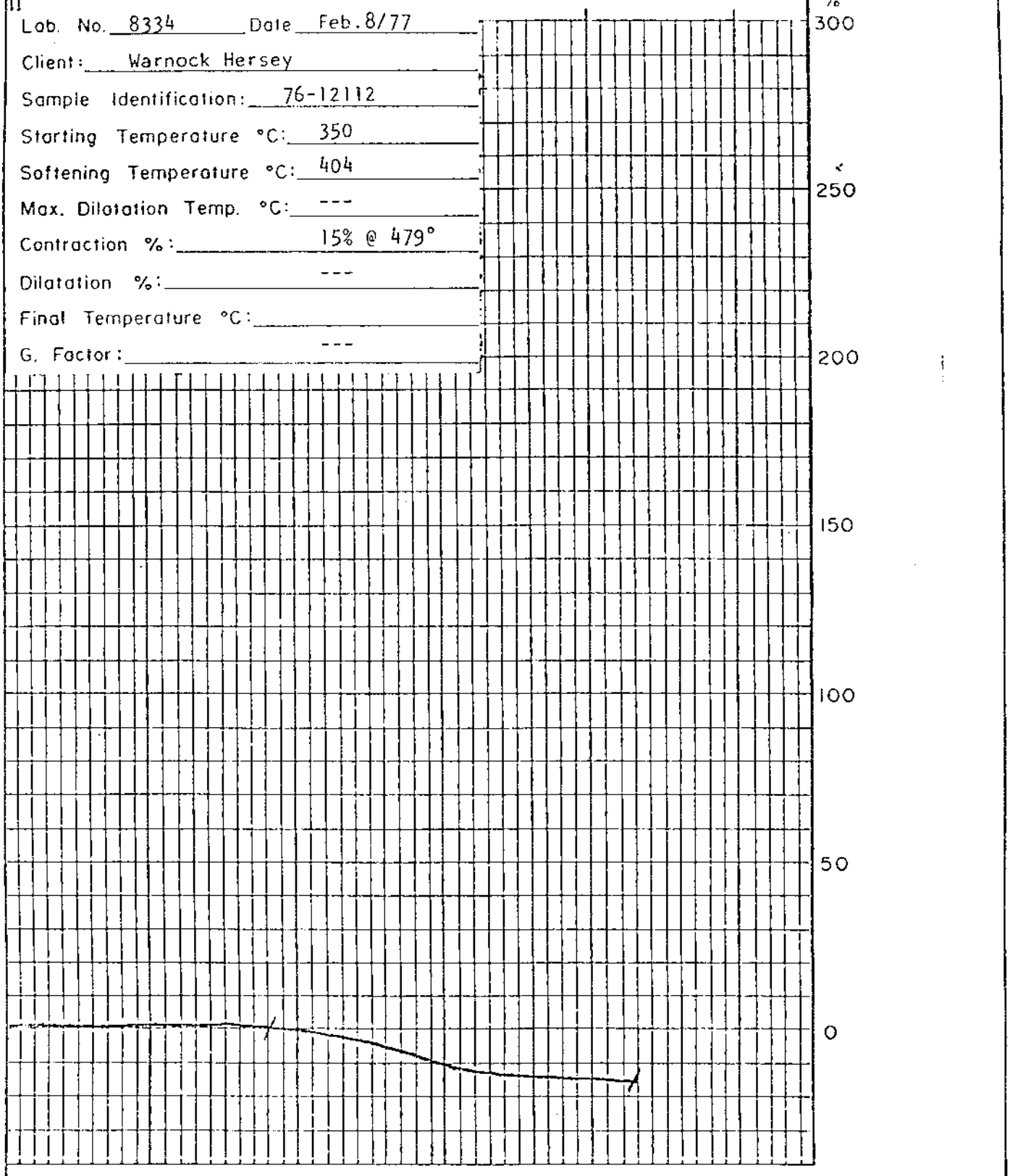
Max. Dilatation Temp. °C: ---

Contraction %: 15% @ 479°

Dilatation %: ---

Final Temperature °C:

G. Factor: ---



BIRTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Warnock Hersey Professional Services Ltd.

ELCO MINING LTD. CORE SAMPLE ANALYSIS

Hole No.: DH 51 - 5 Lab. No.: 76 - 12113 Date: Rec'd December 16, 1976

HEAD RAW ANALYSIS						
R.M.%	Ash%	V.M.%	F.C.%	S.%	H.G.I.	REMARKS
0.5	26.4	17.0	56.1	0.54	109	Air Dried Basis
- -	26.6	17.1	56.3	0.54	- -	Dry Basis

SIZE / RAW ANALYSES								
Size Fraction	Wt. %	R.M.%	Ash %	S. %	CUMULATIVE			
					Wt. %	Ash %	S. %	
¼" x 65 m	81.2	0.5	26.9	0.55	81.2	26.9	0.55	A.D.B.
	81.2	- -	27.0	0.55	81.2	27.0	0.55	D.B.
	18.8	0.6	16.1	0.64	100.0	24.9	0.57	A.D.B.
	18.8	- -	16.2	0.64	100.0	25.0	0.57	D.B.

SINK - FLOAT ANALYSIS: ¼" x 65 M									
S. G.	Wt.%	R.M%	Ash %	V.M%	F.C%	S.%	Cumulative		
							Wt. %	Ash %	
-1.40	65.6	0.6	6.1	22.3	71.0	0.63	65.6	6.1	A.D.B.
	65.6	0 0	6.1	22.4	71.5	0.63	65.6	6.1	D.B.
1.40-1.50	4.3	0.5	12.5	20.0	67.0	0.58	69.9	6.5	A.D.B.
	4.3	- -	12.6	20.1	67.3	0.58	69.9	6.5	D.B.
1.50-1.60	3.4	0.5	20.0	18.2	61.3	0.53	73.3	7.0	A.D.B.
	3.4	- -	20.1	18.3	61.6	0.53	73.3	7.1	D.B.
+1.60	26.7	0.6	79.7	- -	- -	- -	100.0	26.4	A.D.B.
	26.7	- -	80.2	- -	- -	- -	100.0	26.6	D.B.

COMPOSITE ¼" x 65 m FLOATS @ 1.50 S.G., A.D.B.						
F.S.I.	P % on Coal	DILATATION TESTS				
		Softening Temp.(°C)	Max. Dil. Temp.(°C)	Maximum Contr. %	Maximum Dil. %	G.No.
7	0.031					

Lab. No. 8335 Date Feb. 8/77

Client: Warnock Hersey

Sample Identification: 76-12113

Starting Temperature °C: 350

Softening Temperature °C: 398

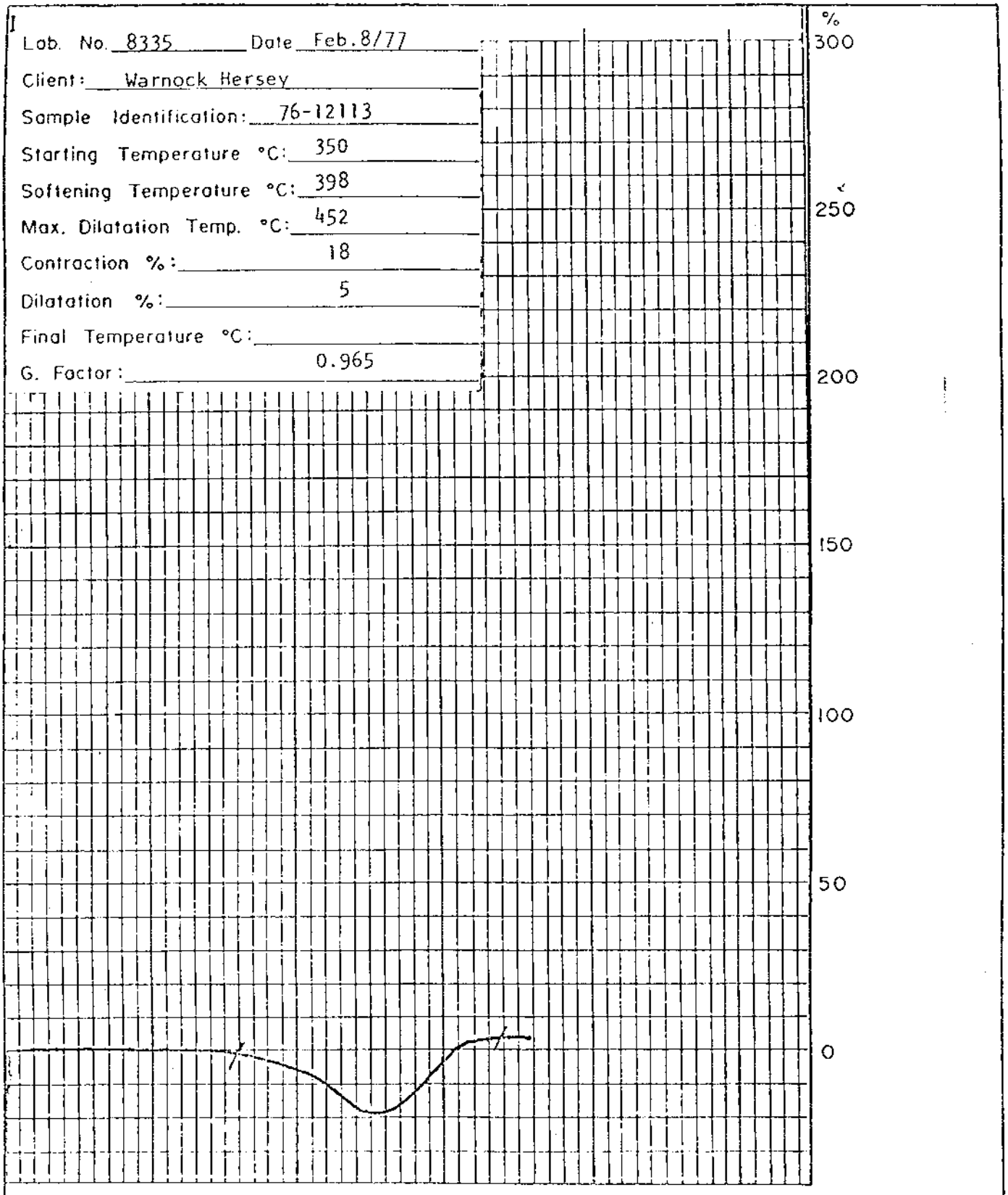
Max. Dilatation Temp. °C: 452

Contraction %: 18

Dilatation %: 5

Final Temperature °C:

G. Factor: 0.965



BIRTLEY ENGINEERING (CANADA) LTD.

Title	Date
RUHR DILATOMETER TEST	
	Drawn

Warnock Hersey Professional Services Ltd.

ELCO MINING LTD. CORE SAMPLE ANALYSIS

Hole No.: DH 51 - 6 Lab. No.: 76 - 12114 Date: Rec'd December 16, 1976

HEAD RAW ANALYSIS						
R.M.%	Ash%	V.M.%	F.C.%	S.%	H.G.I.	REMARKS
0.5	30.1	15.6	53.8	0.55	109	Air Dried Basis
- -	30.2	15.6	54.2	0.55		Dry Basis

SIZE / RAW ANALYSES								
Size Fraction	Wt. %	R.M.%	Ash %	S. %	CUMULATIVE Wt. %	CUMULATIVE Ash %	CUMULATIVE S. %	
¼" x 65 m	79.2	0.5	32.8	0.47	79.2	32.8	0.47	A.D.B.
	79.2	- -	33.0	0.47	79.2	33.0	0.47	D.B.
65 m x 0	20.8	0.6	22.5	0.65	100.0	30.7	0.51	A.D.B.
	20.8	- -	22.6	0.65	100.0	30.8	0.51	D.B.

SINK - FLOAT ANALYSIS: ¼" x 65 M									
S. G.	Wt.%	R.M%	Ash %	V.M%	F.C%	S.%	Cumulative Wt. %	Cumulative Ash %	
-1.40	44.6	0.5	6.8	20.4	72.3	0.60	44.6	6.8	A.D.B.
	44.6	- -	6.9	20.5	72.6	0.60	44.6	6.9	D.B.
1.40-1.50	14.9	0.5	12.4	19.1	68.0	0.59	59.5	8.3	A.D.B.
	14.9	- -	12.5	19.2	68.3	0.59	59.5	8.3	D.B.
1.50-1.60	4.3	0.5	20.3	17.2	62.0	0.55	63.8	9.0	A.D.B.
	4.3	- -	20.4	17.3	62.3	0.55	63.8	9.1	D.B.
+1.60	36.2	0.4	74.1	- -	- -	- -	100.0	32.5	A.D.B.
	36.2	- -	74.4	- -	- -	- -	100.0	32.7	D.B.

COMPOSITE ¼" x 65 m FLOATS @ 1.50 S.G., A.D.B.						
F.S.I.	P % on Coal	DILATATION TESTS: Softening Temp.(°C)	Max. Dil. Temp.(°C)	Maximum Contr. %	Maximum Dil. %	G.No.
2	0.015					

Lab. No. 8336 Date Feb. 8/77

Client: Warnock Hersey

Sample Identification: 76-12114

Starting Temperature °C: 350

Softening Temperature °C: 410

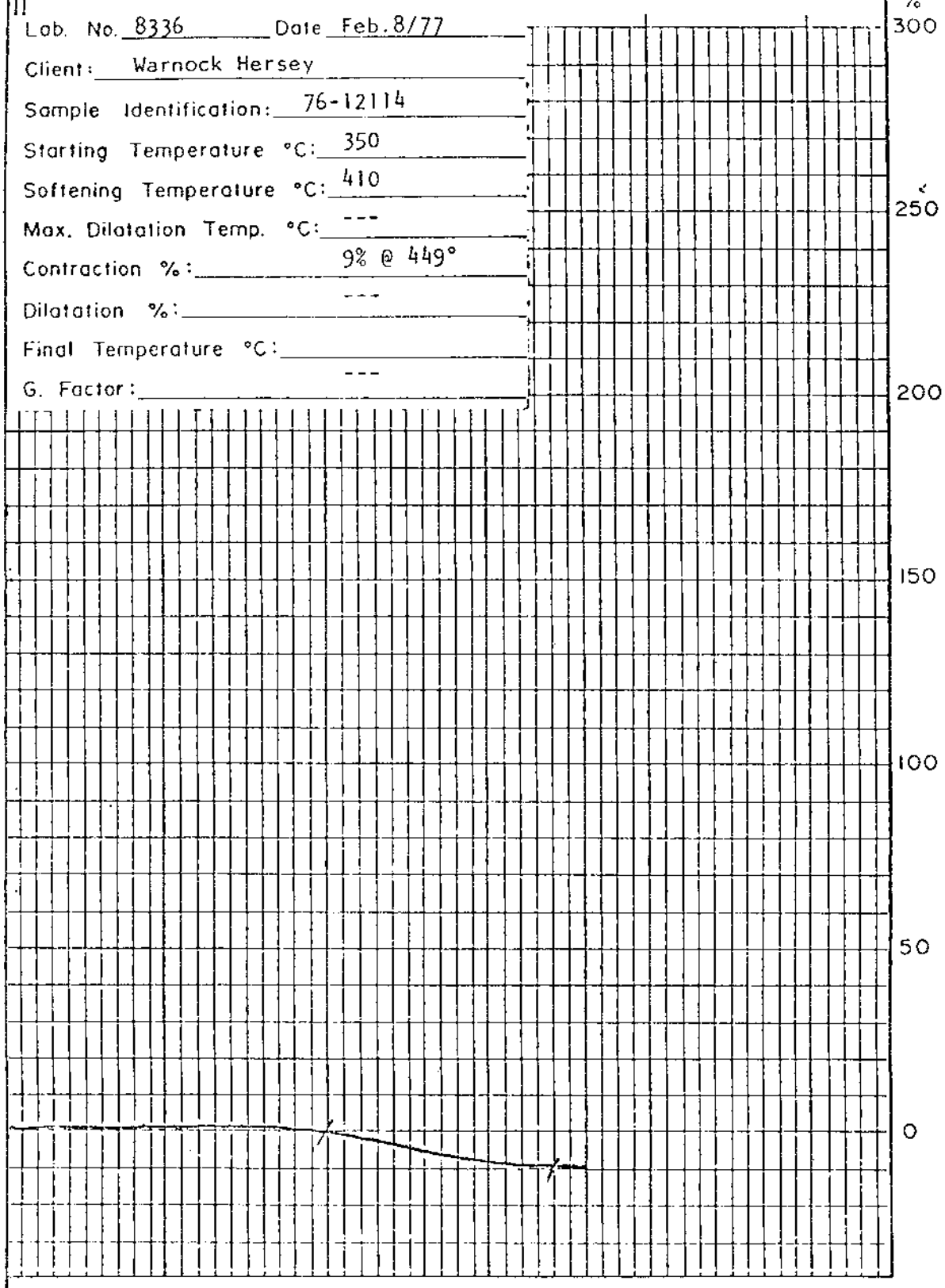
Max. Dilatation Temp. °C: ---

Contraction %: 9% @ 449°

Dilatation %: ---

Final Temperature °C:

G. Factor: ---



BIRTLEY ENGINEERING (CANADA) LTD.

Title	Date
RUHR DILATOMETER TEST	Drawn

Warnock Hersey Professional Services Ltd.

ELCO MINING LTD. CORE SAMPLE ANALYSIS

Hole No.: DH 51 - 7 Lab. No.: 76 - 12115 Date Rec'd December 16, 1976

HEAD RAW ANALYSIS						
R.M.%	Ash%	V.M.%	F.C.%	S.%	H.G.I.	REMARKS
0.7	64.1	11.3	23.9	0.36	61	Air Dried Basis
--	64.6	11.4	24.0	0.36	--	Dry Basis

SIZE / RAW ANALYSES								
Size Fraction	Wt. %	R.M.%	Ash %	S. %	CUMULATIVE			
					Wt. %	Ash %	S. %	
¼" x 65m	82.6	0.7	69.3	0.27	82.6	69.3	0.27	A.D.B.
	82.6	--	69.8	0.27	82.6	69.8	0.27	D.B.
65m x 0	17.4	0.6	22.5	0.65	100.0	61.3	0.34	A.D.B.
	17.4	--	22.6	0.65	100.0	61.6	0.34	D.B.

SINK - FLOAT ANALYSIS: ¼" x 65 M									
S. G.	Wt.%	R.M%	Ash %	V.M%	F.C%	S.%	Cumulative		
							Wt. %	Ash %	
-1.40	5.7	0.4	5.6	22.0	72.0	0.81	5.7	5.6	A.D.B.
	5.7	--	5.6	22.1	72.3	0.81	5.7	5.6	D.B.
1.40-1.50	2.1	0.5	14.9	19.9	64.7	0.80	7.8	8.1	A.D.B.
	2.1	--	15.0	20.0	65.0	0.80	7.8	8.1	D.B.
1.50-1.60	3.1	0.5	26.4	17.1	56.0	0.65	10.9	13.3	A.D.B.
	3.1	--	26.5	17.2	56.3	0.65	10.9	13.4	D.B.
+1.60	89.2	0.4	79.9	--	--	--	100.0	72.8	A.D.B.
	89.2	--	80.2	--	--	--	100.0	73.0	D.B.

COMPOSITE ¼" x 65 m FLOATS @ 1.50 S.G., A.D.B.						
F.S.I.	P % on Coal	DILATATION TESTS				
		Softening Temp.(°C)	Max. Dil. Temp.(°C)	Maximum Contr. %	Maximum Dil. %	G.No.
9	0.011					

Lab. No. 8337 Date Feb. 8/77

Client: Warnock Hersey

Sample Identification: 76-12115

Starting Temperature °C: 350

Softening Temperature °C: 353

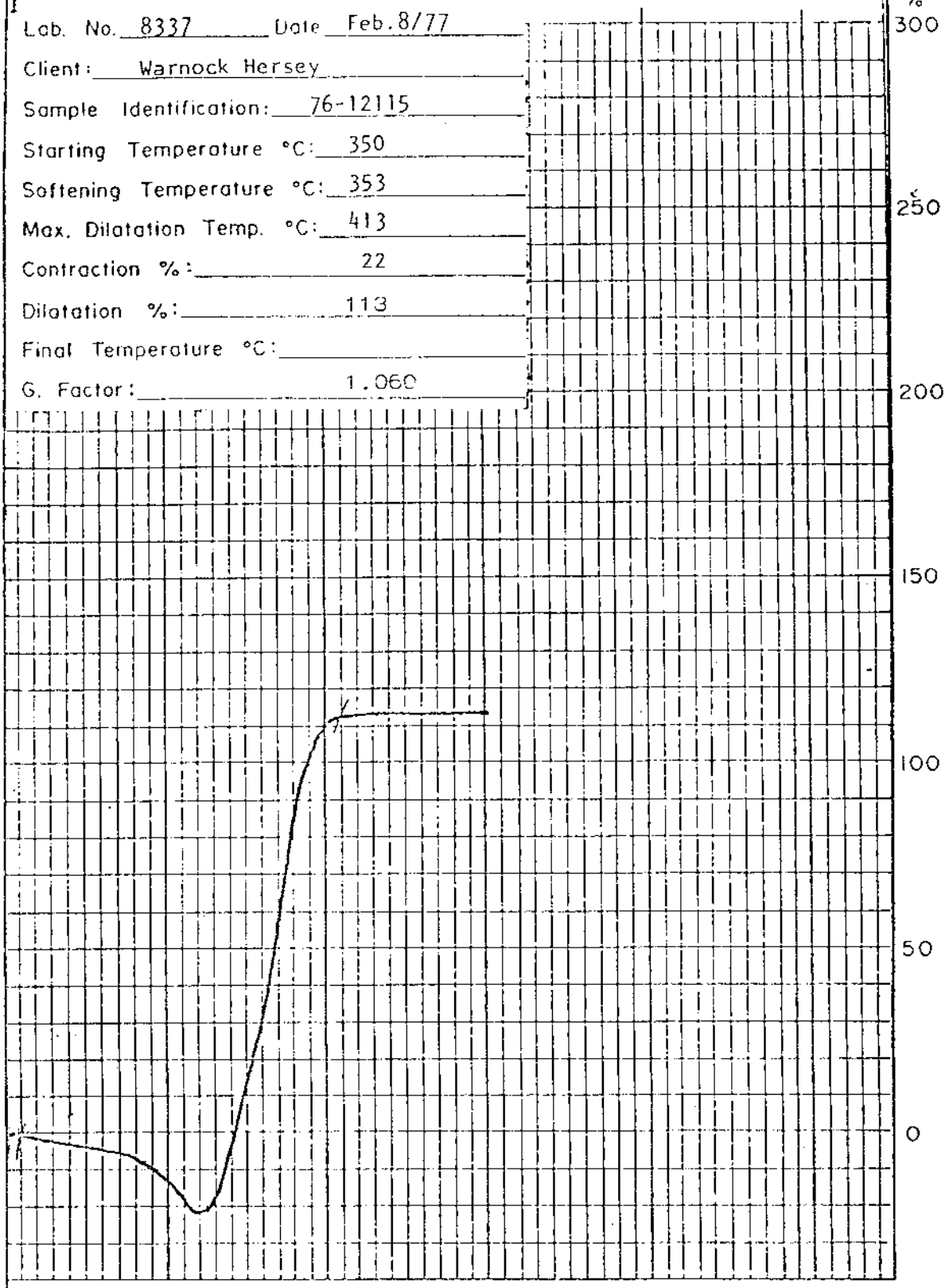
Max. Dilatation Temp. °C: 413

Contraction %: 22

Dilatation %: 113

Final Temperature °C:

G. Factor: 1.060



BIRTLEY ENGINEERING (CANADA) LTD.

Title	Date
RUHR DILATOMETER TEST	
	Drawn

Warnock Hersey Professional Services Ltd.

ELCO MINING LTD. CORE SAMPLE ANALYSIS

Hole No.: DH 51 - 8 Lab. No.: 76 - 12116 Date: Rec'd December 16, 1976

HEAD RAW ANALYSIS						
R.M.%	Ash%	V.M.%	F.C.%	S.%	H.G.I.	REMARKS
0.5	25.1	16.7	57.7	0.60	114	Air Dried Basis
--	25.2	16.8	58.0	0.60	--	Dry Basis

SIZE / RAW ANALYSES								
Size Fraction	Wt. %	R.M.%	Ash %	S. %	CUMULATIVE Wt. %	CUMULATIVE Ash %	CUMULATIVE S. %	
¼" x 65 m	76.1	0.5	26.4	0.60	76.1	26.4	0.60	A.D.B.
	76.1	--	26.6	0.60	76.1	26.6	0.60	D.B.
65m x 0	23.9	0.6	15.2	0.78	100.0	23.7	0.64	A.D.B.
	23.9	--	15.3	0.78	100.0	23.9	0.64	D.B.

SINK - FLOAT ANALYSIS: ¼" x 65 M									
S. G.	Wt.%	R.M%	Ash %	V.M%	F.C%	S.%	Cumulative Wt. %	Cumulative Ash %	
-1.40	42.6	0.7	5.8	18.4	75.1	0.74	42.6	5.8	A.D.B.
	42.6	--	5.8	18.5	75.7	0.74	42.6	5.8	D.B.
1.40-1.50	15.2	0.5	10.7	18.1	70.7	0.62	57.8	7.1	A.D.B.
	15.2	--	10.8	18.2	71.0	0.62	57.8	7.1	D.B.
1.50-1.60	15.1	0.5	23.8	15.3	60.4	0.60	72.9	10.5	A.D.B.
	15.1	--	23.9	15.4	60.7	0.60	72.9	10.6	D.B.
+1.60	27.1	0.6	70.0	--	--	--	100.0	26.6	A.D.B.
	27.1	--	70.4	--	--	--	100.0	26.8	D.B.

COMPOSITE ¼" x 65 m FLOATS @ 1.50 S.G., A.D.B.						
F.S.I.	P % on Coal	DILATATION TESTS Softening Temp. (°C)	Max. Dil. Temp. (°C)	Maximum Contr. %	Maximum Dil. %	G.No.
4	0.021					

Lab. No. 8338 Date Feb 8/77

Client: Warnock Hersey

Sample Identification: 76-12116

Starting Temperature °C: 350

Softening Temperature °C: 374

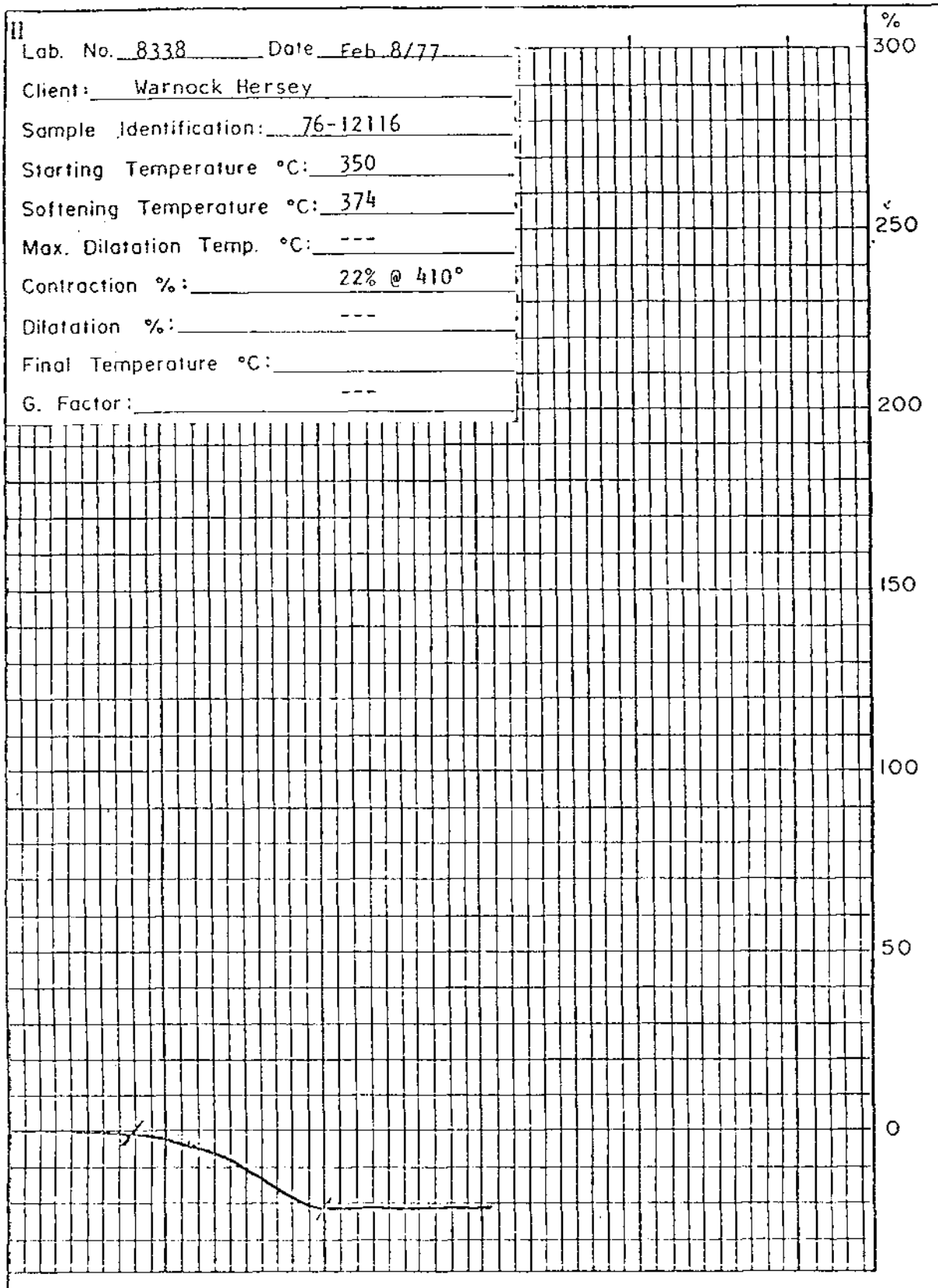
Max. Dilatation Temp. °C: ---

Contraction %: 22% @ 410°

Dilatation %: ---

Final Temperature °C:

G. Factor: ---



BIRTLEY ENGINEERING (CANADA) LTD.

Title	Date
RUHR DILATOMETER TEST	
	Drawn

ELCO MINING LTD.

CORE SAMPLE ANALYSIS

HOLE NO.: DH-52-1 Lab. No. 8217 DATE: Jan/77

HEAD RAW ANALYSIS						
R.M. %	ASH %	V.M. %	F.C. %	S. %	H.G.I.	REMARKS
0.5	22.9	21.9	54.7	0.53	97	Air Dried Basis
	23.0	22.0	55.0	0.53	--	Dry Basis

SIZE/RAW ANALYSES								
SIZE FRACTION	WT. %	R.M. %	ASH %	S. %	CUMULATIVE WT. %	CUMULATIVE ASH %	CUMULATIVE S. %	
1/4" x 65M	86.5	0.5	25.4	0.49	86.5	25.4	0.49	A.D.B.
	86.5		25.5	0.49	86.5	25.5	0.49	D.B.
65M x 0	13.5	0.6	9.4	0.68	100.0	23.2	0.52	A.D.B.
	13.5		9.5	0.68	100.0	23.3	0.52	D.B.

SINK-FLOAT ANALYSIS: 1/4" x 65M									
S. G.	WT. %	R.M. %	ASH %	V.M. %	F.C. %	S. %	CUMULATIVE WT. %	CUMULATIVE ASH %	
-1.40	65.7	1.5	4.2	26.2	68.1	0.71	65.7	4.2	A.D.B.
	65.6		4.3	26.6	69.1	0.72	65.6	4.3	D.B.
1.40-1.50	4.4	1.0	19.4	22.2	57.4	0.58	70.1	5.2	A.D.B.
	4.4		19.6	22.4	58.0	0.59	70.0	5.3	D.B.
1.50-1.60	2.4	1.1	30.7				72.5	6.0	A.D.B.
	2.4		31.0				72.4	6.1	D.B.
+1.60	27.5	1.0	77.8				100.0	25.7	A.D.B.
	27.6		78.6				100.0	26.1	D.B.

COMPOSITE 1/4" x 65M FLOATS @ 1.50 S.G., A.D.B.						
F.S.I.	P% ON COAL	DILATATION TEST SOFTENING TEMP. (°C)	MAX. DIL. TEMP. (°C)	MAXIMUM CONTR. %	MAXIMUM DIL. %	G. NO.
7 1/2	.05	374	431	22	73	1.040

Birtley Engineering

Subsidiary of Great West Steel Industries

Lab. No. 8217 Date Jan 31, 1977.

Client ELCO MINING LTD.

Sample Identification: DH-52-1

Starting Temperature °C: 350

Softening Temperature °C: 374

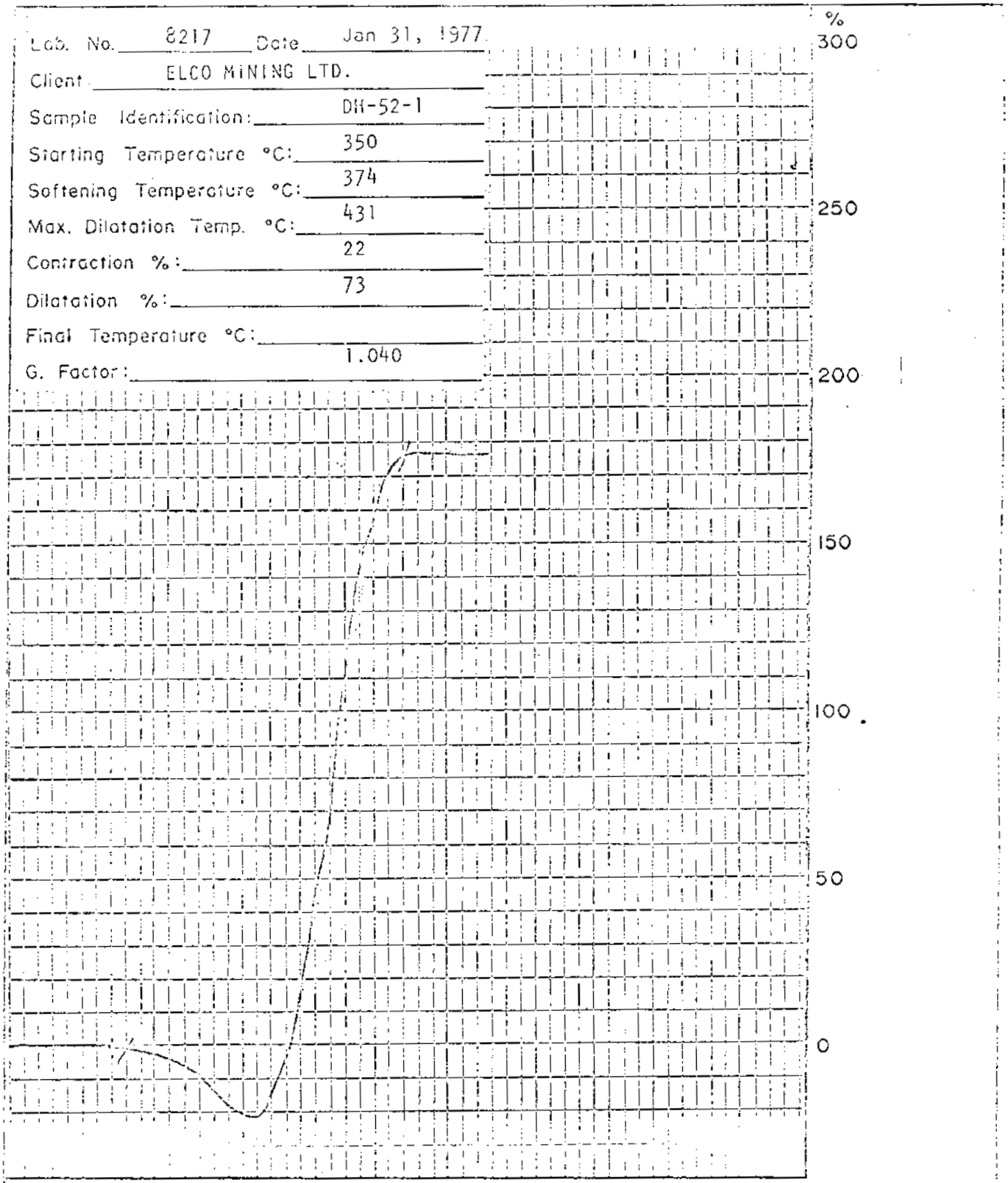
Max. Dilatation Temp. °C: 431

Contraction %: 22

Dilatation %: 73

Final Temperature °C:

G. Factor: 1.040



BIRTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

ELCO MINING LTD.

CORE SAMPLE ANALYSIS

HOLE NO.: DH-52-2 Lab. No. 8218 DATE: Jan/77

HEAD RAW ANALYSIS						
R.M. %	ASH %	V.M. %	F.C. %	S. %	H.G.I.	REMARKS
1.0	20.2	22.4	56.4	0.55	88	Air Dried Basis
	20.4	22.6	57.0	0.56	--	Dry Basis

SIZE/RAW ANALYSES								
SIZE FRACTION	WT. %	R.M. %	ASH %	S. %	CUMULATIVE WT. %	CUMULATIVE ASH %	CUMULATIVE S. %	
1/4" x 65M	92.8	1.2	21.4	0.51	92.8	21.4	0.51	A.D.B.
	92.8		21.7	0.52	92.8	21.7	0.52	D.B.
65M x 0	7.2	1.4	16.4	0.70	100.0	21.0	0.52	A.D.B.
	7.2		16.6	0.71	100.0	21.3	0.53	D.B.

SINK-FLOAT ANALYSIS: 1/4" x 65M									
S. G.	WT. %	R.M. %	ASH %	V.M. %	F.C. %	S. %	CUMULATIVE WT. %	CUMULATIVE ASH %	
-1.40	69.8	0.7	4.8	25.9	68.6	0.80	69.8	4.8	A.D.B.
	69.8		4.8	26.1	69.1	0.81	69.8	4.8	D.B.
1.40-1.50	4.9	0.7	20.4	22.3	56.6	0.73	74.7	5.8	A.D.B.
	4.9		20.5	22.5	57.0	0.74	74.7	5.8	D.B.
1.50-1.60	4.0	1.0	30.7				78.7	7.1	A.D.B.
	4.0		31.0				78.7	7.1	D.B.
+1.60	21.3	0.9	72.8				100.0	21.1	A.D.B.
	21.3		73.5				100.0	21.3	D.B.

COMPOSITE 1/4" x 65M FLOATS @ 1.50 S.G., A.D.B.						
F.S.I.	P% ON COAL	DILATATION TEST				
		SOFTENING TEMP. (°C)	MAX. DIL. TEMP. (°C)	MAXIMUM CONTR. %	MAXIMUM DIL. %	G. NO.
9	.03	368	437	21	265	1.079

Birtley Engineering

Subsidiary of Great West Steel Industries

Lab. No. 8218 Date Jan 31, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-52-2

Starting Temperature °C: 350

Softening Temperature °C: 368

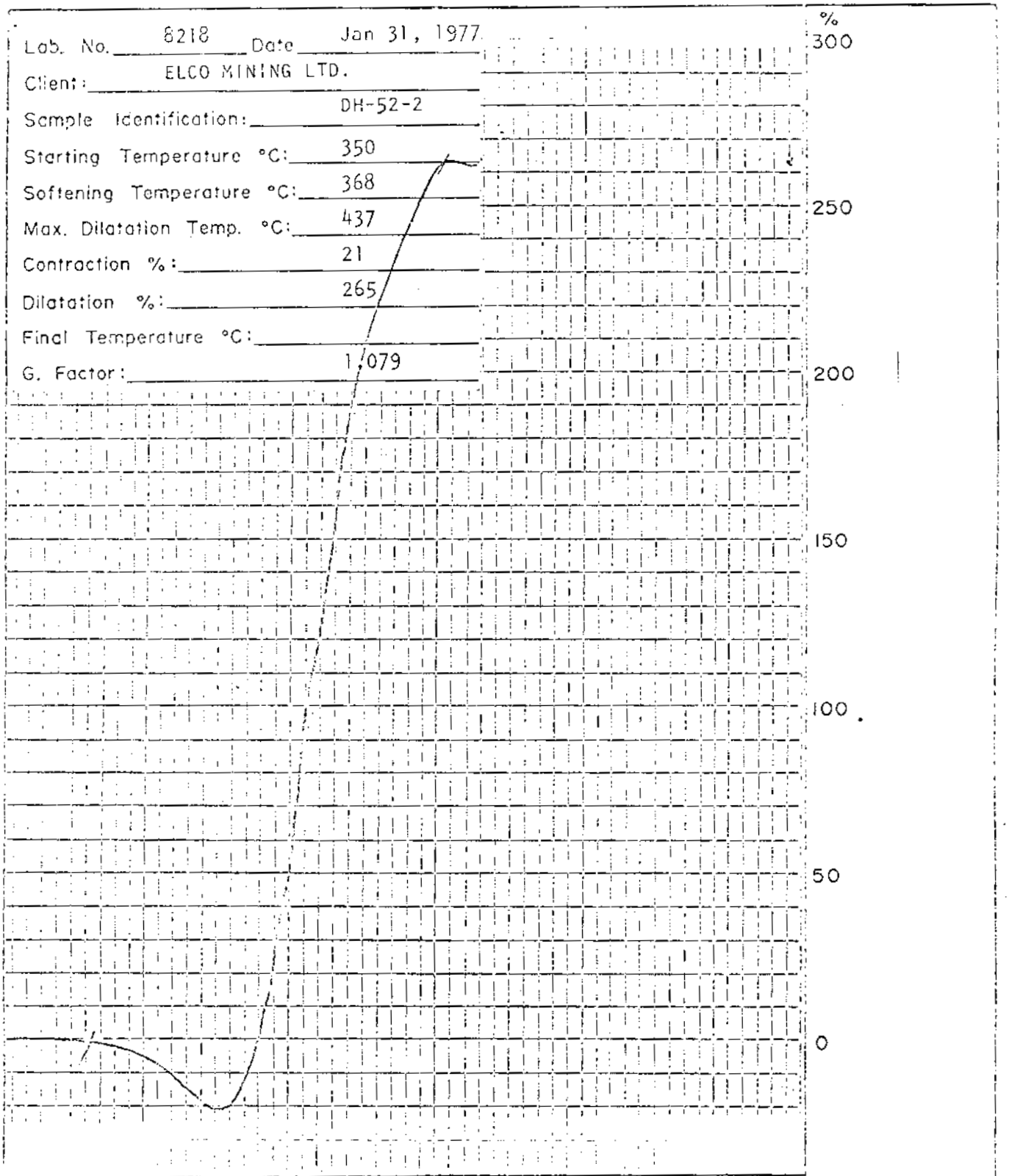
Max. Dilatation Temp. °C: 437

Contraction %: 21

Dilatation %: 265

Final Temperature °C:

G. Factor: 1.079



BARTLEY ENGINEERING (CANADA) LTD.

Title	Date
RUHR DILATOMETER TEST	
	Drawn

ELCO MINING LTD.

CORE SAMPLE ANALYSIS

HOLE NO.: DH-52-3 Lab. No. 8219 DATE: Jan/77

HEAD RAW ANALYSIS						
R.M. %	ASH %	V.M. %	F.C. %	S. %	H.G.I.	REMARKS
1.0	16.4	23.7	58.9	0.77	99	Air Dried Basis
	16.6	23.9	59.5	0.78	--	Dry Basis

SIZE / RAW ANALYSES								
SIZE FRACTION	WT. %	R.M. %	ASH %	S. %	CUMULATIVE WT. %	CUMULATIVE ASH %	CUMULATIVE S. %	
1/4" x 65M	92.6	1.0	16.9	0.78	92.6	16.9	0.78	A.D.B.
	92.6		17.1	0.79	92.6	17.1	0.79	D.B.
65M x 0	7.4	0.8	17.1	0.84	100.0	16.9	0.78	A.D.B.
	7.4		17.2	0.85	100.0	17.1	0.79	D.B.

SINK - FLOAT ANALYSIS: 1/4" x 65M									
S. G.	WT. %	R.M. %	ASH %	V.M. %	F.C. %	S. %	CUMULATIVE WT. %	CUMULATIVE ASH %	
-1.40	79.2	1.2	3.9	27.7	67.2	0.84	79.2	3.9	A.D.B.
	79.2		3.9	28.0	68.1	0.85	79.2	3.9	D.B.
1.40-1.50	3.3	0.9	20.2	22.1	56.8	0.73	82.5	4.6	A.D.B.
	3.3		20.4	22.3	57.3	0.74	82.5	4.6	D.B.
1.50-1.60	2.4	0.8	29.6				84.9	5.3	A.D.B.
	2.4		29.8				84.9	5.3	D.B.
+1.60	15.1	1.0	77.4				100.0	16.2	A.D.B.
	15.1		78.2				100.0	16.3	D.B.

COMPOSITE 1/4" x 65M FLOATS @ 1.50 S.G., A.D.B.						
F.S.I.	P% ON COAL	DILATATION TEST				
		SOFTENING TEMP. (°C)	MAX. DIL. TEMP. (°C)	MAXIMUM CONTR. %	MAXIMUM DIL. %	G. NO.
8	.06	371	437	18	285	1.078

Birtley Engineering

Subsidiary of Great West Steel Industries

Lab. No. 8219 Date Jan 31, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-52-3

Starting Temperature °C: 350

Softening Temperature °C: 371

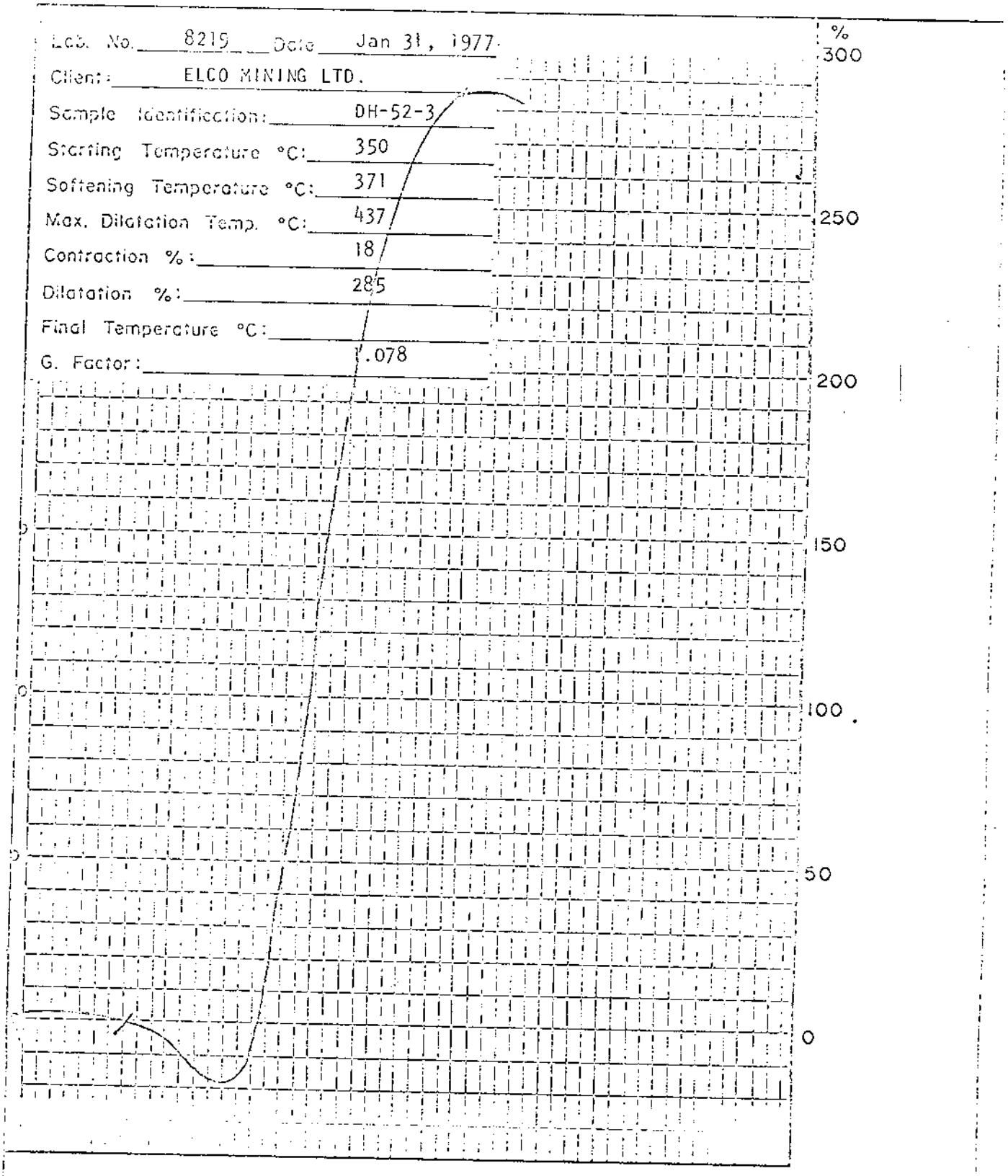
Max. Dilatation Temp. °C: 437

Contraction %: 18

Dilatation %: 28.5

Final Temperature °C:

G. Factor: 1.078



DIRTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

ELCO MINING LTD.

CORE SAMPLE ANALYSIS

HOLE NO.: DH-52-4 Lab. No. 8220 DATE: Jan/77

HEAD RAW ANALYSIS						
R.M. %	ASH %	V.M. %	F.C. %	S. %	H.G.I.	REMARKS
0.5	13.1	22.5	63.9	0.75	97	Air Dried Basis
	13.2	22.6	64.2	0.75	--	Dry Basis

SIZE/RAW ANALYSES								
SIZE FRACTION	WT. %	R.M. %	ASH %	S. %	CUMULATIVE WT. %	CUMULATIVE ASH %	CUMULATIVE S. %	
1/4" x 65M	93.5	1.0	13.1	0.71	93.5	13.1	0.71	A.D.B.
	93.5		13.2	0.72	93.5	13.2	0.72	D.B.
65M x 0	6.5	1.1	17.0	0.75	100.0	13.4	0.71	A.D.B.
	6.5		17.2	0.76	100.0	13.5	0.72	D.B.

SINK-FLOAT ANALYSIS: 1/4" x 65M									
S. G.	WT. %	R.M. %	ASH %	V.M. %	F.C. %	S. %	CUMULATIVE WT. %	CUMULATIVE ASH %	
-1.40	78.1	1.0	3.9	24.6	70.5	0.74	78.1	3.9	A.D.B.
	78.0		3.9	24.8	71.3	0.75	78.0	3.9	D.B.
1.40-1.50	6.7	0.9	16.3	20.3	62.5	0.62	84.8	4.9	A.D.B.
	6.7		16.4	20.5	63.1	0.63	84.7	4.9	D.B.
1.50-1.60	2.4	0.7	28.9				87.2	5.5	A.D.B.
	2.4		29.1				87.1	5.6	D.B.
+1.60	12.8	0.6	64.9				100.0	13.1	A.D.B.
	12.9		65.3				100.0	13.3	D.B.

COMPOSITE 1/4" x 65M FLOATS @ 1.50 S.G., A.D.B.						
F.S.I.	P% ON COAL	DILATATION TEST				
		SOFTENING TEMP. (°C)	MAX. DIL. TEMP. (°C)	MAXIMUM CONTR. %	MAXIMUM DIL. %	G. NO.
8 1/2	.06	374	434	22	123	1.055

Birtley Engineering

Subsidiary of Great West Steel Industries

Lab. No. 8220 Date Jan 31, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-52-4

Starting Temperature °C: 350

Softening Temperature °C: 374

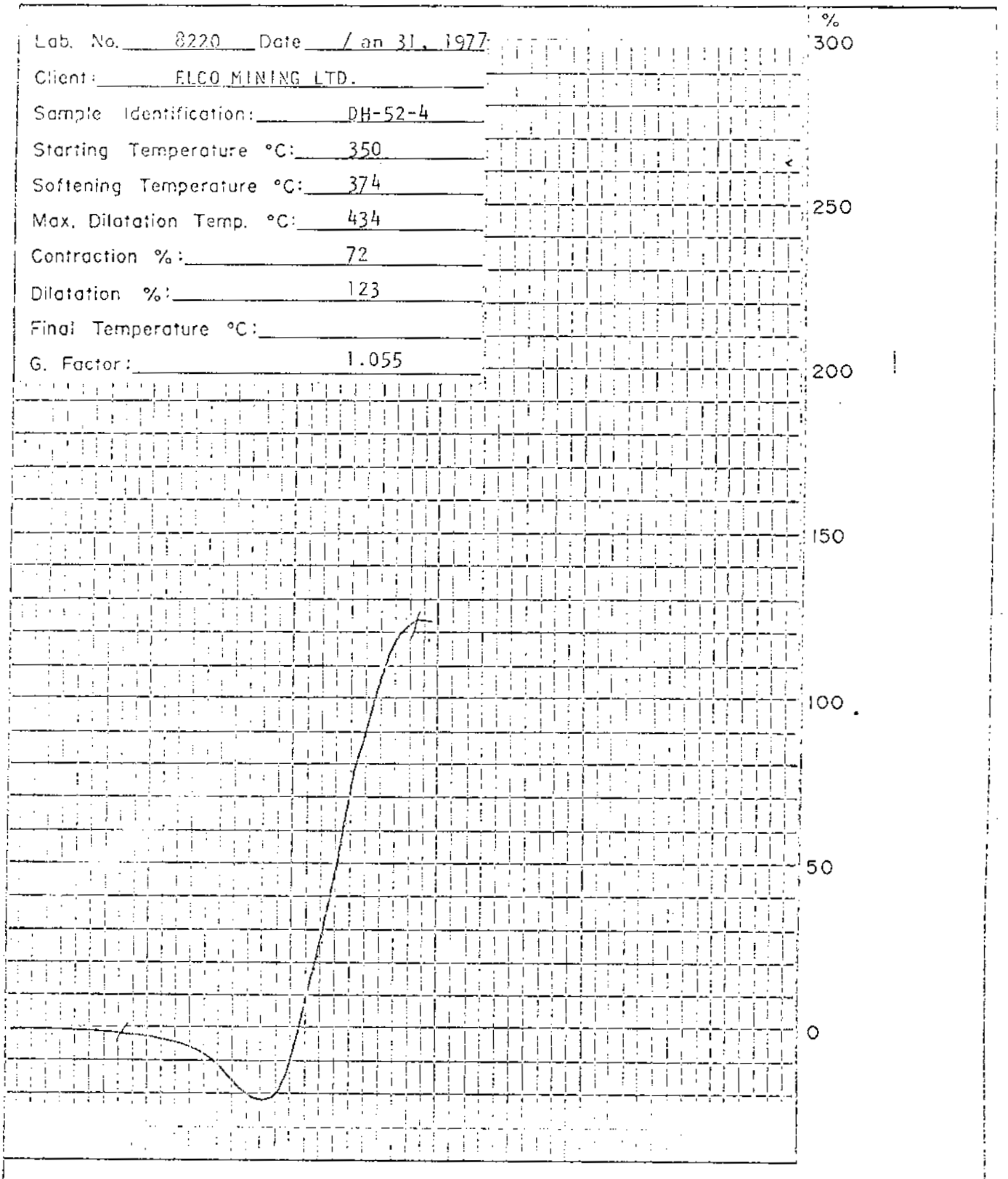
Max. Dilatation Temp. °C: 434

Contraction %: 72

Dilatation %: 123

Final Temperature °C:

G. Factor: 1.055



BIRTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

ELCO MINING LTD.

CORE SAMPLE ANALYSIS

HOLE NO.: DH-52-5 Lab. No. 8221 DATE: Jan/77

HEAD RAW ANALYSIS						
R.M. %	ASH %	V.M. %	F.C. %	S. %	H.G.I.	REMARKS
0.6	18.1	21.4	59.9	1.03	99	Air Dried Basis
	18.2	21.5	60.3	1.04	--	Dry Basis

SIZE / RAW ANALYSES								
SIZE FRACTION	WT. %	R.M. %	ASH %	S. %	CUMULATIVE WT. %	CUMULATIVE ASH %	CUMULATIVE S. %	
1/4" x 65M	86.3	1.0	20.0	1.02	86.3	20.0	1.02	A.D.B.
	86.3		20.2	1.03	86.3	20.2	1.03	D.B.
65M x 0	13.7	0.6	10.2	0.98	100.0	18.7	1.01	A.D.B.
	13.7		10.3	0.99	100.0	18.8	1.02	D.B.

SINK-FLOAT ANALYSIS: 1/4" x 65M									
S. G.	WT. %	R.M. %	ASH %	V.M. %	F.C. %	S. %	CUMULATIVE WT. %	CUMULATIVE ASH %	
-1.40	72.9	1.6	3.2	25.1	70.1	1.14	72.9	3.2	A.D.B.
	72.7		3.3	25.5	71.2	1.16	72.7	3.3	D.B.
1.40-1.50	2.7	1.0	14.2	21.7	63.1	1.08	85.6	3.2	A.D.B.
	2.7		14.3	21.9	63.8	1.09	85.4	3.3	D.B.
1.50-1.60	2.1	0.7	27.1				87.7	3.7	A.D.B.
	2.1		27.3				87.5	3.8	D.B.
+1.60	22.3	0.8	78.8				100.0	20.9	A.D.B.
	22.5		79.4				100.0	21.2	D.B.

COMPOSITE 1/4" x 65M FLOATS @ 1.50 S.G., A.D.B.						
F.S.I.	P% ON COAL	DILATATION TEST				
		SOFTENING TEMP. (°C)	MAX. DIL. TEMP. (°C)	MAXIMUM CONTR. %	MAXIMUM DIL. %	G. NO.
8 1/2	.02	383	431	15	191	1.053

Birtley Engineering

Subsidiary of Great West Steel Industries

Lab. No. 8221 Date Jan 31, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-52-5

Starting Temperature °C: 350

Softening Temperature °C: 383

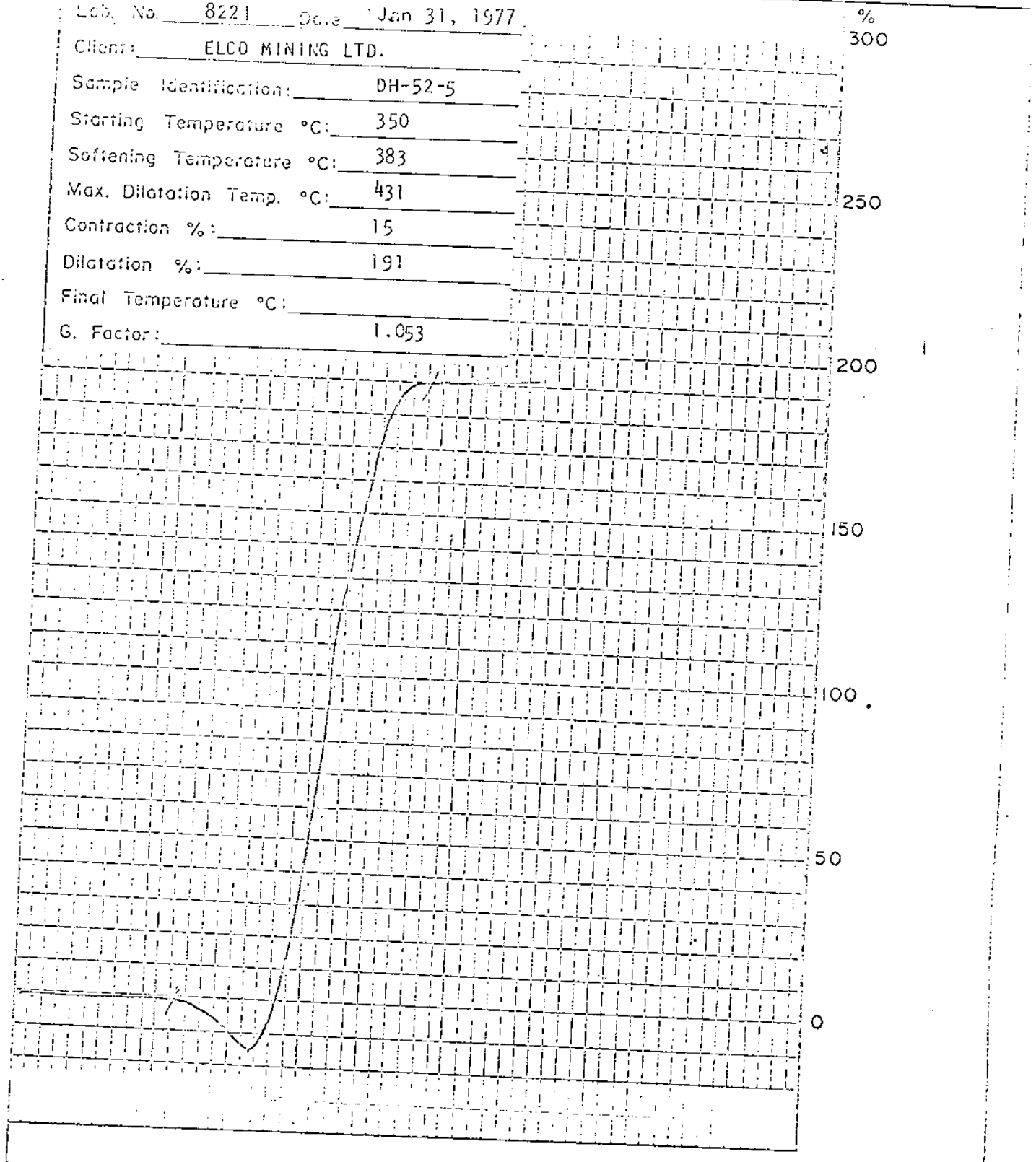
Max. Dilatation Temp. °C: 431

Contraction %: 15

Dilatation %: 191

Final Temperature °C:

G. Factor: 1.053



BIRTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

ELCO MINING LTD.

CORE SAMPLE ANALYSIS

HOLE NO.: DH-52-6 Lab. No. 8222 DATE: Jan/77

HEAD RAW ANALYSIS						
R.M. %	ASH %	V.M. %	F.C. %	S. %	H.G.I.	REMARKS
0.6	37.2	18.3	43.9	0.59	97	Air Dried Basis
	37.4	18.4	44.2	0.59	--	Dry Basis

SIZE/RAW ANALYSES								
SIZE FRACTION	WT. %	R.M. %	ASH %	S. %	CUMULATIVE WT. %	CUMULATIVE ASH %	CUMULATIVE S. %	
1/4" x 65M	86.5	0.6	39.5	0.53	86.5	39.5	0.53	A.D.B.
	86.5		39.7	0.53	86.5	39.7	0.53	D.B.
65M x 0	13.5	1.1	23.3	0.73	100.0	37.3	0.56	A.D.B.
	13.5		23.6	0.74	100.0	37.5	0.56	D.B.

SINK-FLOAT ANALYSIS: 1/4" x 65M									
S. G.	WT. %	R.M. %	ASH %	V.M. %	F.C. %	S. %	CUMULATIVE WT. %	CUMULATIVE ASH %	
-1.40	52.6	2.2	4.6	23.5	69.7	0.82	52.6	4.6	A.D.B.
	52.3		4.7	24.0	71.3	0.84	52.3	4.7	D.B.
1.40-1.50	3.6	1.2	18.1	19.8	60.9	0.69	56.2	5.5	A.D.B.
	3.6		18.3	20.0	61.7	0.70	55.9	5.6	D.B.
1.50-1.60	2.0	1.1	28.5				58.2	6.3	A.D.B.
	2.0		28.8				57.9	6.4	D.B.
+1.60	41.8	1.0	83.0				100.0	38.3	A.D.B.
	42.1		83.8				100.0	39.0	D.B.

COMPOSITE 1/4" x 65M FLOATS @ 1.50 S.G., A.D.B.						
F.S.I.	P% ON COAL	DILATATION TEST				
		SOFTENING TEMP. (°C)	MAX. DIL. TEMP. (°C)	MAXIMUM CONTR. %	MAXIMUM DIL. %	G. NO.
8 1/2	.03	395	446	13	26	1.021

Birtley Engineering

Subsidiary of Great West Steel Industries

Lab. No. 8222 Date Jan 31, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-52-6

Starting Temperature °C: 350

Softening Temperature °C: 395

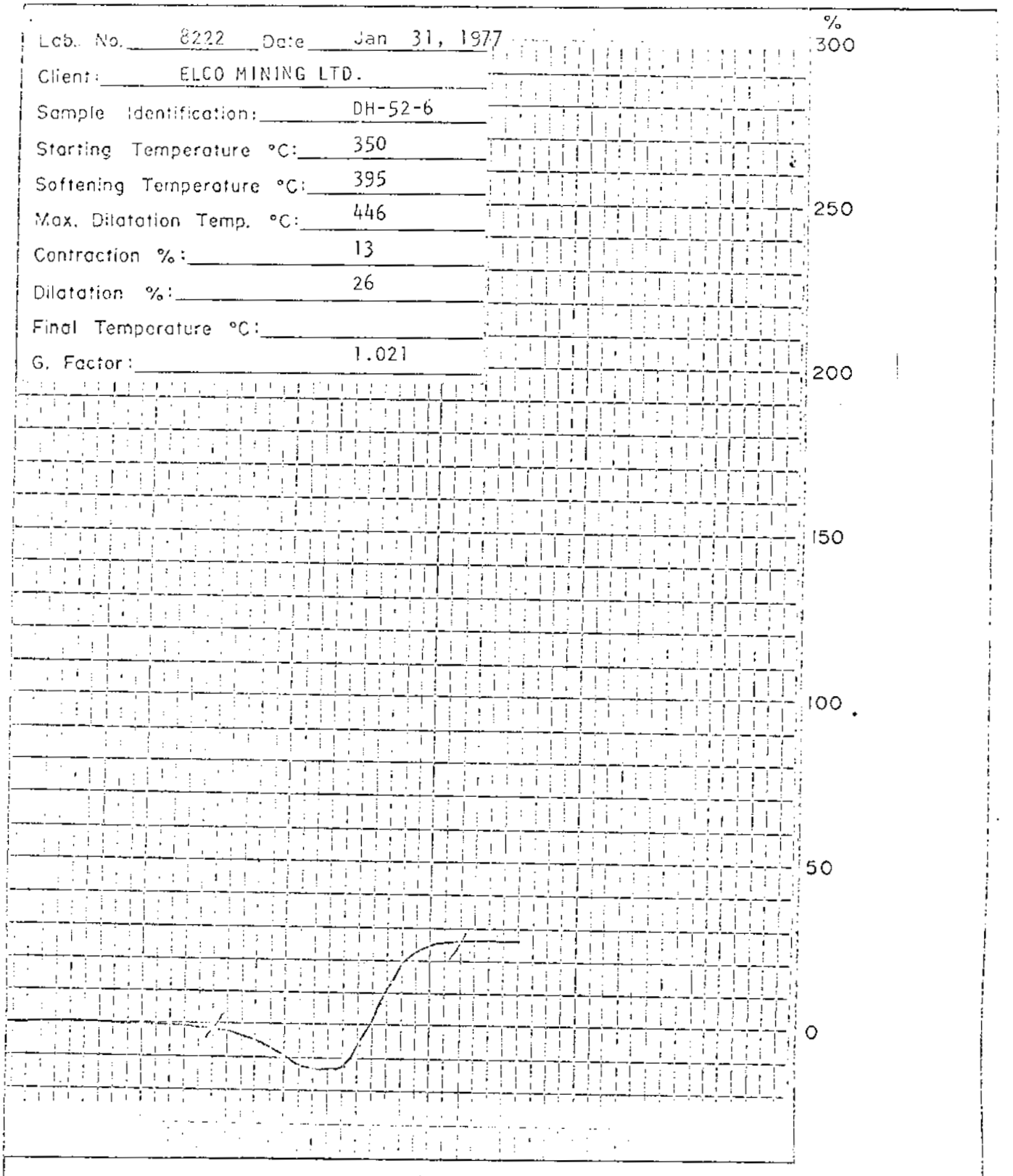
Max. Dilatation Temp. °C: 446

Contraction %: 13

Dilatation %: 26

Final Temperature °C:

G. Factor: 1.021



BURTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

ELCO MINING LTD.

CORE SAMPLE ANALYSIS

HOLE NO.: DH-52-7 Lab. No. 8223 DATE: Jan/77

HEAD RAW ANALYSIS						
R.M. %	ASH %	V.M. %	F.C. %	S. %	H.G.I.	REMARKS
0.4	36.7	17.7	45.2	0.64	84	Air Dried Basis
	36.8	17.8	45.4	0.64	--	Dry Basis

SIZE/RAW ANALYSES								
SIZE FRACTION	WT. %	R.M. %	ASH %	S. %	CUMULATIVE WT. %	CUMULATIVE ASH %	CUMULATIVE S. %	
1/4" x 65M	88.4	0.6	38.3	0.59	88.4	38.3	0.59	A.D.B.
	88.5		38.5	0.59	88.5	38.5	0.59	D.B.
65M x 0	11.6	0.9	18.5	0.73	100.0	36.0	0.61	A.D.B.
	11.5		18.7	0.74	100.0	36.2	0.61	D.B.

SINK-FLOAT ANALYSIS: 1/4" x 65M									
S. G.	WT. %	R.M. %	ASH %	V.M. %	F.C. %	S. %	CUMULATIVE WT. %	CUMULATIVE ASH %	
-1.40	48.1	1.3	5.3	22.5	70.9	0.91	48.1	5.3	A.D.B.
	48.0		5.4	22.8	71.8	0.92	48.0	5.4	D.B.
1.40-1.50	7.0	1.1	16.2	20.0	62.7	0.86	55.1	6.7	A.D.B.
	7.0		16.4	20.2	63.4	0.87	55.0	6.8	D.B.
1.50-1.60	3.5	0.9	28.0				58.6	8.0	A.D.B.
	3.5		28.3				58.5	8.1	D.B.
+1.60	41.4	1.0	81.3				100.0	38.3	A.D.B.
	41.5		82.1				100.0	38.8	D.B.

COMPOSITE 1/4" x 65M FLOATS @ 1.50 S.G., A.D.B.						
F.S.I.	P% ON COAL	DILATATION TEST				
		SOFTENING TEMP. (°C)	MAX. DIL. TEMP. (°C)	MAXIMUM CONTR. %	MAXIMUM DIL. %	G. NO.
7 1/2	.08	390	443	21	44	1.023

Birtley Engineering

Subsidiary of Great West Steel Industries

Lab. No. 8223 Date Jan 31, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-52-7

Starting Temperature °C: 350

Softening Temperature °C: 390

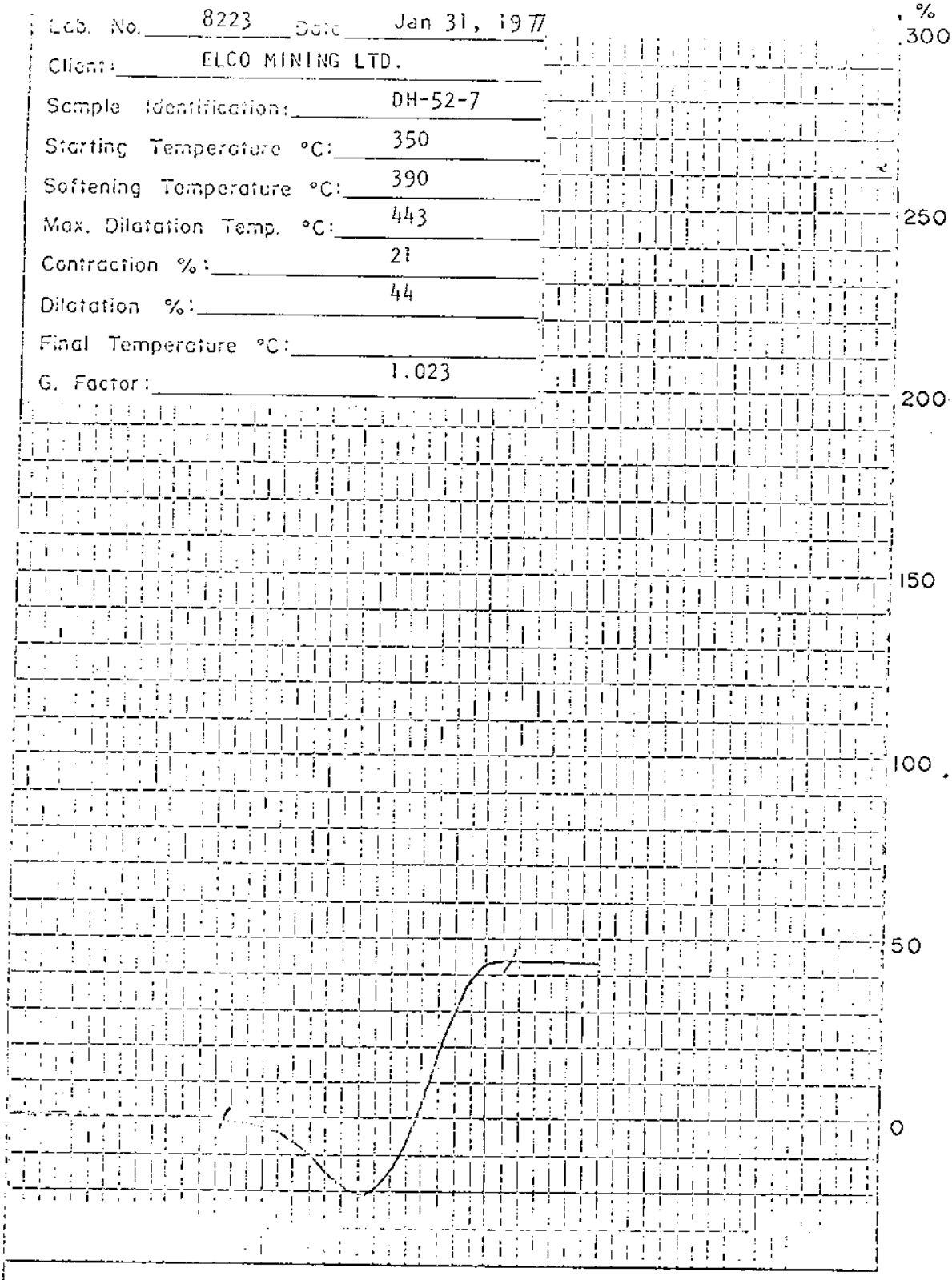
Max. Dilatation Temp. °C: 443

Contraction %: 21

Dilatation %: 44

Final Temperature °C:

G. Factor: 1.023



BARTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. 7980 Date Jan 13, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-53-1

Starting Temperature °C: 350

Softening Temperature °C: 355

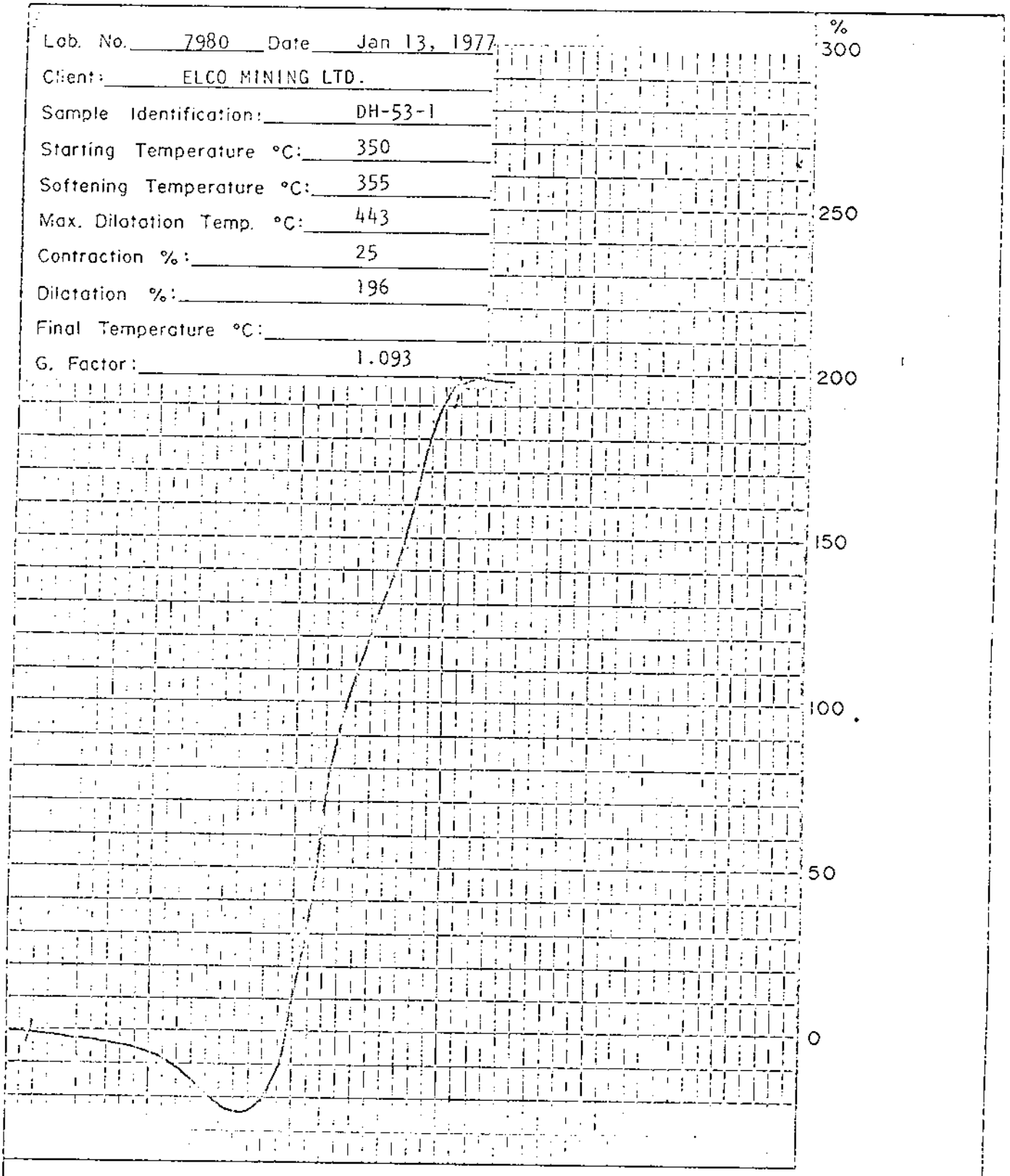
Max. Dilatation Temp. °C: 443

Contraction %: 25

Dilatation %: 196

Final Temperature °C:

G. Factor: 1.093



BARTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. 7981 Date Jan 13, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-53-2

Starting Temperature °C: 350

Softening Temperature °C: 361

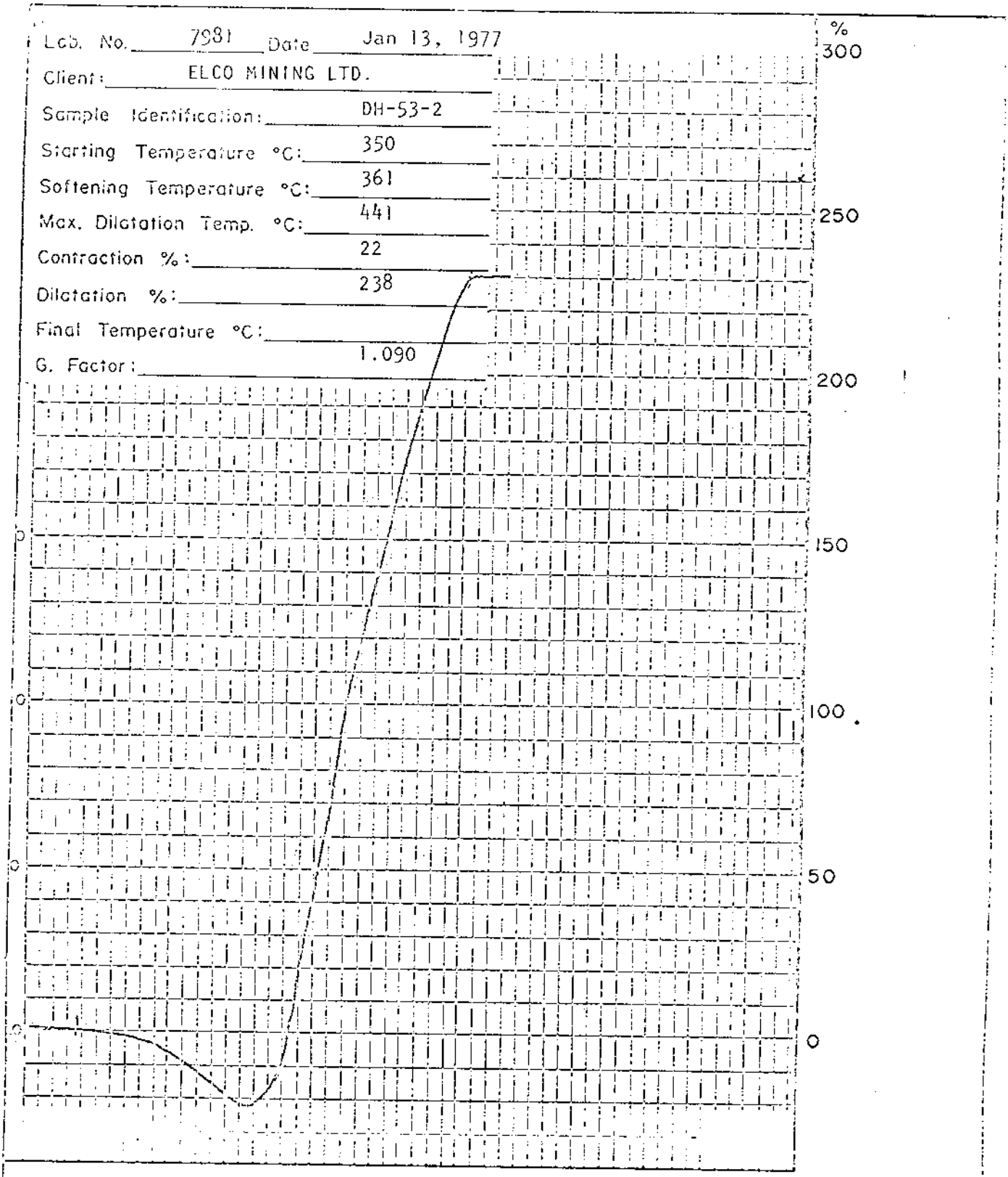
Max. Dilatation Temp. °C: 441

Contraction %: 22

Dilatation %: 238

Final Temperature °C:

G. Factor: 1.090



BIRTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. 7982 Date Jan 13, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-53-3

Starting Temperature °C: 350

Softening Temperature °C: 361

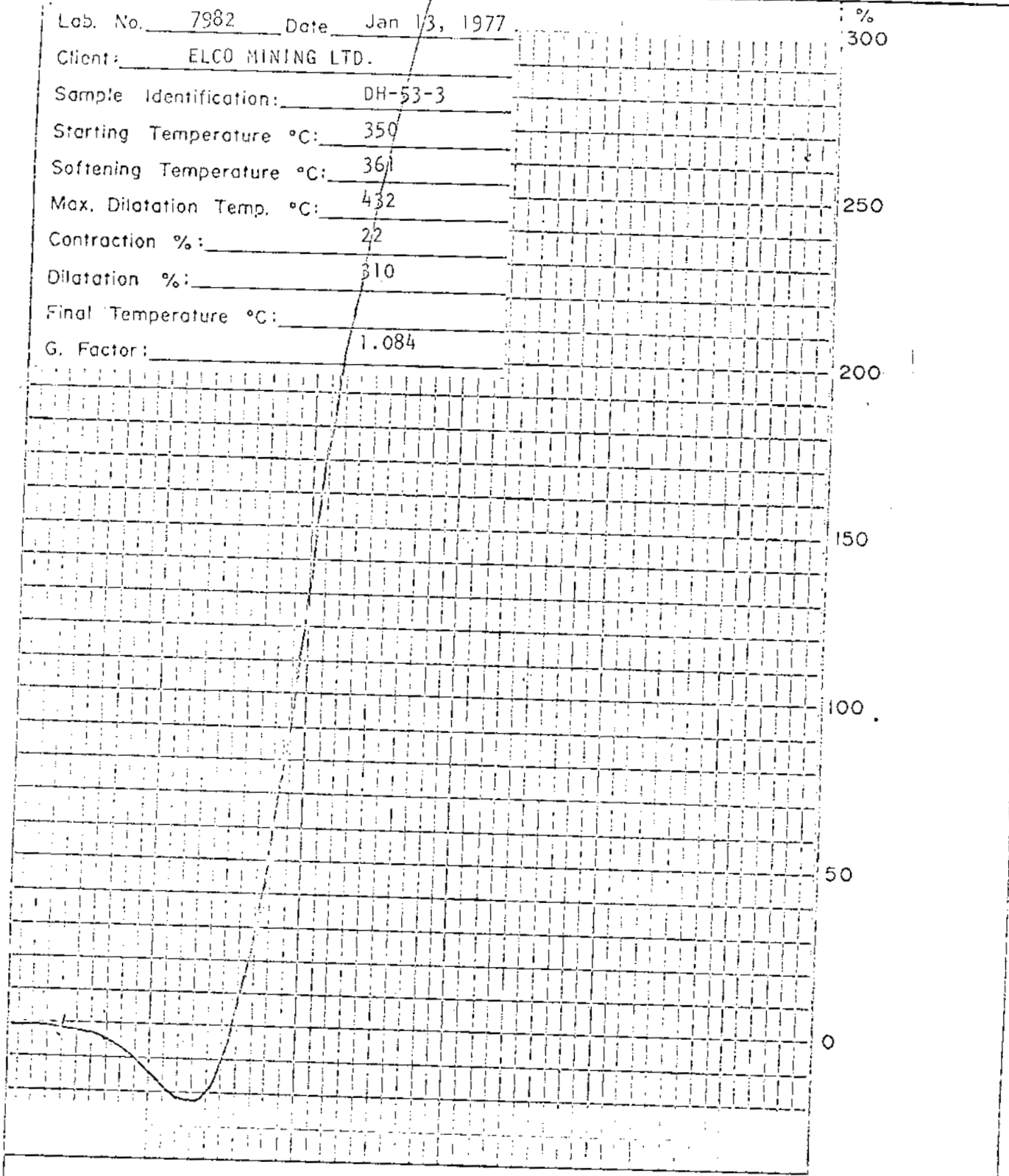
Max. Dilatation Temp. °C: 432

Contraction %: 22

Dilatation %: 310

Final Temperature °C:

G. Factor: 1.084



BIRTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. 7983 Date Jan 13, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-53-4

Starting Temperature °C: 350

Softening Temperature °C: 357

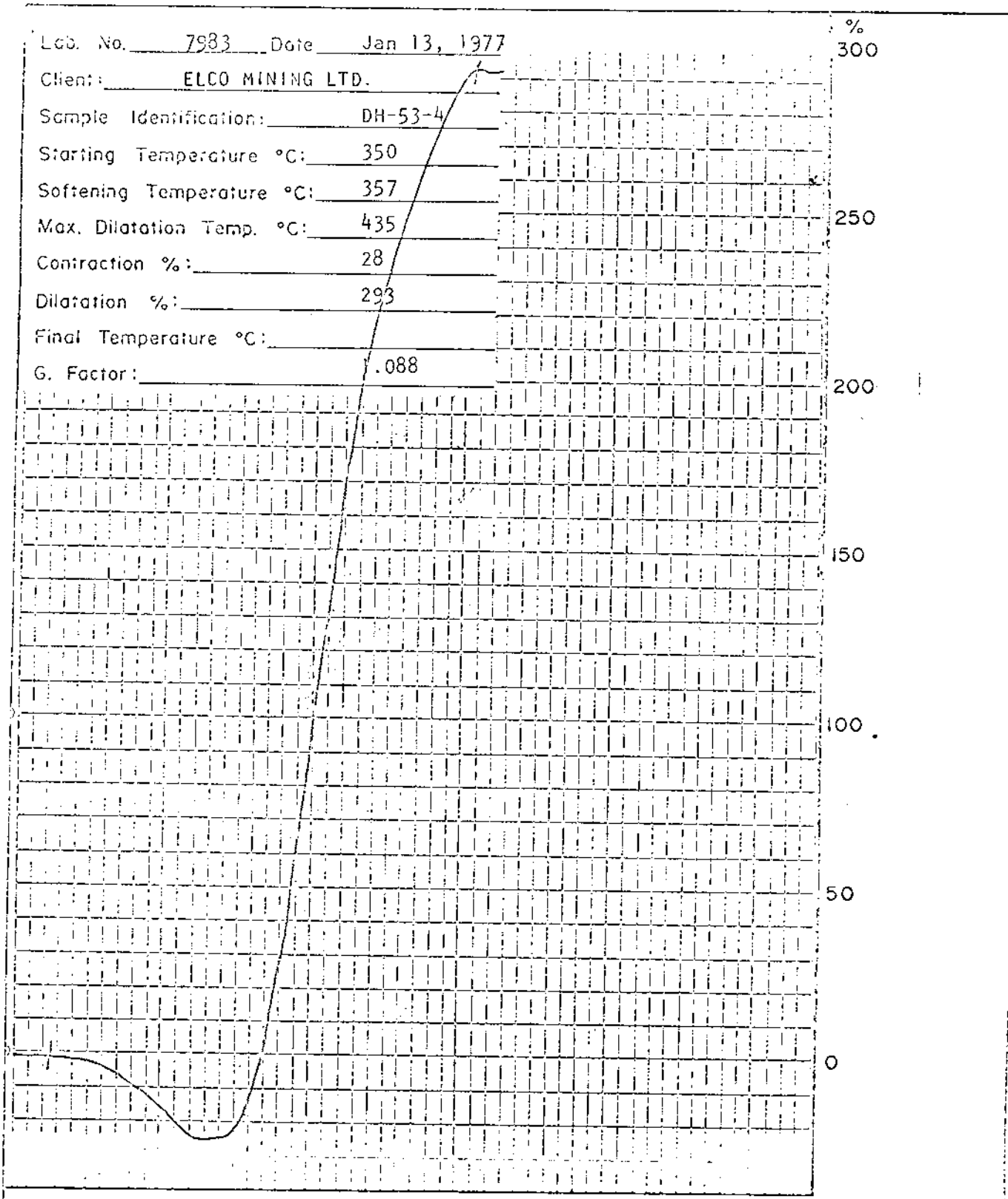
Max. Dilatation Temp. °C: 435

Contraction %: 28

Dilatation %: 293

Final Temperature °C:

G. Factor: .088



BIRTLEY ENGINEERING (CANADA) LTD.

Title	Date
RUHR DILATOMETER TEST	
	Drawn

Lab. No. 7984 Date Jan 13, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-53-5

Starting Temperature °C: 350

Softening Temperature °C: 367

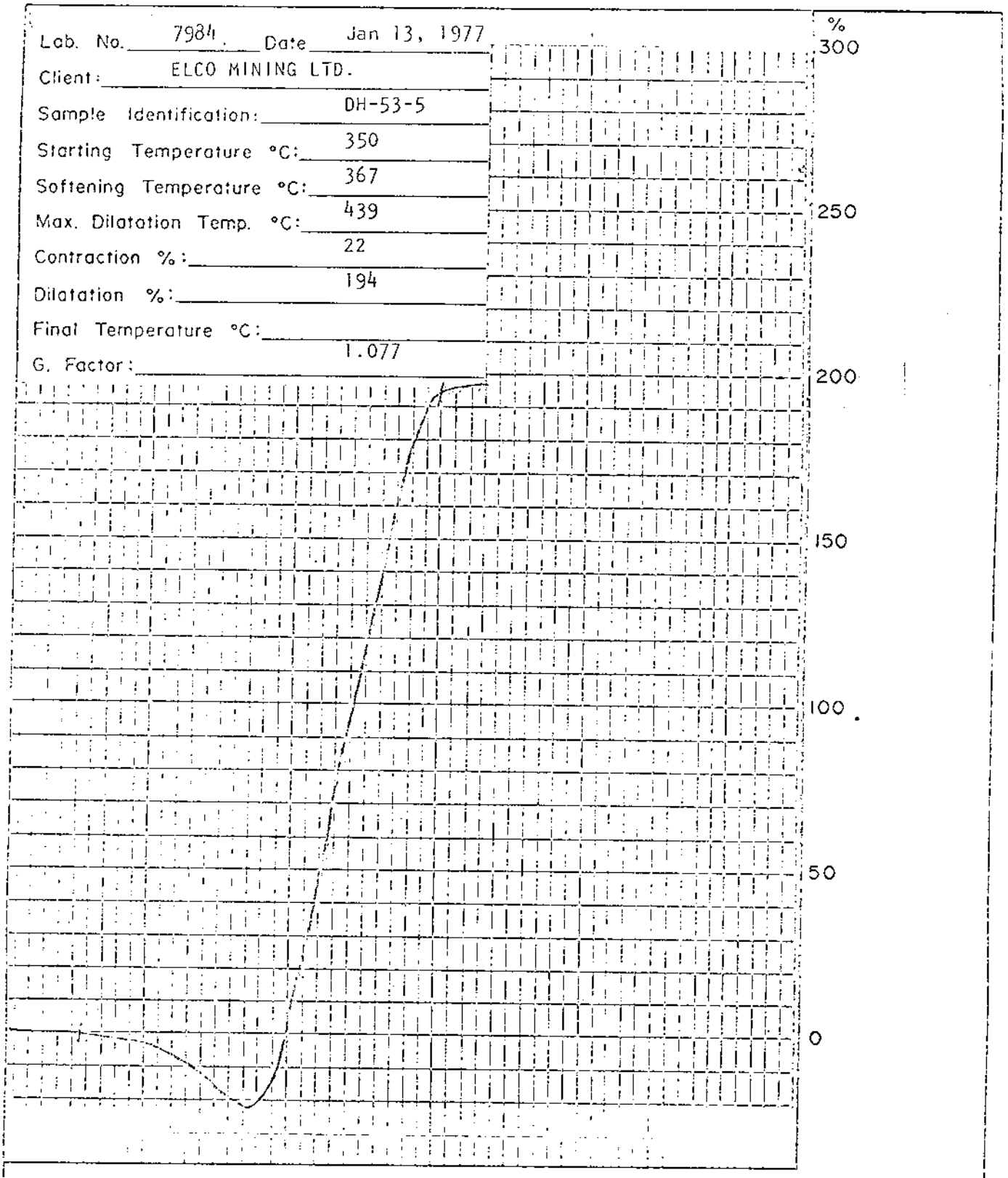
Max. Dilatation Temp. °C: 439

Contraction %: 22

Dilatation %: 194

Final Temperature °C:

G. Factor: 1.077



BIRTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. 7985 Date Jan 13, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-53-6

Starting Temperature °C: 350

Softening Temperature °C: 376

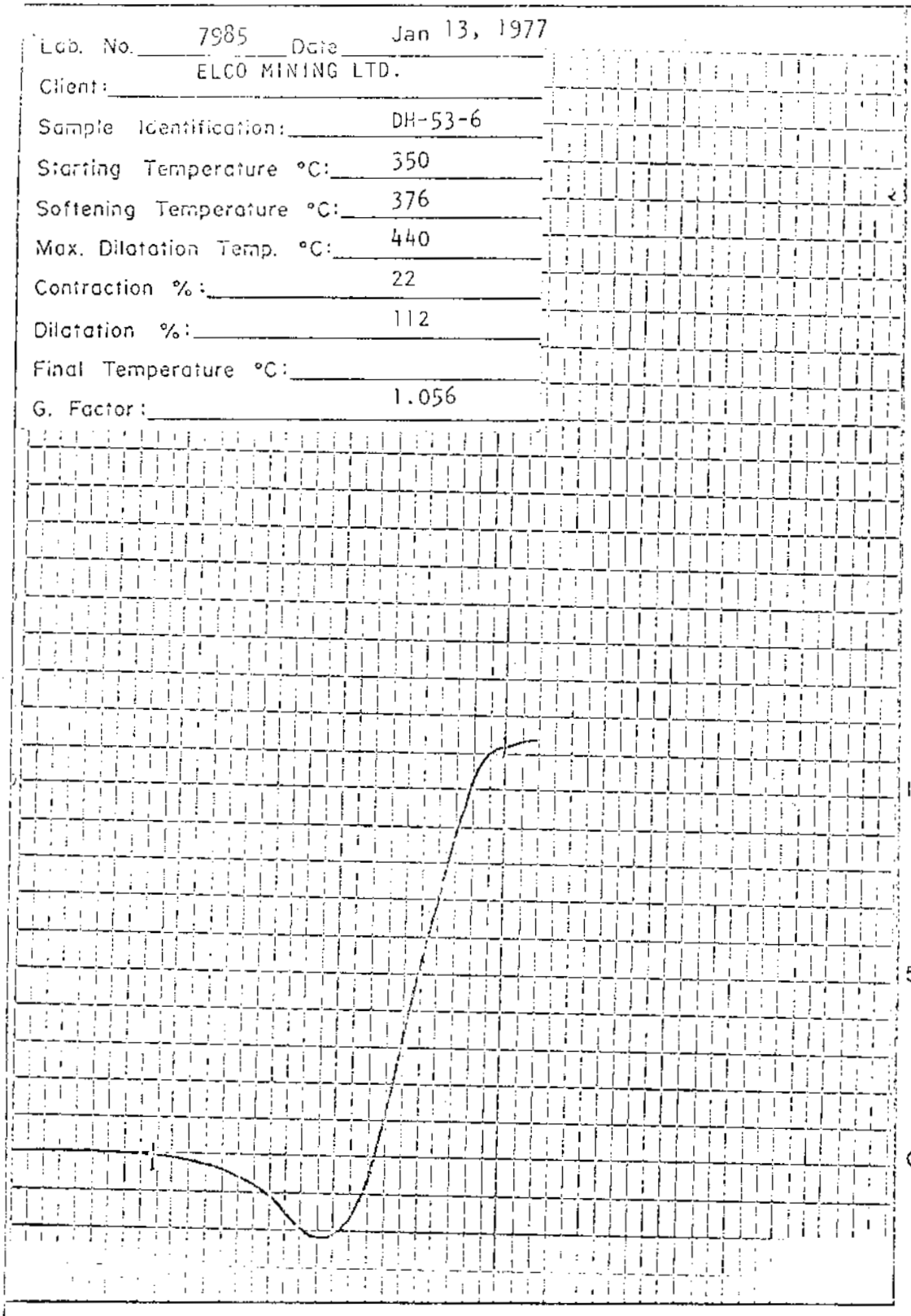
Max. Dilatation Temp. °C: 440

Contraction %: 22

Dilatation %: 112

Final Temperature °C:

G. Factor: 1.056



BIRTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. 7986 Date Jan 13, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-53-7

Starting Temperature °C: 350

Softening Temperature °C: 369

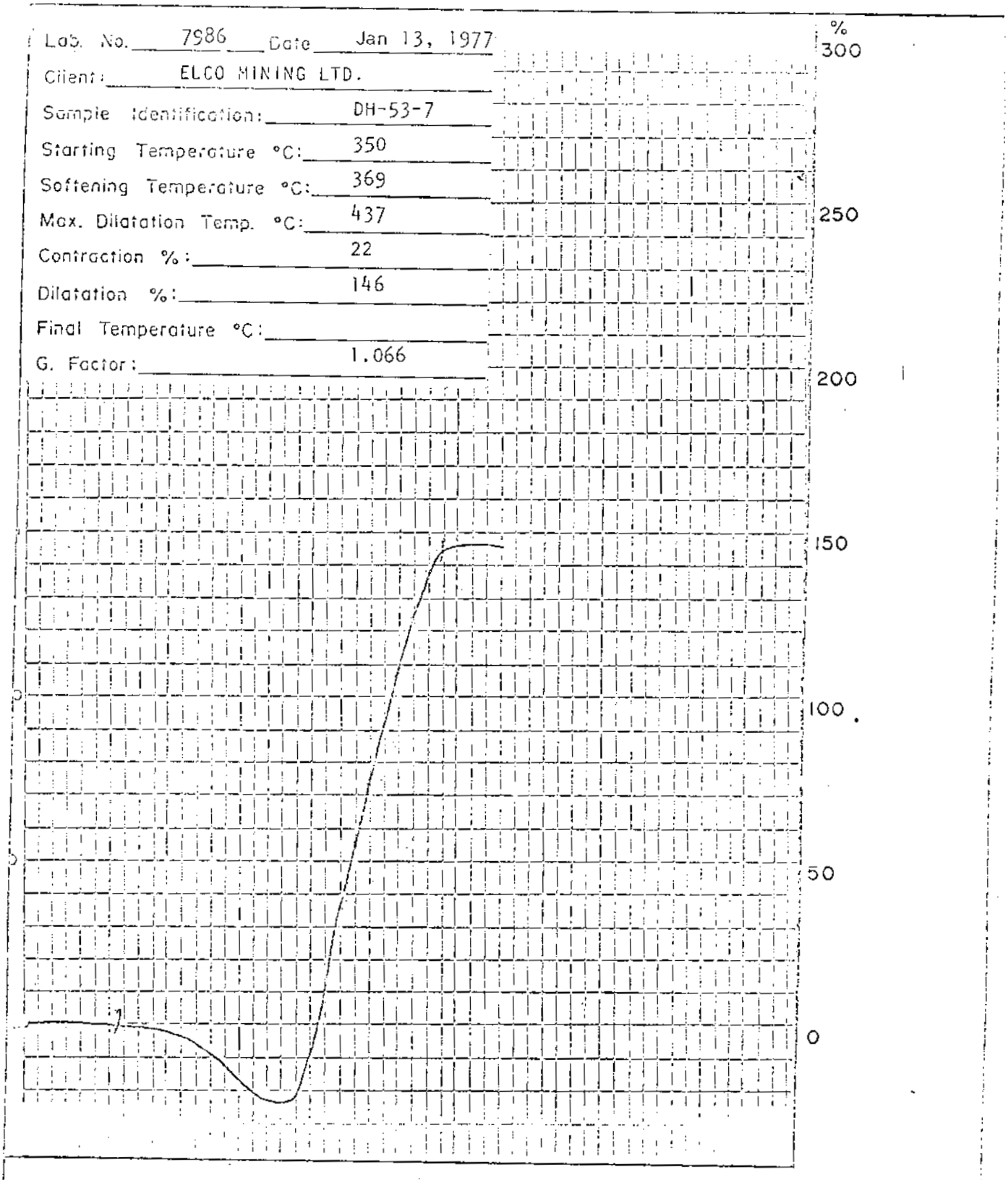
Max. Dilatation Temp. °C: 437

Contraction %: 22

Dilatation %: 146

Final Temperature °C:

G. Factor: 1.066



BIRTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. 7987 Date Jan 13, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-53-8

Starting Temperature °C: 350

Softening Temperature °C: 369

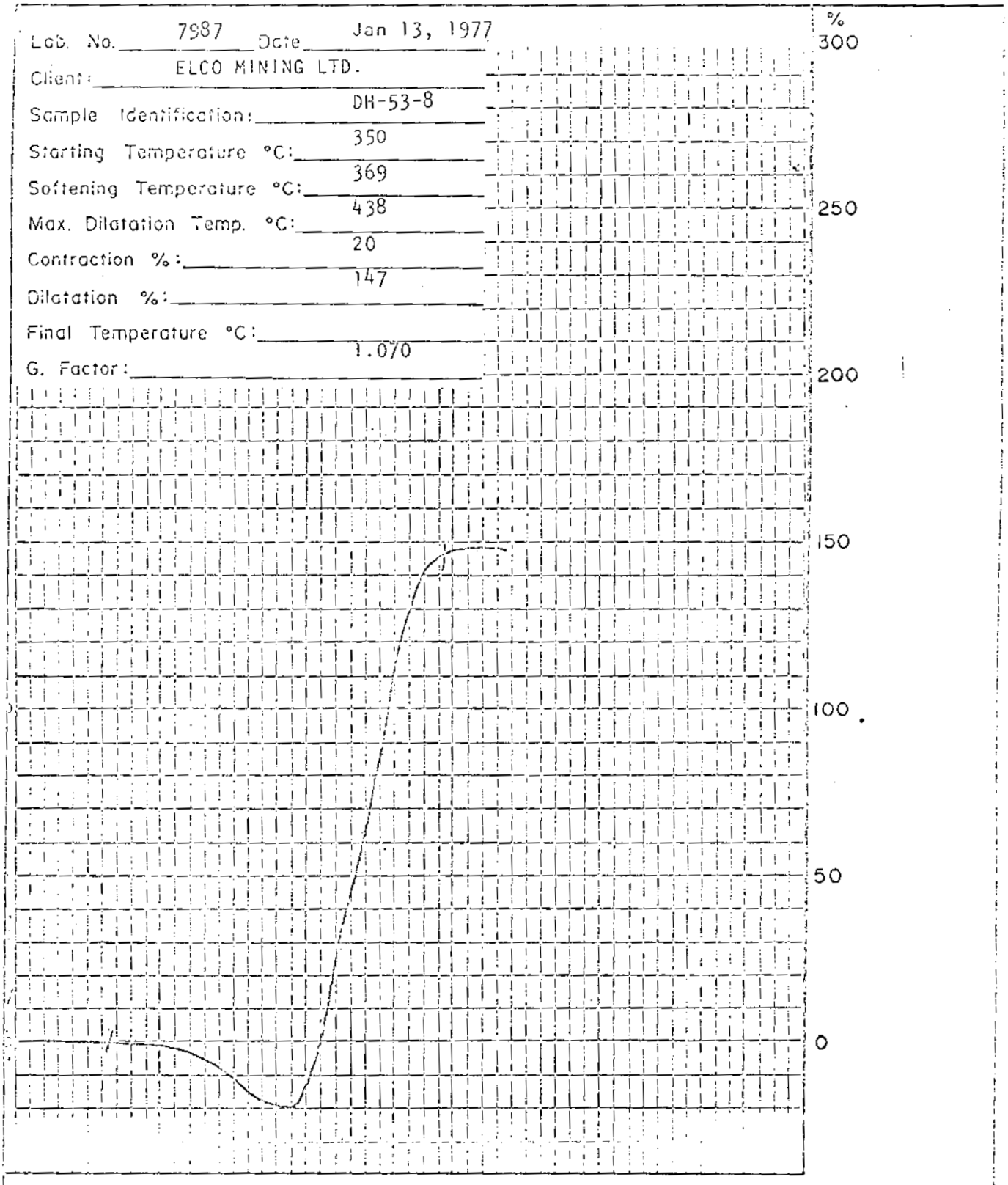
Max. Dilatation Temp. °C: 438

Contraction %: 20

Dilatation %: 147

Final Temperature °C:

G. Factor: 1.070



BIRTLEY ENGINEERING (CANADA) LTD.

Title	Date
RUHR DILATOMETER TEST	
	Drawn

Warnock Hersey Professional Services Ltd.

ELCO MINING LTD. CORE SAMPLE ANALYSIS

Hole No.: DH - 54 - 1 Lab. No.: 77 - 1028 Date: February 21, 1977

HEAD RAW ANALYSIS						
R.M.%	Ash%	V.M.%	F.C.%	S.%	H.G.I.	REMARKS
0.8	23.6	25.8	49.8	0.76	82.3	Air Dried Basis
- - -	23.8	26.0	50.2	0.77	- - -	Dry Basis

SIZE / RAW ANALYSES								
Size Fraction	Wt. %	R.M.%	Ash %	S. %	CUMULATIVE Wt. %	CUMULATIVE Ash %	CUMULATIVE S. %	
¼" x 65 m	86.2	0.7	25.3	0.78	86.2	25.3	0.78	A.D.B.
	86.2	- - -	25.5	0.78	86.2	25.5	0.78	D.B.
65m x 0	13.8	0.8	15.4	0.90	100.0	23.9	0.80	A.D.B.
	13.8	- - -	15.5	0.91	100.0	24.1	0.80	D.B.

SINK - FLOAT ANALYSIS: ¼" x 65 M									
S. G.	Wt.%	R.M%	Ash %	V.M%	F.C%	S.%	Cumulative Wt. %	Cumulative Ash %	
-1.40	51.2	0.8	3.8	33.8	61.6	0.95	51.2	3.8	A.D.B.
	51.2	- - -	3.8	34.0	62.2	0.96	51.2	3.8	D.B.
1.40-1.50	9.5	0.8	8.8	29.5	60.9	0.86	60.7	4.6	A.D.B.
	9.5	- - -	8.9	29.7	61.4	0.87	60.7	4.6	D.B.
1.50-1.60	7.9	1.0	23.3	- - -	- - -	- - -	68.6	6.7	A.D.B.
	7.9	- - -	23.5	- - -	- - -	- - -	68.6	6.8	D.B.
+1.60	31.4	0.8	63.4	- - -	- - -	- - -	100.0	24.5	A.D.B.
	31.4	- - -	63.9	- - -	- - -	- - -	100.0	24.7	D.B.

COMPOSITE ¼" x 65 m FLOATS @ 1.50 S.G., A.D.B.						
F.S.I.	F % on Coal	DILATATION TESTS Softening Temp. (°C)	Max. Dil. Temp. (°C)	Maximum Contr. %	Maximum Dil. %	G.No.
8½	0.025	371°C	440°C	16%	228%	1.080

Lab. No. 8290 Date Feb/77

Client: Warnock Hersey

Sample Identification: 77-1028

Starting Temperature °C: 350

Softening Temperature °C: 371

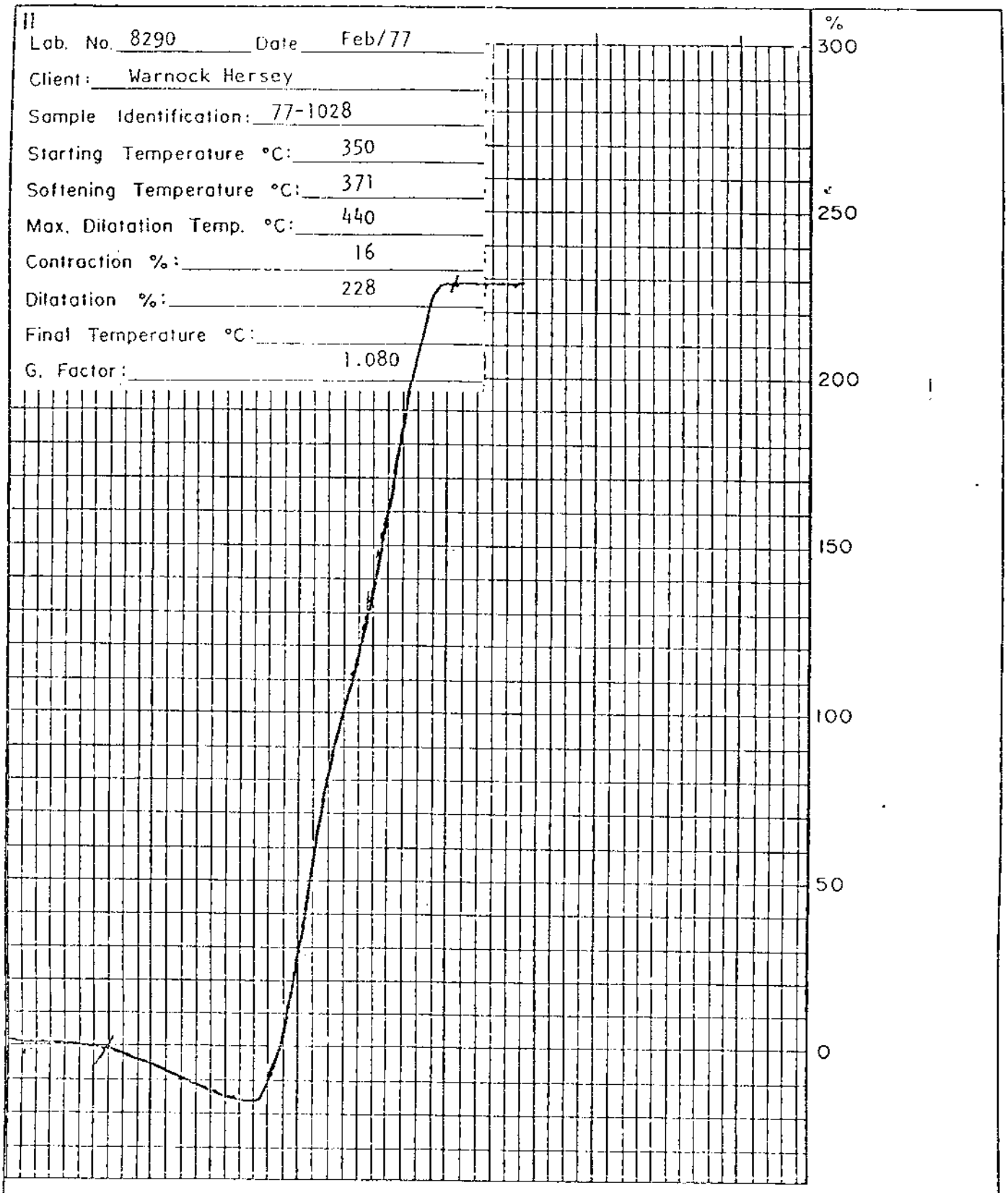
Max. Dilatation Temp. °C: 440

Contraction %: 16

Dilatation %: 228

Final Temperature °C:

G. Factor: 1.080



BIRTLEY ENGINEERING (CANADA) LTD.

Title	Date
RUHR DILATOMETER TEST	
	Drawn

Warnock Hersey Professional Services Ltd.

ELCO MINING LTD. CORE SAMPLE ANALYSIS

Hole No.: DH 54 - 2 Lab. No.: 77 - 1029 Date: February 21, 1977

HEAD RAW ANALYSIS						
R.M.%	Ash%	V.M.%	F.C.%	S.%	H.G.I.	REMARKS
0.9	32.8	23.6	42.7	0.90	94.8	Air Dried Basis
- - -	33.1	23.8	43.1	0.91	- - -	Dry Basis

SIZE / RAW ANALYSES								
Size Fraction	Wt. %	R.M.%	Ash %	S. %	CUMULATIVE Wt. %	CUMULATIVE Ash %	CUMULATIVE S. %	
¼" x 65 m	76.8	0.8	37.2	0.90	76.8	37.2	0.90	A.D.B.
	76.8	- - -	37.5	0.91	76.8	37.5	0.91	D.B.
65 m x 0	23.2	0.8	19.5	1.09	100.0	33.1	0.94	A.D.B.
	23.2	- - -	19.7	1.10	100.0	33.4	0.95	D.B.

SINK - FLOAT ANALYSIS: ¼" x 65 M									
S. G.	Wt.%	R.M%	Ash %	V.M%	F.C%	S.%	Cumulative Wt. %	Cumulative Ash %	
-1.40	32.6	1.0	5.7	34.0	59.3	1.10	32.6	5.7	A.D.B.
	32.6	- - -	5.7	34.3	60.0	1.11	32.6	5.7	D.B.
1.40-1.50	7.6	0.8	14.6	28.5	56.1	1.03	40.2	7.4	A.D.B.
	7.6	- - -	14.7	28.8	56.5	1.04	40.2	7.4	D.B.
1.50-1.60	8.0	0.9	24.9	- - -	- - -	- - -	48.2	1.03	A.D.B.
	8.0	- - -	25.1	- - -	- - -	- - -	48.2	1.03	D.B.
+1.60	51.8	0.8	66.7	- - -	- - -	- - -	100.0	39.5	A.D.B.
	51.8	- - -	67.3	- - -	- - -	- - -	100.0	39.8	D.B.

COMPOSITE ¼" x 65 m FLOATS @ 1.50 S.G., A.D.B.						
F.S.I.	P % on Coal	DILATATION TESTS: Softening Temp. (°C)	Max. Dil. Temp. (°C)	Maximum Contr. %	Maximum Dil. %	G.No.
7½	0.007	362°C	434°C	19%	225%	1.083

Lab. No. 8291 Date Feb/77

Client: Warnock Hersey

Sample Identification: 77-1029

Starting Temperature °C: 350

Softening Temperature °C: 362

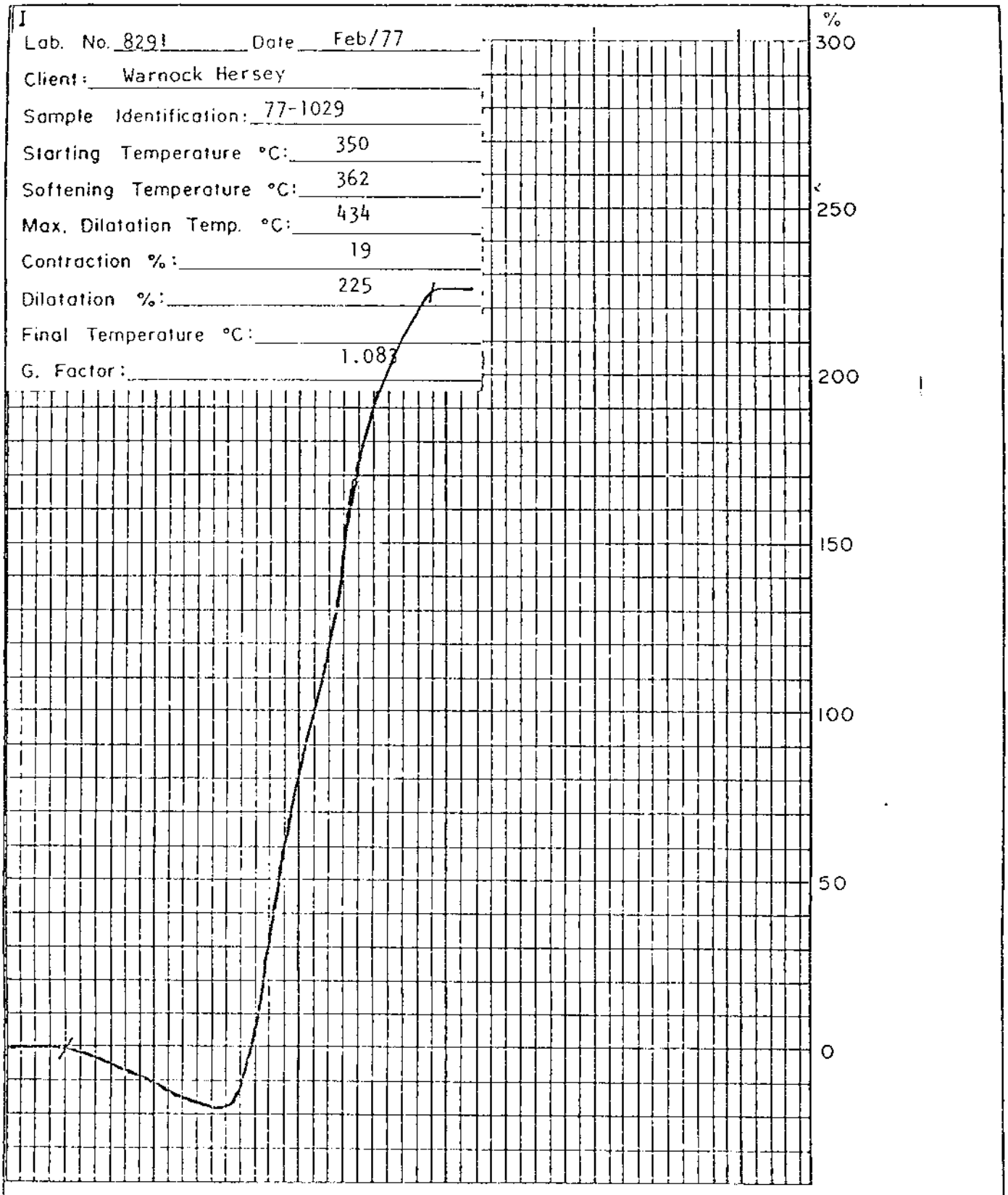
Max. Dilatation Temp. °C: 434

Contraction %: 19

Dilatation %: 225

Final Temperature °C:

G. Factor: 1.083



BIRTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Warnock Hersey Professional Services Ltd.

ELCO MINING LTD. CORE SAMPLE ANALYSIS

Hole No.: DH 54 - 3 Lab. No.: 77 - 1030 Date: February 21, 1977

HEAD RAW ANALYSIS						
R.M.%	Ash%	V.M.%	F.C.%	S.%	H.G.I.	REMARKS
1.1	21.7	25.7	51.5	0.56	105.2	Air Dried Basis
- - -	22.0	26.0	52.0	0.57	- - -	Dry Basis

SIZE / RAW ANALYSES								
Size Fraction	Wt. %	R.M.%	Ash %	S. %	CUMULATIVE Wt. %	CUMULATIVE Ash %	CUMULATIVE S. %	
¼" x 65 m	76.5	0.8	25.5	0.58	76.5	25.5	0.58	A.D.B.
	76.5	- - -	25.7	0.58	76.5	25.7	0.58	D.B.
65 m x 0	23.5	0.8	12.0	0.59	100.0	22.3	0.58	A.D.B.
	23.5	- - -	12.1	0.59	100.0	22.5	0.58	D.B.

SINK - FLOAT ANALYSIS: ¼" x 65 M									
S. G.	Wt.%	R.M%	Ash %	V.M%	F.C%	S.%	Cumulative Wt. %	Cumulative Ash %	
-1.40	58.1	1.2	3.2	31.4	64.2	0.57	58.1	3.2	A.D.B.
	58.0	- -	3.2	31.8	65.0	0.58	58.0	3.2	D.B.
1.40-1.50	6.1	1.2	16.9	25.2	56.6	0.56	64.2	4.5	A.D.B.
	6.1	- - -	17.1	25.5	57.4	0.57	64.1	4.5	D.B.
1.50-1.60	6.9	0.9	27.8	- - -	- - -	- - -	71.1	6.8	A.D.B.
	6.9	- - -	28.0	- - -	- - -	- - -	71.0	6.8	D.B.
+1.60	28.9	0.9	72.1	- - -	- - -	- - -	100.0	25.7	A.D.B.
	29.0	- - -	72.8	- - -	- - -	- - -	100.0	25.9	D.B.

COMPOSITE ¼" x 65 m FLOATS @ 1.50 S.G., A.D.B.						
F.S.I.	P % on Coal	DILATATION TESTS Softening Temp. (°C)	Max. Dil. Temp. (°C)	Maximum Contr. %	Maximum Dil. %	G.No.
8	0.009	365°C	434°C	21%	105%	1.061

Lab. No. 8292 Date Feb/77

Client: Warnock Hersey

Sample Identification: 77-1030

Starting Temperature °C: 350

Softening Temperature °C: 365

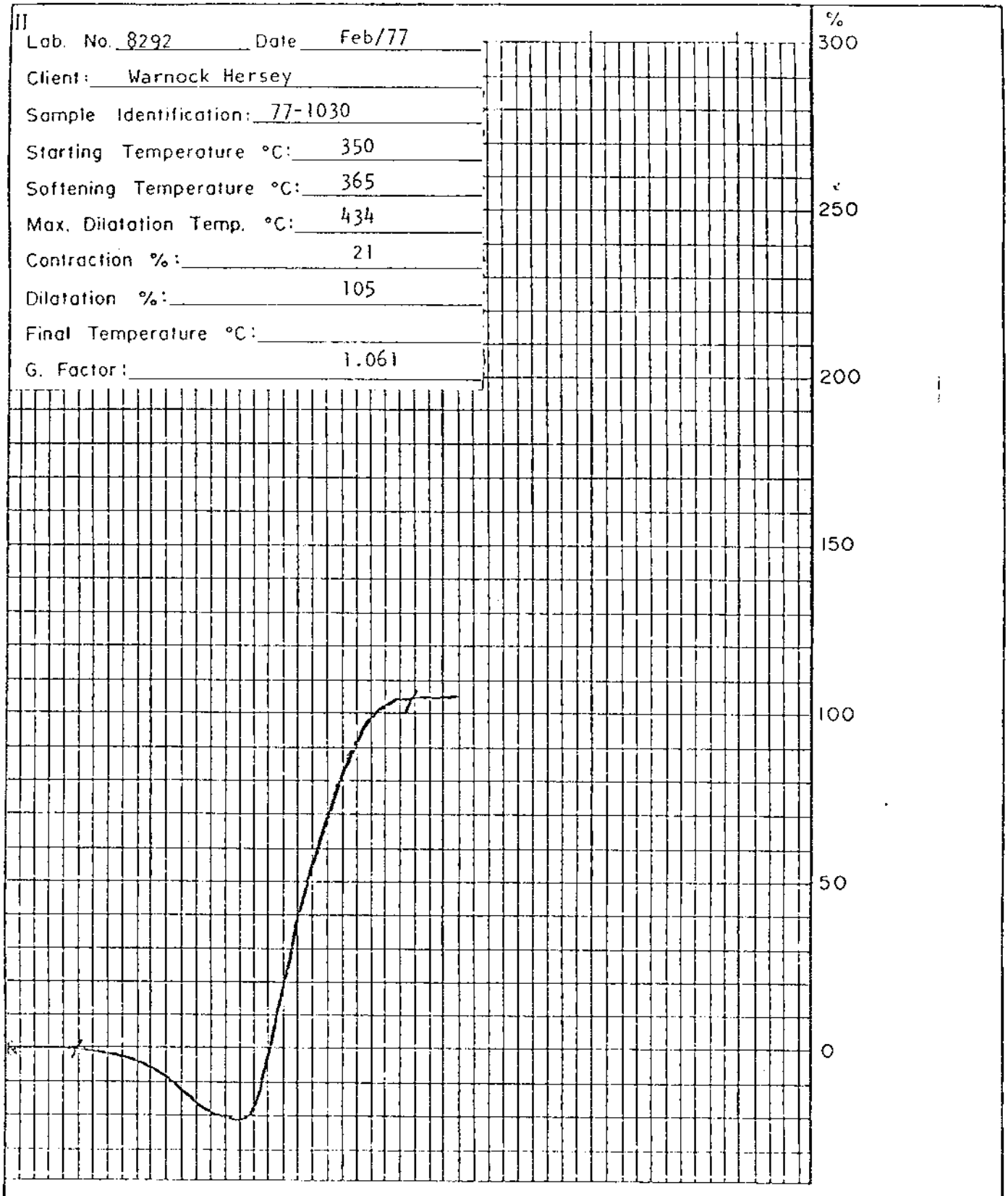
Max. Dilatation Temp. °C: 434

Contraction %: 21

Dilatation %: 105

Final Temperature °C:

G. Factor: 1.061



BIRTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Warnock Hersey Professional Services Ltd.

ELCO MINING LTD. CORE SAMPLE ANALYSIS

Hole No.: DH - 54 - 4 Lab. No.: 77 - 1031 Date: February 21, 1977

HEAD RAW ANALYSIS						
R.M.%	Ash%	V.M.%	F.C.%	S.%	H.G.I.	REMARKS
0.7	40.8	21.7	36.8	0.58	116.9	Air Dried Basis
- - -	41.1	21.9	37.0	0.58	- - -	Dry Basis

SIZE / RAW ANALYSES								
Size Fraction	Wt. %	R.M.%	Ash %	S. %	CUMULATIVE			
					Wt. %	Ash %	S. %	
¼" x 65m	81.0	0.6	45.2	0.53	81.0	45.2	0.53	A.D.B.
	81.0	- --	45.5	0.53	81.0	45.2	0.53	D.B.
65m x 0	19.0	0.7	23.1	0.71	100.0	41.0	0.56	A.D.B.
	19.0	- - -	23.3	0.72	100.0	41.3	0.56	D.B.

SINK - FLOAT ANALYSIS: ¼" x 65 M									
S. G.	Wt.%	R.M%	Ash %	V.M%	F.C%	S.%	Cumulative		
							Wt. %	Ash %	
-1.40	33.3	1.2	4.2	34.8	59.8	0.83	33.3	4.2	A.D.B.
	33.2	- -	4.3	35.2	60.5	0.84	33.2	4.3	D.B.
1.40-1.50	6.6	1.0	13.5	28.6	56.9	0.84	39.9	5.7	A.D.B.
	6.6	- -	13.6	28.8	57.6	0.85	39.8	5.8	D.B.
1.50-1.60	3.9	0.8	26.0	- - -	- - -	- - -	43.8	7.5	A.D.B.
	3.9	- - -	26.3	- - -	- - -	- --	43.7	7.7	D.B.
+1.60	56.2	0.8	75.8	- - -	- - -	- - -	100.0	45.9	A.D.B.
	56.3	- - -	76.4	- --	- - -	- --	100.0	46.4	D.B.

COMPOSITE ¼" x 65 m FLOATS @ 1.50 S.G., A.D.B.						
F.S.I.	P % on Coal	DILATATION TESTS				
		Softening Temp. (°C)	Max. Dil. Temp. (°C)	Maximum Contr. %	Maximum Dil. %	G.No.
8½	0.037	356°C	434°C	21%	217%	1.089

Lab. No. 8293 Date Feb/77

Client: Warnock Hersey

Sample Identification: 77-1031

Starting Temperature °C: 350

Softening Temperature °C: 356

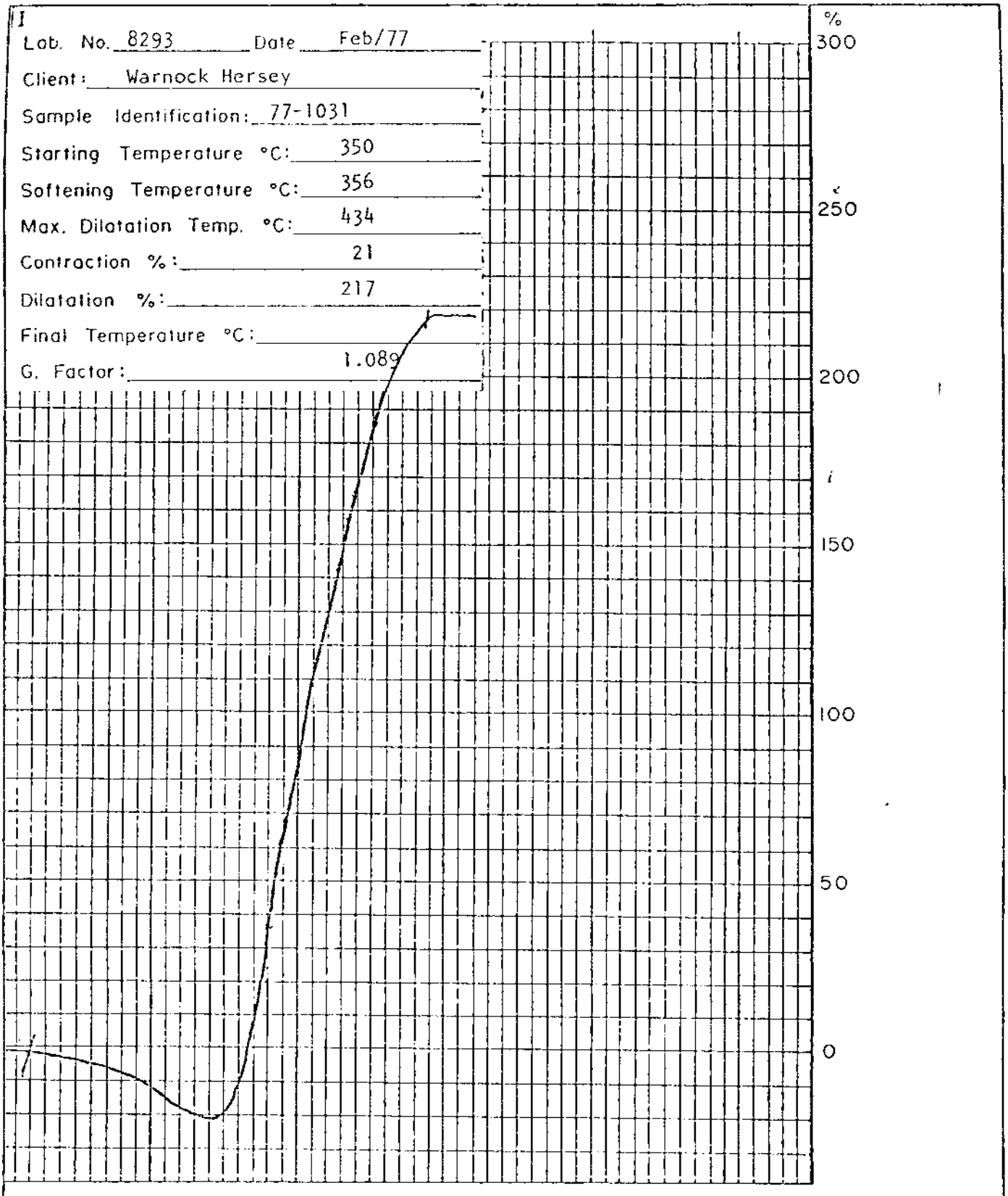
Max. Dilatation Temp. °C: 434

Contraction %: 21

Dilatation %: 217

Final Temperature °C:

G. Factor: 1.089



BIRTLEY ENGINEERING (CANADA) LTD.

Title	Date
RUHR DILATOMETER TEST	
	Drawn

Warnock Hersey Professional Services Ltd.

ELCO MINING LTD. CORE SAMPLE ANALYSIS

Hole No.: DH 54 - 5 Lab. No.: 77 - 1032 Date: February 21, 1977

HEAD RAW ANALYSIS						
R.M.%	Ash%	V.M.%	F.C.%	S.%	H.G.I.	REMARKS
0.8	49.0	18.9	31.3	0.76	94.1	Air Dried Basis
- - -	49.4	19.0	31.6	0.77	- - -	Dry Basis

SIZE / RAW ANALYSES								
Size Fraction	Wt. %	R.M.%	Ash %	S. %	CUMULATIVE			
					Wt. %	Ash %	S. %	
¼" x 65m	73.5	0.8	55.2	0.69	73.5	55.2	0.69	A.D.B.
	73.5	- - -	55.6	0.70	73.5	55.6	0.70	D.B.
65m x 0	26.5	0.8	24.9	0.94	100.0	47.2	0.76	A.D.B.
	26.5	- - -	25.1	0.95	100.0	47.5	0.77	D.B.

SINK - FLOAT ANALYSIS: ¼" x 65 M									
S. G.	Wt.%	R.M%	Ash %	V.M%	F.C%	S.%	Cumulative		
							Wt. %	Ash %	
-1.40	24.2	1.2	4.4	31.7	62.6	0.98	24.2	4.4	A.D.B.
	24.1	- -	4.5	32.1	63.4	0.99	24.1	4.5	D.B.
1.40-1.50	6.8	0.9	13.1	29.8	56.2	0.88	31.0	6.3	A.D.B.
	6.8	- - -	13.2	30.1	56.7	0.89	29.9	6.6	D.B.
1.50-1.60	3.3	0.8	23.8	- - -	- - -	- - -	34.3	8.0	A.D.B.
	3.3	- - -	24.0	- - -	- - -	- - -	34.2	8.1	D.B.
+1.60	65.7	0.7	72.6	- - -	- - -	- - -	100.0	50.4	A.D.B.
	65.8	- - -	73.1	- - -	- - -	- - -	100.0	50.9	D.B.

COMPOSITE ¼" x 65 m FLOATS @ 1.50 S.G., A.D.B.						
F.S.I.	P % on Coal	DILATATION TESTS				
		Softening Temp.(°C)	Max. Dil. Temp.(°C)	Maximum Contr. %	Maximum Dil. %	G.No.
9	0.014	359°C	431°C	24%	258%	1.082

Lab. No. 8294 Date Feb/77

Client: Warnock Hersey

Sample Identification: 77-1032

Starting Temperature °C: 350

Softening Temperature °C: 359

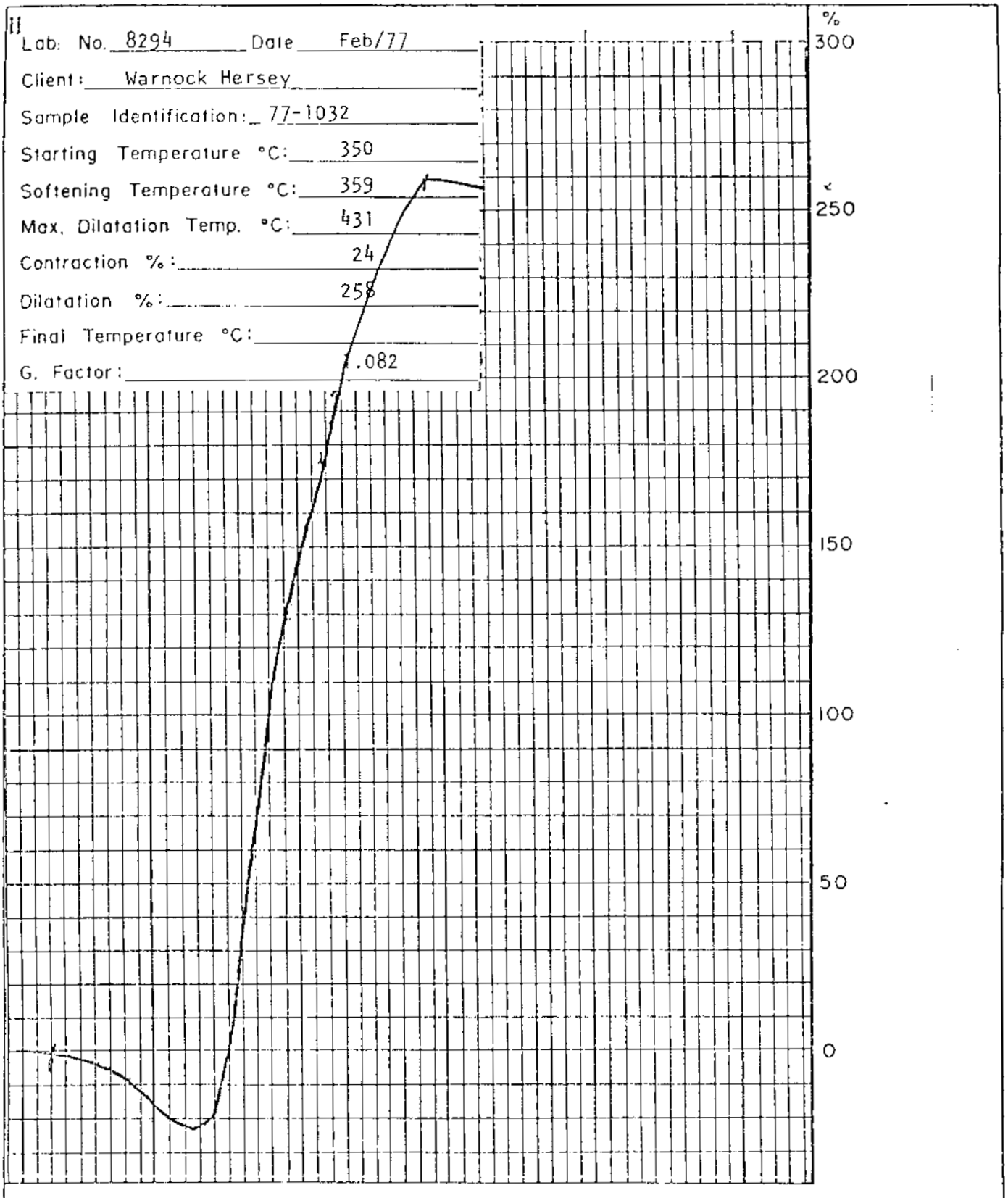
Max. Dilatation Temp. °C: 431

Contraction %: 24

Dilatation %: 258

Final Temperature °C:

G. Factor: .082



BIRTLEY ENGINEERING (CANADA) LTD.

Title	Date
RUHR DILATOMETER TEST	
	Drawn

Warnock Hersey Professional Services Ltd.

ELCO MINING LTD. CORE SAMPLE ANALYSIS

Hole No.: DH - 54 - 6 Lab. No.: 77 - 1033 Date: February 21, 1977

HEAD RAW ANALYSIS						
R.M.%	Ash%	V.M.%	F.C.%	S.%	H.G.I.	REMARKS
0.8	29.0	24.0	46.2	0.89	93.4	Air Dried Basis
- - -	29.2	24.2	46.6	0.90	- - -	Dry Basis

SIZE / RAW ANALYSES								
Size Fraction	Wt. %	R.M.%	Ash %	S. %	CUMULATIVE			
					Wt. %	Ash %	S. %	
¼" x 65m	78.2	0.7	32.0	0.93	78.2	32.0	0.93	A.D.B.
	78.2	- - -	32.2	0.94	78.2	32.2	0.94	D.B.
65 m x0	21.8	0.8	18.4	0.97	100 0	29.0	0.94	A.D.B.
	21.8	- - -	18.6	0.98	100.0	29.2	0.95	D.B.

SINK - FLOAT ANALYSIS: ¼" x 65 M									
S. G.	Wt.%	R.M%	Ash %	V.M%	F.C%	S.%	Cumulative		
							Wt. %	Ash %	
-1.40	52.6	1.0	5.0	34.9	59.1	1.07	52.6	5.0	A.D.B.
	52.6	- - -	5.1	35.4	59.5	1.08	52.6	5.1	D.B.
1.40-1.50	3.4	0.8	13.4	27.8	58.0	1.02	56.0	5.5	A.D.B.
	3.4	- - -	13.5	28.0	58.5	1.03	56.0	5.6	D.B.
1.50-1.60	6.5	0.7	20.0	- - -	- - -	- - -	62.5	7.0	A.D.B.
	6.5	- - -	20.1	- - -	- - -	- -	62.5	7.1	D.B.
+1.60	37.5	0.8	68.2	- - -	- - -	- -	100.0	30.0	A.D.B.
	37.5	- - -	68.8	- - -	- - -	- -	100.0	30.2	D.B.

COMPOSITE ¼" x 65 m FLOATS @ 1.50 S.G., A.D.B.						
F.S.I.	F % on Coal	DILATATION TESTS				
		Softening Temp.(°C)	Max. Dil. Temp.(°C)	Maximum Contr. %	Maximum Dil. %	G.No.
8½	0.026	365°C	432°C	20%	256%	1.077

Lab. No. 8295 Date Feb./77

Client: Warnock Hersey

Sample Identification: 77-1033

Starting Temperature °C: 350

Softening Temperature °C: 365

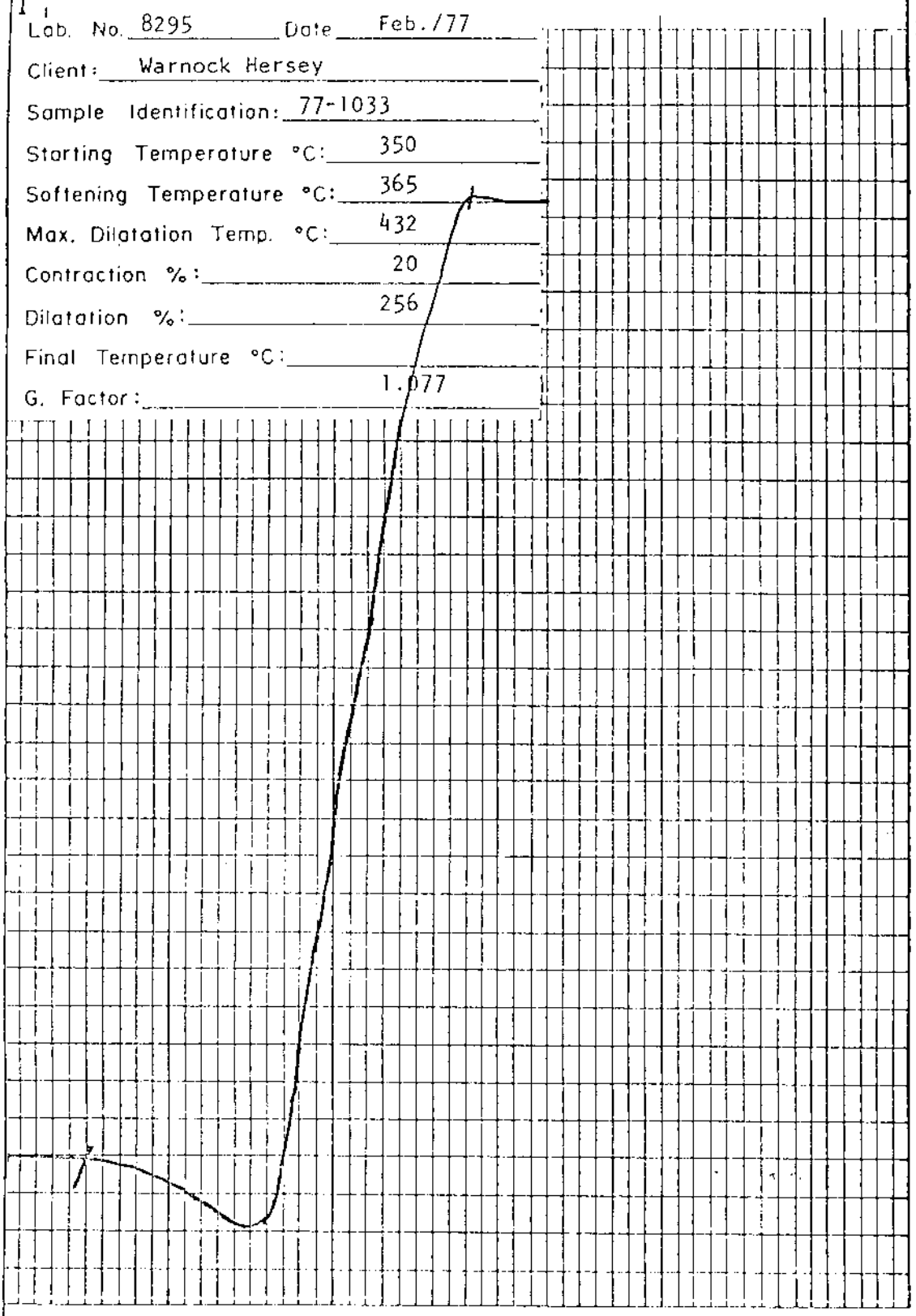
Max. Dilatation Temp. °C: 432

Contraction %: 20

Dilatation %: 256

Final Temperature °C:

G. Factor: 1.077



BIRTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Warnock Hersey Professional Services Ltd.

ELCO MINING LTD. CORE SAMPLE ANALYSIS

Hole No.: DH 54 - 7 Lab. No.: 77 - 1034 Date: February 21, 1977

HEAD RAW ANALYSIS						
R.M.%	Ash%	V.M.%	F.C.%	S.%	H.G.I.	REMARKS
0.7	25.1	24.0	50.2	0.75	85.8	Air Dried Basis
- - -	25.3	24.1	50.6	0.76	- - -	Dry Basis

SIZE / RAW ANALYSES								
Size Fraction	Wt. %	R.M.%	Ash %	S. %	CUMULATIVE			
					Wt. %	Ash %	S. %	
¼" x 65 m	83.1	0.6	26.0	0.75	83.1	26.0	0.75	A.D.B.
	83.1	- - -	26.2	0.75	83.1	26.2	0.75	D.B.
65m x 0	16.9	0.7	19.7	0.81	100.0	24.9	0.76	A.D.B.
	16.9	- - -	19.8	0.82	100.0	25.1	0.76	D.B.

SINK - FLOAT ANALYSIS: ¼" x 65 M									
S. G.	Wt.%	R.M%	Ash %	V.M%	F.C%	S.%	Cumulative		
							Wt. %	Ash %	
-1.40	57.6	0.8	6.9	31.7	60.6	1.02	57.6	6.9	A.D.B.
	57.6	- - -	6.9	31.9	61.2	1.03	57.6	6.9	D.B.
1.40-1.50	9.0	0.6	19.1	25.2	55.1	0.96	66.6	8.5	A.D.B.
	9.0	- - -	19.2	25.4	55.4	0.96	66.6	8.6	D.B.
1.50-1.60	6.6	0.8	29.8	- - -	- - -	- -	73.2	10.5	A.D.B.
	6.6	- - -	30.1	- - -	- - -	- -	73.2	10.5	D.B.
+1.60	26.8	0.9	66.2	- - -	- - -	- -	100.0	25.4	A.D.B.
	26.8	- - -	66.8	- - -	- - -	- -	100.0	25.6	D.B.

COMPOSITE ¼" x 65 m FLOATS @ 1.50 S.G., A.D.B.						
F.S.I.	F % on Coal	DILATATION TESTS				
		Softening Temp. (°C)	Max. Dil. Temp. (°C)	Maximum Contr. %	Maximum Dil. %	G.No.
8½	0.016	360°C	434°C	21%	227%	1.084

Lab. No. 8296 Date Feb/ 77

Client: Warnock Hersey

Sample Identification: 77-1034

Starting Temperature °C: 350

Softening Temperature °C: 360

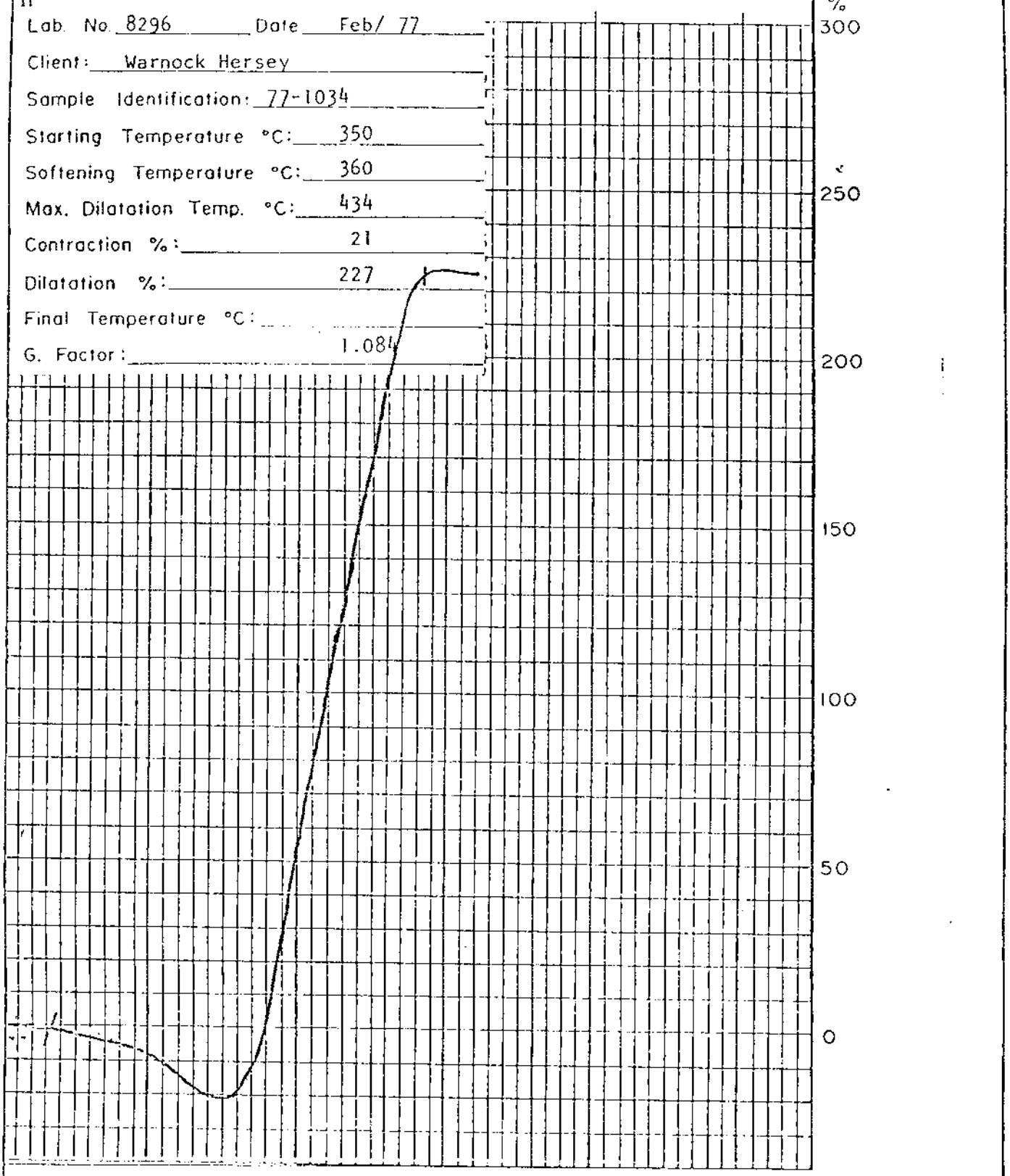
Max. Dilatation Temp. °C: 434

Contraction %: 21

Dilatation %: 227

Final Temperature °C:

G. Factor: 1.084



BIRTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Warnock Hersey Professional Services Ltd.

ELCO MINING LTD. CORE SAMPLE ANALYSIS

Hole No.: DH 54 - 8 Lab. No.: 77 - 1035 Date: February 21, 1977

HEAD RAW ANALYSIS						
R.M.%	Ash%	V.M.%	F.C.%	S.%	H.G.I.	REMARKS
0.8	21.9	24.8	52.5	0.79	82.3	Air Dried Basis
- - -	22.0	25.0	53.0	0.80	- - -	Dry Basis

SIZE / RAW ANALYSES								
Size Fraction	Wt. %	R.M.%	Ash %	S. %	CUMULATIVE			
					Wt. %	Ash %	S. %	
¼" x 65 m	83.3	0.6	23.2	0.74	83.3	23.2	0.74	A.D.B.
	83.3	- - -	23.3	0.74	83.3	23.3	0.74	D.B.
65m x 0	16.7	0.7	16.0	0.87	100.0	21.9	0.76	A.D.B.
	16.7	- - -	16.1	0.88	100.0	22.1	0.76	D.B.

SINK - FLOAT ANALYSIS: ¼" x 65 M									
S. G.	Wt.%	R.M%	Ash %	V.M%	F.C%	S.%	Cumulative		
							Wt. %	Ash %	
-1.40	64.0	0.7	6.9	28.8	63.6	0.87	64.0	6.9	A.D.B.
	64.0	- - -	6.9	29.0	64.1	0.88	64.0	6.9	D.B.
1.40-1.50	8.8	0.5	21.1	25.5	52.9	0.82	72.8	8.6	A.D.B.
	8.8	- - -	21.2	25.7	53.1	0.83	72.8	8.6	D.B.
1.50-1.60	5.8	0.7	26.6	- - -	- - -	- - -	78.6	9.9	A.D.B.
	5.8	- - -	26.8	- - -	- - -	- - -	78.6	10.0	D.B.
+1.60	21.4	0.7	65.7	- - -	- - -	- -	100.0	21.9	A.D.B.
	21.4	- - -	66.2	- -	- - -	- - -	100.0	22.0	D.B.

COMPOSITE ¼" x 65 m FLOATS @ 1.50 S.G., A.D.B.						
F.S.I.	P % on Coal	DILATATION TESTS				
		Softening Temp. (°C)	Max. Dil. Temp. (°C)	Maximum Contr. %	Maximum Dil. %	G.No.
8	0.019	356°C	437°C	23%	247%	1.093

Lab. No. 8297 Date Feb. 2/77

Client: Warnock Hersey

Sample Identification: 77-1035

Starting Temperature °C: 350

Softening Temperature °C: 356

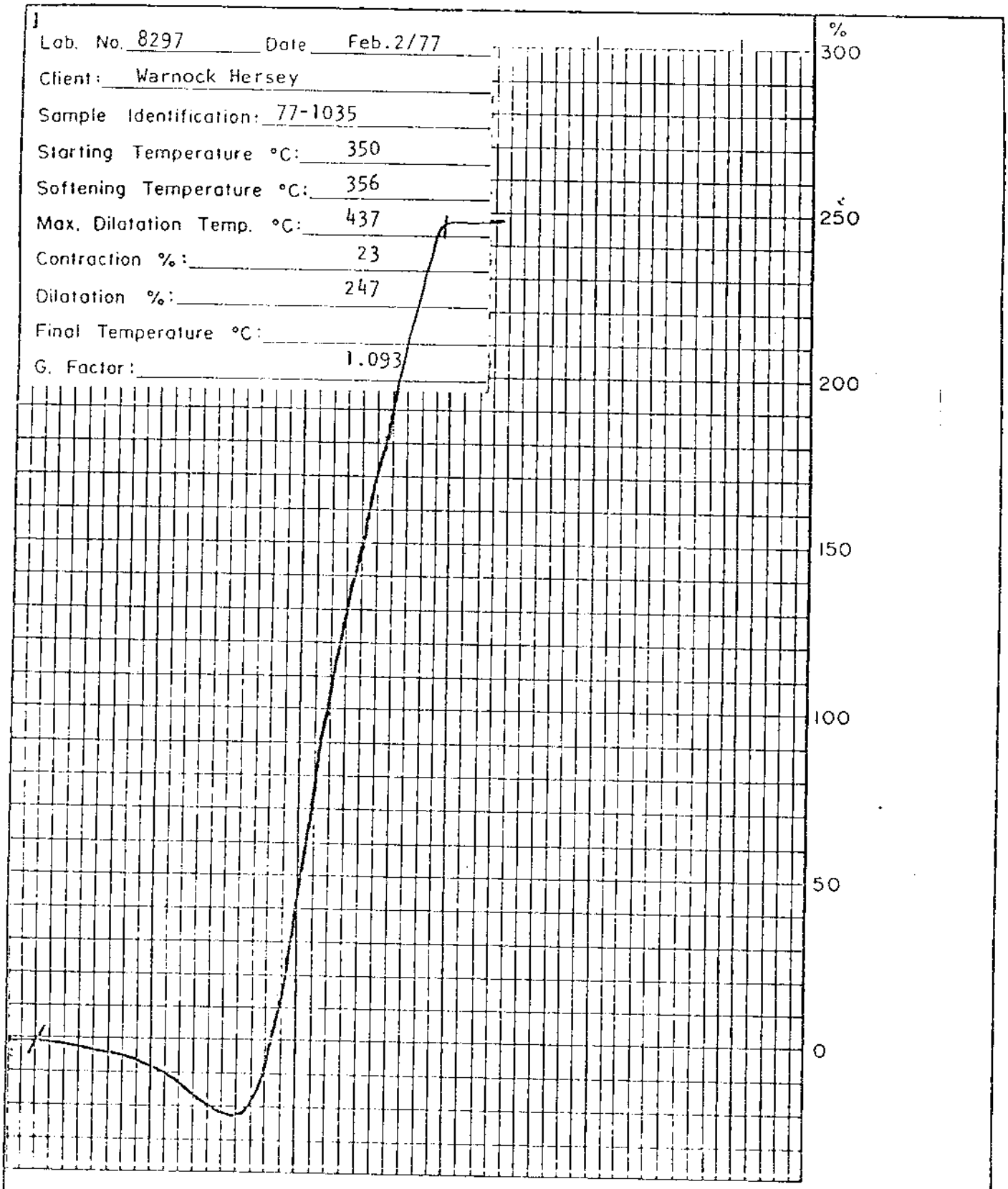
Max. Dilatation Temp. °C: 437

Contraction %: 23

Dilatation %: 247

Final Temperature °C:

G. Factor: 1.093



BIRTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Warnock Hersey Professional Services Ltd.

ELCO MINING LTD. CORE SAMPLE ANALYSIS

Hole No.: DH - 54 - 9 Lab. No.: 77 - 1036 Date: February 22, 1977

HEAD RAW ANALYSIS						
R.M.%	Ash%	V.M.%	F.C %	S.%	H.G.I.	REMARKS
0.7	40.7	20.4	38.2	0.86	76.8	Air Dried Basis
- - -	41.0	20.5	38.5	0.87	- - -	Dry Basis

SIZE / RAW ANALYSES								
Size Fraction	Wt. %	R.M.%	Ash %	S. %	CUMULATIVE			
					Wt. %	Ash %	S. %	
¼" x 65m	86.5	0.6	42.1	0.81	86.5	42.1	0.81	A.D.B.
	86.5	- - -	42.4	0.81	86.5	42.4	0.81	D.B.
65m x 0	13.5	0.6	26.8	1.05	100.0	40.0	0.84	A.D.B.
	13.5	- - -	27.0	1.06	100.0	40.3	0.84	D.B.

SINK - FLOAT ANALYSIS: ¼" x 65 M									
S. G.	Wt.%	R.M%	Ash %	V.M%	F.C%	S.%	Cumulative		
							Wt. %	Ash %	
-1.40	29.7	0.6	5.0	32.8	61.6	1.29	29.7	5.0	A.D.B.
	29.7	- - -	5.0	33.0	62.0	1.30	29.7	5.0	D.B.
1.40-1.50	6.2	0.5	14.5	26.9	58.1	1.12	35.9	6.6	A.D.B.
	6.2	- - -	14.6	27.0	58.4	1.13	35.9	6.6	D.B.
1.50-1.60	4.1	0.7	26.7	- - -	- - -	- -	40.0	8.7	A.D.B.
	4.1	- - -	26.9	- - -	- - -	- -	40.0	8.7	D.B.
+1.60	60.0	0.8	70.0	- - -	- - -	- -	100.0	45.5	A.D.B.
	60.0	- - -	70.5	- - -	- - -	- -	100.0	45.8	D.B.

COMPOSITE ¼" x 65 m FLOATS @ 1.50 S.G., A.D.B.						
F.S.I.	P % on Coal	DILATATION TESTS				
		Softening Temp.(°C)	Max. Dil. Temp.(°C)	Maximum Contr. %	Maximum Dil. %	G.No.
9	0.011	353°C 359°C	438°C 434°C	14% 12%	208 % 213%	1.104 1.092

Duplicate Run ------- 1.098 - Average

Lab. No. 8298A Date Feb. 4/77

Client: Warnock Hersey

Sample Identification: 77-1036

Starting Temperature °C: 350

Softening Temperature °C: 353

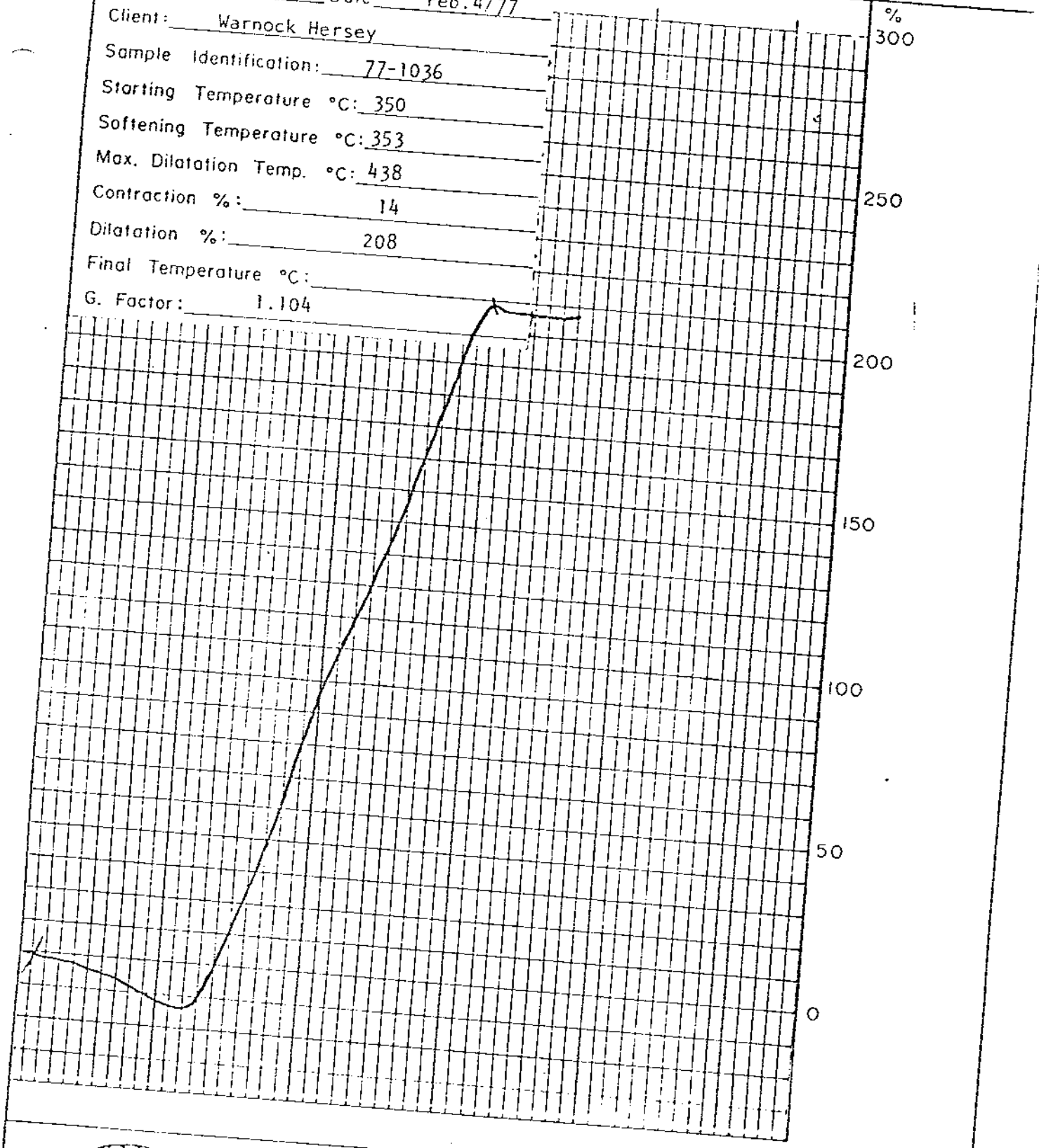
Max. Dilatation Temp. °C: 438

Contraction %: 14

Dilatation %: 208

Final Temperature °C:

G. Factor: 1.104



BIRTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

II

Lab. No. 8298B Date Feb. 4/77

Client: Warnock Hersey

Sample Identification: 77-1036

Starting Temperature °C: 350

Softening Temperature °C: 359

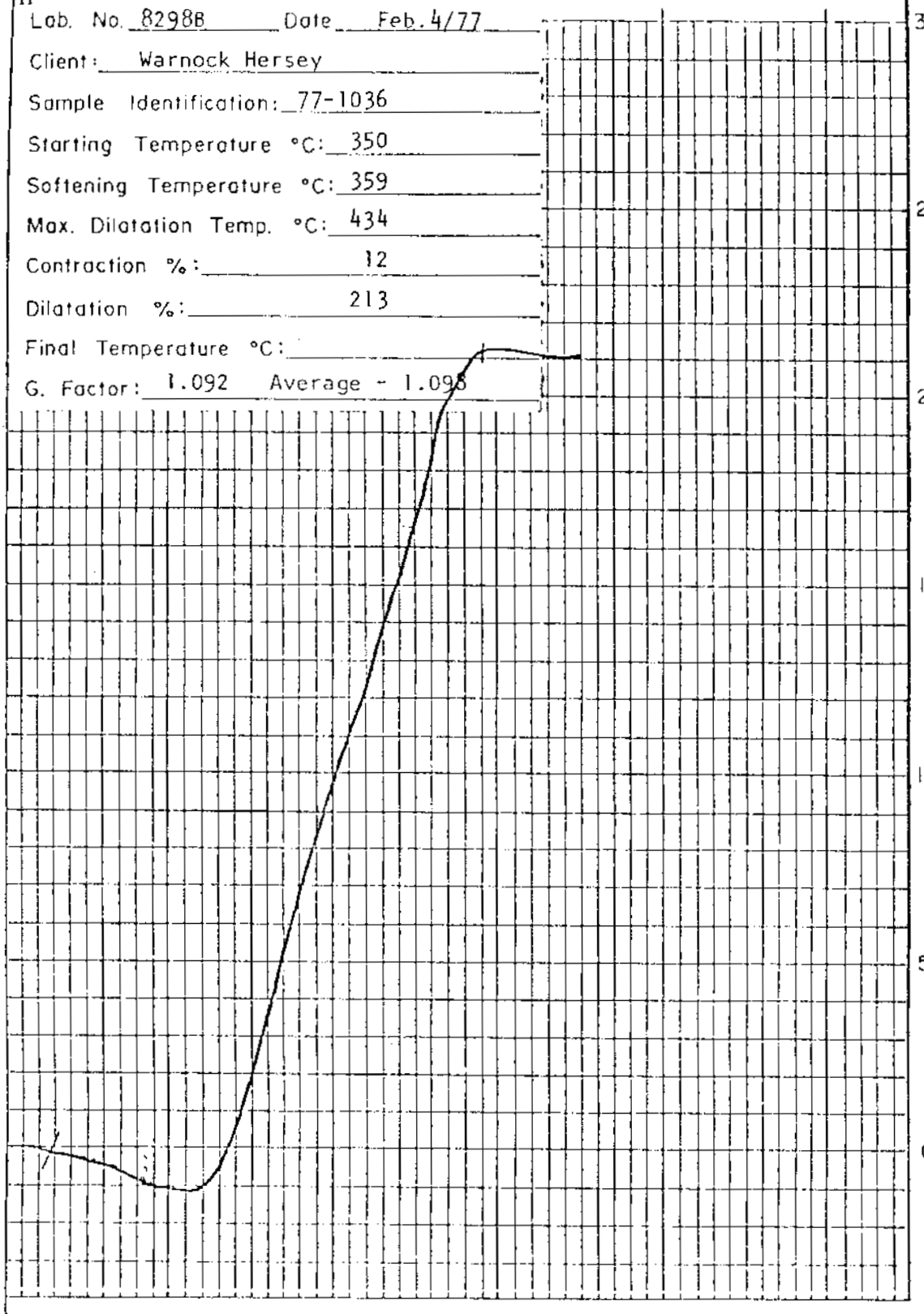
Max. Dilatation Temp. °C: 434

Contraction %: 12

Dilatation %: 213

Final Temperature °C:

G. Factor: 1.092 Average - 1.098



BIRTLEY ENGINEERING (CANADA) LTD.

Title	Date
RUHR DILATOMETER TEST	
	Drawn

Warnock Hersey Professional Services Ltd.

ELCO MINING LTD. CORE SAMPLE ANALYSIS

Hole No.: DH 54 - 10 Lab. No.: 77 - 1037 Date: February 22, 1977

HEAD RAW ANALYSIS						
R.M.%	Ash%	V.M.%	F.C %	S.%	H.G.I.	REMARKS
1.1	25.1	23.2	50.6	1.04	90.6	Air Dried Basis
- - -	25.4	23.4	51.2	1.05	- - -	Dry Basis

SIZE / RAW ANALYSES								
Size Fraction	Wt. %	R.M.%	Ash %	S. %	CUMULATIVE			
					Wt. %	Ash %	S. %	
¼" x 65m	83.9	0.7	26.0	1.05	83.9	26.0	1.05	A.D.B.
	83.9	- - -	26.2	1.06	83.9	26.2	1.06	D.B.
65m x 0	16.1	0.7	17.2	1.00	100.0	24.6	1.04	A.D.B.
	16.1	- - -	17.3	1.01	100.0	24.8	1.05	D.B.

SINK - FLOAT ANALYSIS: ¼" x 65 M									
S. G.	Wt.%	R.M%	Ash %	V.M%	F.C%	S.%	Cumulative		
							Wt. %	Ash %	
-1.40	67.3	0.6	3.4	28.4	67.6	0.86	67.3	3.4	A.D.B.
	67.3	- - -	3.4	28.6	68.0	0.86	67.3	3.4	D.B.
1.40-1.50	2.7	0.8	15.8	24.9	58.5	0.72	70.0	3.9	A.D.B.
	2.7	- - -	15.9	25.1	59.0	0.73	70.0	3.9	D.B.
1.50-1.60	1.2	0.8	26.0	- - -	- - -	- - -	71.2	4.2	A.D.B.
	1.2	- - -	26.2	- - -	- - -	- - -	71.2	4.2	D.B.
+1.60	28.8	0.8	76.4	- - -	- - -	- - -	100.0	25.0	A.D.B.
	28.8	- - -	77.0	- - -	- - -	- - -	100.0	25.2	D.B.

COMPOSITE ¼" x 65 m FLOATS @ 1.50 S.G., A.D.B.						
F.S.I.	P % on Coal	DILATATION TESTS				
		Softening Temp.(°C)	Max. Dil. Temp.(°C)	Maximum Contr. %	Maximum Dil. %	G.No.
9	0.019	365°C	437°C	19%	204%	1.080

I

Lab. No. 8299 Date Feb. 1/77

Client: Warnock Hersey

Sample Identification: 77-1037

Starting Temperature °C: 350

Softening Temperature °C: 365

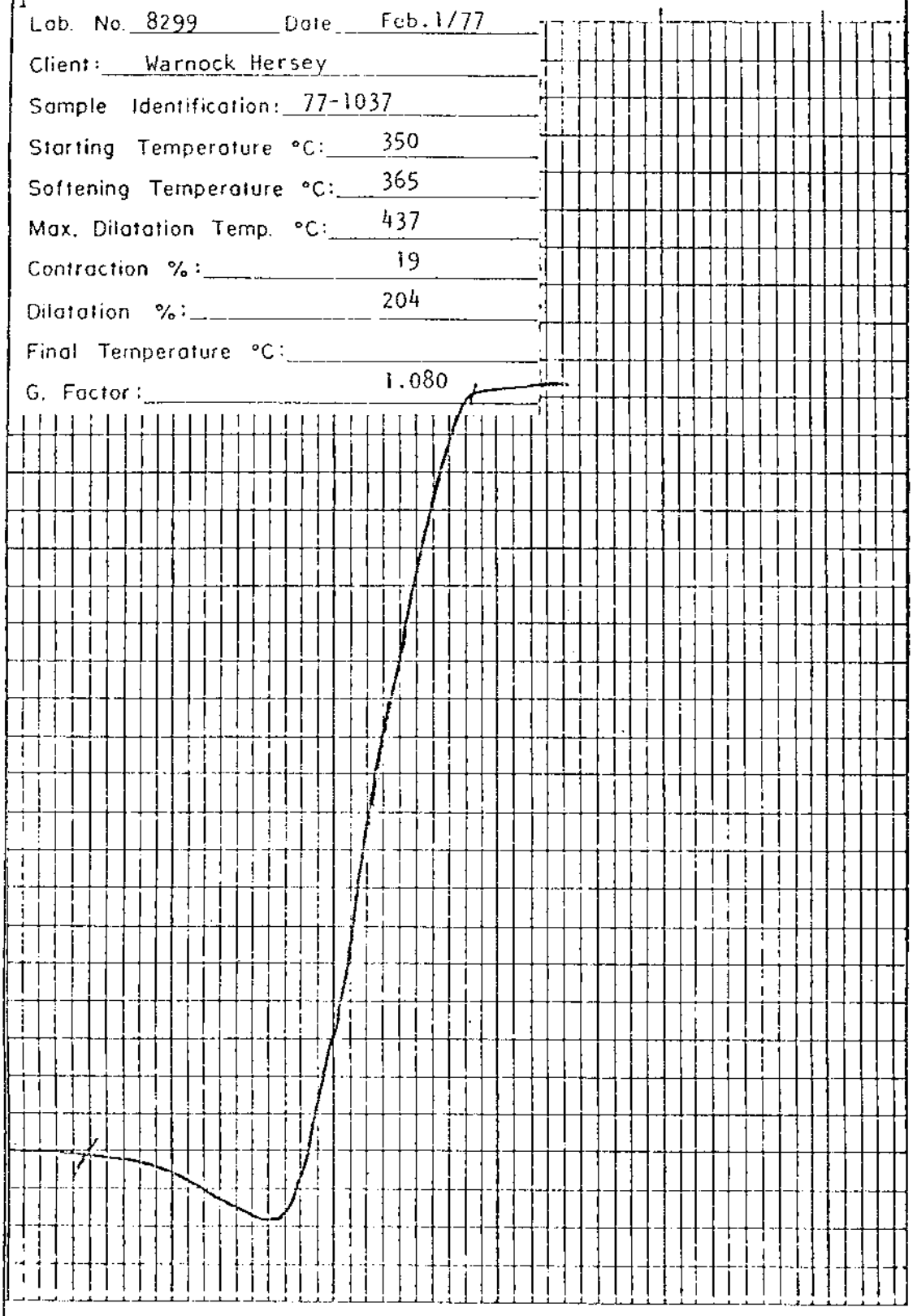
Max. Dilatation Temp. °C: 437

Contraction %: 19

Dilatation %: 204

Final Temperature °C:

G. Factor: 1.080



BIRTLEY ENGINEERING (CANADA) LTD.

Title	Date
RUHR DILATOMETER TEST	
	Drawn

Warnock Hersey Professional Services Ltd.

CORE SAMPLE ANALYSIS

Hole No.: DH - 54 - 11 Lab. No.: 77 - 1038 Date: February 22, 1977

HEAD RAW ANALYSIS						
R.M.%	Ash%	V.M.%	F.C.%	S.%	H.G.I.	REMARKS
1.0	14.0	24.1	60.9	0.83	127.3	Air Dried Basis
- - -	14.1	24.4	61.5	0.84	- - -	Dry Basis

SIZE / RAW ANALYSES								
Size Fraction	Wt. %	R.M.%	Ash %	S. %	CUMULATIVE			
					Wt. %	Ash %	S. %	
¼" x 65m	75.4	0.7	15.3	0.80	75.4	15.3	0.80	A.D.B.
	75.4	- - -	15.4	0.81	75.4	15.4	0.81	D.B.
65m x 0	24.6	0.7	7.9	0.92	100.0	13.5	0.83	A.D.B.
	24.6	- - -	8.0	0.93	100.0	13.6	0.84	D.B.

SINK - FLOAT ANALYSIS: ¼" x 65 M									
S. G.	Wt.%	R.M%	Ash %	V.M%	F.C%	S.%	Cumulative		
							Wt. %	Ash %	
-1.40	75.9	1.0	3.5	28.8	66.7	0.72	75.9	3.5	A.D.B.
	75.9	- - -	3.5	29.1	67.4	0.73	75.9	3.5	D.B.
1.40-1.50	5.7	0.7	16.9	24.3	58.1	0.71	81.6	4.4	A.D.B.
	5.7	- - -	17.0	24.5	58.5	0.72	81.6	4.4	D.B.
1.50-1.60	3.0	0.8	26.5	- - -	- - -	- - -	84.6	5.2	A.D.B.
	3.0	- -	26.7	- - -	- - -	- - -	84.6	5.2	D.B.
+1.60	15.4	0.8	70.6	- - -	- - -	- - -	100.0	15.3	A.D.B.
	15.4	- - -	71.2	- - -	- - -	- - -	100.0	15.4	D.B.

COMPOSITE ¼" x 65 m FLOATS @ 1.50 S.G., A.D.B.						
F.S.I.	P % on Coal	DILATATION TESTS				
		Softening Temp. (°C)	Max. Dil. Temp. (°C)	Maximum Contr. %	Maximum Dil. %	G.No.
8	0.011	380°C	434°C	11%	78%	1.053

II

Lab. No. 8300 Date Feb/77

Client: Warnock Hersey

Sample Identification: 77-1038

Starting Temperature °C: 350

Softening Temperature °C: 380

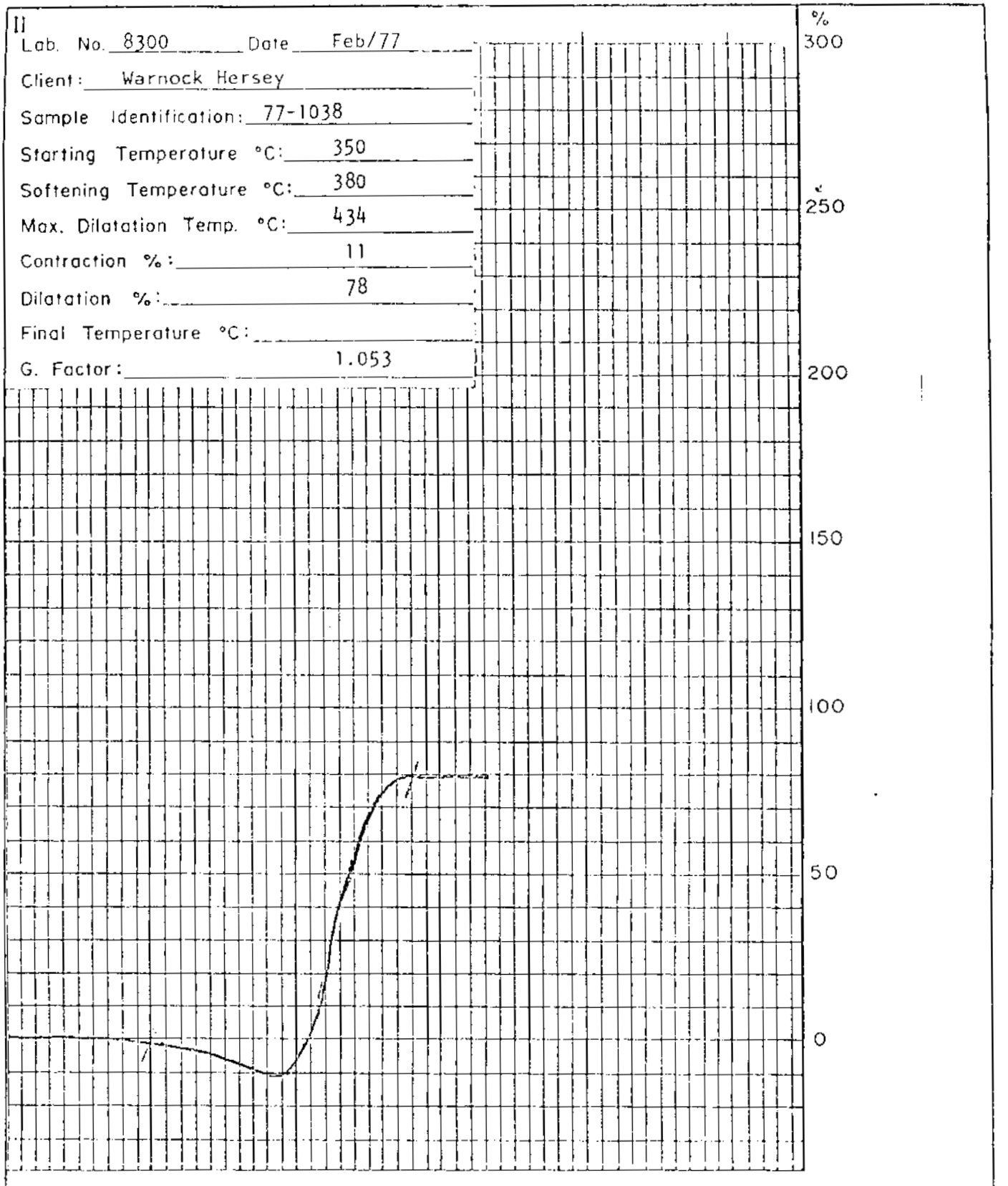
Max. Dilatation Temp. °C: 434

Contraction %: 11

Dilatation %: 78

Final Temperature °C:

G. Factor: 1.053



BIRTLEY ENGINEERING (CANADA) LTD.

Title	Date
RUHR DILATOMETER TEST	
	Drawn

Warnock Hersey Professional Services Ltd.

ELCO MINING LTD — CORE SAMPLE ANALYSIS

Hole No.: DH 54 - 12 Lab. No.: 77 - 1039 Date: February 22, 1977

HEAD RAW ANALYSIS						
R.M.%	Ash%	V.M.%	F.C.%	S.%	H.G.I.	REMARKS
0.9	11.0	30.3	57.8	1.03	92.7	Air Dried Basis
- - -	11.1	30.6	58.3	1.04	- - -	Dry Basis

SIZE / RAW ANALYSES								
Size Fraction	Wt. %	R.M.%	Ash %	S. %	CUMULATIVE Wt. %	CUMULATIVE Ash %	CUMULATIVE S. %	
¼" x 65m	79.5	0.6	12.1	1.01	79.5	12.1	1.01	A.D.B.
	79.5	- - -	12.2	1.02	79.5	12.2	1.02	D.B.
65m x 0	20.5	0.8	8.8	1.02	100.0	11.4	1.01	A.D.B.
	20.5	- - -	8.9	1.03	100.0	11.5	1.02	D.B.

SINK - FLOAT ANALYSIS: ¼" x 65 M									
S. G.	Wt.%	R.M%	Ash %	V.M%	F.C%	S.%	Cumulative Wt. %	Cumulative Ash %	
-1.40	80.5	0.9	2.8	32.1	64.2	0.80	80.5	2.8	A.D.B.
	80.5	- - -	2.8	32.4	64.8	0.81	80.5	2.8	D.B.
1.40-1.50	5.3	0.9	6.8	27.2	65.1	0.78	85.8	3.0	A.D.B.
	5.3	- - -	6.8	27.5	65.7	0.79	85.8	3.0	D.B.
1.50-1.60	0.4	1.0	23.6	- - -	- - -	- -	86.2	3.1	A.D.B.
	0.4	- - -	23.9	- - -	- -	- -	86.2	3.1	D.B.
+1.60	13.8	1.0	63.8	- - -	- - -	- - -	100.0	11.5	A.D.B.
	13.8	- - -	64.4	- - -	- - -	- - -	100.0	11.6	D.B.

COMPOSITE ¼" x 65 m FLOATS @ 1.50 S.G., A.D.B.						
F.S.I.	P % on Coal	DILATATION TESTS Softening Temp. (°C)	Max. Dil. Temp. (°C)	Maximum Contr. %	Maximum Dil. %	G.No.
9	0.003	359°C	434°C	12%	204%	1.092
		359°C	434°C	11%	157%	1.090

DUPLICATE RUN = 1.091 Average

Lab. No. 8301B Date Feb. 4/77

Client: Warnock Hersey

Sample Identification: 77-1039

Starting Temperature °C: 350

Softening Temperature °C: 359

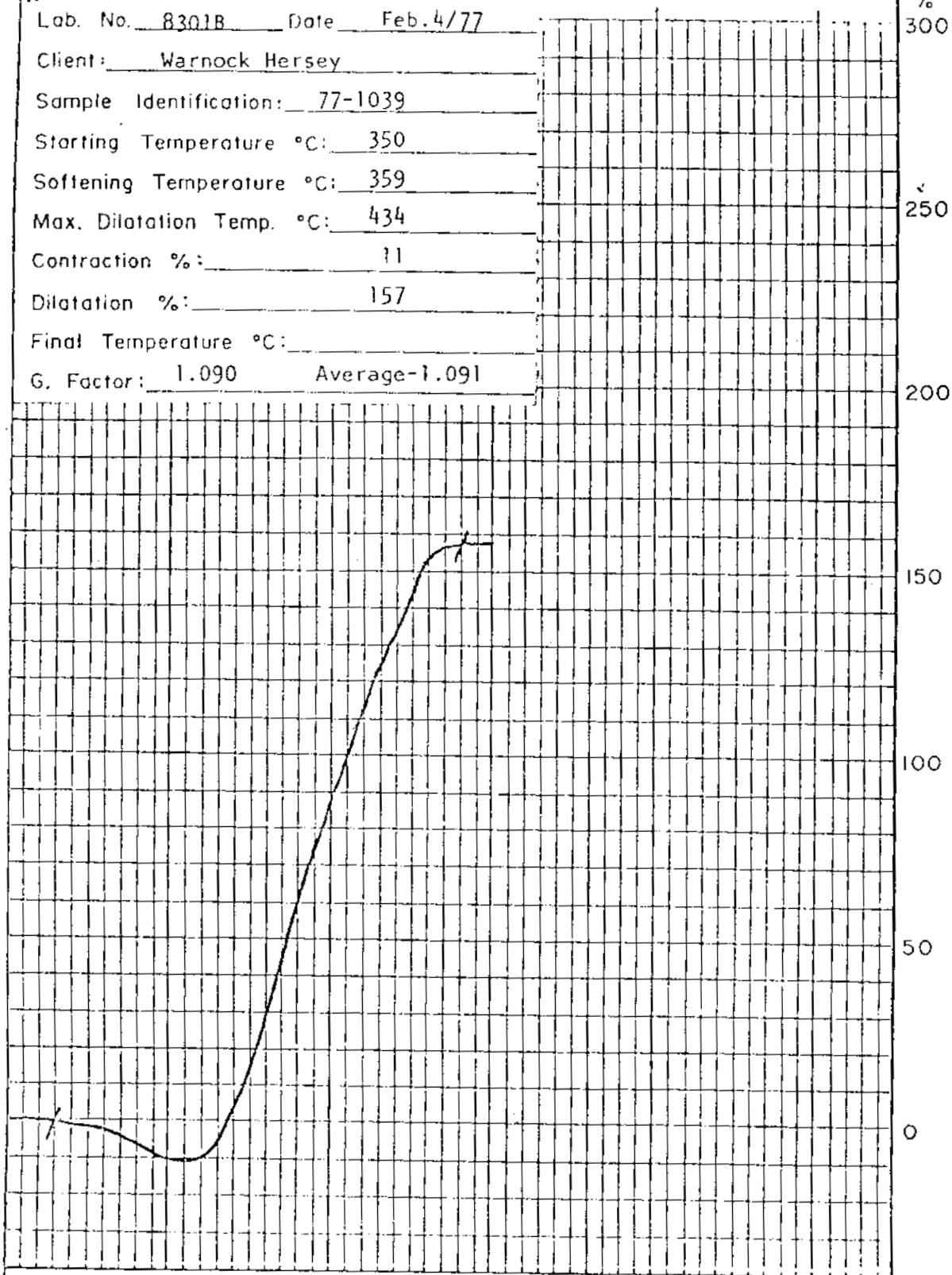
Max. Dilatation Temp. °C: 434

Contraction %: 11

Dilatation %: 157

Final Temperature °C:

G. Factor: 1.090 Average-1.091



BIRTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. 8301A Date Feb. 4/77

Client: Warnock Hersey

Sample Identification: 77-1039

Starting Temperature °C: 350

Softening Temperature °C: 359

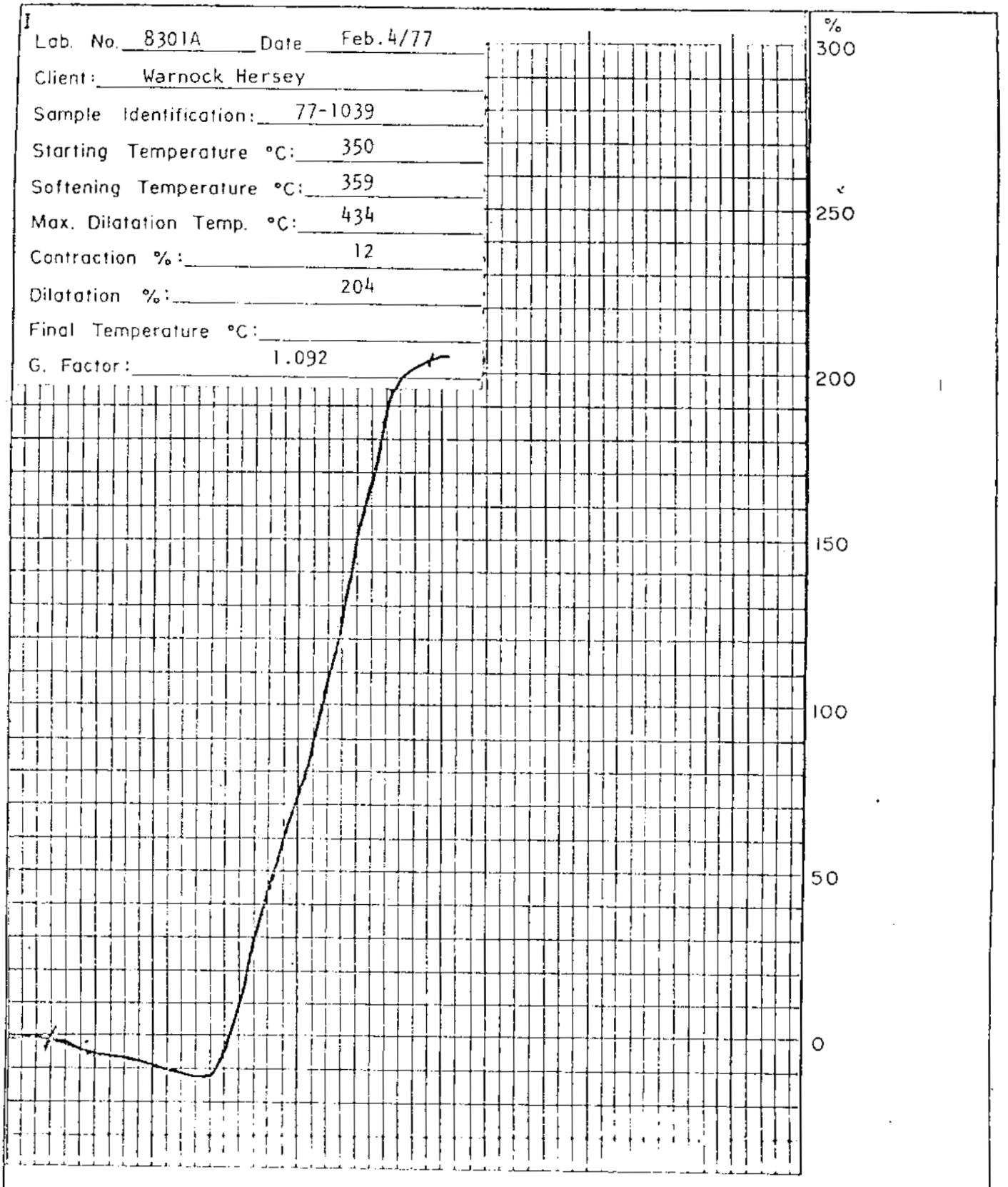
Max. Dilatation Temp. °C: 434

Contraction %: 12

Dilatation %: 204

Final Temperature °C:

G. Factor: 1.092



BIRTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Warnock Hersey Professional Services Ltd.

ELCO MINING LTD. — Elk River Coal Project 1976-77

DRILL CORE ANALYSIS

Sample Identification: DH 55 - 1 — Warnock Hersey Lab. No.: 76 - 11304

TABLE I Raw Coal Head Sample ¼" x 0

AIR DRIED BASIS						% DRY BASIS			
Moist.	Ash	V.M.	F.C.	Sulphur	H.G.I.	Ash	V.M.	F.C.	Sulphur
0.6	23.8	29.3	46.3	0.60	87.8	24.0	29.5	46.5	0.60

TABLE II Screen Analysis

	AIR DRIED BASIS				DRY BASIS	
Size	Weight %	Moisture	ASH	Sulphur	ASH	Sulphur
¼" x 65	81.7	0.8	24.7	0.56	24.9	0.56
65 x 0	18.3	0.8	19.8	0.61	20.0	0.62
TOTAL	100.0	--	--	--	24.0	0.57

TABLE III Float/Sink ¼" x 65 Fraction

Spec. Grav.		AIR DRIED BASIS						DRY BASIS			
Sink	Float	Weight%	Moist.	Ash	V.M.	F.C.	Sulphur	ASH	V.M.	F.C.	Sulphur
	1.40	55.8	0.8	6.0	34.8	58.4	0.70	6.0	35.9	58.1	0.71
1.40	1.50	8.3	0.9	12.9	31.9	54.3	0.65	13.0	32.2	54.8	0.66
1.50	1.60	4.9	0.8	21.3	28.7	49.2	0.61	21.5	28.9	49.6	0.62
1.60		31.0	--	--	--	--	--	57.0	--	--	--
TOTAL		100.0	--	--	--	--	--	23.2	--	--	--

TABLE IV Cumulative 1.60 Float

F.S.I.	Phosphorus (in coal)	DILATATION					
		TEMPERATURE °C			PER CENT		"G" FACTOR
		Initial	Softening	Maximum Dilatation	Maximum Contraction	Maximum Dilatation	
8½	0.041						

Lab. No. 8093 Date Jan/77

Client: Warnock Hersey

Sample Identification: 76-11304

Starting Temperature °C: 350

Softening Temperature °C: 360

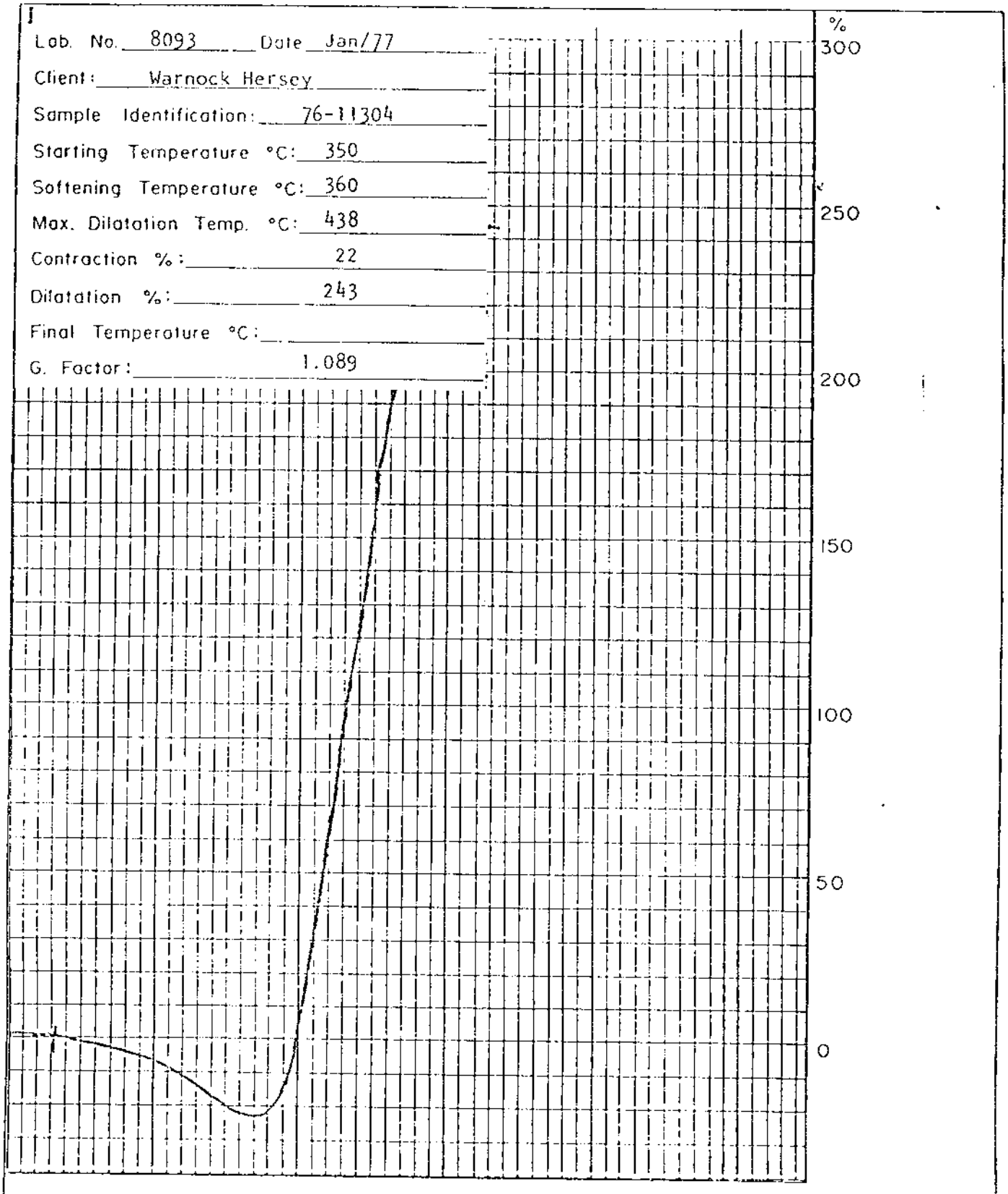
Max. Dilatation Temp. °C: 438

Contraction %: 22

Dilatation %: 243

Final Temperature °C:

G. Factor: 1.089



BIRTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Warnock Hersey Professional Services Ltd.

ELCO MINING LTD.. Elk River Coal Project 1976-77

DRILL CORE ANALYSIS

Sample Identification: DH 55 - 2 Warnock Hersey Lab. No.: 76 - 11305

TABLE I Raw Coal Head Sample ¼" x 0

AIR DRIED BASIS						% DRY BASIS			
Moist.	Ash	V.M.	F. C.	Sulphur	H.G.I.	Ash	V. M.	F.C.	Sulphur
0.7	29.0	25.3	45.0	0.56	74.6	29.2	25.4	45.4	0.56

TABLE II Screen Analysis

	AIR DRIED BASIS				DRY BASIS	
Size	Weight %	Moisture	ASH	Sulphur	ASH	Sulphur
¼" x 65	85.1	0.8	31.0	0.50	31.2	0.56
65 x 0	14.9	0.8	19.3	0.59	19.5	0.60
TOTAL	100.0	--	--	--	29.4	0.51

TABLE III Float/Sink ¼" x 65 Fraction

Spec. Grav.		AIR DRIED BASIS						DRY BASIS			
Sink	Float	Weight%	Moist.	Ash	V.M.	F.C.	Sulphur	ASH	V.M.	F C.	Sulphur
	1.40	51.0	0.8	6.1	33.9	59.2	0.64	6.2	34.2	59.6	0.65
1.40	1.50	5.3	0.9	8.5	34.9	55.7	0.61	8.6	35.2	56.2	0.62
1.50	1.60	5.6	0.8	21.7	29.2	48.3	0.57	21.9	29.4	48.7	0.58
1.60		38.1	--	--	--	--	--	68.1	--	--	--
TOTAL		100.0	--	--	--	--	--	30.8	--	--	--

TABLE IV Cumulative 1.60 Float

F.S.I.	Phosph-orus (in coal)	DILATATION					
		TEMPERATURE °C			PER CENT		"C" FACTOR
		Initial	Softening	Maximum Dilatation	Maximum Contraction	Maximum Dilatation	
8	0.029						

Lab. No. 8094 Date Jan/77

Client: Warnock Hersey

Sample Identification: 76-11305

Starting Temperature °C: 350

Softening Temperature °C: 360

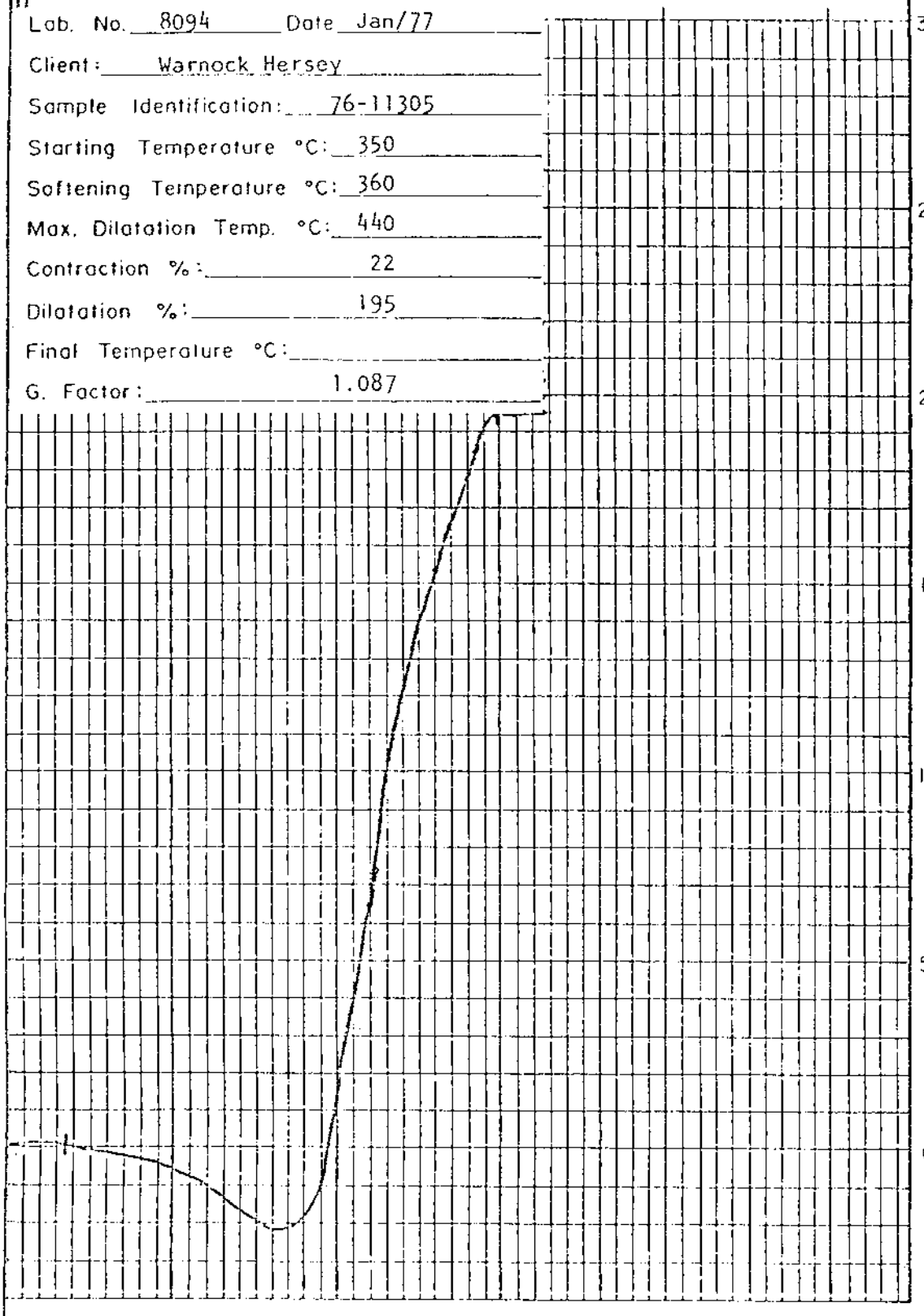
Max. Dilatation Temp. °C: 440

Contraction %: 22

Dilatation %: 195

Final Temperature °C:

G. Factor: 1.087



BIRTLEY ENGINEERING (CANADA) LTD.

Title	Date
RUHR DILATOMETER TEST	
	Drawn

Warnock Hersey Professional Services Ltd.

ELCO MINING LTD.. Elk River Coal Project 1976-77

DRILL CORE ANALYSIS

Sample Identification: DH 55 - 3 Warnock Hersey Lab. No.: 76 - 11306

TABLE I Raw Coal Head Sample ¼" x 0

AIR DRIED BASIS						% DRY BASIS			
Moist.	Ash	V.M.	F.C.	Sulphur	H.G.I.	Ash	V.M.	F.C.	Sulphur
0.8	16.6	27.6	55.0	0.92	128.0	16.7	27.9	55.4	0.93

TABLE II Screen Analysis

	AIR DRIED BASIS				DRY BASIS	
Size	Weight %	Moisture	ASH	Sulphur	ASH	Sulphur
¼" x 65	68.8	0.8	17.4	0.93	17.5	0.94
65 x 0	31.2	0.9	12.4	0.84	12.4	0.85
TOTAL	100.0	--	--	--	15.9	0.91

TABLE III Float/Sink ¼" x 65 Fraction

Spec. Grav.		AIR DRIED BASIS						DRY BASIS			
Sink	Float	Weight%	Moist.	Ash	V.M.	F.C.	Sulphur	ASH	V.M.	F.C.	Sulphur
	1.40	73.1	0.9	3.9	34.1	61.1	0.99	3.9	34.4	61.7	1.00
1.40	1.50	5.7	1.1	7.6	27.4	63.9	0.95	7.7	27.7	64.6	0.96
1.50	1.60	2.8	0.9	11.2	25.7	62.2	0.93	11.3	25.9	62.8	0.94
1.60		18.4	--	--	--	--	--	67.9	--	--	--
TOTAL		100.0	--	--	--	--	--	16.1	--	--	--

TABLE IV Cumulative 1.60 Float

F.S.I.	Phosph-orus (in coal)	DILATATION					
		TEMPERATURE °C			PER CENT		"G" FACTOR
		Initial	Softening	Maximum Dilatation	Maximum Contraction	Maximum Dilatation	
8	0.010						

Lab. No. 8095 Date Jan/77

Client: Warnock Hersey

Sample Identification: 76-11306

Starting Temperature °C: 350

Softening Temperature °C: 366

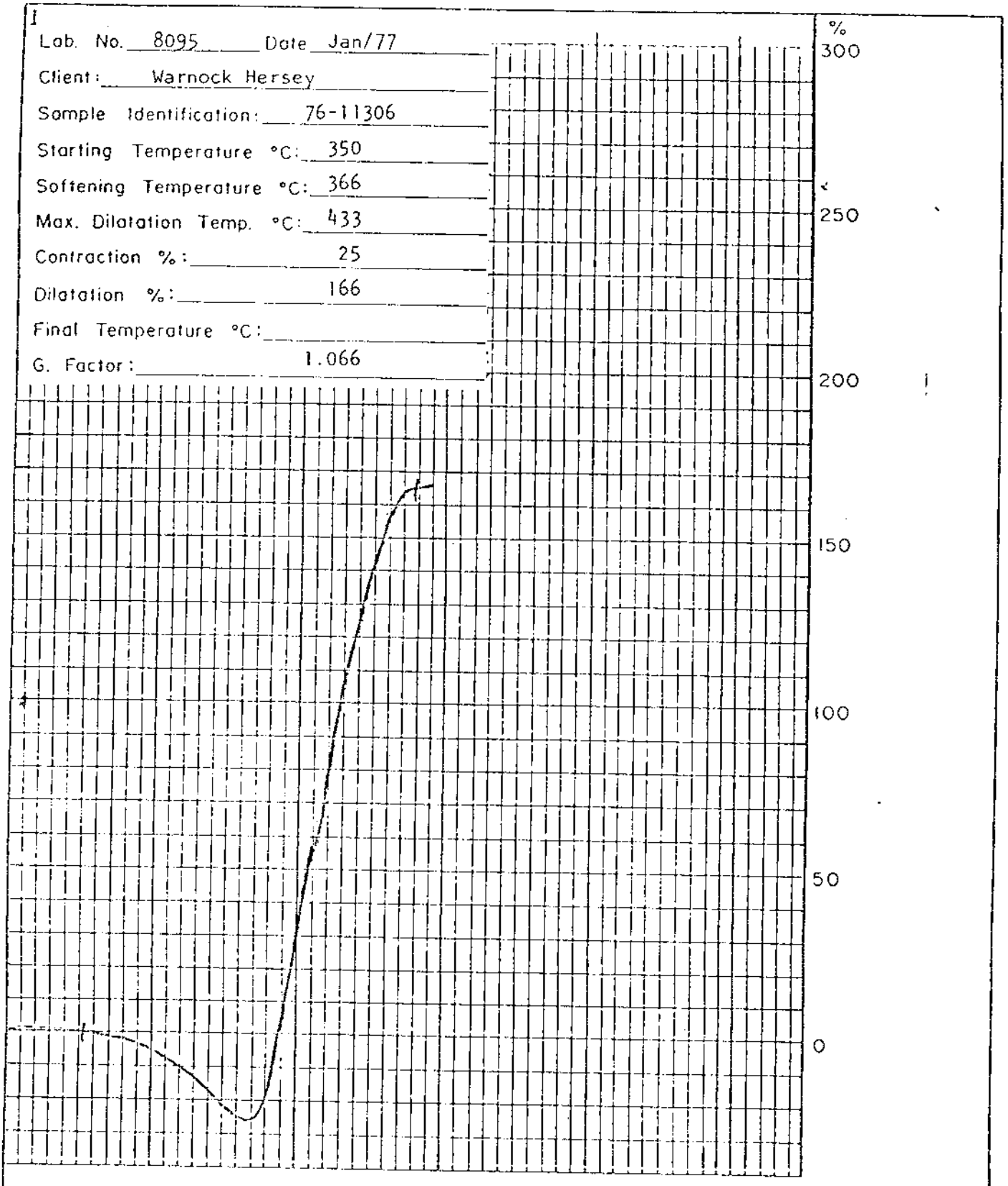
Max. Dilatation Temp. °C: 433

Contraction %: 25

Dilatation %: 166

Final Temperature °C:

G. Factor: 1.066



BIRTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Warnock Hersey Professional Services Ltd.

ELCO MINING LTD.. Elk River Coal Project 1976-77

DRILL CORE ANALYSIS

Sample Identification: DH 55 - 4 Warnock Hersey Lab. No.: 76 - 11307

TABLE I Raw Coal Head Sample ¼" x 0

AIR DRIED BASIS						% DRY BASIS			
Moist.	Ash	V.M.	F. C.	Sulphur	H.G.I.	Ash	V. M.	F.C.	Sulphur
0.8	46.8	21.3	31.1	0.72	103.8	47.1	21.5	31.4	0.72

TABLE II Screen Analysis

	AIR DRIED BASIS				DRY BASIS	
Size	Weight %	Moisture	ASH	Sulphur	ASH	Sulphur
¼" x 65	85.0	0.8	52.0	0.69	52.4	0.71
65 x 0	15.0	0.9	26.5	1.01	26.7	1.02
TOTAL	100.0	- -	- -	- -	48.5	0.76

TABLE III Float/Sink ¼" x 65 Fraction

Spec. Grav.		AIR DRIED BASIS						DRY BASIS			
Sink	Float	Weight%	Moist.	Ash	V.M.	F.C.	Sulphur	ASH	V.M.	F C.	Sulphur
	1.40	30.6	0.8	3.6	35.0	60.6	0.81	3.7	35.3	61.0	0.82
1.40	1.50	2.8	1.0	7.4	28.2	63.4	0.77	7.5	28.5	64.0	0.78
1.50	1.60	2.6	0.8	22.8	23.8	52.6	0.73	23.0	24.0	53.0	0.74
1.60		64.0	- -	- -	- -	- -	- -	82.8	- -	- -	- -
TOTAL		100.0	- -	- -	- -	- -	- -	54.9	- -	- -	- -

TABLE IV Cumulative 1.60 Float

F.S.I.	Phosphorus (in coal)	DILATATION					
		TEMPERATURE °C			PER CENT		"G" FACTOR
		Initial	Softening	Maximum Dilatation	Maximum Contraction	Maximum Dilatation	
8	0.016						

Lab. No. 8096 Date Jan/77

Client: Warnock Hersey

Sample Identification: 71-11307

Starting Temperature °C: 350

Softening Temperature °C: 362

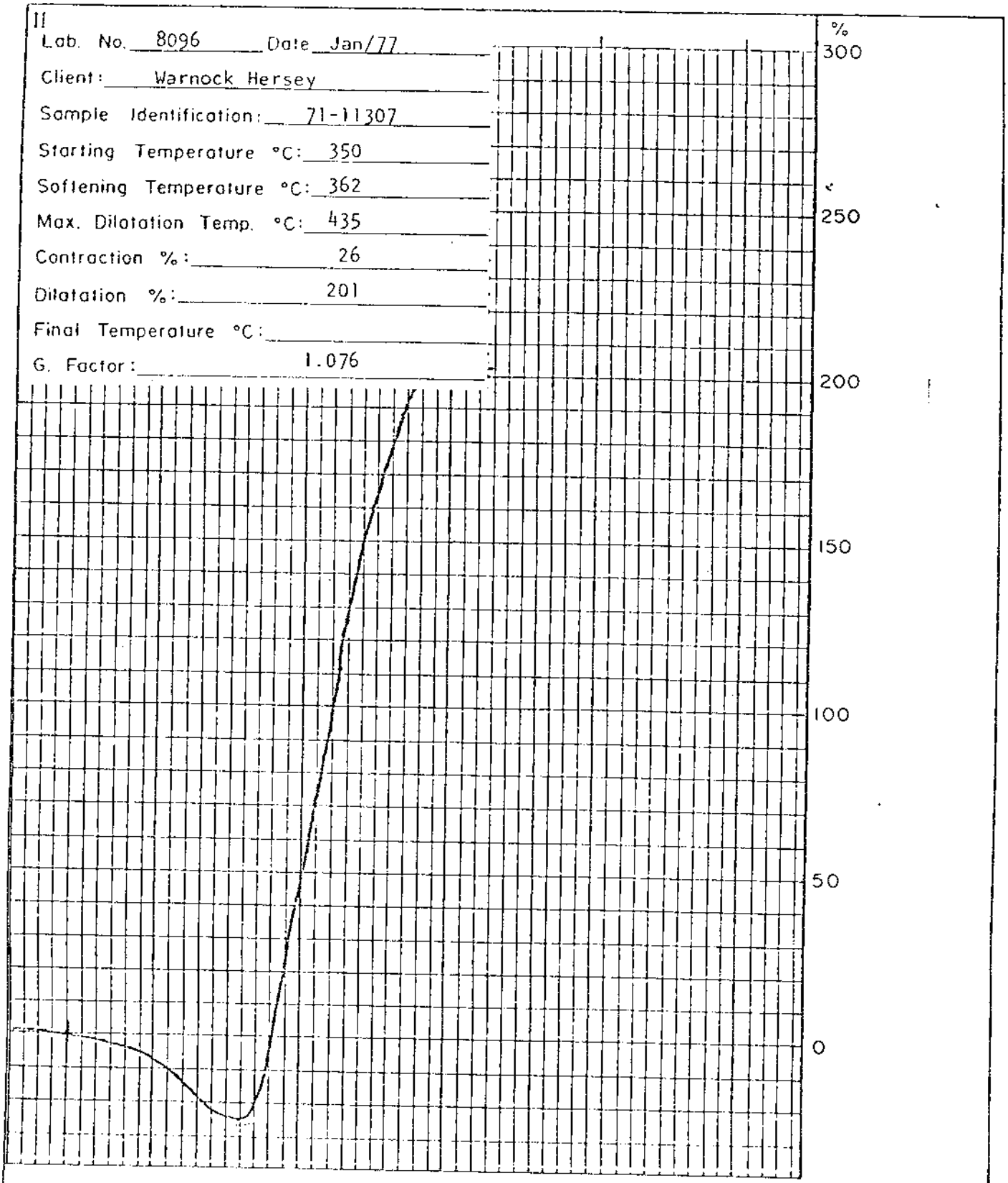
Max. Dilatation Temp. °C: 435

Contraction %: 26

Dilatation %: 201

Final Temperature °C:

G. Factor: 1.076



BIRTLEY ENGINEERING (CANADA) LTD.

Title	Date
RUHR DILATOMETER TEST	
	Drawn

Warnock Hersey Professional Services Ltd.

ELCO MINING LTD.. Elk River Coal Project 1976-77

DRILL CORE ANALYSIS

Sample Identification: DH 55 - 5 Warnock Hersey Lab. No.: 76 - 11308

TABLE I Raw Coal Head Sample ¼" x 0

AIR DRIED BASIS						% DRY BASIS			
Moist.	Ash	V.M.	F. C.	Sulphur	H.G.I.	Ash	V. M.	F.C.	Sulphur
0.7	12.1	25.4	61.8	0.84	92.7	12.2	25.5	62.3	0.85

TABLE II Screen Analysis

	AIR DRIED BASIS				DRY BASIS	
Size	Weight %	Moisture	ASH	Sulphur	ASH	Sulphur
¼" x 65	78.7	0.7	11.8	0.89	11.9	0.90
65 x 0	21.3	0.8	10.4	0.87	10.5	0.88
TOTAL	100.0	--	--	--	11.6	0.90

TABLE III Float/Sink ¼" x 65 Fraction

Spec. Grav.		AIR DRIED BASIS						DRY BASIS			
Sink	Float	Weight%	Moist.	Ash	V.M.	F.C.	Sulphur	ASH	V.M.	F.C.	Sulphur
	1.40	82.3	0.9	4.2	30.1	64.8	1.04	4.2	30.4	65.4	1.05
1.40	1.50	3.5	1.0	10.7	27.8	60.5	0.98	10.8	28.0	61.2	0.99
1.50	1.60	2.7	0.8	21.2	24.2	53.8	0.85	21.4	24.4	54.2	0.86
1.60		11.5	--	--	--	--	--	59.4	--	--	--
TOTAL		100.0	--	--	--	--	--	11.2	--	--	--

TABLE IV Cumulative 1.60 Float

F.S.I.	Phosphorus (in coal)	DILATATION					
		TEMPERATURE °C			PER CENT		"G" FACTOR
		Initial	Softening	Maximum Dilatation	Maximum Contraction	Maximum Dilatation	
6	0.010						

Lab. No. 8097 Date Jan/77

Client: Warnock Hersey

Sample Identification: 76-11308

Starting Temperature °C: 350

Softening Temperature °C: 376

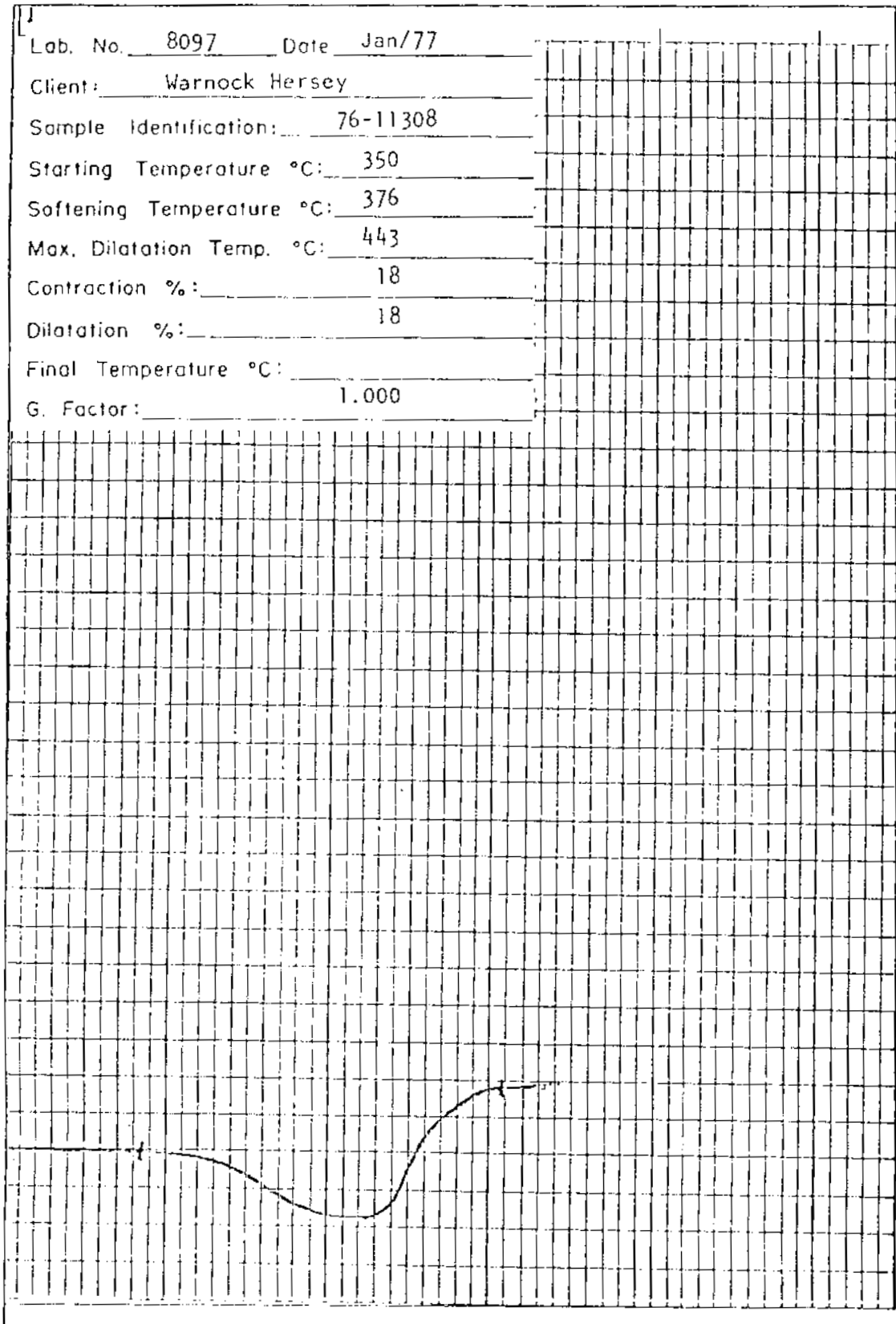
Max. Dilatation Temp. °C: 443

Contraction %: 18

Dilatation %: 18

Final Temperature °C:

G. Factor: 1.000



BIRTLEY ENGINEERING (CANADA) LTD.

Title	Date
RUHR DILATOMETER TEST	
	Drawn

Lab. No. 30[illegible] Date Jan 17, 1977

Client: ELCO MINING LTD.

Sample Identification: DM-56-1

Starting Temperature °C: 350

Softening Temperature °C: 387

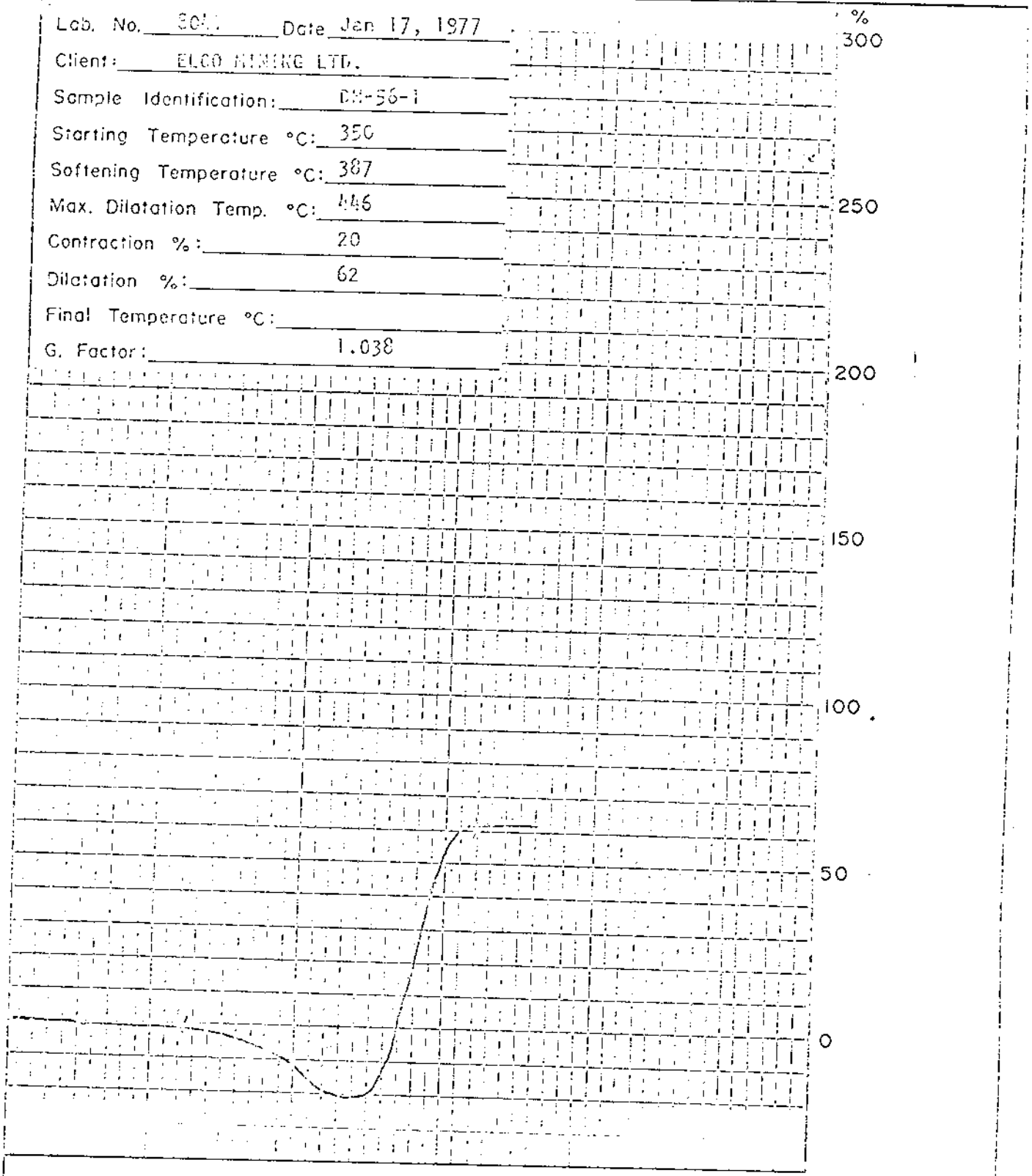
Max. Dilatation Temp. °C: 446

Contraction %: 20

Dilatation %: 62

Final Temperature °C:

G. Factor: 1.038



BIRTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. 9012 Date Jan 17, 1977

Client: ELCO MINING LTD.

Sample Identification: DT-56-2

Starting Temperature °C: 350

Softening Temperature °C: 386

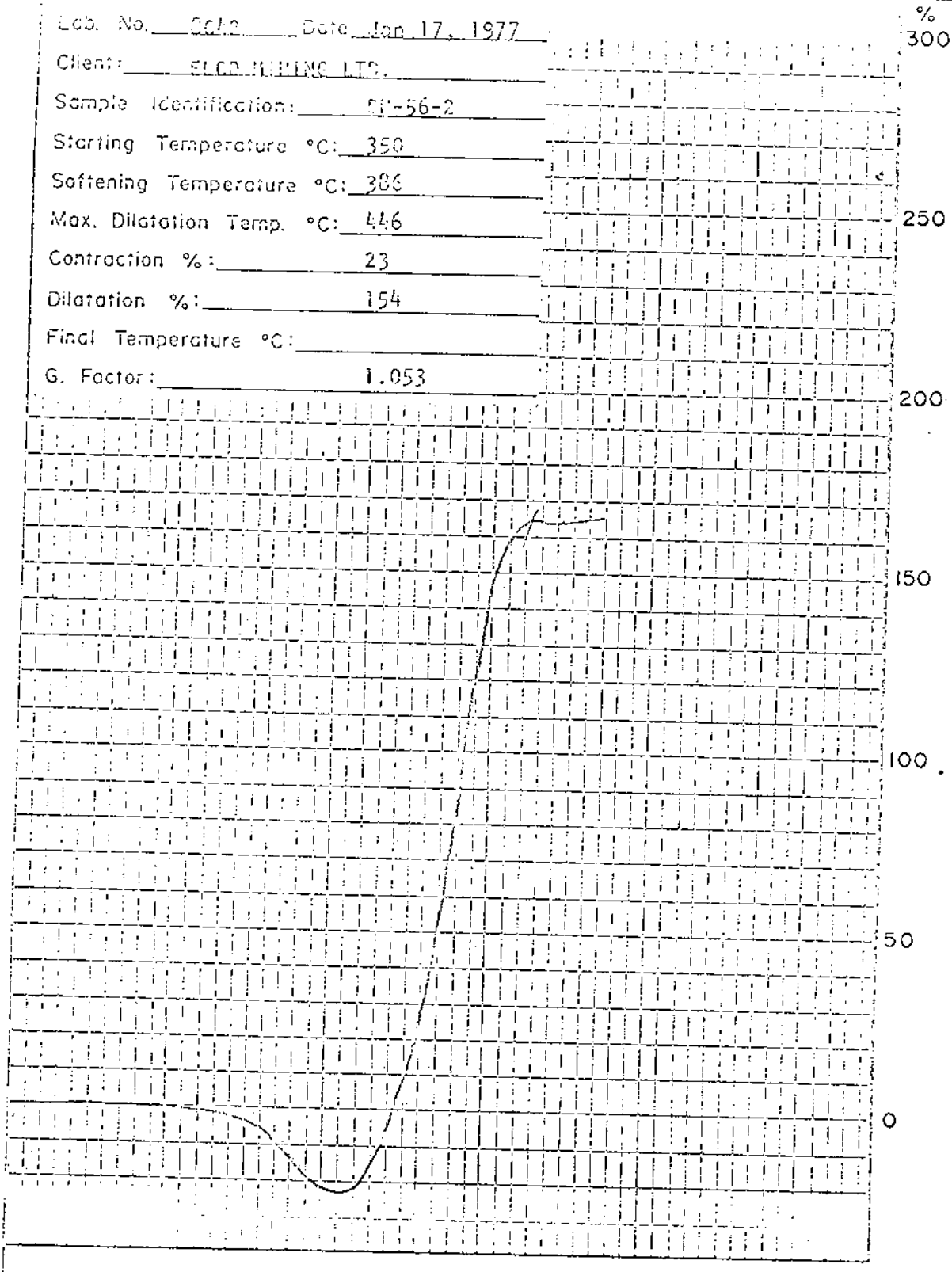
Max. Dilatation Temp. °C: 446

Contraction %: 23

Dilatation %: 154

Final Temperature °C:

G. Factor: 1.053



BIRTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. [illegible] Date Jan 17, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-56-3

Starting Temperature °C: 350

Softening Temperature °C: 406

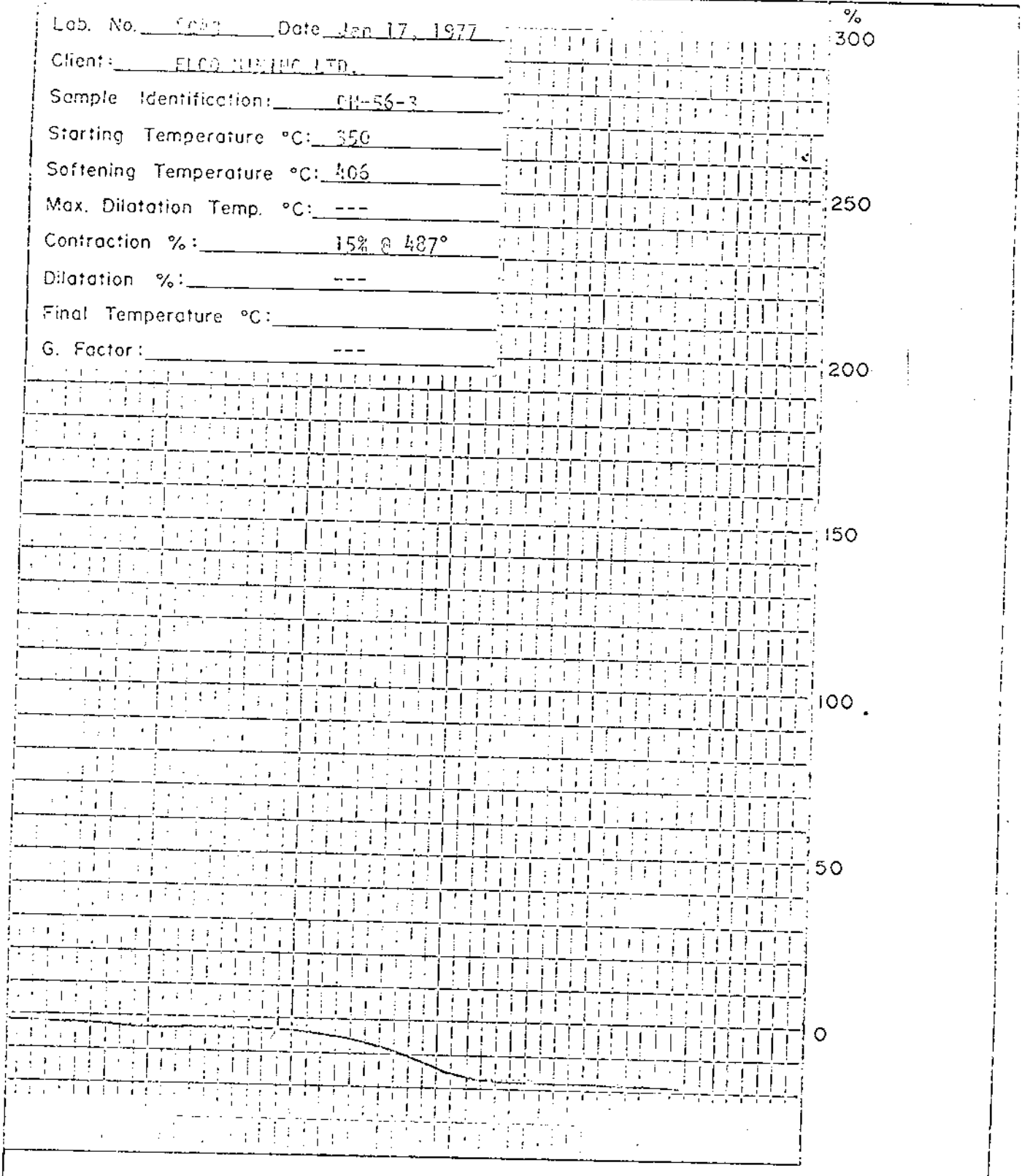
Max. Dilatation Temp. °C: ---

Contraction %: 15% @ 487°

Dilatation %: ---

Final Temperature °C:

G. Factor: ---



BARTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. 8047 Date Jan. 17, 1977

Client: BLOC MINING LTD.

Sample Identification: DH-56-4

Starting Temperature °C: 350

Softening Temperature °C: 406

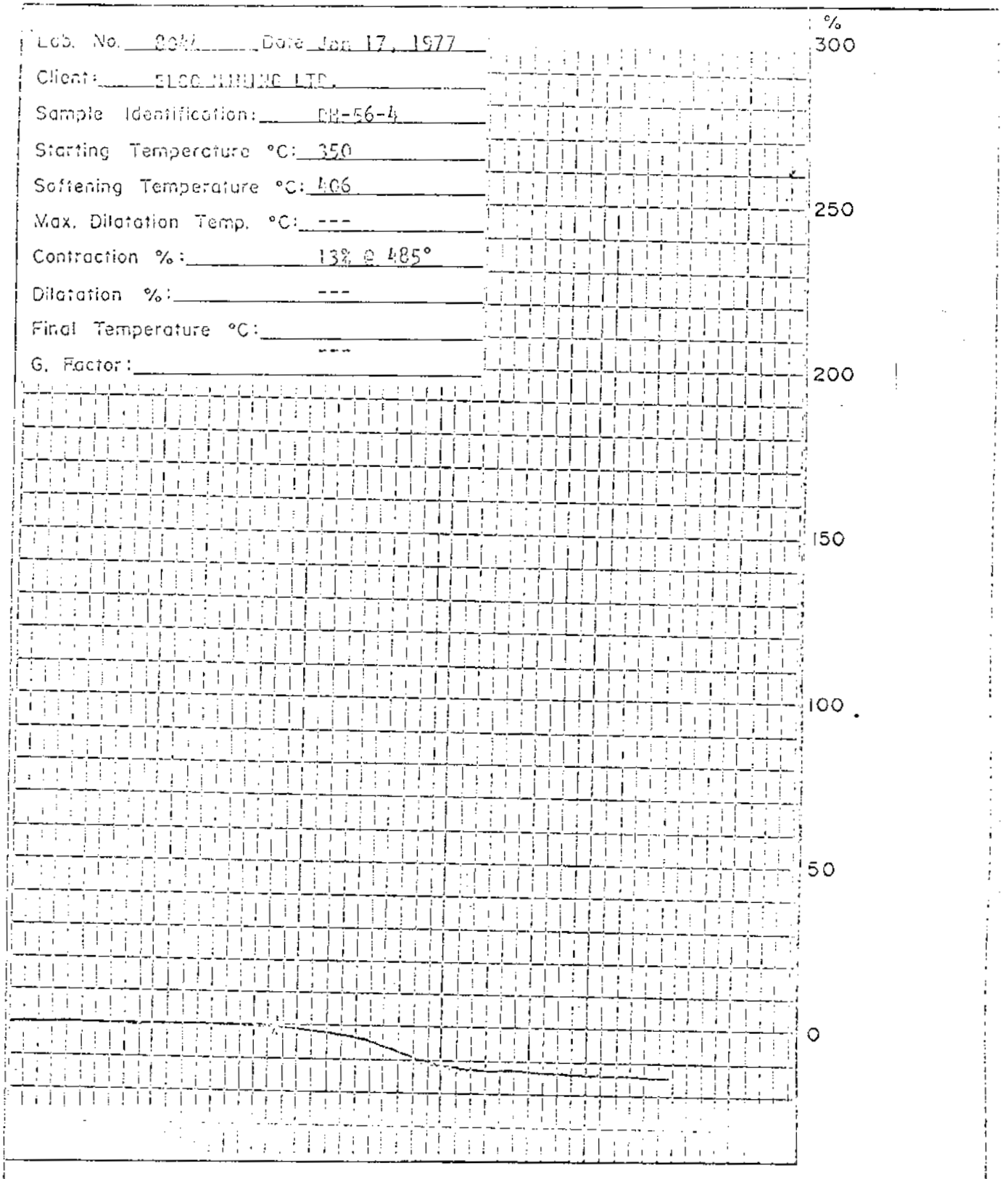
Max. Dilatation Temp. °C: ---

Contraction %: 13% @ 485°

Dilatation %: ---

Final Temperature °C: ---

G. Factor:



BARTLEY ENGINEERING (CANADA) LTD.

Title	Date
RUHR DILATOMETER TEST	
	Drawn

Lab. No. 3043 Date Jan. 17, 977

Client: ELCO MINING LTD.

Sample Identification: DH-56-5

Starting Temperature °C: 350

Softening Temperature °C: 396

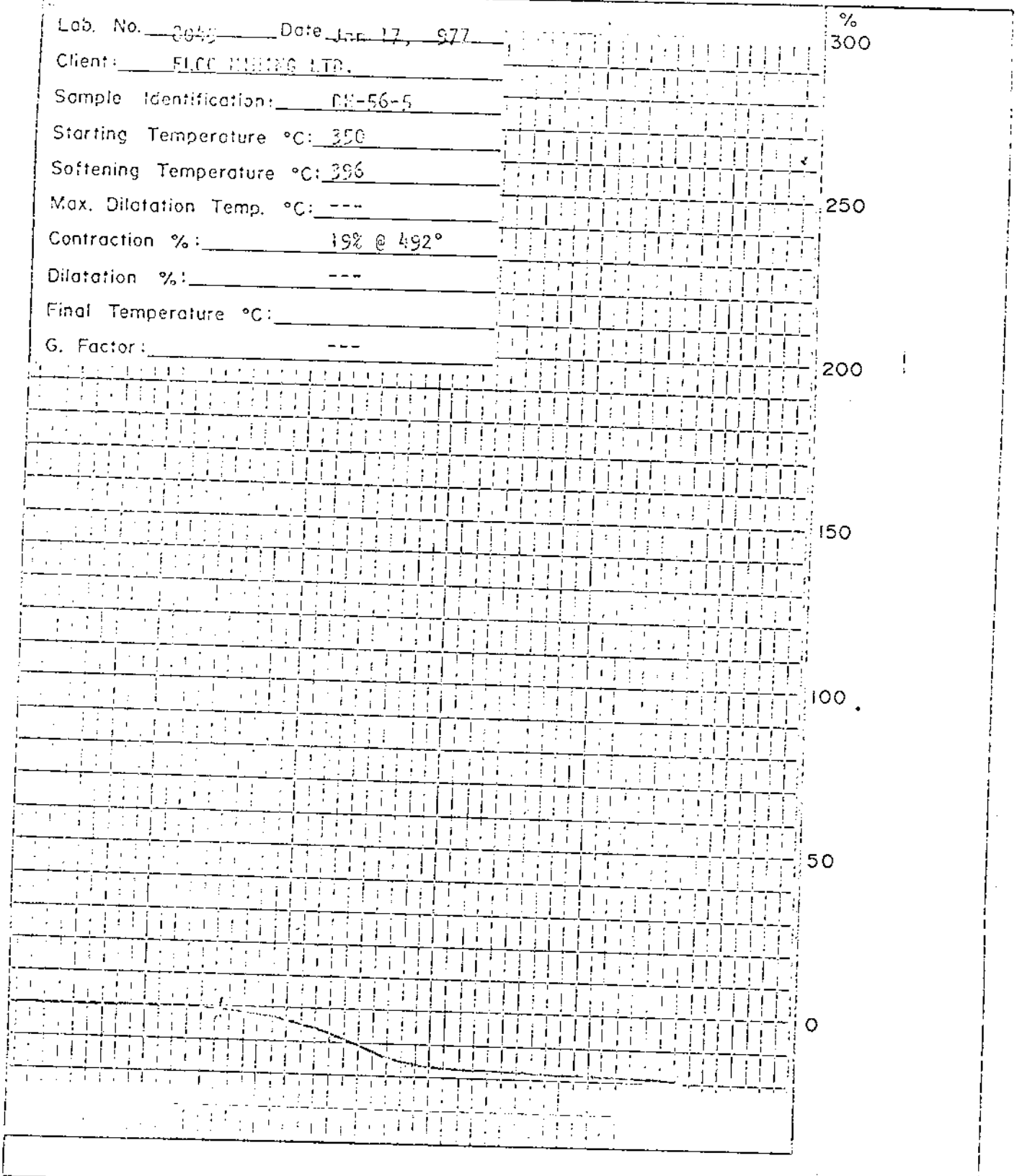
Max. Dilatation Temp. °C: ---

Contraction %: 19% @ 492°

Dilatation %: ---

Final Temperature °C:

G. Factor: ---



BIRTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. 3046 Date Jan 17, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-56-6

Starting Temperature °C: 350

Softening Temperature °C: 409

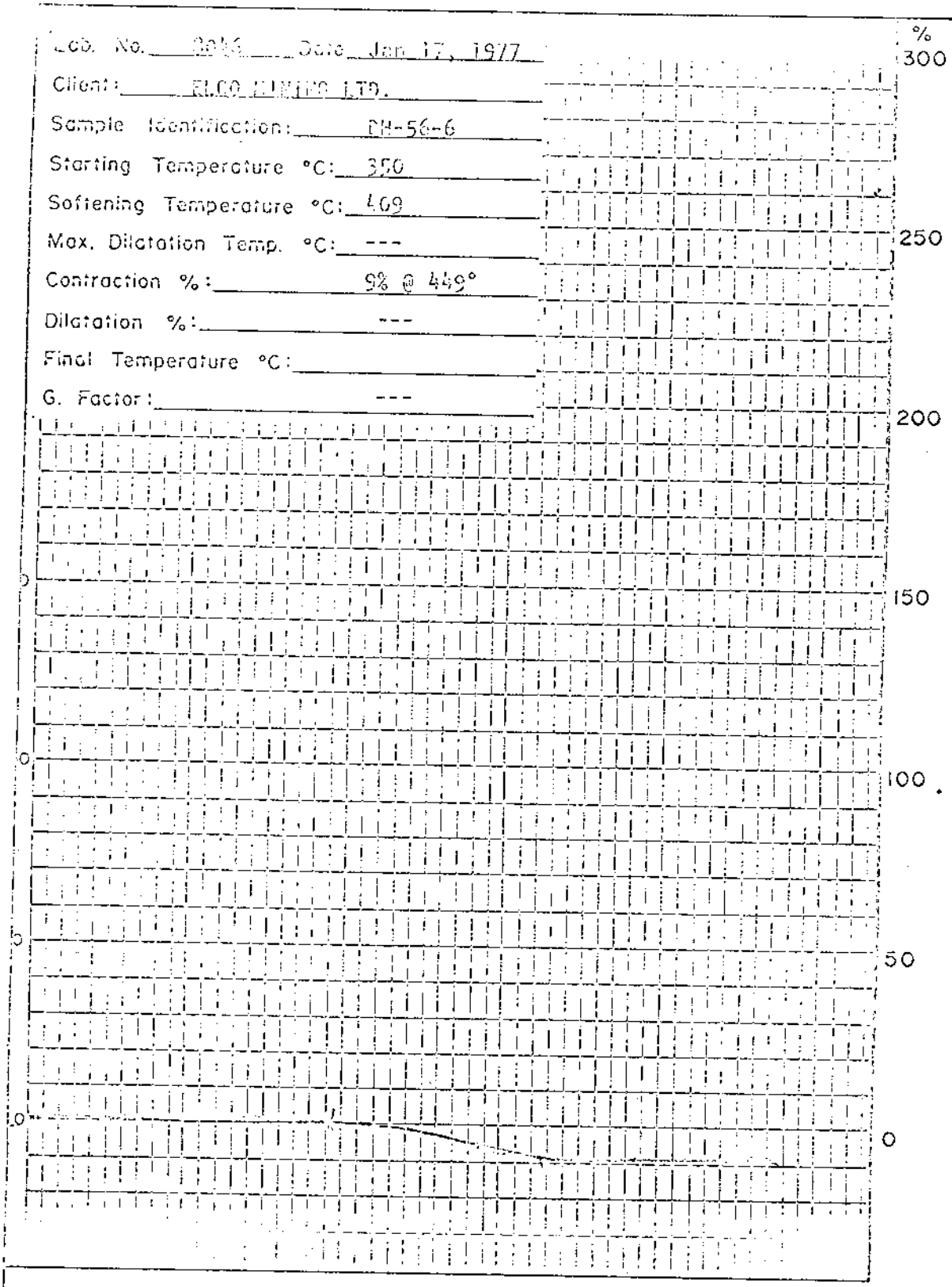
Max. Dilatation Temp. °C: ---

Contraction %: 9% @ 449°

Dilatation %: ---

Final Temperature °C:

G. Factor: ---



DIRTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. 7988 Date Jan 14, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-57-1

Starting Temperature °C: 350

Softening Temperature °C: 376

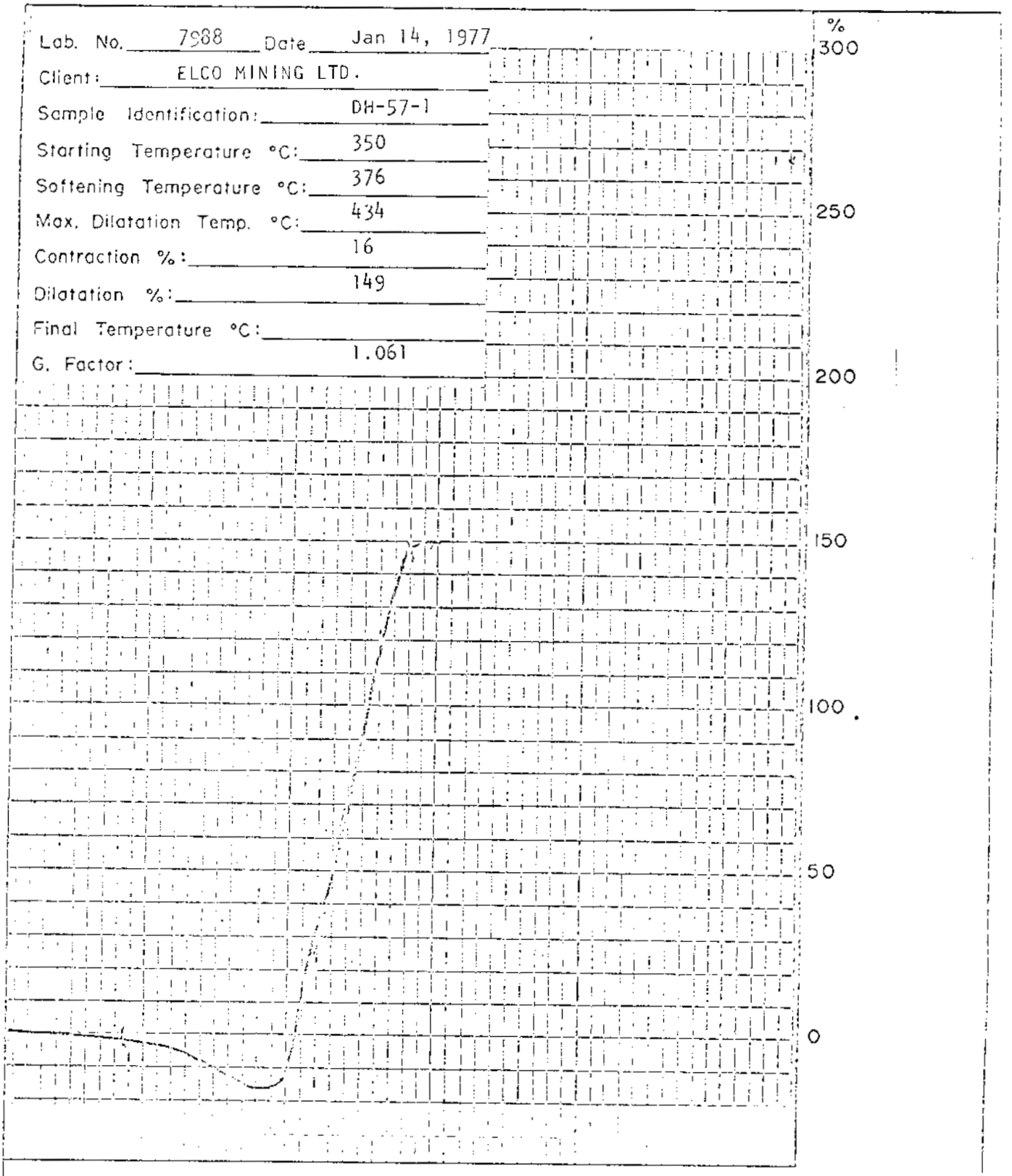
Max. Dilatation Temp. °C: 434

Contraction %: 16

Dilatation %: 149

Final Temperature °C:

G. Factor: 1.061



BARTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. 7989 Date Jan 14, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-57-2

Starting Temperature °C: 350

Softening Temperature °C: 374

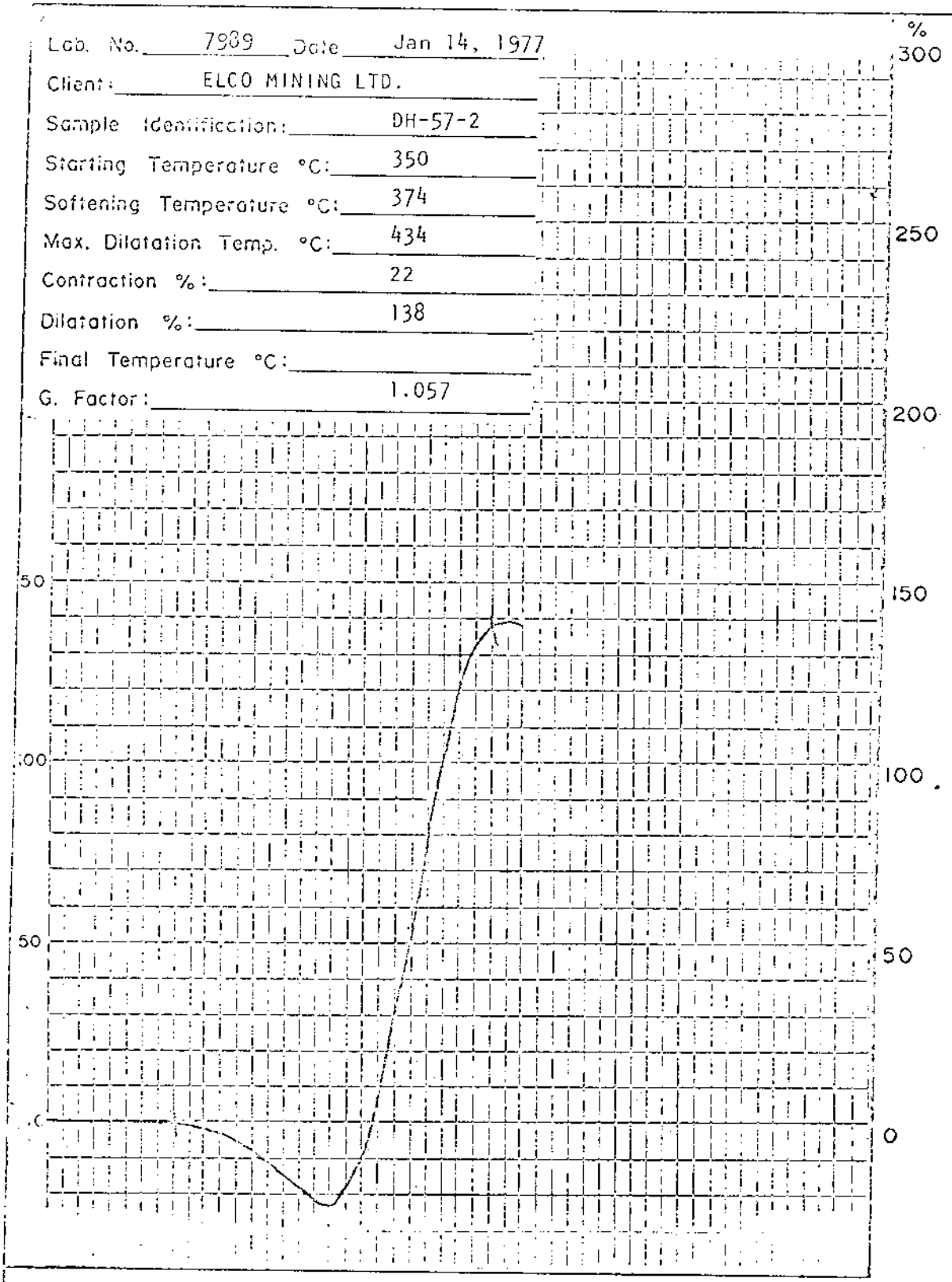
Max. Dilatation Temp. °C: 434

Contraction %: 22

Dilatation %: 138

Final Temperature °C:

G. Factor: 1.057



BARTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. 7990 Date Jan. 14, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-57-3

Starting Temperature °C: 350

Softening Temperature °C: 376

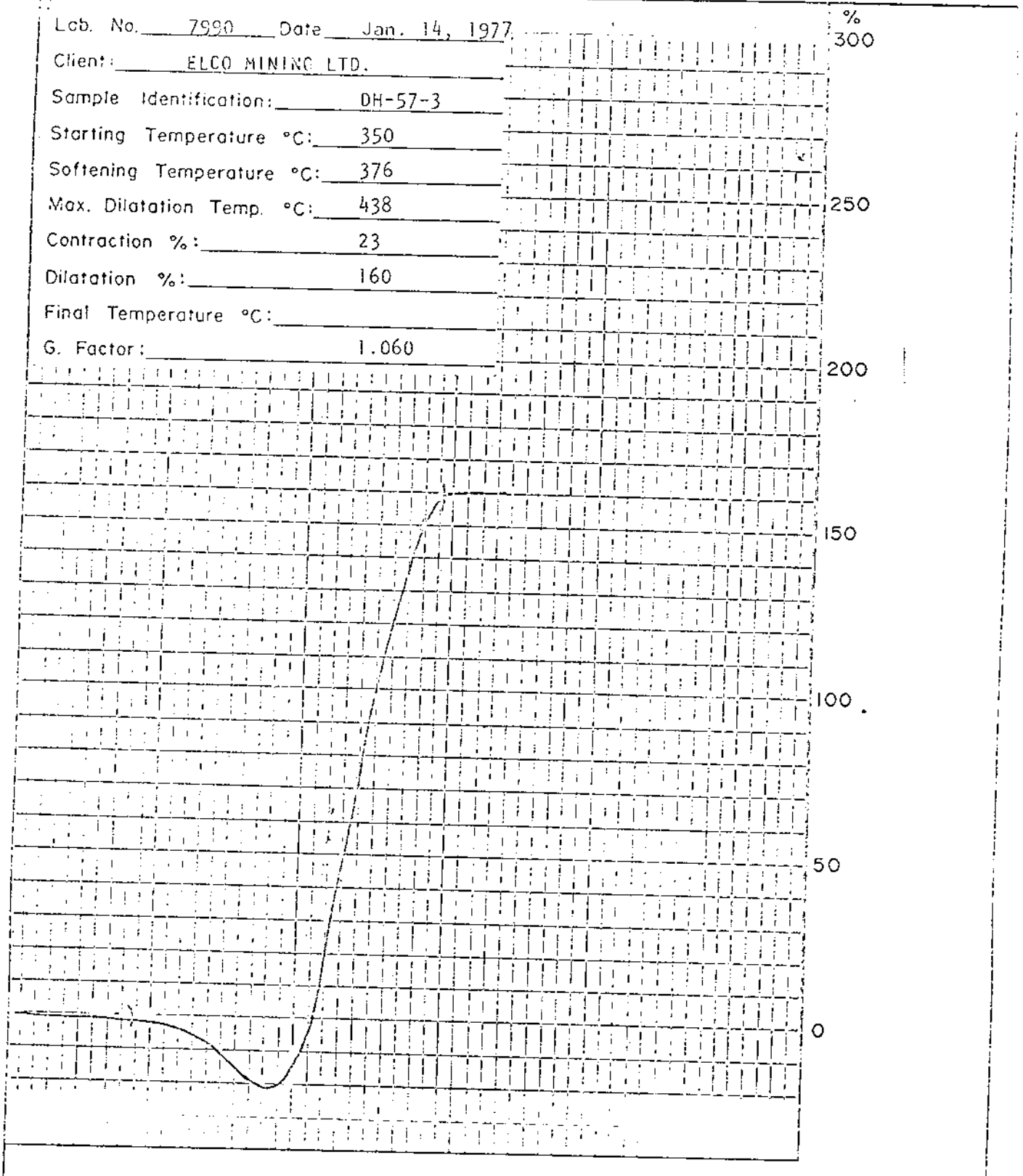
Max. Dilatation Temp. °C: 438

Contraction %: 23

Dilatation %: 160

Final Temperature °C:

G. Factor: 1.060



BIRTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. 7991 Date Jan 14, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-57-4

Starting Temperature °C: 350

Softening Temperature °C: 382

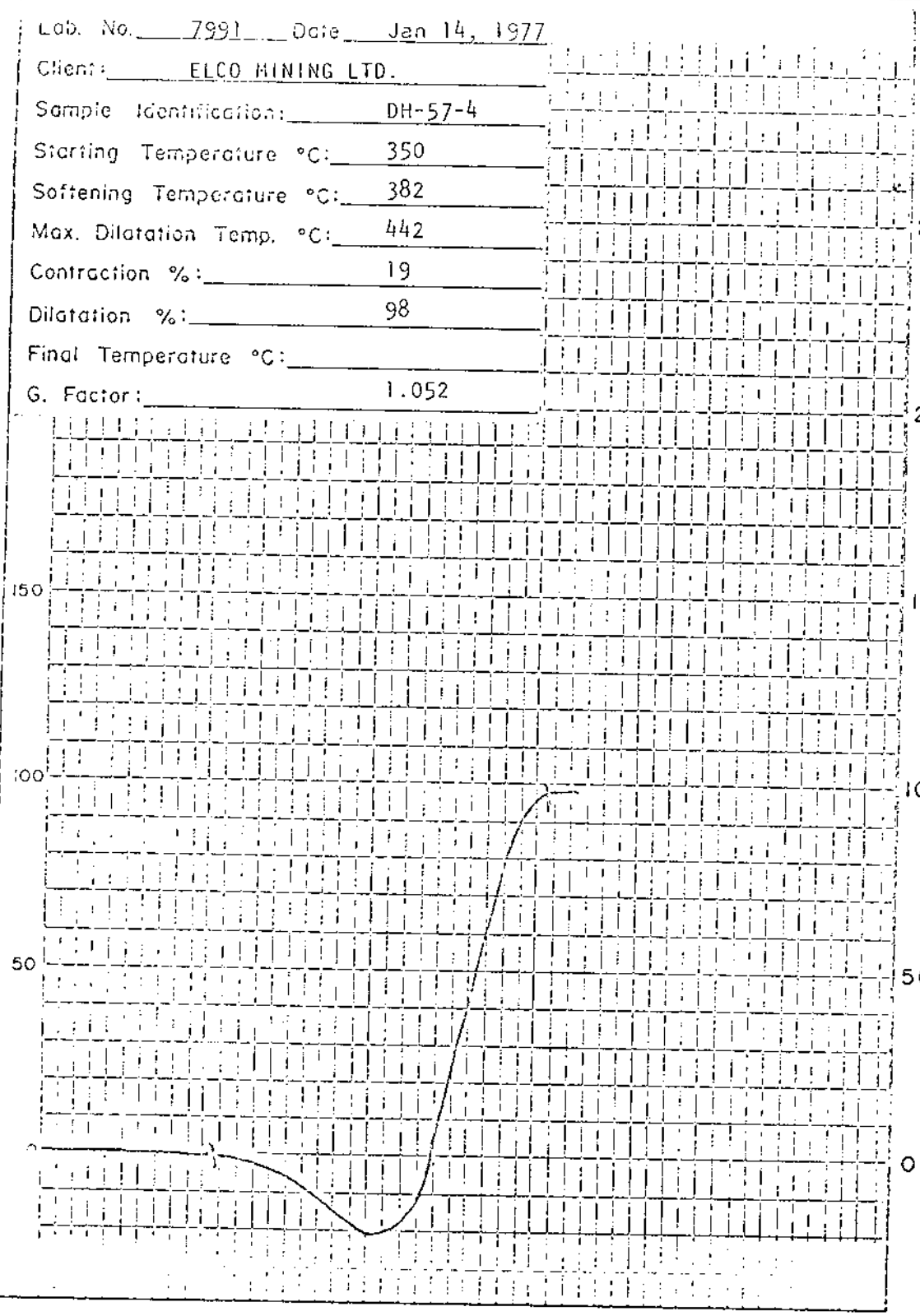
Max. Dilatation Temp. °C: 442

Contraction %: 19

Dilatation %: 98

Final Temperature °C:

G. Factor: 1.052



BARTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. 7992 Date Jan 15, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-57-5

Starting Temperature °C: 350

Softening Temperature °C: 366

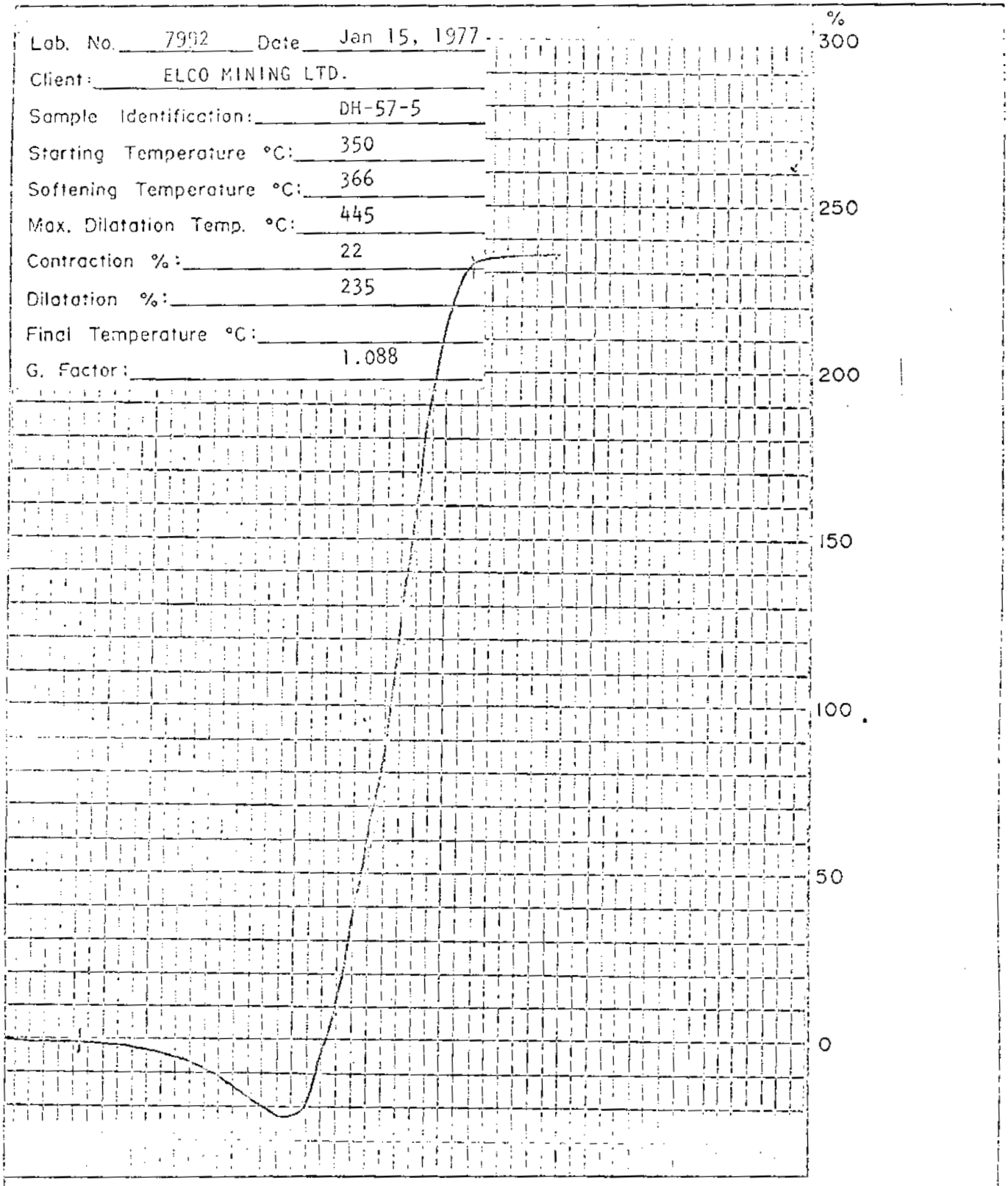
Max. Dilatation Temp. °C: 445

Contraction %: 22

Dilatation %: 235

Final Temperature °C:

G. Factor: 1.088



BIRTLEY ENGINEERING (CANADA) LTD.

Title	Date
RUHR DILATOMETER TEST	
	Drawn

Lab. No. 7993 Date Jan 15, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-57-6

Starting Temperature °C: 350

Softening Temperature °C: 384

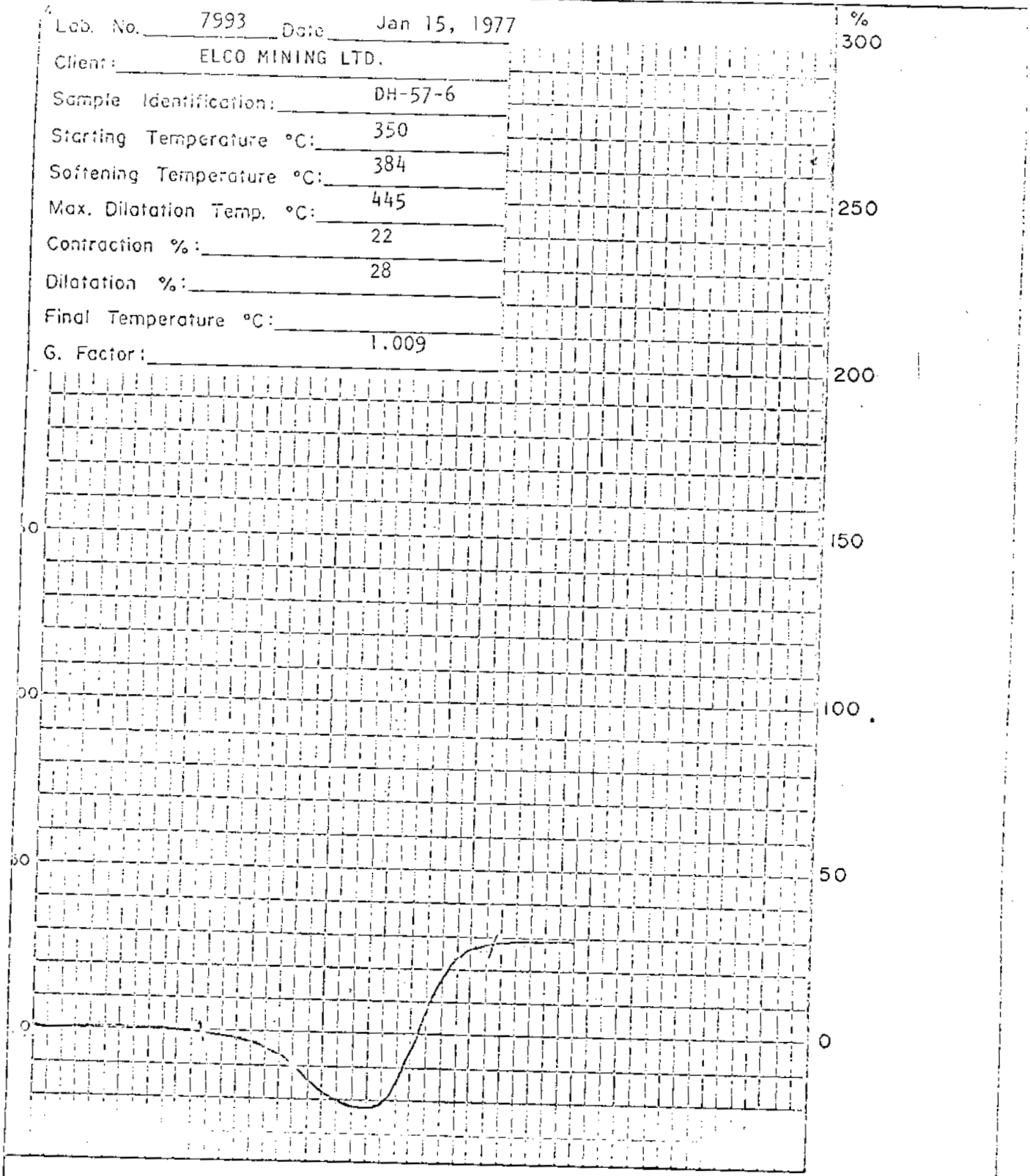
Max. Dilatation Temp. °C: 445

Contraction %: 22

Dilatation %: 28

Final Temperature °C:

G. Factor: 1.009



BARTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. 7994 Date Jan 14, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-57-7

Starting Temperature °C: 350

Softening Temperature °C: 386

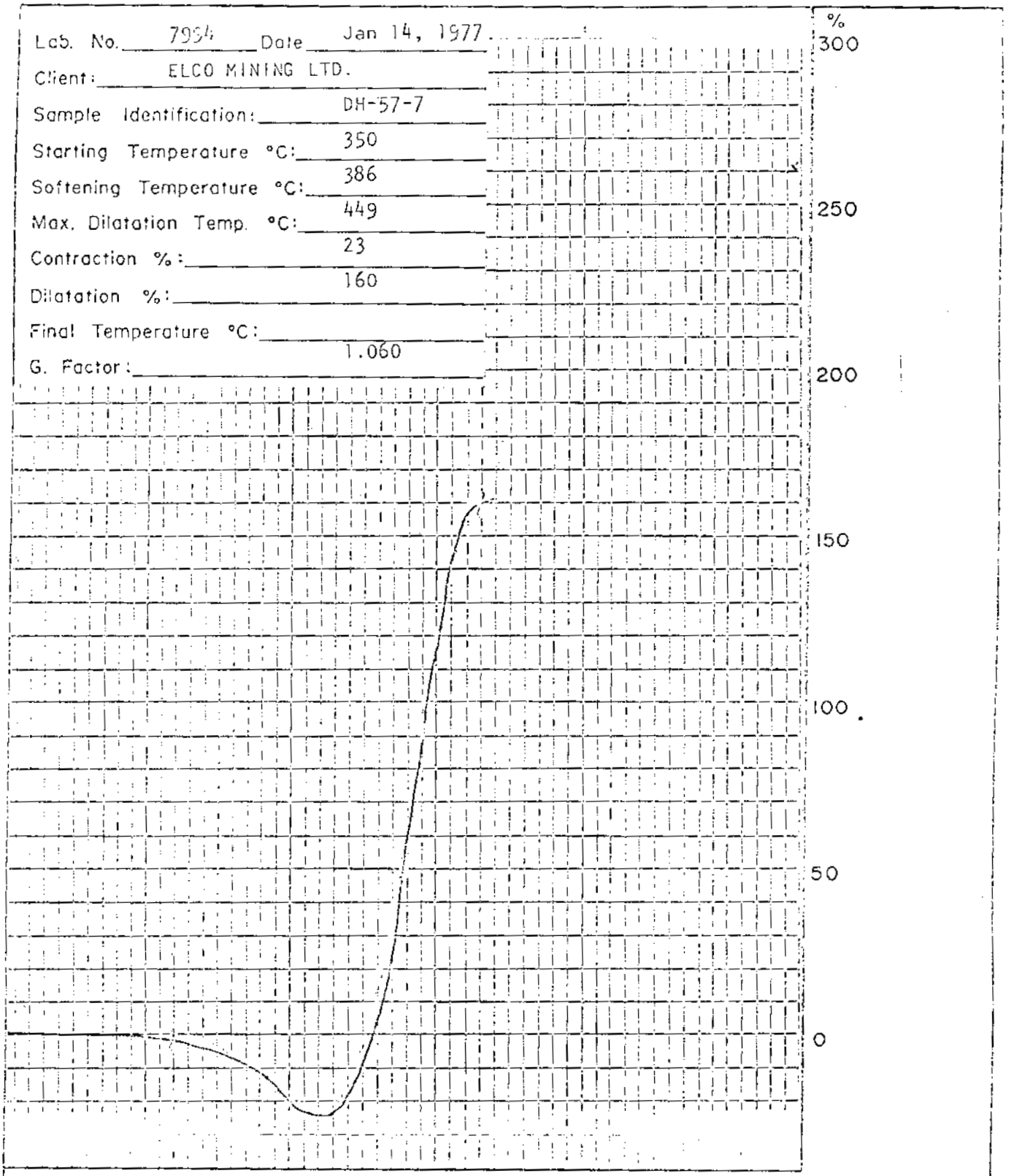
Max. Dilatation Temp. °C: 449

Contraction %: 23

Dilatation %: 160

Final Temperature °C:

G. Factor: 1.060



BIRTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. 7995 Date Jan 14, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-57-8

Starting Temperature °C: 350

Softening Temperature °C: 382

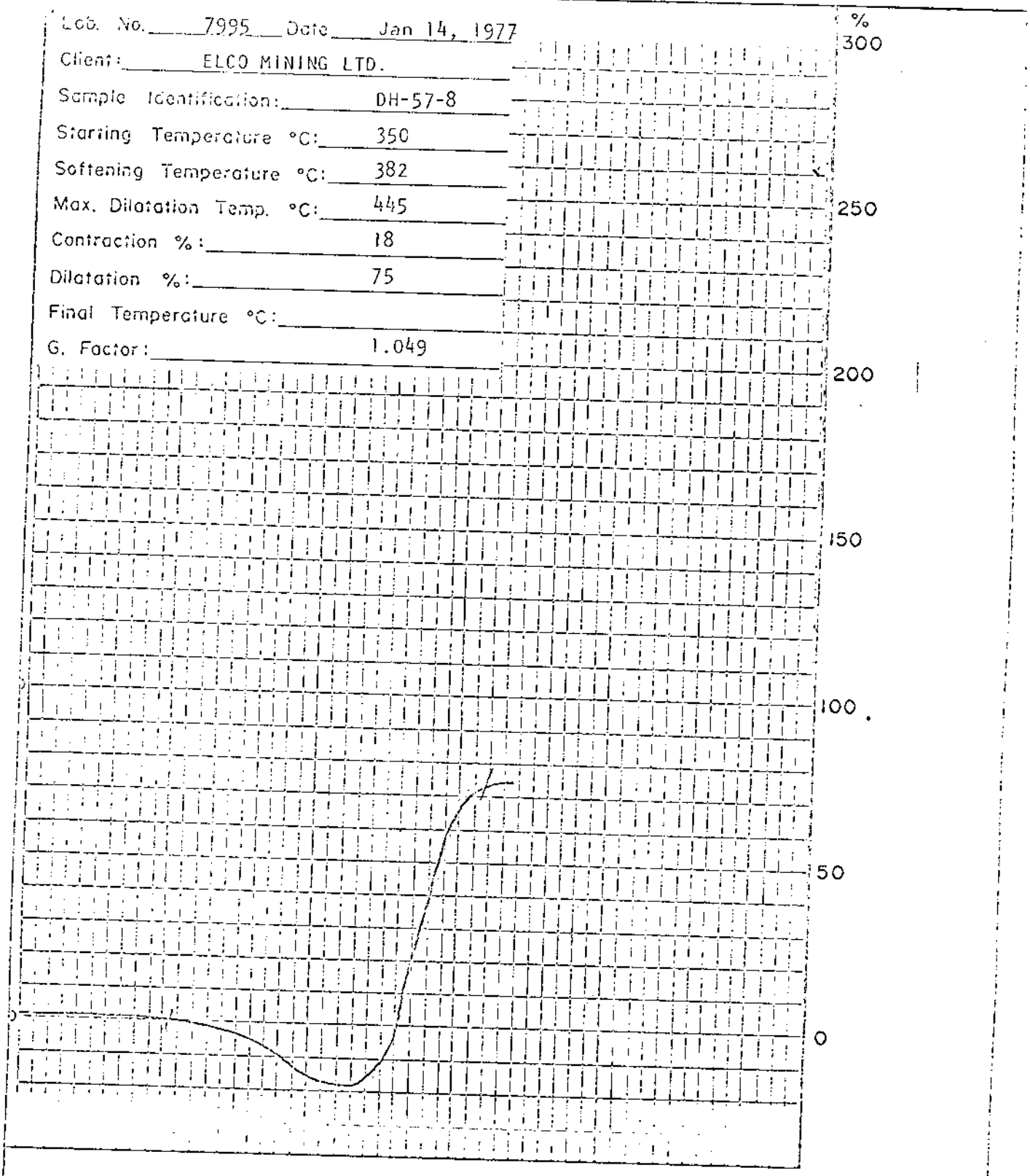
Max. Dilatation Temp. °C: 445

Contraction %: 18

Dilatation %: 75

Final Temperature °C:

G. Factor: 1.049



BARTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. 7996 Date Jan 14, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-58-1

Starting Temperature °C: 350

Softening Temperature °C: 351

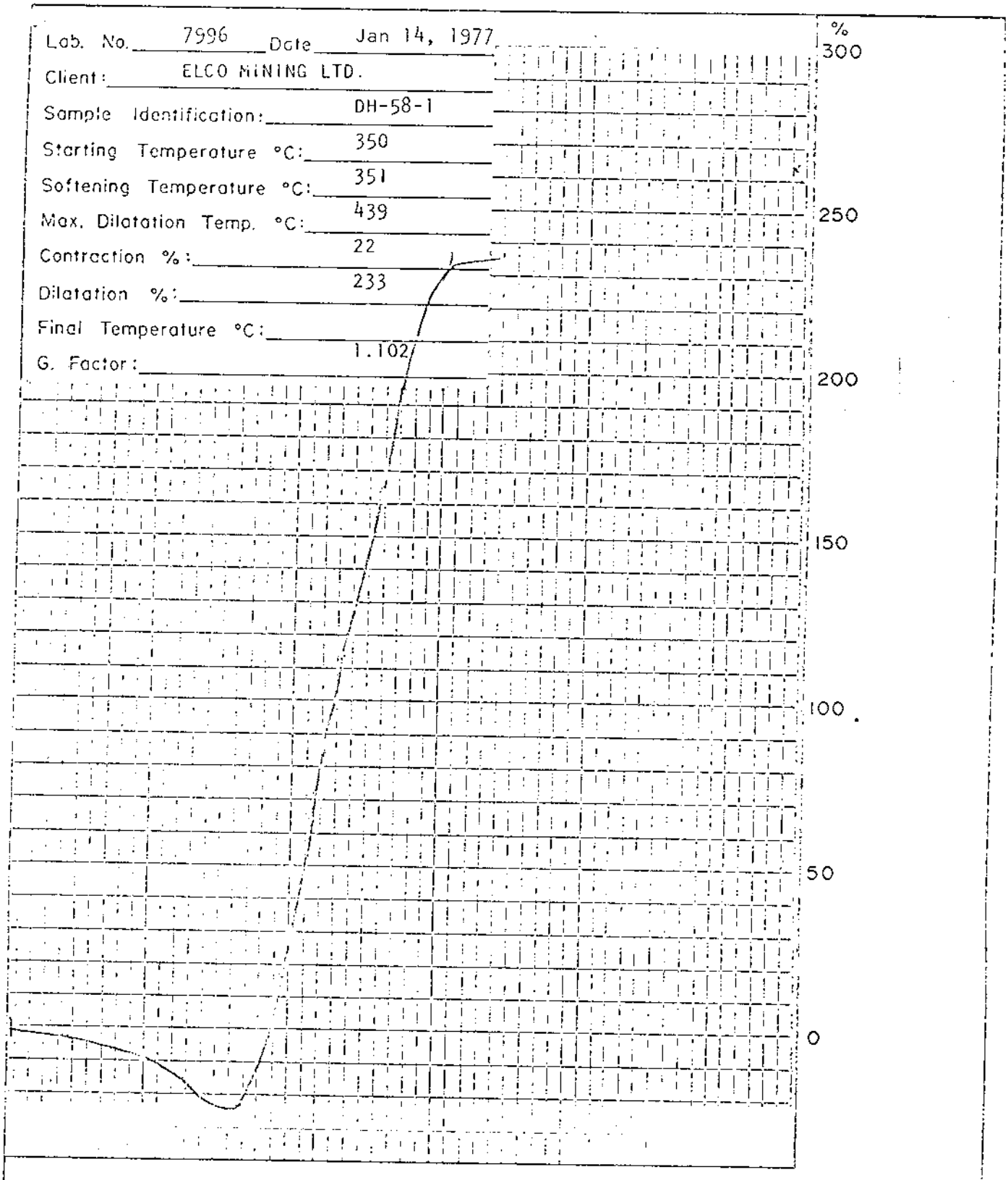
Max. Dilatation Temp. °C: 439

Contraction %: 22

Dilatation %: 233

Final Temperature °C:

G. Factor: 1.102



BIRTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. 7997 Date Jan 14, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-58-2

Starting Temperature °C: 350

Softening Temperature °C: 367

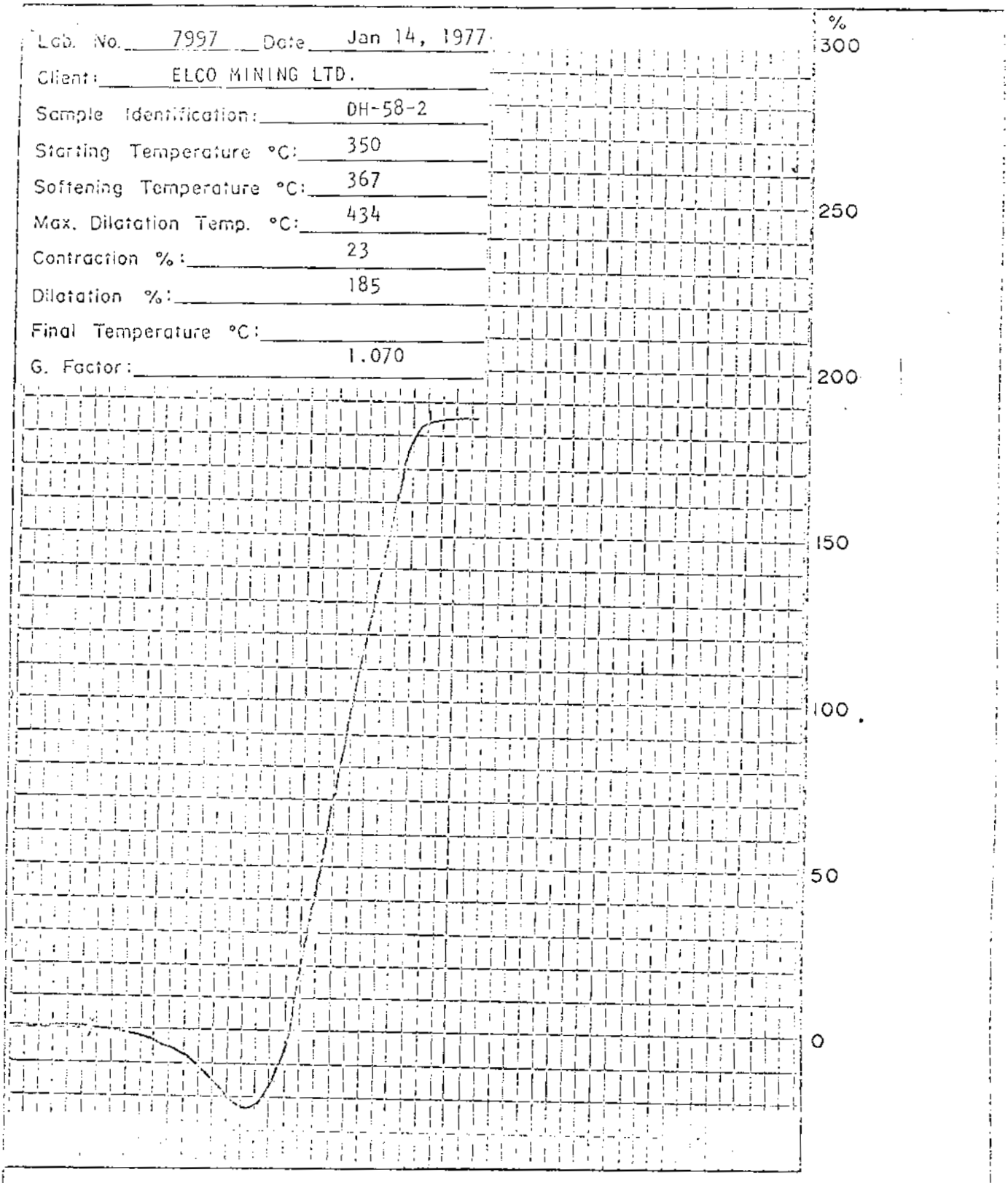
Max. Dilatation Temp. °C: 434

Contraction %: 23

Dilatation %: 185

Final Temperature °C:

G. Factor: 1.070



BIRTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. 7998 Date Jan 14, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-58-3

Starting Temperature °C: 350

Softening Temperature °C: 366

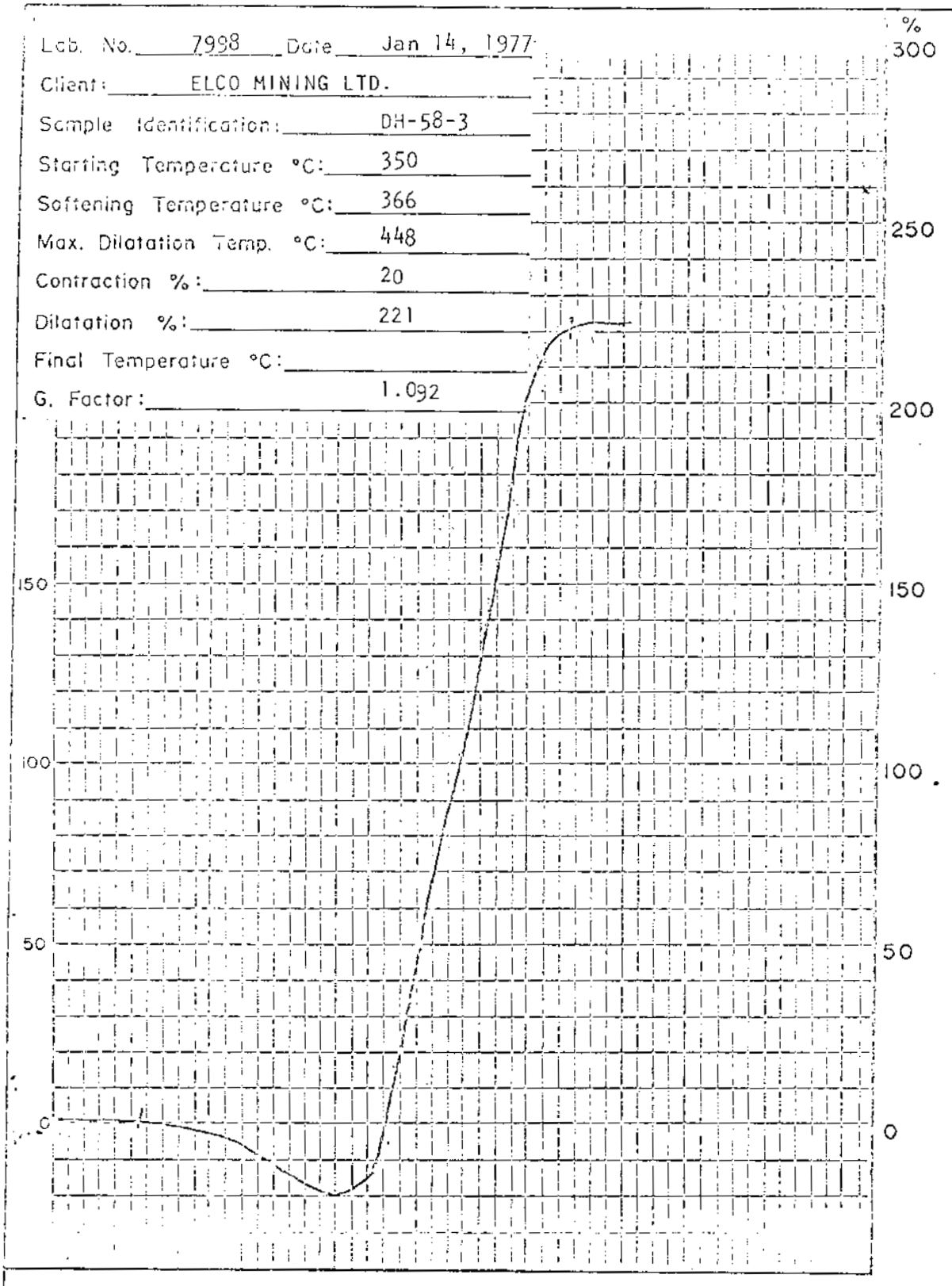
Max. Dilatation Temp. °C: 448

Contraction %: 20

Dilatation %: 221

Final Temperature °C:

G. Factor: 1.092



BAILEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. 7999 Date Jan 14, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-58-4

Starting Temperature °C: 350

Softening Temperature °C: 375

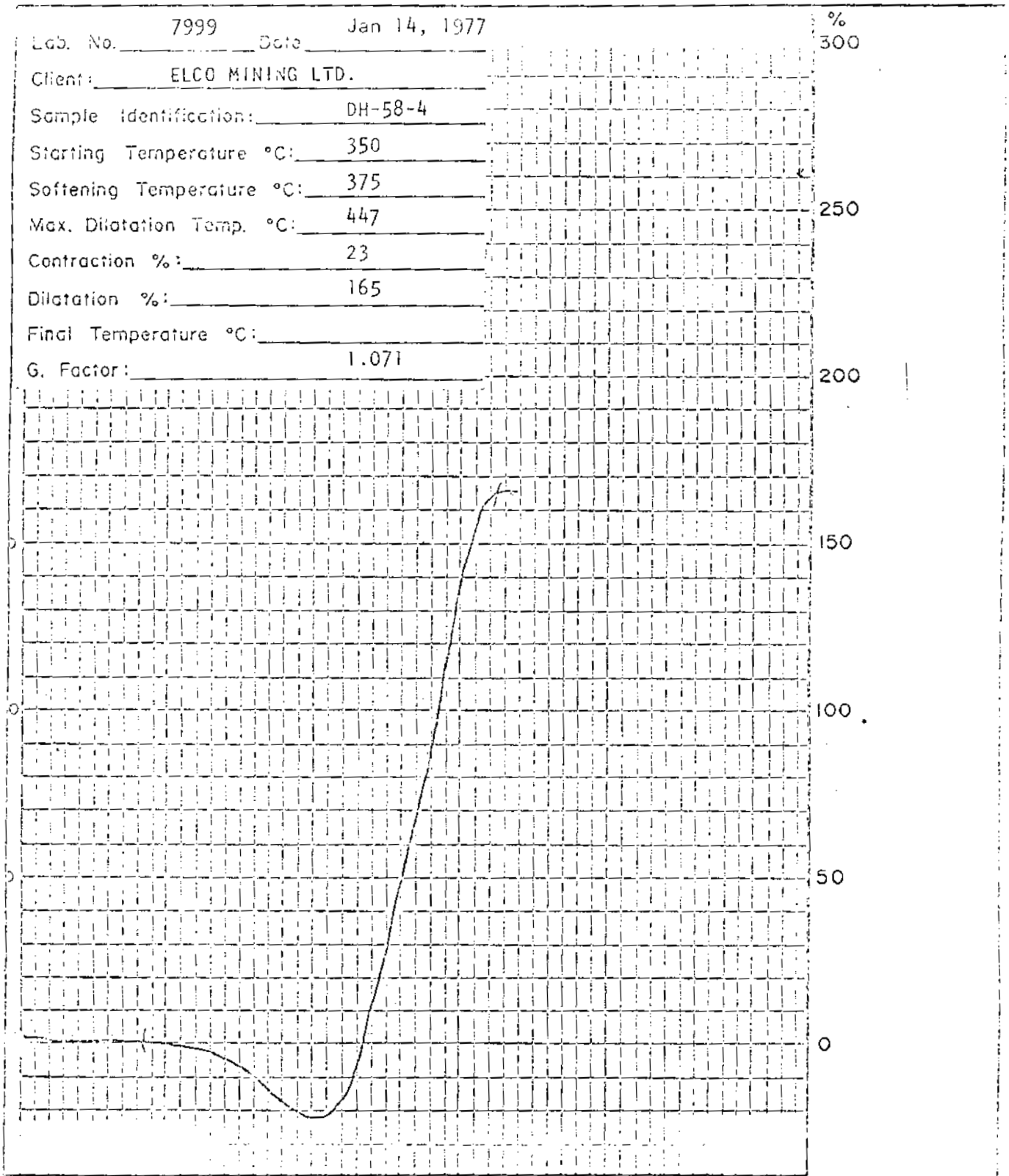
Max. Dilatation Temp. °C: 447

Contraction %: 23

Dilatation %: 165

Final Temperature °C:

G. Factor: 1.071



BIRTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. 7858 Date Nov. 23, 1976

Client: ELCO MINING LTD.

Sample Identification: DH-59-1

Starting Temperature °C: 360

Softening Temperature °C: 428

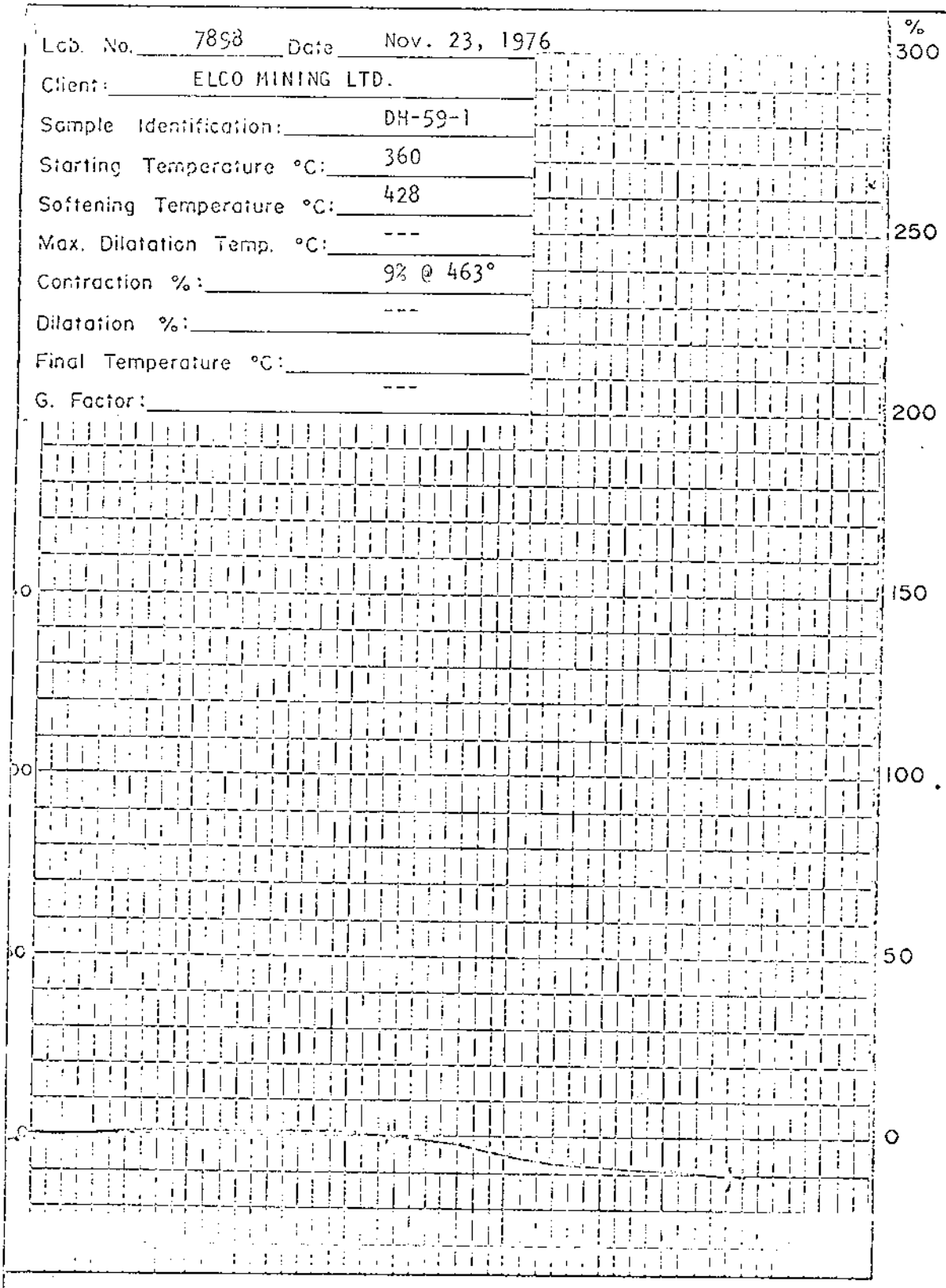
Max. Dilatation Temp. °C: ---

Contraction %: 9% @ 463°

Dilatation %: ---

Final Temperature °C: ---

G. Factor:



BIRTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. 7899 Date Nov. 23, 1976

Client: ELCO MINING LTD.

Sample Identification: DH-59-2

Starting Temperature °C: 360

Softening Temperature °C: 401

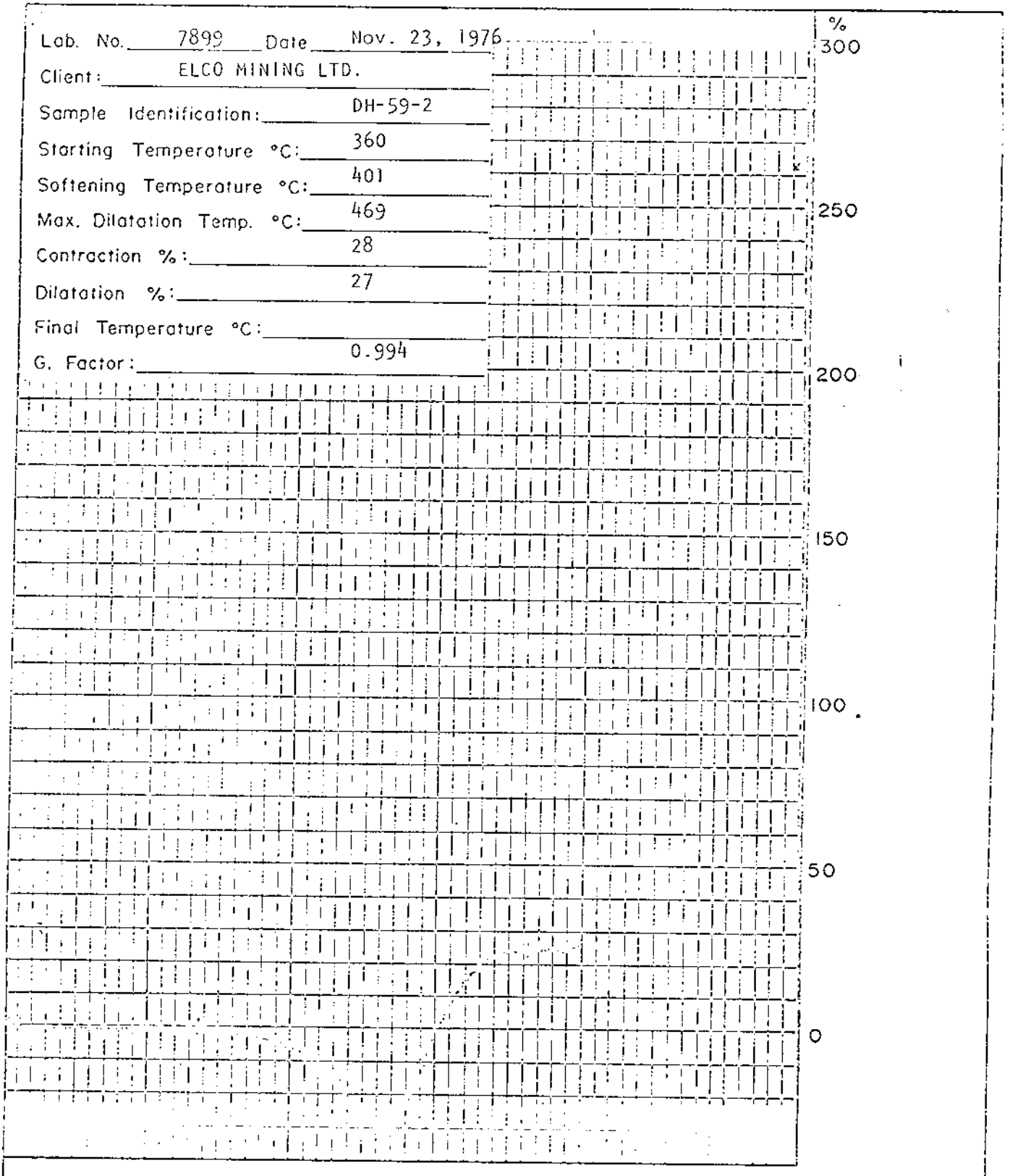
Max. Dilatation Temp. °C: 469

Contraction %: 28

Dilatation %: 27

Final Temperature °C:

G. Factor: 0.994



BIRTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. 7900 Date Nov. 23, 1976

Client: ELCO MINING LTD.

Sample Identification: DH-59-3

Starting Temperature °C: 360

Softening Temperature °C: 416

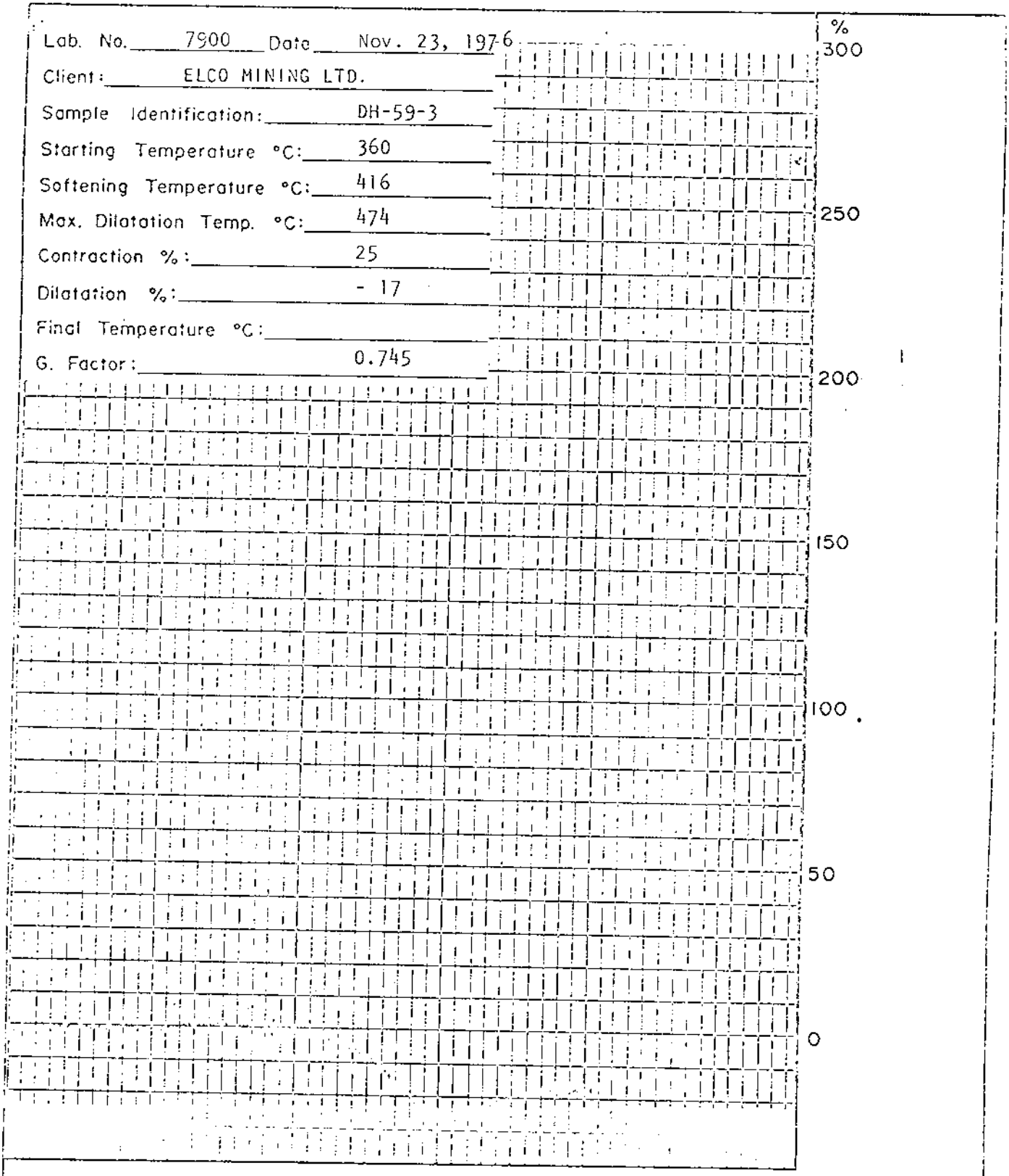
Max. Dilatation Temp. °C: 474

Contraction %: 25

Dilatation %: - 17

Final Temperature °C:

G. Factor: 0.745



BIRTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. 7901 Date Nov. 24, 1976

Client: ELCO MINING LTD.

Sample Identification: DH-59-4

Starting Temperature °C: 360

Softening Temperature °C: 406

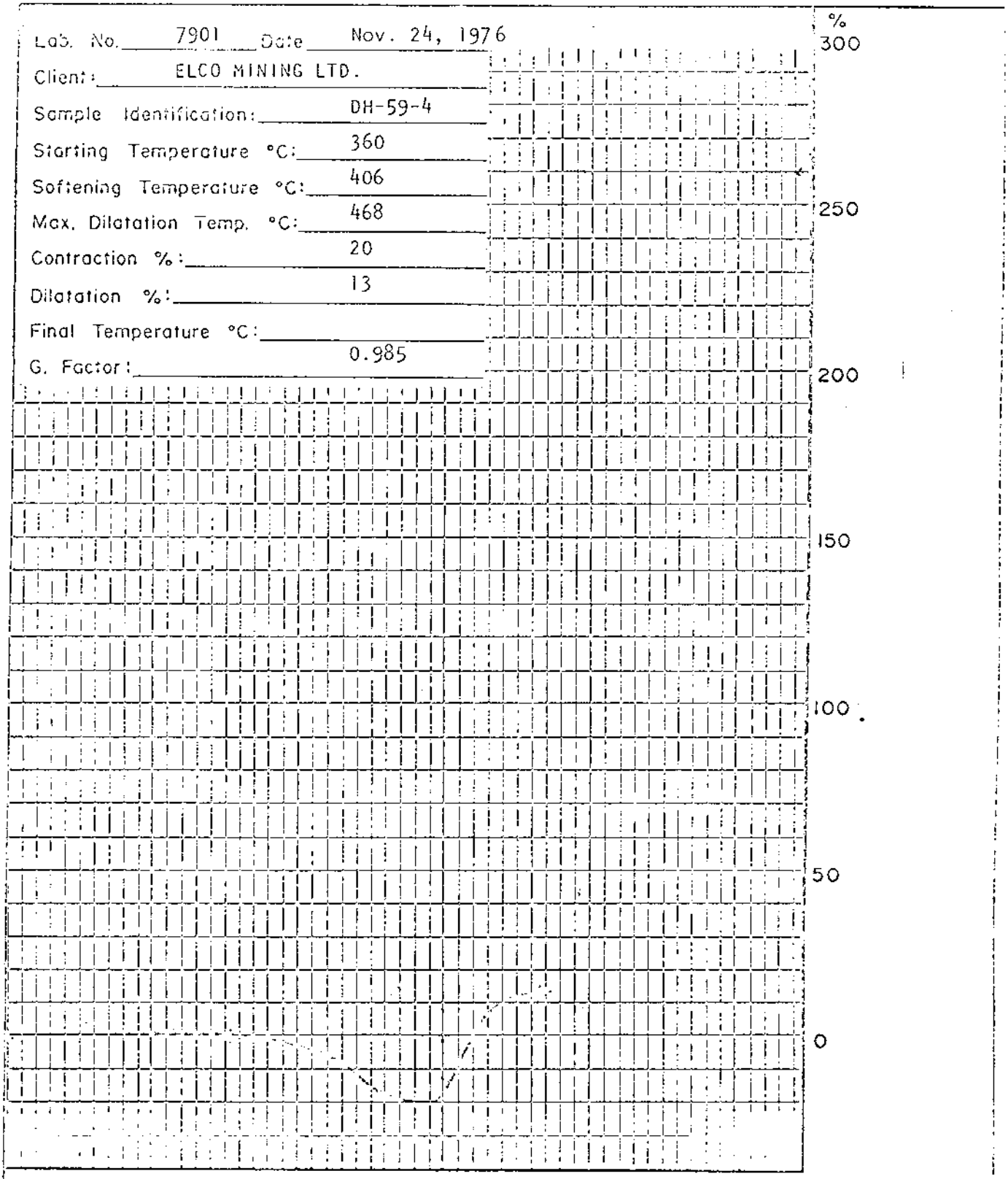
Max. Dilatation Temp. °C: 468

Contraction %: 20

Dilatation %: 13

Final Temperature °C:

G. Factor: 0.985



BIRTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. 7903 Date Nov. 23, 1976

Client: ELCO MINING LTD.

Sample Identification: DH-59-6

Starting Temperature °C: 360

Softening Temperature °C: 397

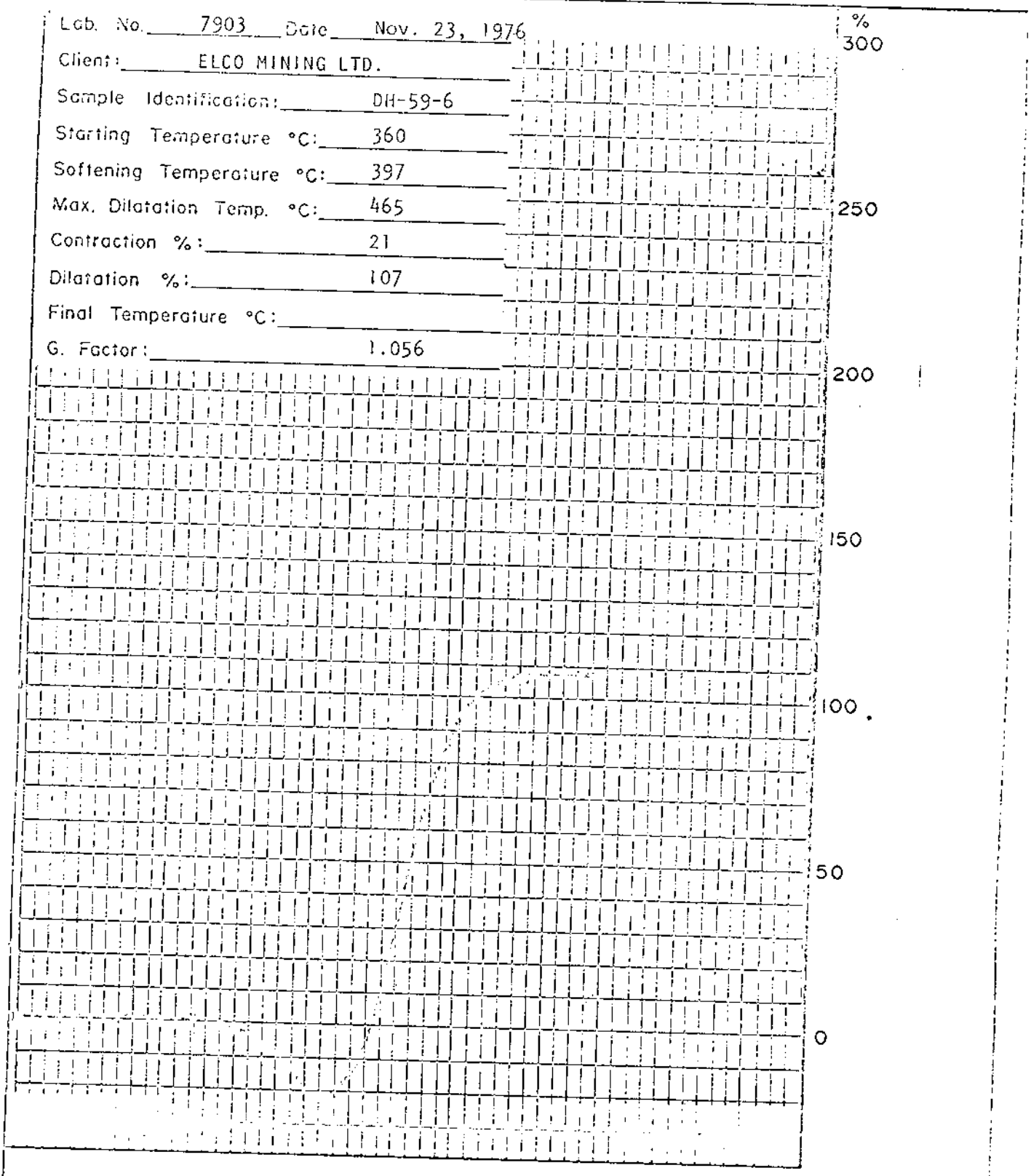
Max. Dilatation Temp. °C: 465

Contraction %: 21

Dilatation %: 107

Final Temperature °C:

G. Factor: 1.056



BIRTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. 7939 Date Jan 10, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-60-1

Starting Temperature °C: 350

Softening Temperature °C: 407

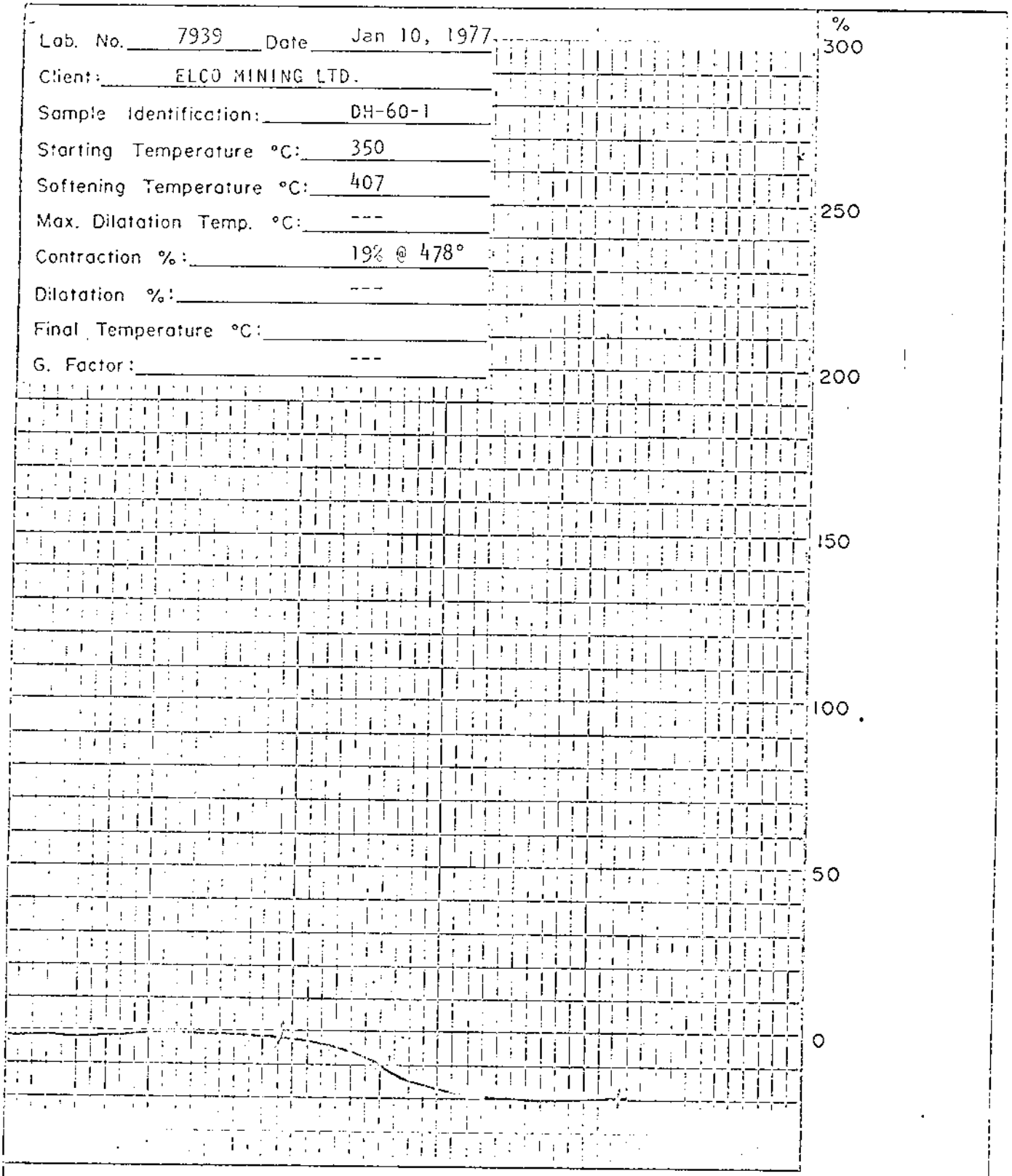
Max. Dilatation Temp. °C: ---

Contraction %: 19% @ 478°

Dilatation %: ---

Final Temperature °C:

G. Factor: ---



BIRTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. 7940 Date Jan. 10, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-60-2

Starting Temperature °C: 350

Softening Temperature °C: 403

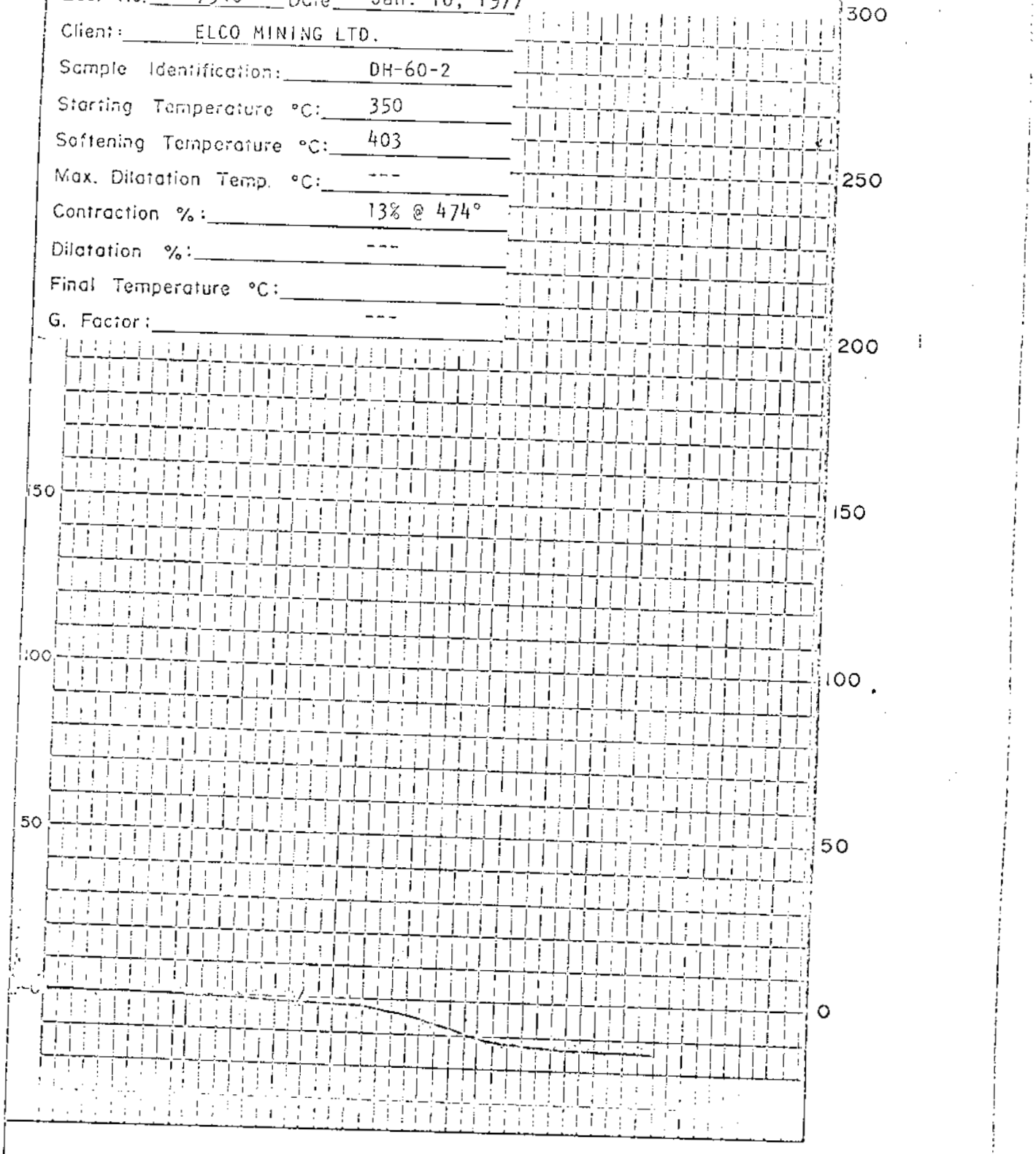
Max. Dilatation Temp. °C: ---

Contraction %: 13% @ 474°

Dilatation %: ---

Final Temperature °C:

G. Factor: ---



BIRTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. 7941 Date Jan. 10, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-60-3

Starting Temperature °C: 350

Softening Temperature °C: 382

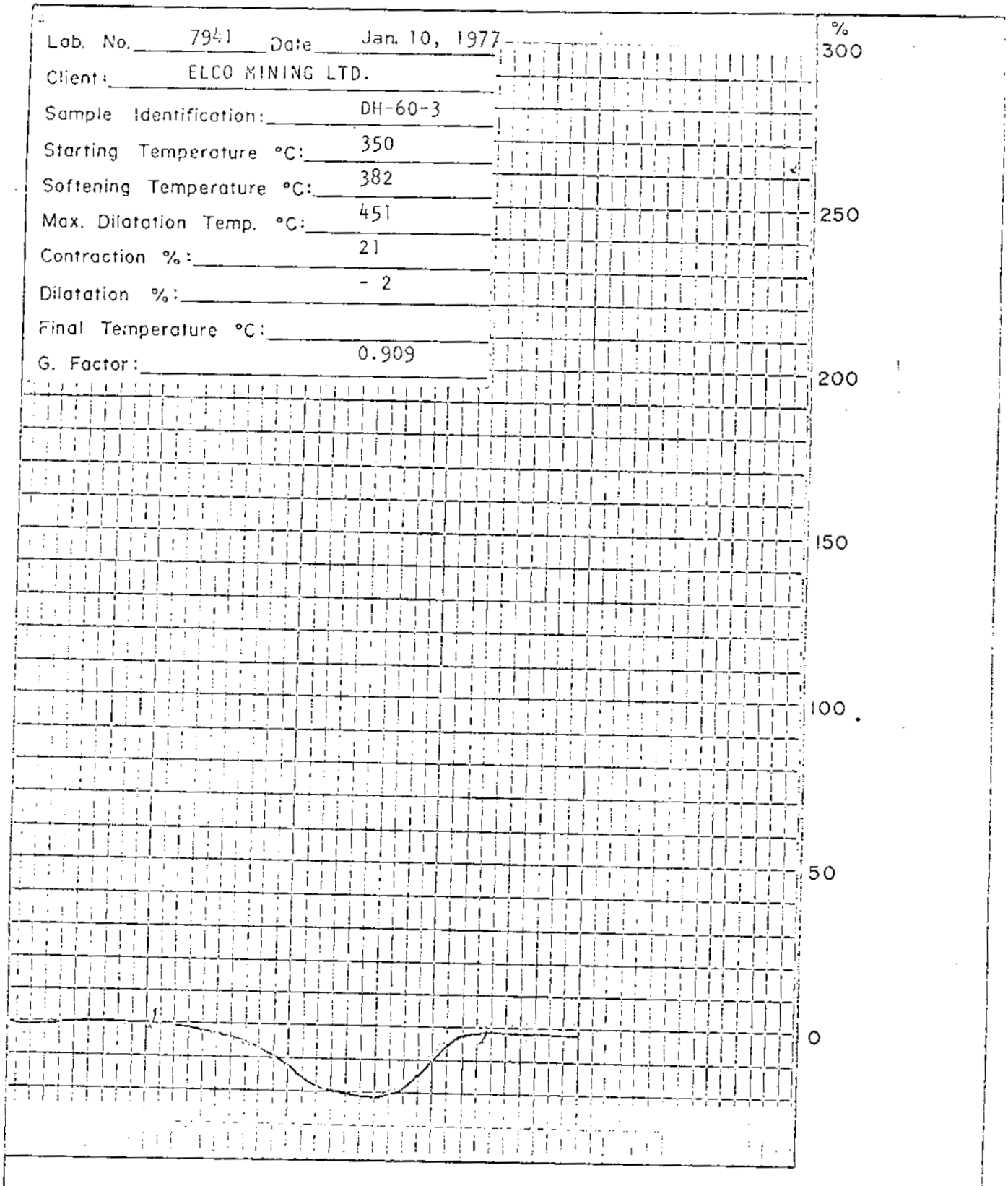
Max. Dilatation Temp. °C: 451

Contraction %: 21

Dilatation %: - 2

Final Temperature °C:

G. Factor: 0.909



BIRTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. 7942 Date Jan 10, 1977

Client: ELCO MINING LTD.

Sample Identification: DH-60-4

Starting Temperature °C: 350

Softening Temperature °C: 410

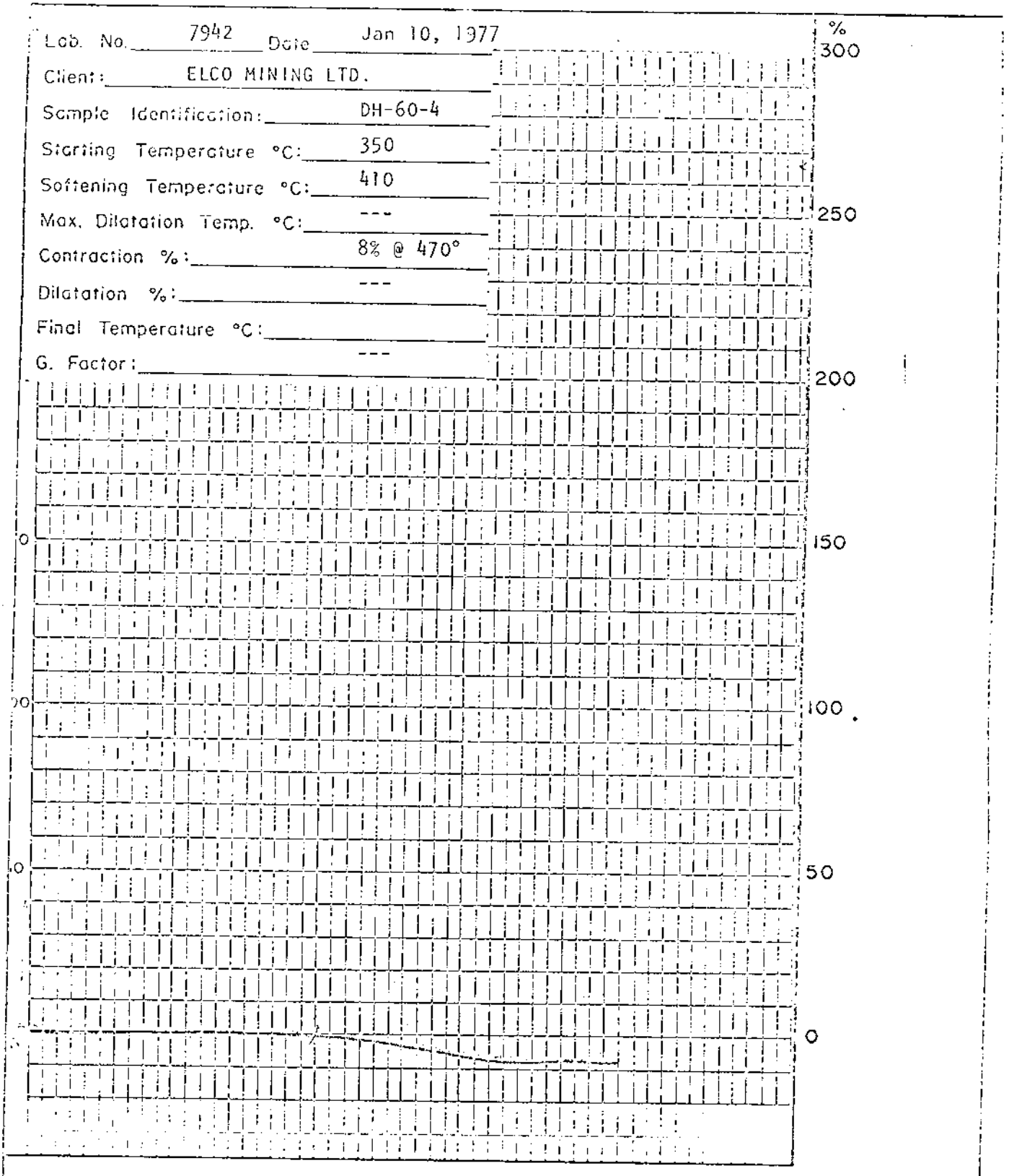
Max. Dilatation Temp. °C: ---

Contraction %: 8% @ 470°

Dilatation %: ---

Final Temperature °C: ---

G. Factor:



BARTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn

Lab. No. 7943 Date Jan 10, 1976.

Client: ELCO MINING LTD.

Sample Identification: DH-60-5

Starting Temperature °C: 350

Softening Temperature °C: 397

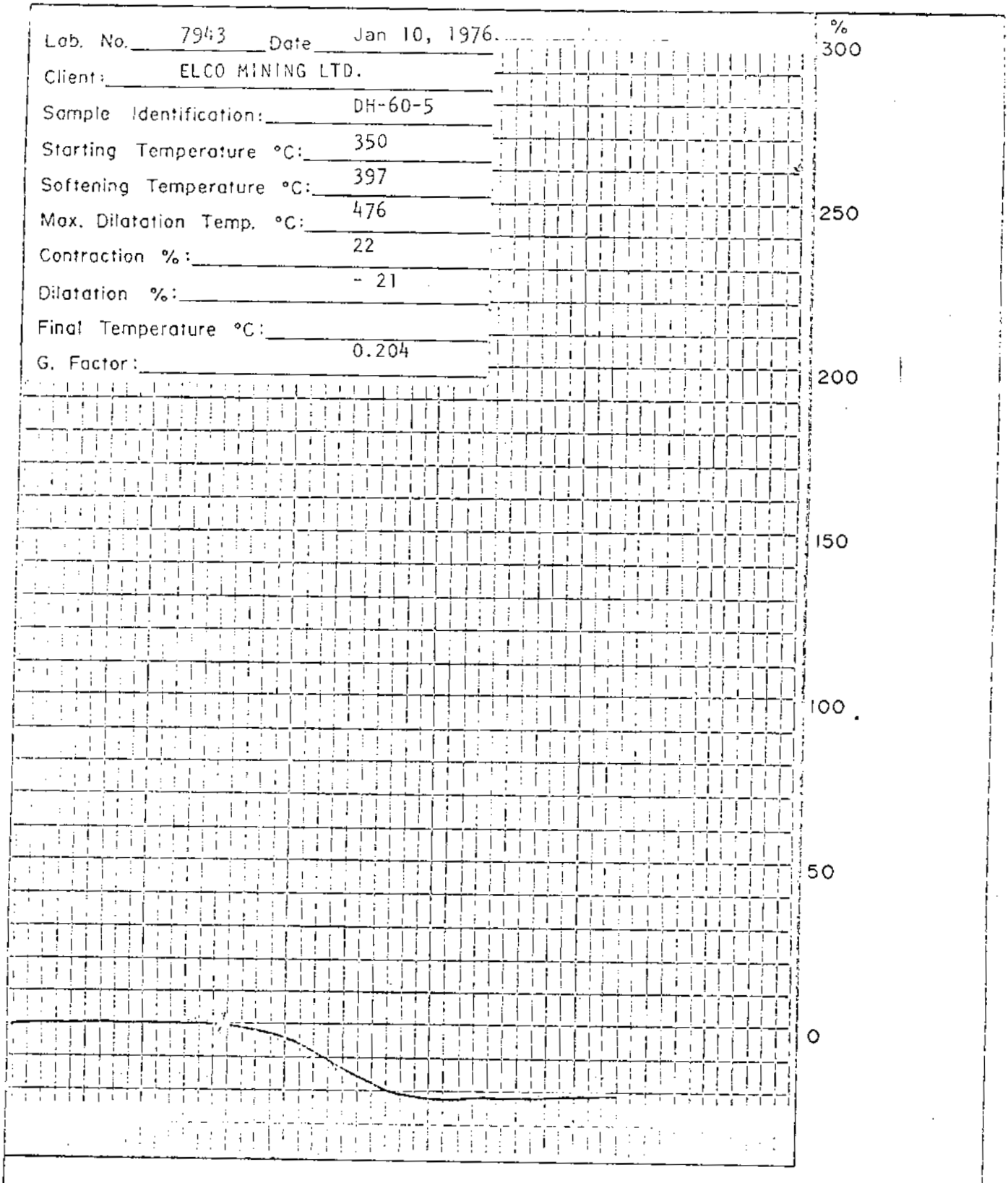
Max. Dilatation Temp. °C: 476

Contraction %: 22

Dilatation %: - 21

Final Temperature °C:

G. Factor: 0.204



BIRTLEY ENGINEERING (CANADA) LTD.

Title

RUHR DILATOMETER TEST

Date

Drawn