

and reduction of area

Let  $L$  be the original length of the sample — say 10"

Let  $L_1$  be the length of the broken sample

Let  $A$  be the original area of the sample — say  $1\frac{1}{2} \times \frac{1}{2}$ .

Let  $A_1$  be the area of the sample at the point of fracture after it is broken

Then Per Centage of elongation =  $\frac{(L_1 - L)}{L} 100$

Per centage of reduction of area =  $\frac{(A - A_1)}{A} 100$

I trust that these few rough notes and tables may be of use to some of my friends in Japan. If they are I shall be fully compensated for the trouble I have taken in their preparation. Should any gentleman require any further explanation of my letter I shall have pleasure in giving it.

○西字新聞抄譯

空中索道

ロイヤルソートヤネー

歐洲諸國ニテ空中索道ノ設置漸ク盛ニシテ實ニ目下運搬諸法中一便



IRON PLATES

Number of Experiment	Width of Sample in inches	Thickness of Sample in inches	Area of sample in square inches	Length of sample in inches between datum points	Elastic limit of iron in tons per square inch	Breaking stress of iron in tons per square inch	Per centage of elongation of broken sample	Per centage of reduction of area of iron at point of fracture	Where tested	Description of iron tested	Remarks
33			1.048	10	14.50	21.68	7.5	8.30	London	Plate 1" thick	
34			.991	10	13.72	18.16	7.0	3.94	London	— <del>1/16</del> —	Local flaw — 5 per cent crystalline iron.
35			.9452	6		21.59	10.4	10.2	Darlington	— <del>1/16</del> —	This is taken from same plate as No 34. Not broken
36			.876	10	15.98	23.11	7.0	8.9	London	— <del>1/16</del> —	25 per cent crystalline iron.
37	1.138	7.703	.800	8	12.19	23.83	5.0		London	— <del>1/16</del> —	69 per cent crystalline iron — local flaw.
38			.641	10	14.04	23.04	11.2	12.95	London	— <del>1/16</del> —	Taken from same plate as No 74 cross grain test.
39			.628	10	14.81	22.13	7.2	3.98	London	— <del>1/16</del> —	
40	1.73	.585	1.012	10		24.16	14.18		Glasgow	— <del>1/16</del> —	
41	1.73	.59	1.02	10		23.43	9.7		Glasgow	— <del>1/16</del> —	
42				10		23.01	13.33		Dublin	— <del>1/16</del> —	
43	1.47	.615	.904	8		22.88	13.7		Glasgow	— <del>1/16</del> —	
44	1.47	.615	.904	8		23.03	13.2		Glasgow	— <del>1/16</del> —	
45	1.212	.518	.628	10	14.59	21.73	7.5	8.9	London	— <del>1/16</del> —	All fibrous iron.
46			.531	10	15.07	24.2	10.76	10.16	London	— <del>1/16</del> —	40 per cent crystalline iron.
47	1.74	.49	.852	10		22.94	14.5		Glasgow	— <del>1/16</del> —	
48	1.73	.49	.847	10		22.96	12.2		Glasgow	— <del>1/16</del> —	
49				10		22.95	13.83		Dublin	— <del>1/16</del> —	
50	1.25	.475	.593	10		25.29	13.5		Glasgow	— <del>1/16</del> —	
51	1.212	.385	.467	10	14.61	24.65	13.0	13.9	London	— <del>1/16</del> —	20 per cent crystalline iron.
52	2.052	.385	.79	10	16.53	23.37	11.2	15.3	London	— <del>1/16</del> —	All fibrous iron.
53	2.228	.383	.853	10	16.82	22.99	10.0	15.4	London	— <del>1/16</del> —	All fibrous iron.
54			.401	10	14.96	21.8	7.2	11.47	London	— <del>1/16</del> —	All fibrous iron.
55			.418	10	14.35	25.07	9.0	9.69	London	— <del>1/16</del> —	50 per cent crystalline iron.
56	1.74	.365	.635	10		23.62	8.0		Glasgow	— <del>1/16</del> —	
57	1.32	.352	.464	10		23.51	6.4		Glasgow	— <del>1/16</del> —	
58	1.74	.353	.614	10		23.45	9.1		Glasgow	— <del>1/16</del> —	
59	1.46	.395	.576	8		24.21	6.6		Glasgow	— <del>1/16</del> —	Taken from same plate as No 81 cross grain test.
60	1.46	.39	.569	8		24.88	9.5		Glasgow	— <del>1/16</del> —	
61	1.154	.305	.352	8	12.4	23.95	10.4	14.4	London	— <del>1/16</del> —	All fibrous iron.
62			.323	10	14.55	22.07	4.0	7.12	London	— <del>1/16</del> —	5 per cent crystalline iron.
63			.314	10	15.92	22.93	8.0	8.25	London	— <del>1/16</del> —	
64			.324	10	17.75	22.65	4.5	6.79	London	— <del>1/16</del> —	40 per cent crystalline iron.

Number of experiment	Width of sample in inches	Thickness of sample in inches	Area of sample in square inches	Length of sample in inches between datum points	Elastic limit of iron in tons per square inch	Breaking stress of iron in tons per square inch	Per centage of elongation of broken sample	Per centage of reduction of area of iron at point of fracture	Where Tested	Description of iron tested	Remarks
65	1.45	.62	.899	8	22.12	11.2			Glasgow	plate $\frac{3}{8}$ thick	Long plate 2''-0'' wide same plate as No 73 cross grain test.
66	1.45	.62	.899	8	23.05	11.2			Glasgow	— $\frac{3}{8}$ —	
67	1.48	.51	.754	8	23.50	10.6			Glasgow	— $\frac{1}{2}$ —	Same plate as No 77 cross grain test
68	1.58	.51	.754	8	21.83	9.3			Glasgow	— $\frac{1}{2}$ —	
69	1.46	.365	.54	8	22.82	7.5			Glasgow	— $\frac{3}{8}$ —	Long plate 1''-8'' wide; — Same plate as No 79 Cross grain test.
70	1.47	.37	.543	8	22.88	9.2			Glasgow	— $\frac{3}{8}$ —	— do — do — „ „ „ 79 „ „ „
71	1.47	.355	.521	8	21.37	9.3			Glasgow	— $\frac{3}{8}$ —	Plate 3''-4'' wide „ „ „ 80 „ „ „
72	1.475	.365	.538	8	21.81	9.0			Glasgow	— $\frac{3}{8}$ —	„ do — „ „ „ 80 „ „ „

PLATES TESTED AT RIGHT ANGLES TO THEIR FIBRE OR GRAIN

73	1.48	.62	.917	8	17.54	1.6			Glasgow	plate $\frac{3}{8}$ thick	
74			.636	10	14.78	18.87	3.4	4.08	London	— $\frac{3}{8}$ —	
75			.6223	6		20.09	3.125		Darlington	— $\frac{1}{2}$ —	
76			.6579	6		19.2	3.125		Darlington	— $\frac{1}{2}$ —	
77	1.25	.51	.632	8	17.08	2.0			Glasgow	— $\frac{1}{2}$ —	
78	1.47	.365	.536	8	19.68	.062			Glasgow	— $\frac{3}{8}$ —	
79	1.47	.36	.529	8	18.99	2.7			Glasgow	— $\frac{3}{8}$ —	
80	1.47	.365	.536	8	20.12	4.7			Glasgow	— $\frac{3}{8}$ —	
81	1.45	.393	.572	8	19.73	.062			Glasgow	— $\frac{3}{8}$ —	
82			.4725	6	20.1	4.67			Darlington	— $\frac{3}{8}$ —	

TEE IRON T

Number of experiment	Width of sample in inches	Thickness of sample in inches	Area of sample in square inches	Length of sample in inches between datum points	Elastic limit of iron in tons per square inch	Breaking stress of iron in tons per square inch	Per centage of elongation of broken sample	Per centage of reduction of area of iron at point of fracture	Where Tested	Description of Iron Tested	Remarks
83	1.17	.49	.573	8		24.945	13.625		London	6 × 3 × ½ Tee iron	
84	1.13	.49	.553	8		23.78	17.625		London	6 × 3 × ½ Tee iron	
85	1.13	.49	.553	8		23.236	12.625		London	6 × 3 × ½ Tee iron	
86	1.26	.49	.6174	6		25.1	25.0	25.0	Darlington	6 × 3 × ½ „ „	All silky fibrous iron
87				10		23.5	11.00		Dublin	6 × 3 × ½ „ „	
88	1.212	.38	.461	10	15.12	23.83	20.7	15.6	London	6 × 2½ × ⅜ „ „	20 per cent crystalline iron
89			.507	10	14.6	24.26	17.12	18.15	London	5 × 3 × ½ „ „	40 per cent crystalline iron

FLAT BAR IRON

90	2.133	.605	1.291	10	14.77	23.43	13.7	13.9	London	12 × ½ for	70 per cent crystalline iron
91	2.122	.608	1.29	10	16.59	23.59	9.2	11.2	London	12 × ⅝ „	60 per cent crystalline iron
92	2.152	.62	1.334	10	14.0	19.3	4.1		London	10 × ⅝ „	There was a local flaw in this sample
93	2.036	.629	1.281	10	14.78	22.14	7.1		London	10 × ⅝ „	Laminated
94	1.485	.62	.92	10	11.83	22.8	11.8	16.8	London	10 × ⅝ „	
95	1.713	.618	1.059	10	10.33	23.5	16.8	21.1	London	10 × ¾ „	
96				10		24.0	11.66		Dublin	6 × ½ „	
97	2.196	.866	.804	10	14.25	22.83	9.7	17.1	London	3½ × ⅜ „	Laminated
98	2.614	.515	1.346	10	14.46	22.79	22.0	27.5	London	3½ × ½ „	All fibrous iron
99		.503		10	14.91	23.96	20.2	25.84	London	3 × ½ „	All fibrous iron
100	1.567	.435	.682	10	14.53	22.58	16.9	19.3	London	3 × ⅞ „	
101	1.618	.371	.6	10	15.2	23.05	24.0	29.1	London	3 × ⅝ „	

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 條例ヲ設クルノ必要ヲ見ルニ至レリ獨逸國ニテ鑛山用トシテ製造セ  
 ル綱索ノ三分一餘ハ實ニブライヘルド會社專賣ノ空中索道ニ使用セ  
 ラレブライヘルド會社ハ己レ一手ニテ索道ヲ建設シタルヲ已ニ三百  
 五十線ニ及ヘリト云フ其他全歐各地ニ於テ設置シタルモノ頗ル多シ  
 以テ其盛況ノ一斑ヲ窺フベシ又運搬スヘキ一車ノ重量モ以前ハ七十  
 五斤トカ或ハ百斤位ニ過キサリシカ今日ニテハ千斤ニテモ二千斤ニ  
 テモ之ヲ一車ニ運搬スルヲ得ルノミナラズ架柱ノ距離モ漸ク遠ニ  
 達シ互リ一千尺位ノ河流ニ跨ルヲ困難ナラス運搬ノ如キモ極メテ低  
 廉ナリ今獨逸國ノ一例ヲ示サンニ同國サルブルツ炭山ニテ石炭ヲ索  
 道ニヨリ四哩許ノ距離ニ一日千噸ツ、運搬スルニ其費用ハ僅ニ一噸  
 一哩ニ付キ〇五六セント〔我七厘三毛弱〕ノ割合ニ當レリ云々

(Eng. & Min. Journal.)

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