XYPEX
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T/A XYPEX ACN 050 139 985

FACSIMILE TRANSMISSION FORM

TO XYPEX SYDNEY FACSIMILE NUMBER

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MESSAGE Trial Test As Discussed.

IIRS

Group Manufacturing Technology

Division Construction Industry

Sheet no 1 of 7 sheets + Figs. I, II and III.

An Institiúid Taighde
Tionscail agus Caighdeán

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Confidential
Report

Title "TESTING OF 'XYPEX' CONCRETE WATERPROOFING COMPOUND"

Report ref. R6/2503IG

File no. 53/4.85

Date received

Report by Seamus Kelly

Approved by W. J. Crowe (Dr.

Date 26th July, 1985.

INTRODUCTION:

This report describes the results of comparative water leakage tests carried out at IIRS laboratories on treated and untreated samples of concrete.

A. DESCRIPTION AND SAMPLE PREPARATION:

A.1 "Xypex" concrete waterproofing compound is described in the manufacturer's literature as a mixture of Portland cement, fine silica sand, and active organic chemicals. Ideally, the compound is intended for application to the surface of newly poured concrete; mature concrete must be saturated with water before treatment.

A.2 For the purposes of the test programme, a number of plain concrete slabs were cast at IIRS. The slabs measured 500 mm x 500 mm x 60 mm nominal thickness. The mix used was as follows:-

Cement	:	30 kg
Total Aggregate	:	216 kg
Fine Aggregate	:	72 kg (33%)

This mix was selected from Table 50 of CP 110 : Part 1 : 1972 to give Concrete Grade 10 to 15. Test cubes were cast and crushed after 7 days, giving cube strengths of 9 N/mm^2. The concrete mix was deliberately chosen to produce a relatively low-strength permeable concrete.

A.3 The top surface of the slabs to be treated were brushed down to remove laitance and to provide a rough surface for the application of the "Xypex" compound. The "Xypex" was mixed with water in the proportions of 5 powder to 2 water and applied to the slab surfaces by IIRS personnel using a stiff plastic bristled broom while the concrete was still "green", i.e. between 20 and 72 hours after casting, in accordance with the manufacturer's instructions.

A.4 The treated slabs were covered with damp sacking for a curing period of ten days prior to testing.

B. TEST SET-UP AND RESULTS:

B.1 Treated and untreated samples were set up under 100 mm dia. PVC standpipes which were sealed to the concrete using "Araldite" epoxy resin. The standpipes, which were 5 metres in height, were then filled with water. The rate of leakage through each sample was monitored by measuring the volume of water required to top up the standpipe to a marked level. It was, therefore, possible to obtain a comparison between the rate of leakage through treated and untreated samples under a 5 metre head of water (equivalent to a pressure of 490 mbar) over a period of days.

B.2 Testing of sample pair 1A and 1B commenced 12 days after treatment of sample 1B. Testing of sample pair 2A and 2B commenced 21 days after treatment of sample 2B. Testing of sample pair 3A and 3B commenced 26 days after treatment of sample 3B.

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B.3 Test results are given in Tables 1 and 2 below. These are expressed graphically in Figs. I, II and III.

C. DISCUSSION AND CONCLUSIONS:

C.1 In the case of all three sample pairs, the rate of leakage through the treated samples was significantly lower than through the untreated samples (Tables 1 and Figs. I and II). Leakage through treated samples in the first 24 hours varied from 6% to 11% of that through corresponding untreated samples.

C.2 During the course of the test programme, the heads of the standpipes were covered to minimise evaporation losses. Some leakage may also have occurred at the interface between the epoxy resin sealant and the concrete. While the amount of such leakage is not quantifiable, its effect on the apparent rate of leakage would be more significant in the case of the treated samples because of the much smaller volume involved. The leakage rate decreased with time in both treated and untreated samples.

C.3 The ratio between leakage rates of treated and untreated samples also decreased with time (see Table 2 and Fig. II); from 5.9% to 3.2% after 169 hours in the case of sample pair 1A and 1B and from 11.3% to 5.5% after 379 hours in the case of sample pair 3A and 3B.

C.4 It can therefore be concluded that:

(a) the application of "Xypex" waterproofing compound results a significant improvement in the resistance to water penet of the concrete slabs tested under a head of 5 metres of wat (490 mbar pressure).

(b) Comparative tests illustrated that the relative performance of the treated samples vis-a-vis the untreated samples improved further with time.

ABOUT THE INSTITUTE

IIRS was established by Dail Eireann as a statutory body by the Industrial Research and Standards Act, 1946, and was reconstituted by an amending Act of 1961. Its principal functions are to encourage and assist the use of science and technology in industry by research and development, consultancy and advisory work, investigation and testing, formulation of Standards and by providing a national technical information service.

The Institute is financed mainly by a grant-in-aid from the Minister for Industry and Energy and the Board is appointed by him. About one-third of operating revenue is derived from client fees. Staff employed is about 600, approximately one-third professional, one-third technician and one-third support staff.

Concrete Technology Department

Services
Assistance to the construction industry in its day-to-day production and building programmes, with emphasis on providing solutions to immediate or short term problems.

Concrete Technology
- technical consultancy and investigation
- quality assurance and control
- concrete mix and block design
- aggregate grading and evaluation
- concrete core cutting and testing
- on site structural testing
- laboratory analysis and testing
- provision of 'techno-paks' (comprehensive manufacturing specifications) to precast manufacturers.

TABLE 1 MEASURED LEAKAGE RATES

SAMPLE	LEAKAGE (mls)	TIME INCREMENT (hrs)	LEAKAGE RATE (mls/hr)
1A (untreated)	3200	26	123.1
	2030	23	88.3
	5550	120	46.3
1B (treated)	190	26	7.3
	100	23	4.3
	180	120	1.5
2A (untreated)	2870	72	39.9
2B (treated)	210	72	2.9
3A (untreated)	1590	24	66.3
	1110	24	46.3
	2280	72	31.7
	1000	45	22.2
	510	24	21.3
	490	27	18.2
	1170	67	17.5
	1460	96	15.2
3B (treated)	180	24	7.5
	100	24	4.2
	210	72	2.9
	110	45	2.4
	40	24	1.7
	20	27	0.7
	80	67	1.2
	80	96	0.8

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TABLE 2: COMPARISON OF LEAKAGE RATES

SAMPLE PAIRS	TOTAL ELAPSED TIME (hrs)	LEAKAGE RATE A	LEAKAGE RATE B	B/A
1A, 1B	26	123.1	7.3	5.9%
	49	88.3	4.3	4.9%
	169	46.3	1.5	3.2%
2A, 2B	72	39.9	2.9	7.3%
3A, 3B	24	66.3	7.5	11.3%
	48	46.3	4.2	9%
	120	31.7	2.9	9.2%
	165	22.2	2.4	11%
	189	21.3	1.7	7.8%
	216	18.2	0.7	4.1%
	283	17.5	1.2	6.8%
	379	15.2	0.8	5.5%

FIG. 1

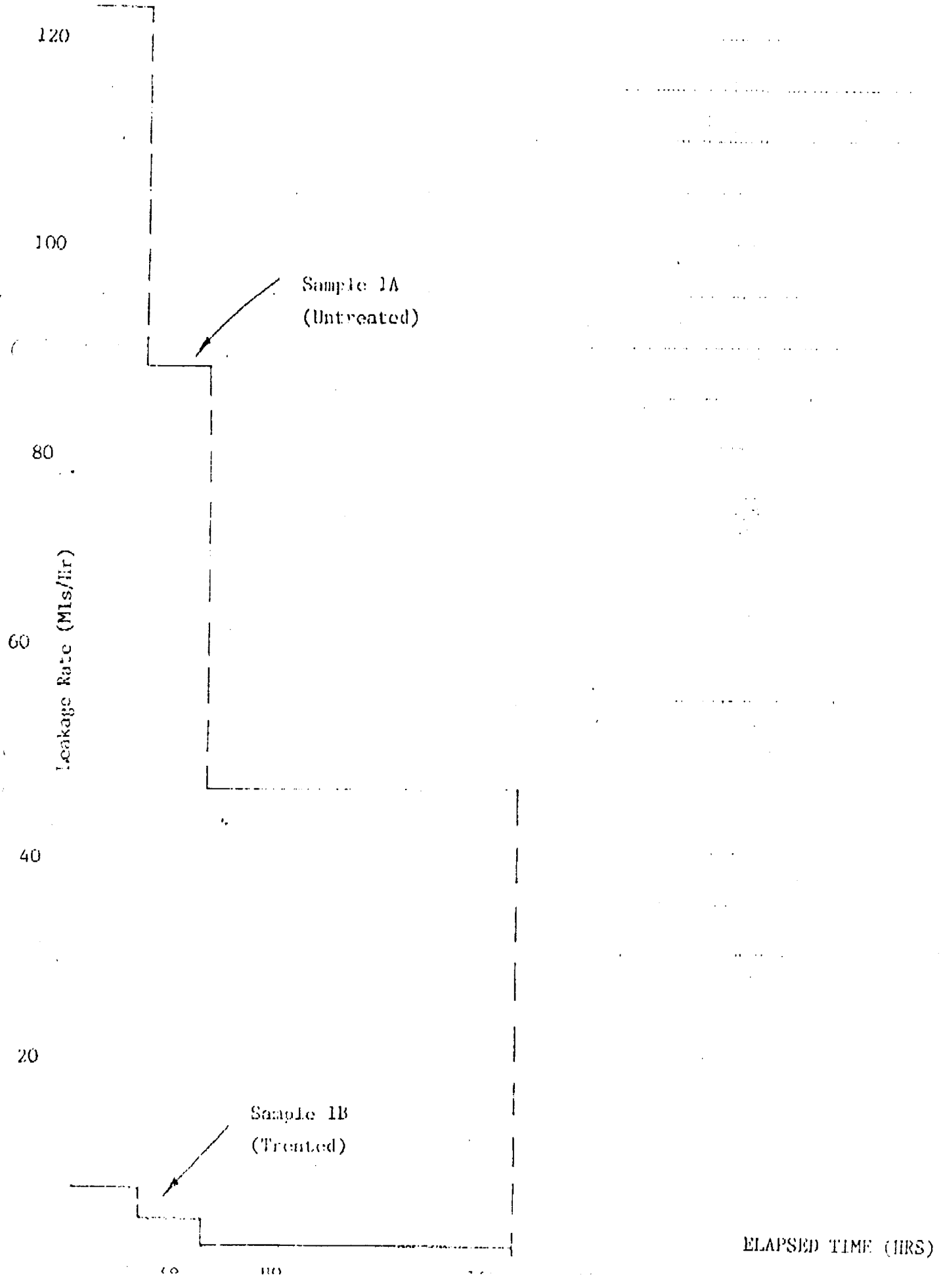
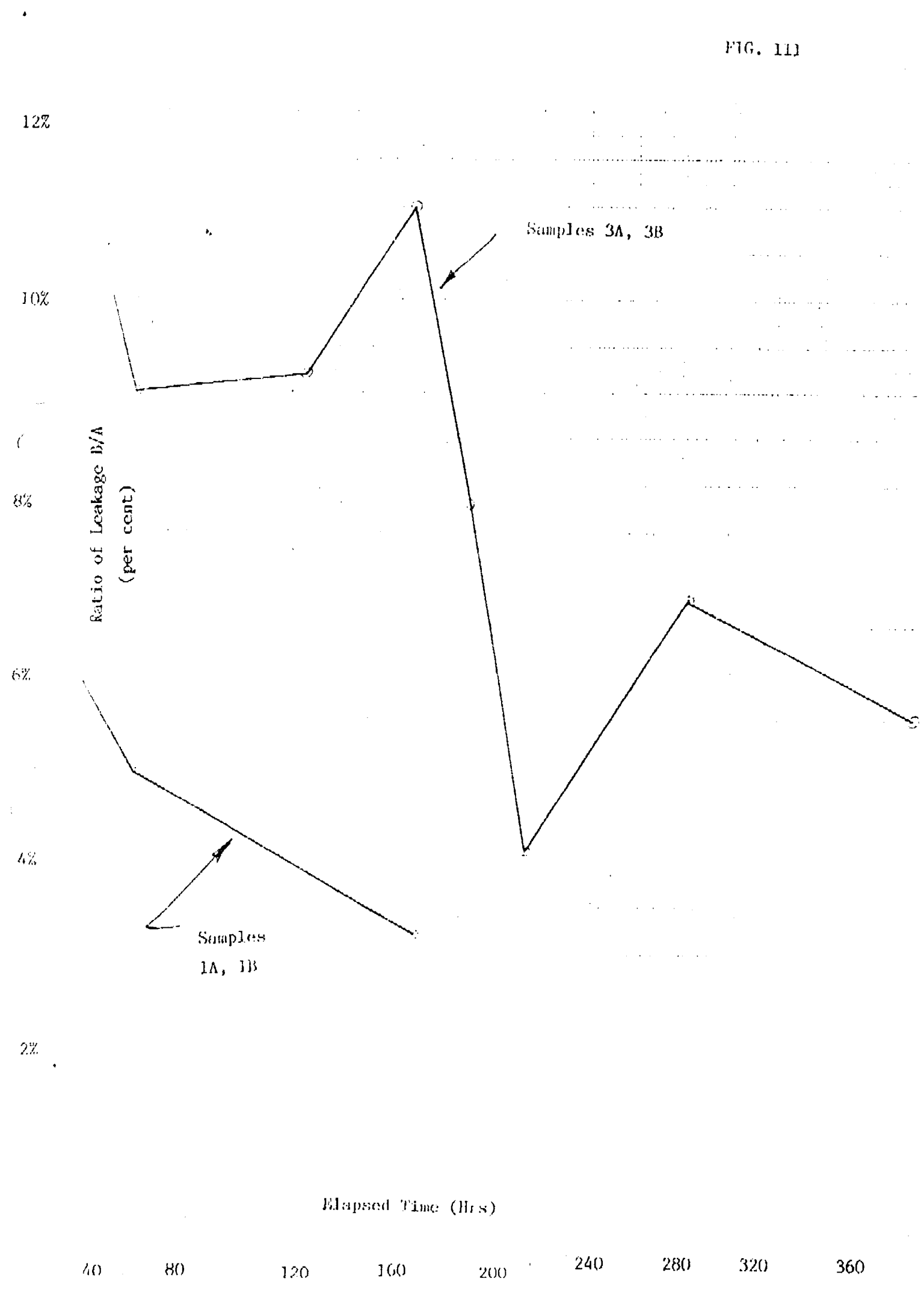

120
100
80
60
40
20
Leakage Rate (Mls/Hr)
Sample 1A
(Untreated)
Sample 1B
(Treated)
ELAPSED TIME (HRS)

FIG. 11


12%
10%
8%
6%
4%
2%
Ratio of Leakage B/A
(per cent)
Samples 3A, 3B
Samples
1A, 1B
Elapsed Time (Hrs)
40
80
120
160
200
240
280
320
360