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TITLE: Bomb Pressure Measurements

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CONFIDENTIAL TO: Industrial Research Limited
and Filtercorp International Limited

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1 Introduction

Industrial Research Limited was requested by Filtercorp, on 5 April 2007, to carry out a series of pressure measurements of a bomb exploding inside a pressure vessel. The purpose of these measurements was to validate the design of Filtercorp's new Seeflex040 couplings. A total of 10 bombs were exploded to test both a clear Seeflex 040 coupling and a Kevlar Seeflex 040 coupling.

2 Methodology and Equipment

A PCB 113A26 ballistic pressure transducer was selected for the experiment due to its extremely short rise and response time. The output signal from the transducer was conditioned using a PCB Charge Amplifier and logged at 20kHz with a National Instruments data acquisition system. Table 1 lists the equipment and serial numbers. The pressure transducer was located at the top ring of the test unit and mounted in a specially manufactured fitting. The data was not filtered.

Table 1: Equipment and serial numbers

Item	Serial numbers
PCB 113A26 pressure transducer	12567
PCB 483A02 charge amplifier	987
National instruments DAQ card "E series" 20ks/s	188035B-01
Laptop, Toshiba P5432A-3N152	3001218J
BNC 2090 connector box	CB2369

3 Results

A total of 10 tests were conducted, five on Seeflex 040 couplings and five on Seeflex 040 Kevlar couplings. The couplings were provided by Filtercorp. The bomb sizes were increased for the Kevlar couplings. Table 2 shows the results from these tests. All of the couplings remained intact after testing.

Table 2: Results of testing

Coupling Type	Bomb Size (grams)	Peak pressure (kPa)	Result
Seeflex 040_1	50 g	54.3	Intact
Seeflex 040_2	50 g	54.6	Intact
Seeflex 040_3	50 g	58.8	Intact
Seeflex 040_4	50 g	52.3	Intact
Seeflex 040_5	50 g	53.5	Intact
Seeflex 040 Kevlar_1	100g	117.7	Intact
Seeflex 040 Kevlar_2	100g	132.2	Intact
Seeflex 040 Kevlar_3	100g	136.3	Intact
Seeflex 040 Kevlar_4	100g	107.9	Intact
Seeflex 040 Kevlar_5	100g	138.4	Intact

Figures 1-5 show the results from the tests of the Seeflex 040 couplings.

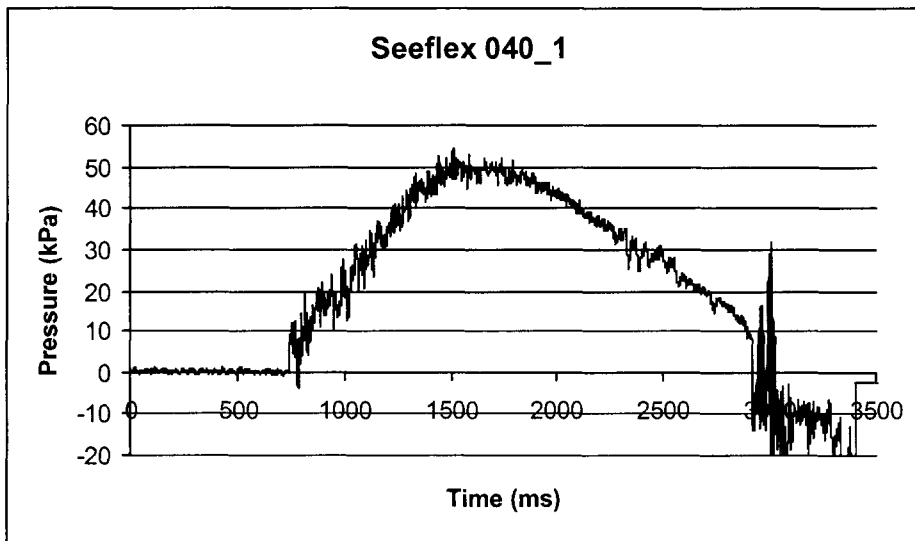


Figure 1: 50 gram bomb, Seeflex 040 coupling 1

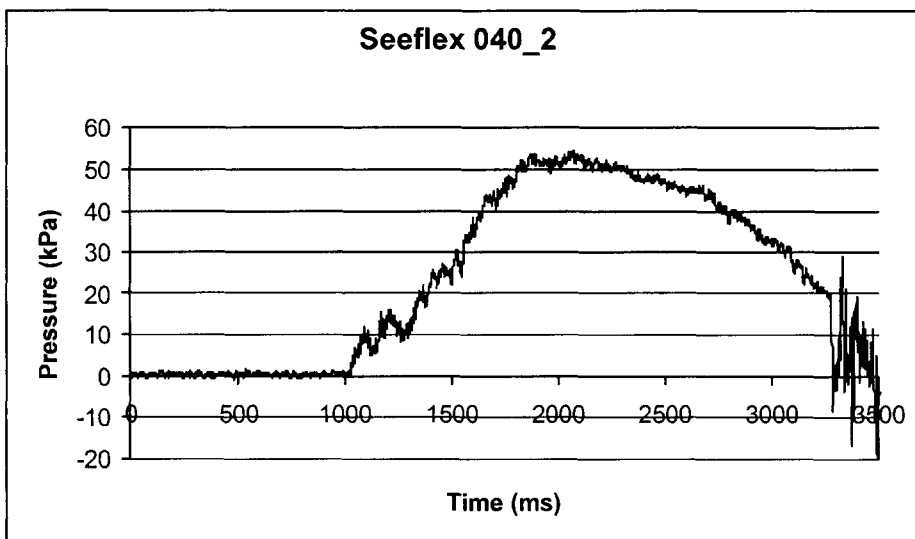


Figure 2: 50 gram bomb, Seeflex 040 coupling 2

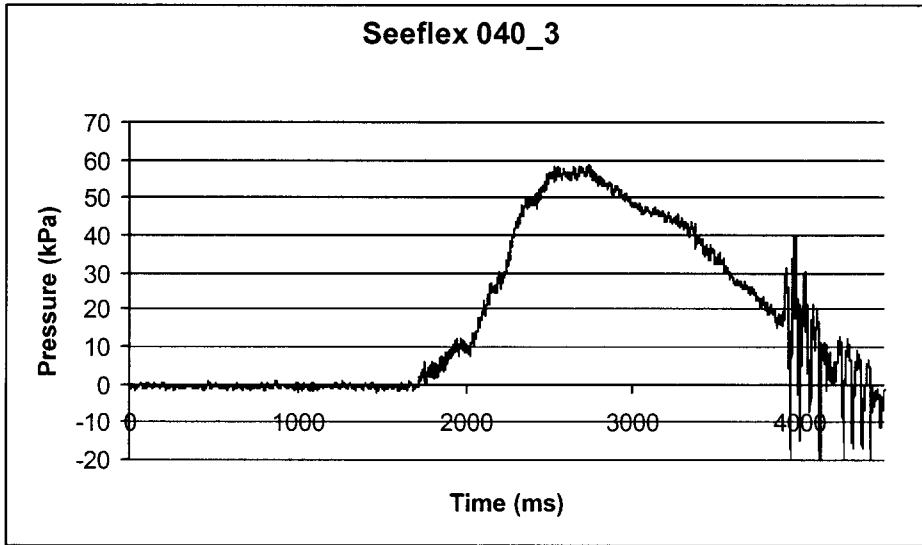


Figure 3: 50 gram bomb, Seeflex 040 coupling 3

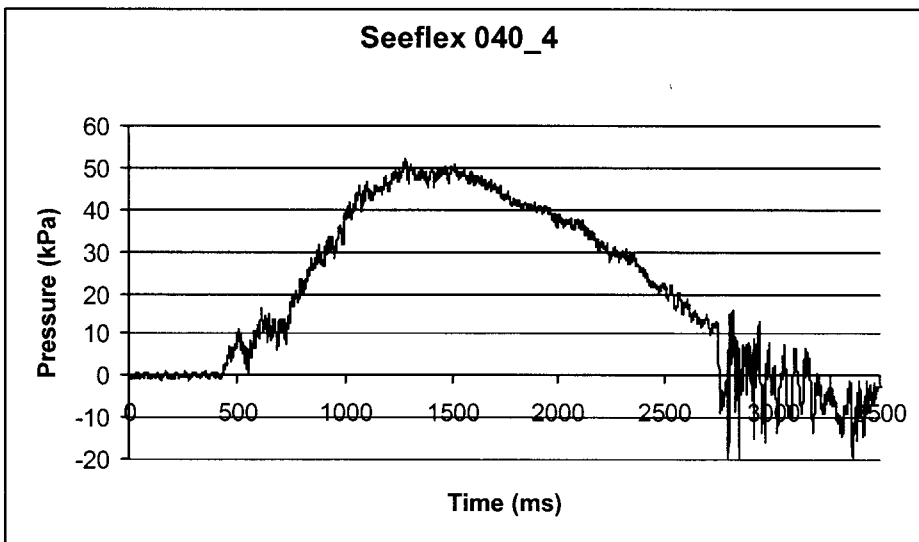


Figure 4: 50 gram bomb, Seeflex 040 coupling 4

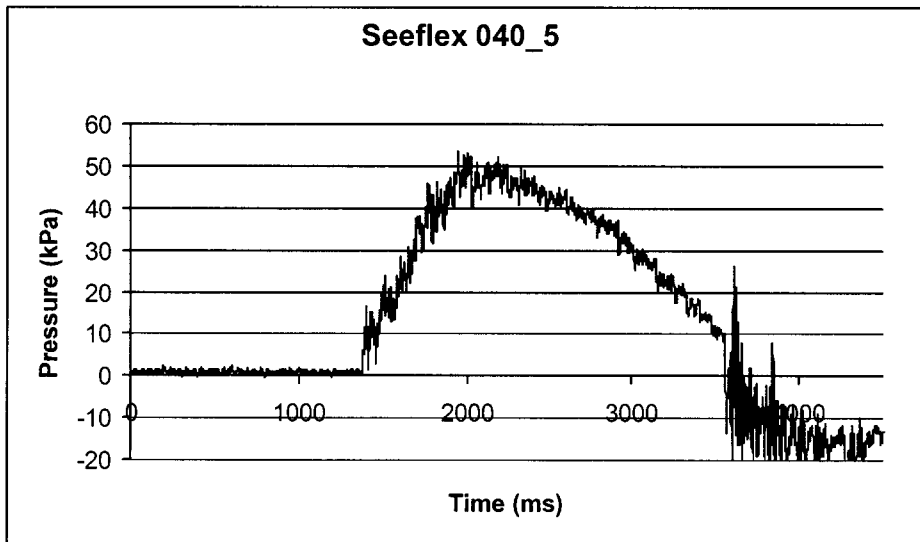


Figure 5: 50 gram bomb, Seeflex 040 coupling 5

Figures 6-10 show the results from the tests of the Seeflex 040 Kevlar couplings.

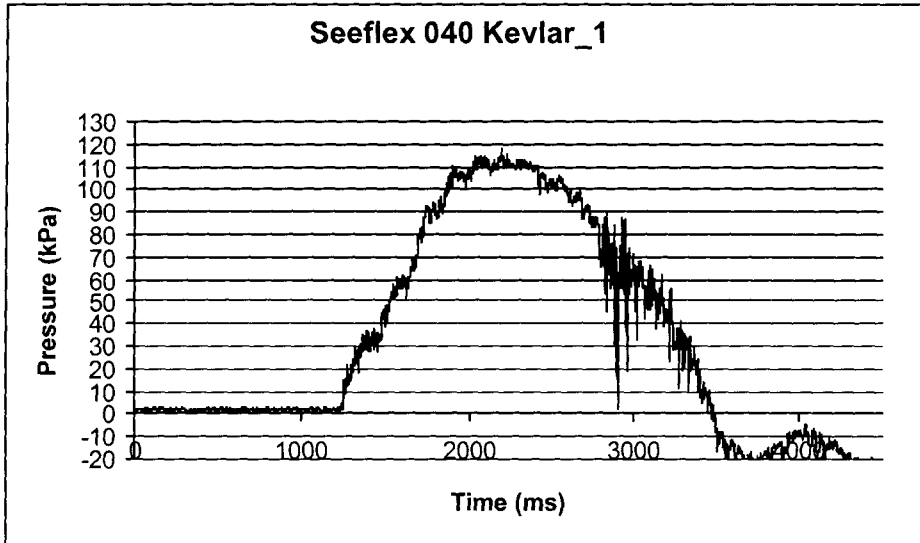


Figure 6: 100 gram bomb, Seeflex 040 Kevlar coupling 1

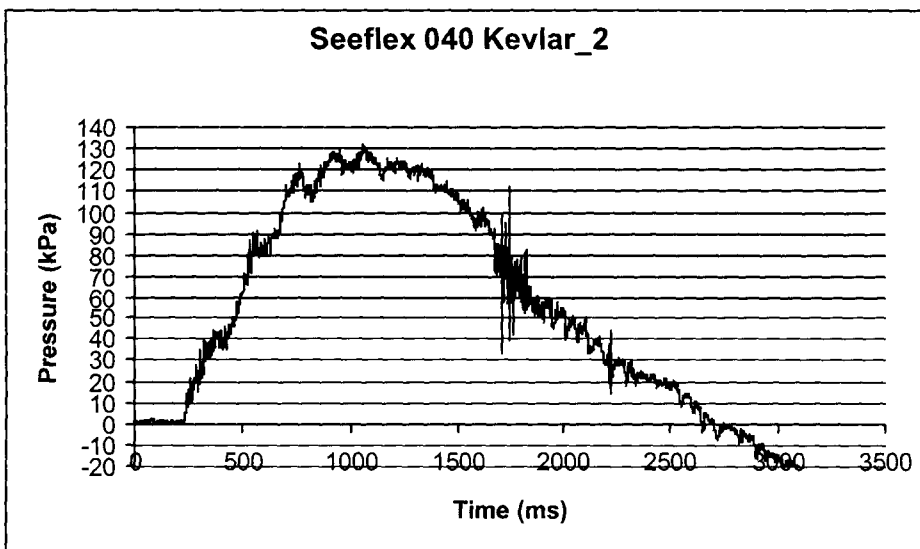


Figure 7: 100 gram bomb, Seeflex 040 Kevlar coupling 2

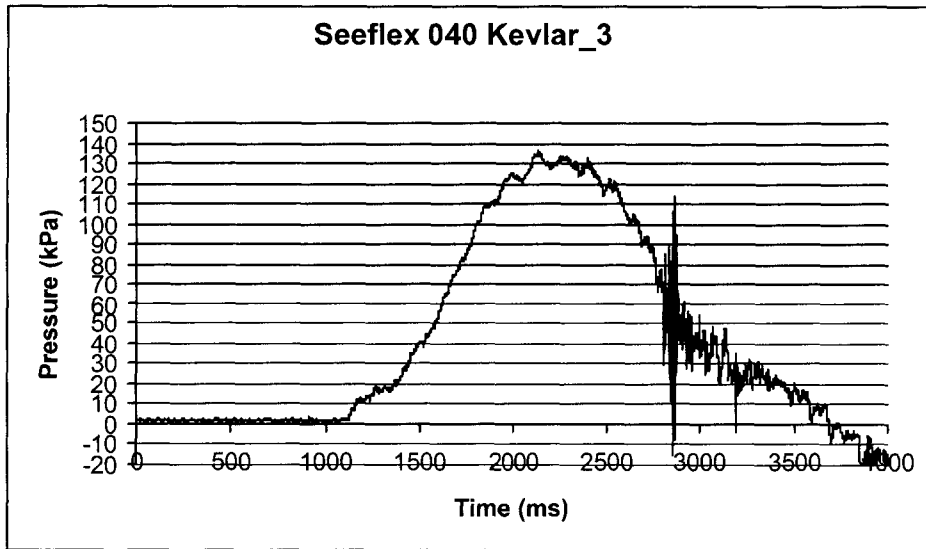


Figure 8: 100 gram bomb, Seeflex 040 Kevlar coupling 3

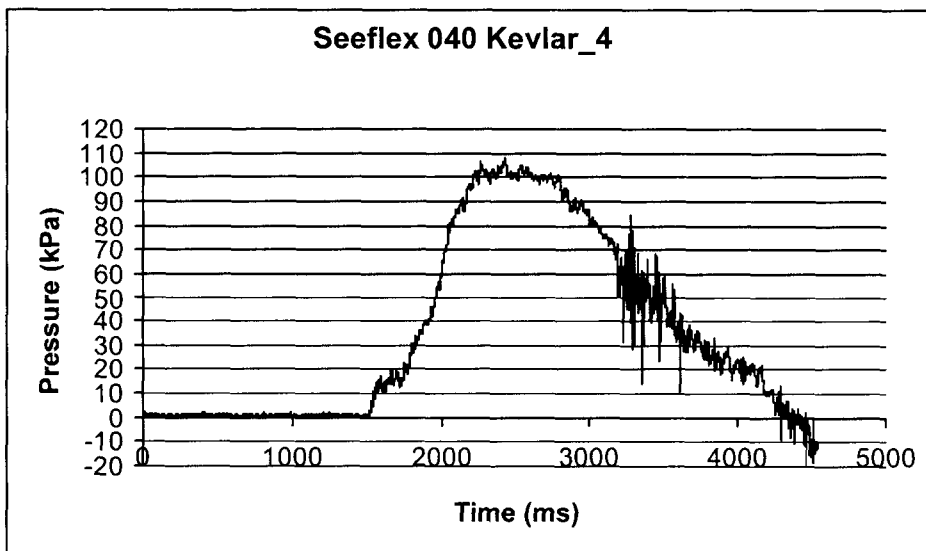


Figure 9: 100 gram bomb, Seeflex 040 Kevlar coupling 4

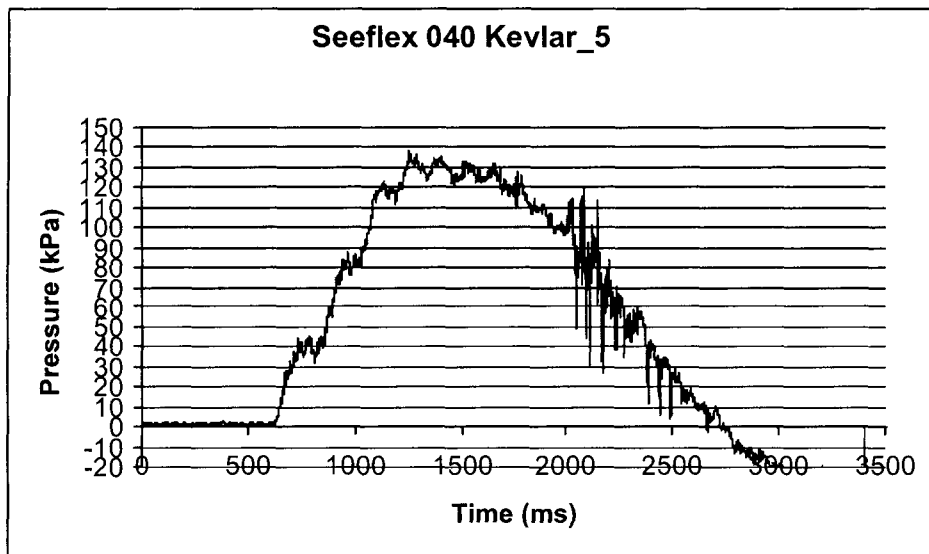


Figure 10: 100 gram bomb, Seeflex 040 Kevlar coupling 5