

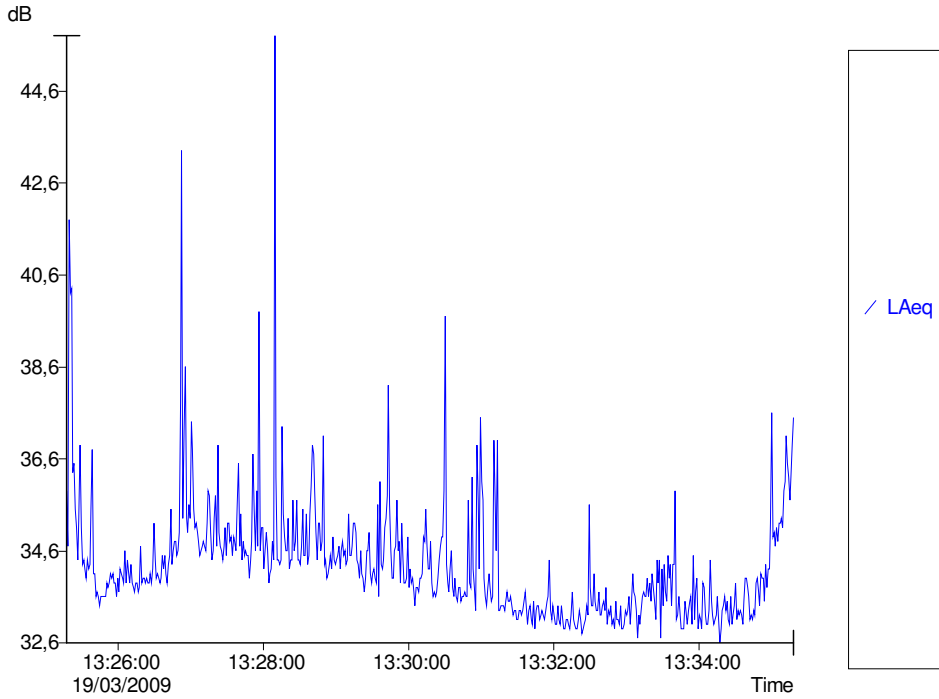


## **ANEXO 2. LAUDOS DE MEDIÇÕES DE RUÍDO E DE VIBRAÇÕES**

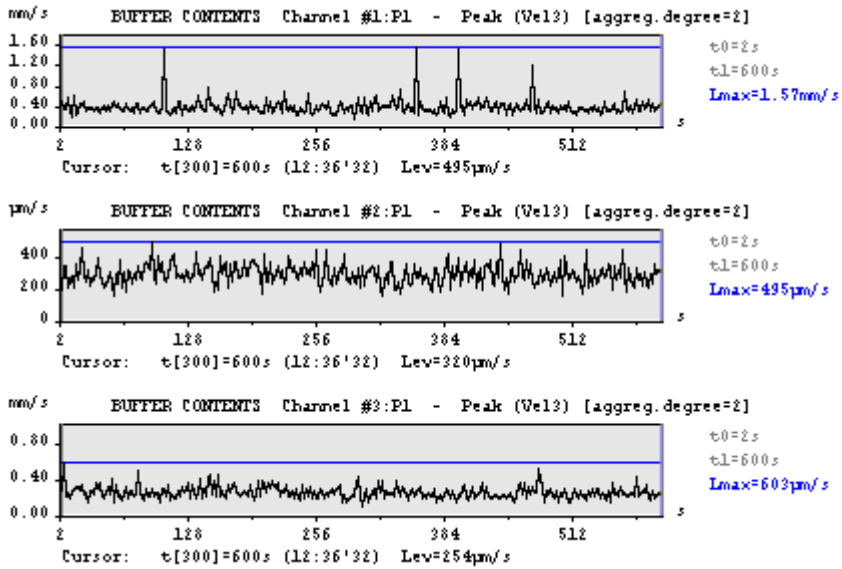
## **2.1 - HISTOGRAMAS DOS NÍVEIS DE PRESSÃO SONORA E VIBRAÇÃO**

## DIURNO

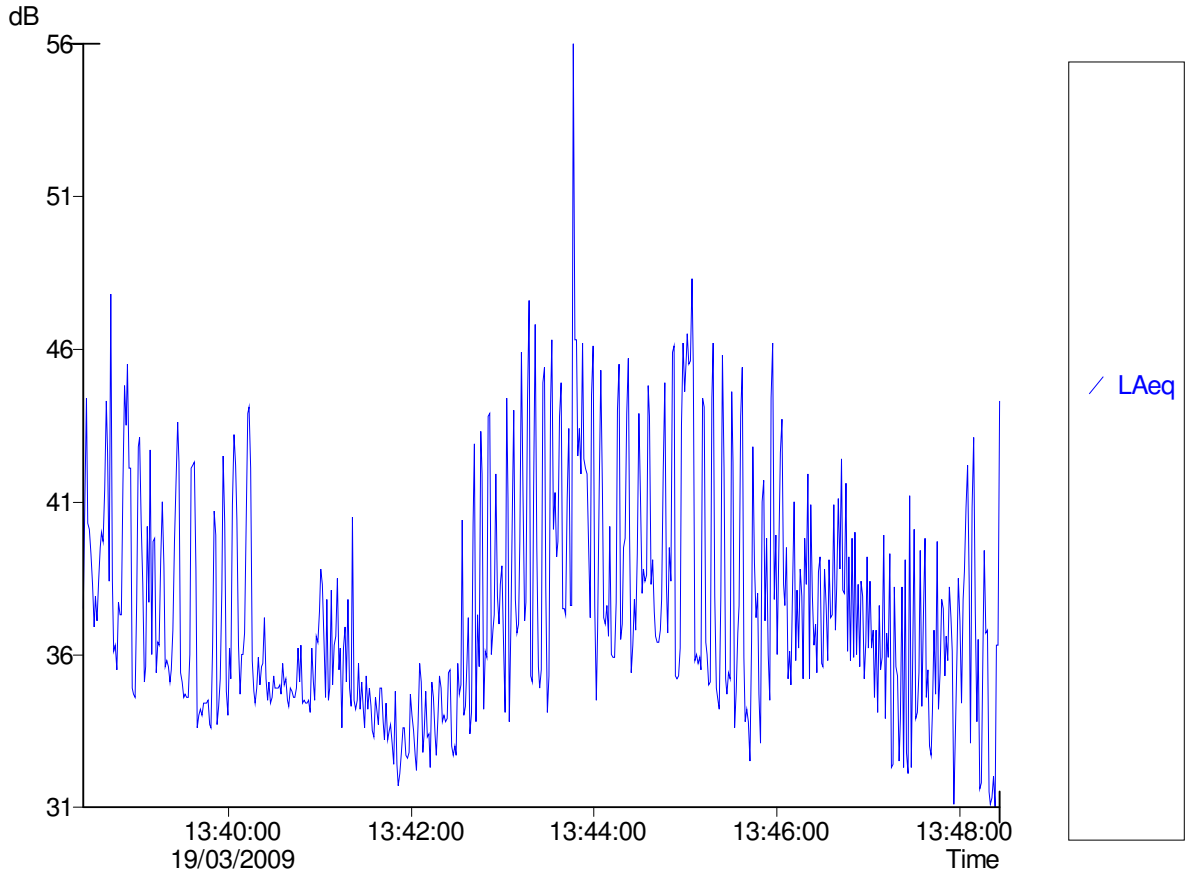
### Ponto 01 A



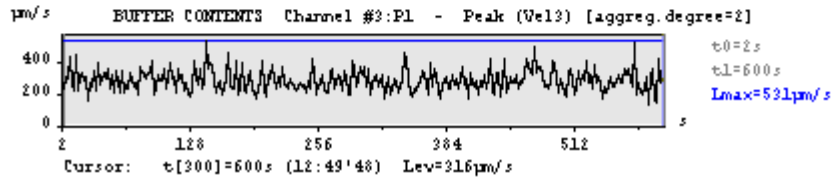
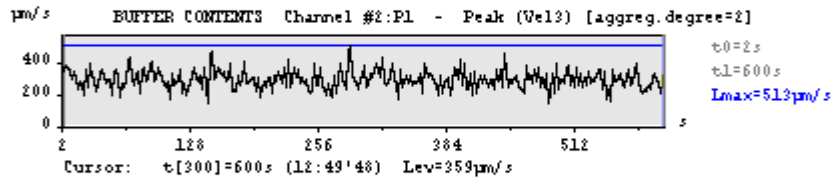
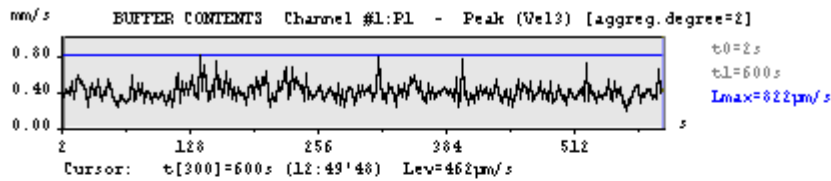
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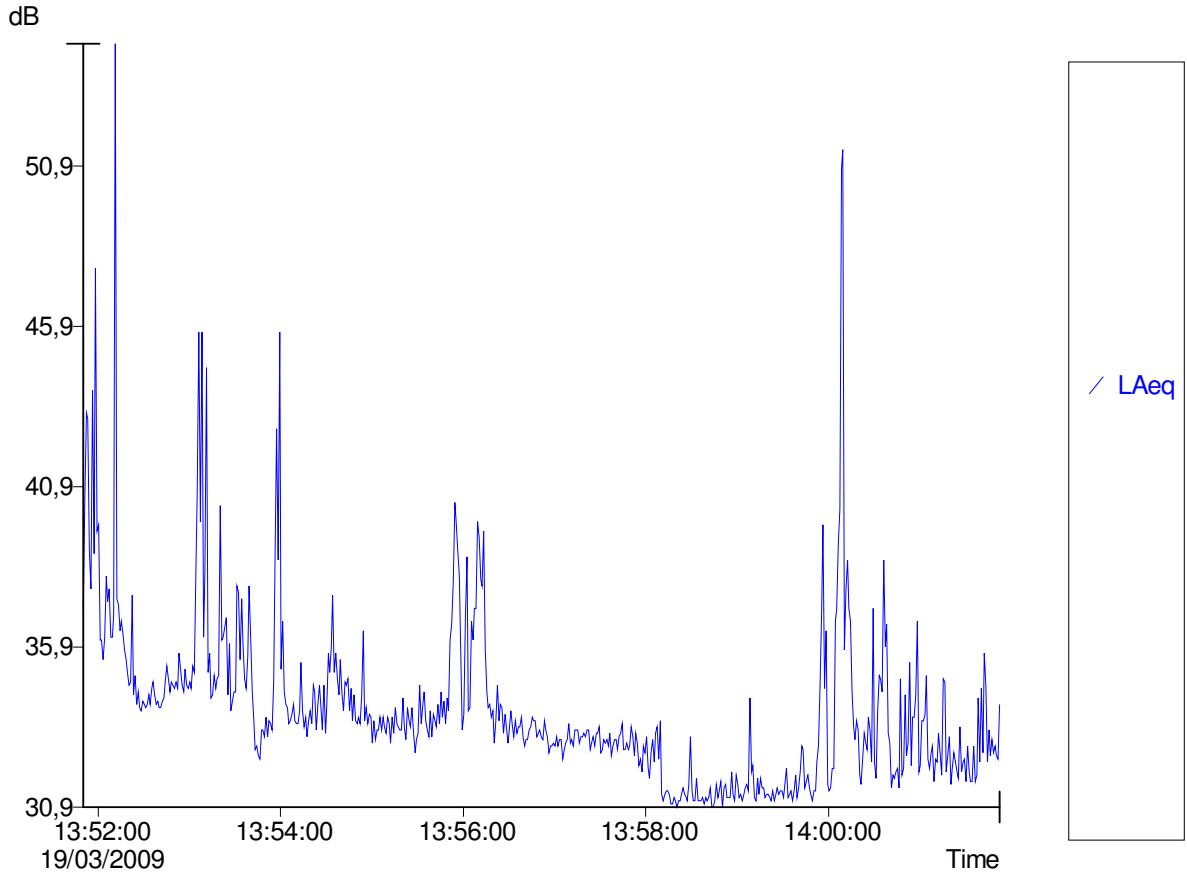
### Ponto 01 B



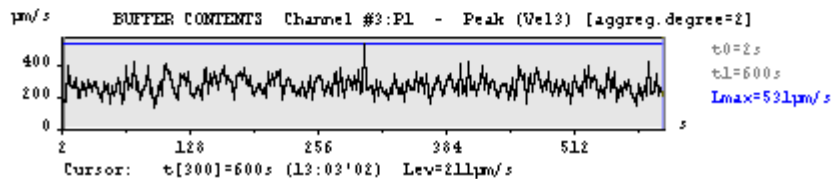
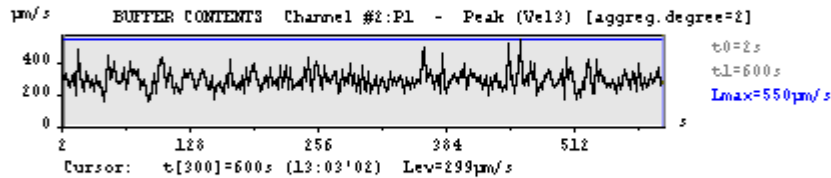
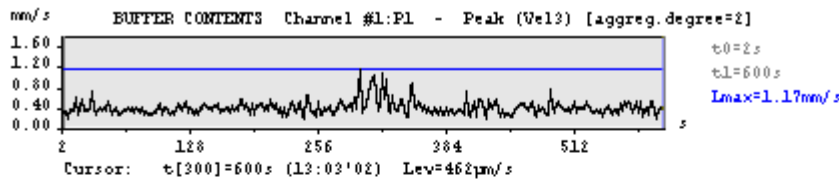
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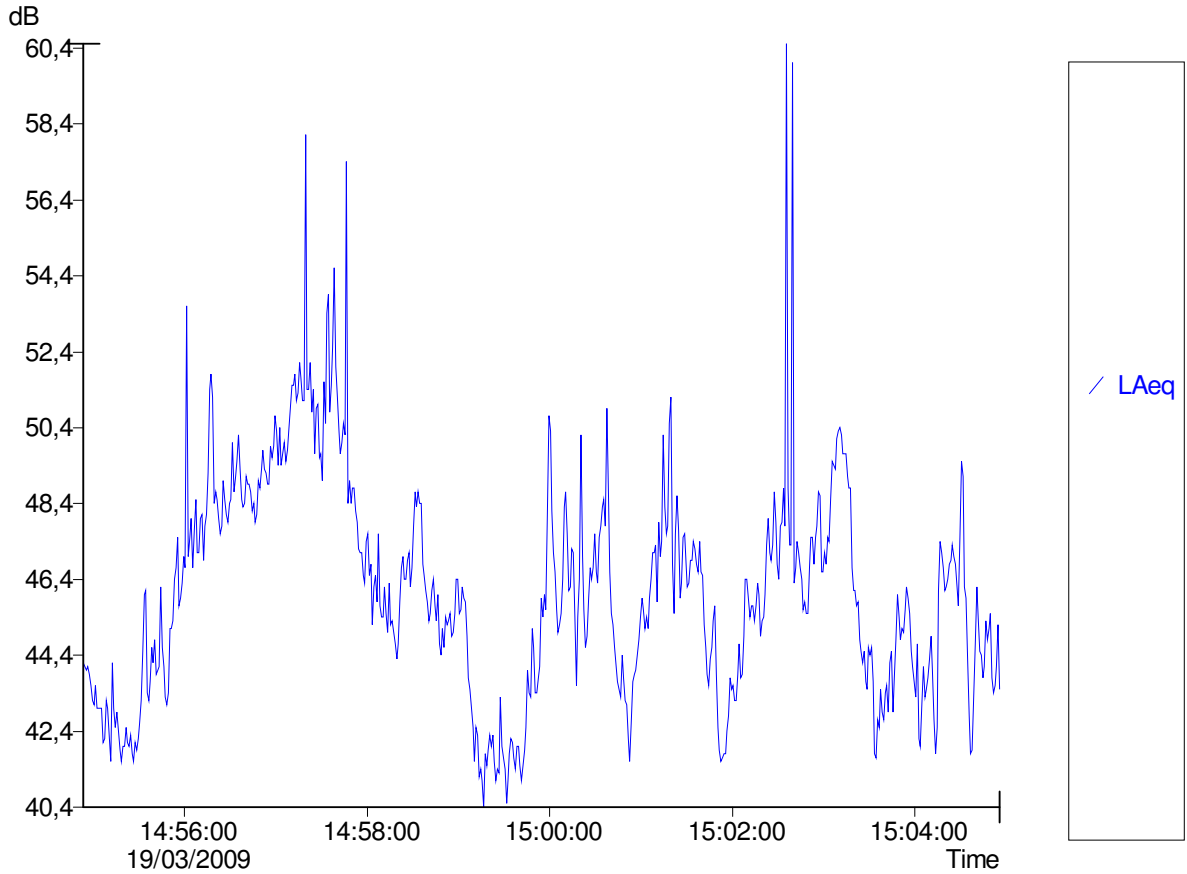
### Ponto 01 C



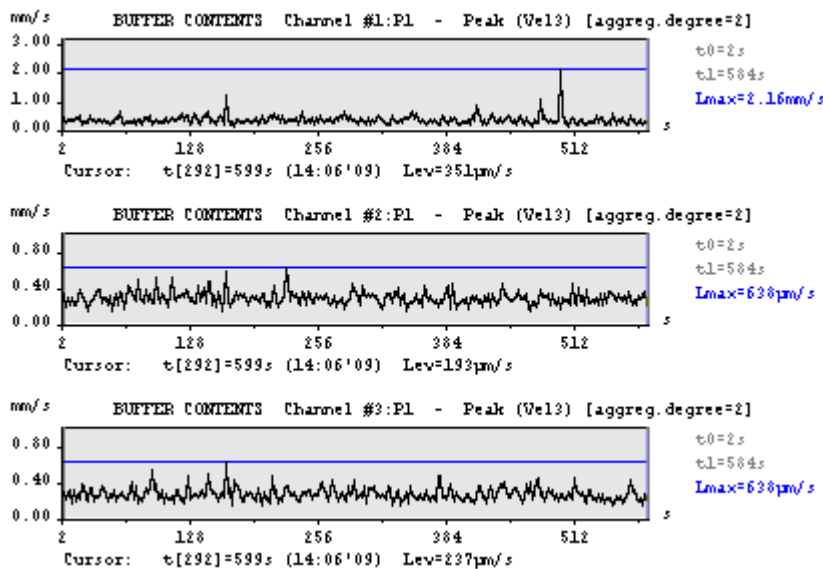
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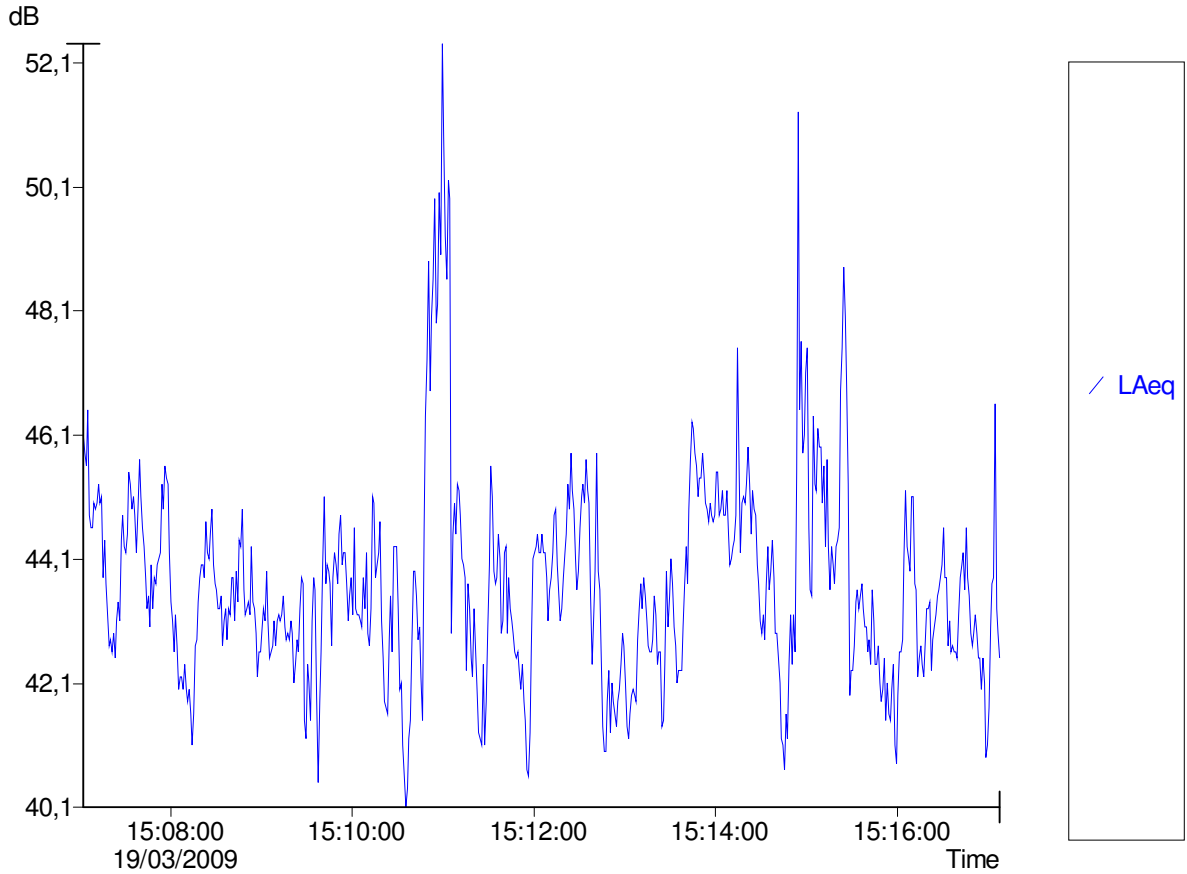
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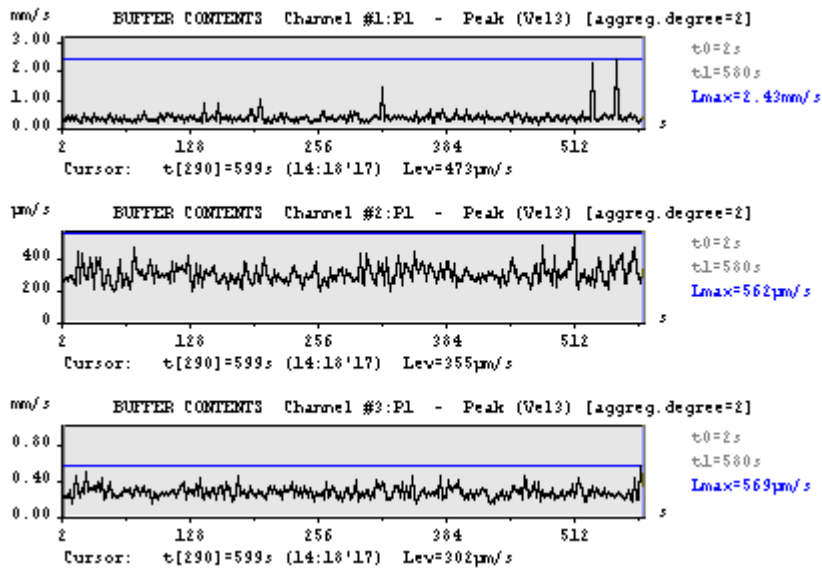
\\SERVIDOR\SHARED\DOCS\RUIDO\V-1\EMPRESAS\CVRDAM-1\RUIDO\CRJ00004.DTA  
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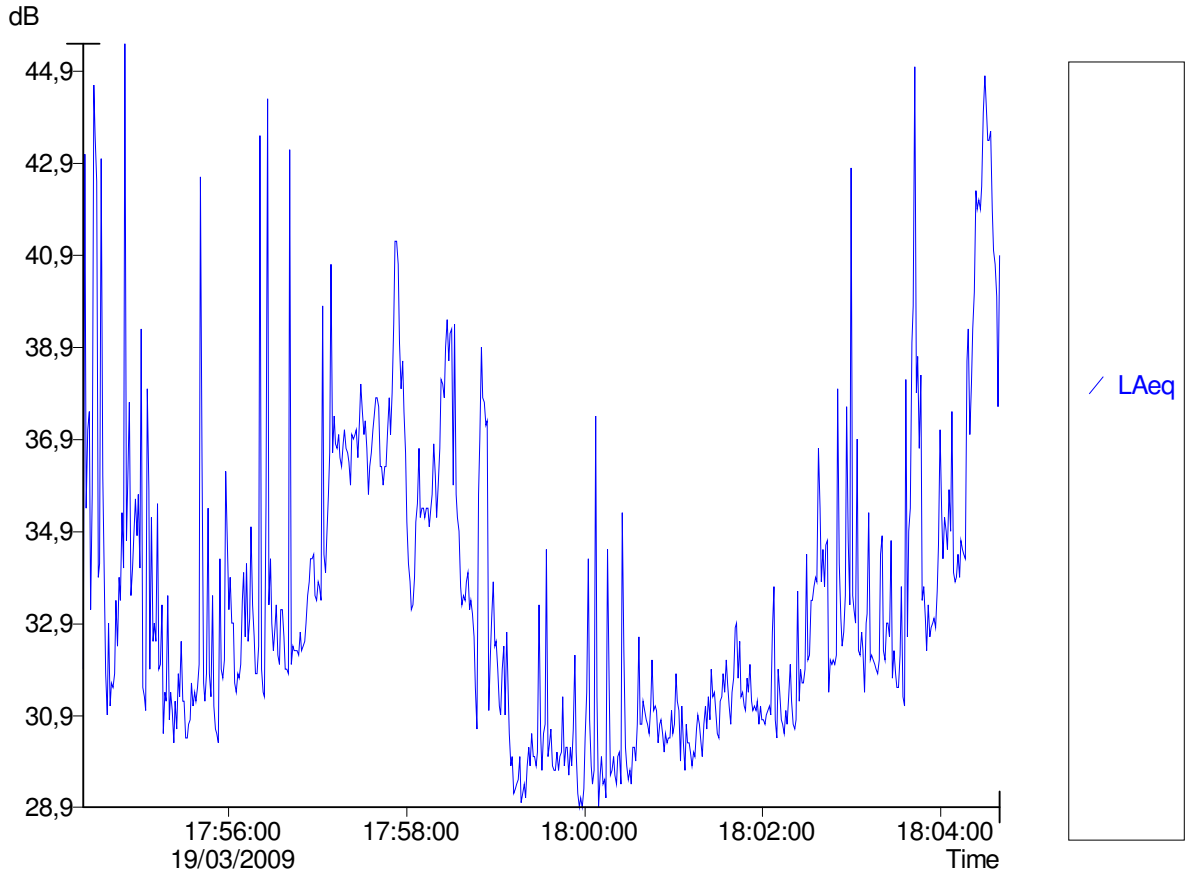
### Ponto 02 B



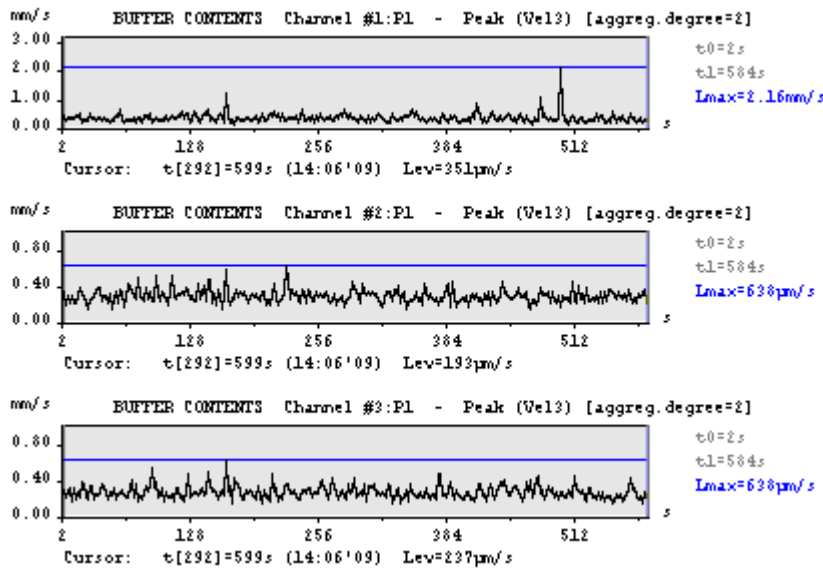
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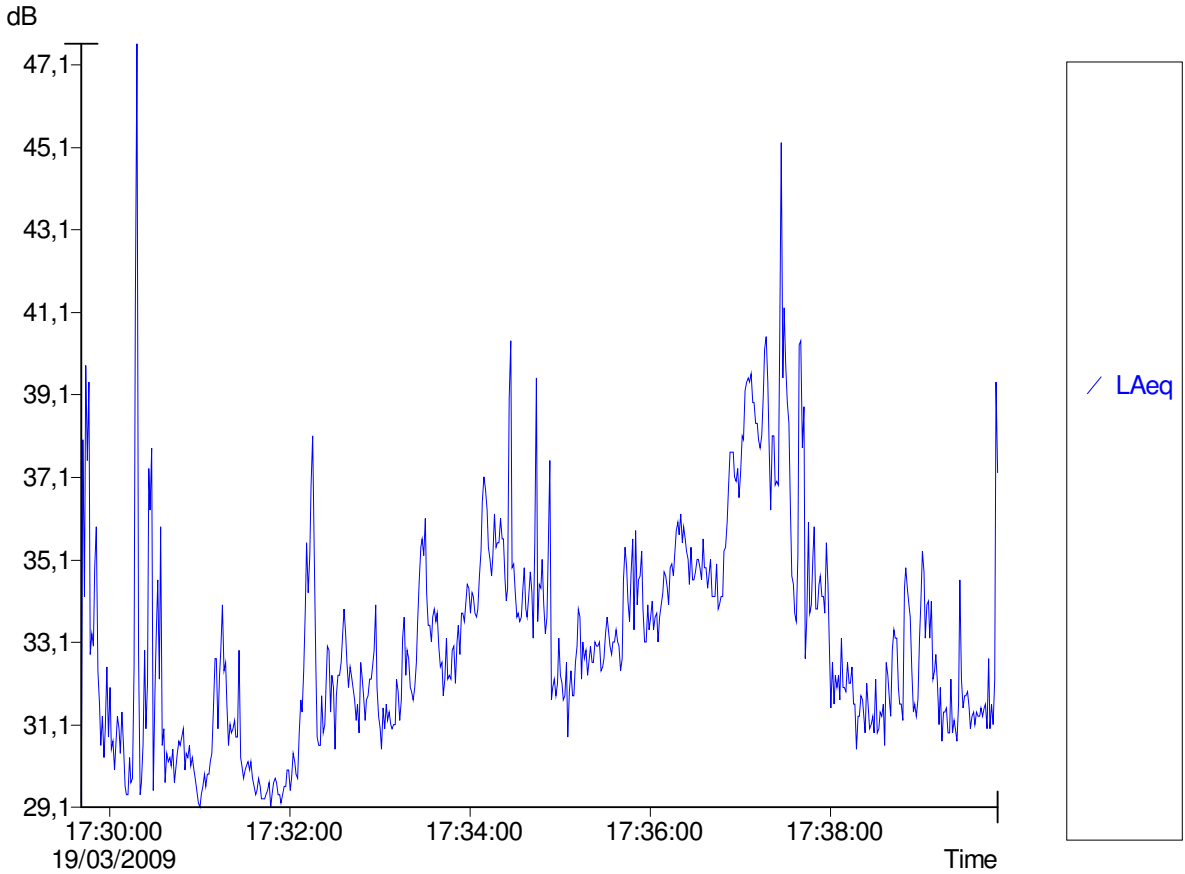


Y:\CRJ00009.DTA  
Overall profile duration = 00:10:18 (618 samples)

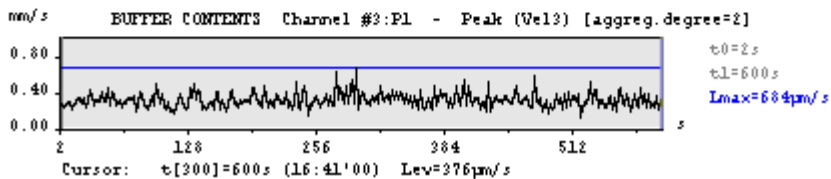
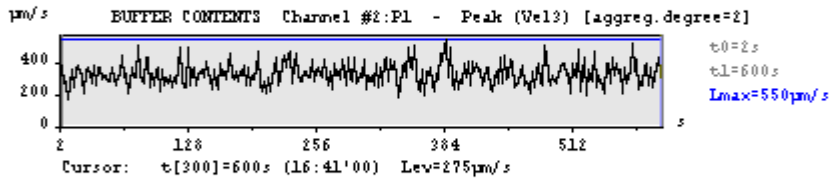
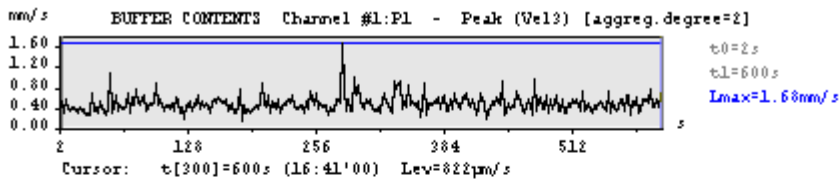




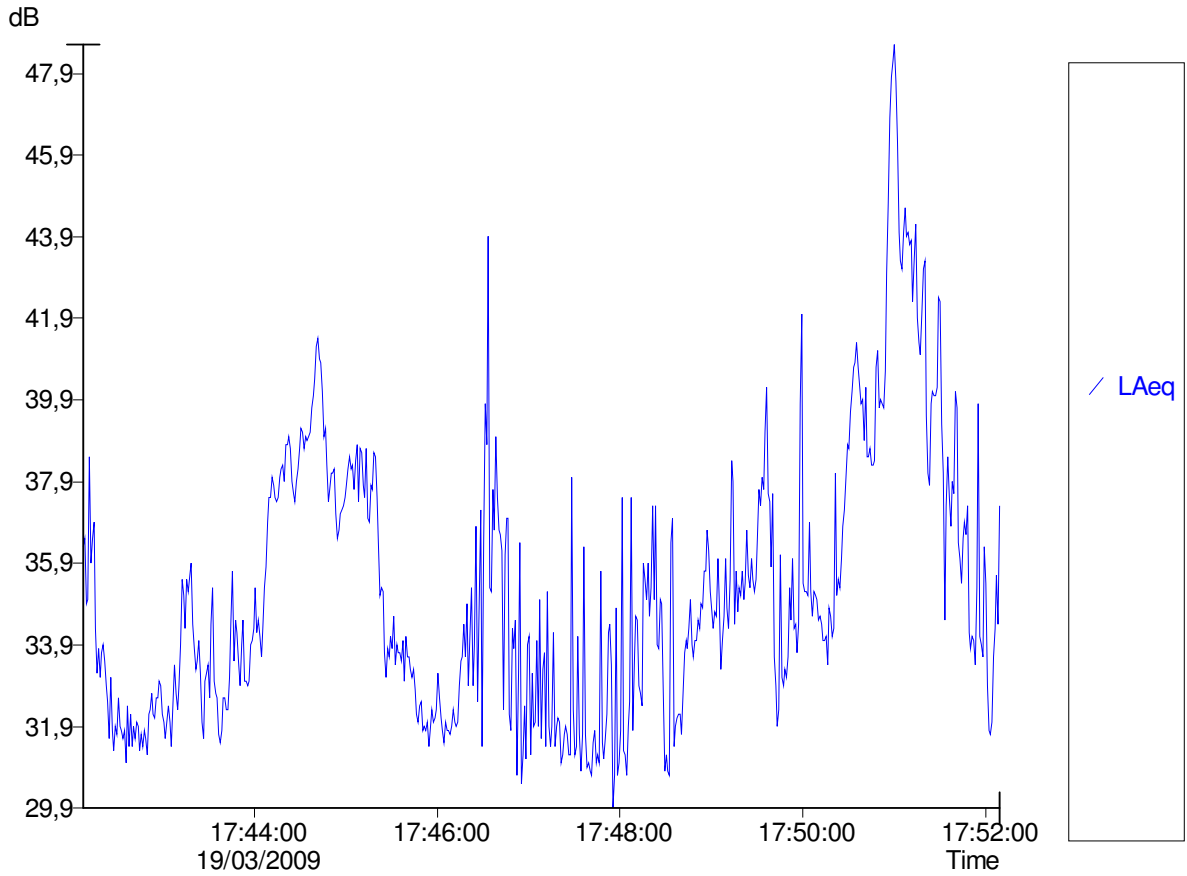
### Ponto 03 A



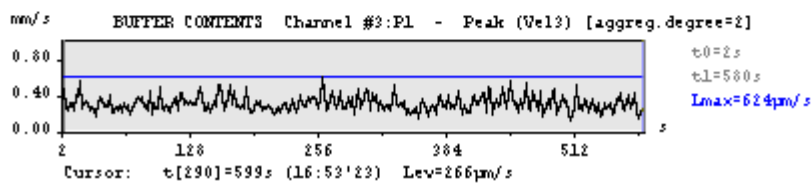
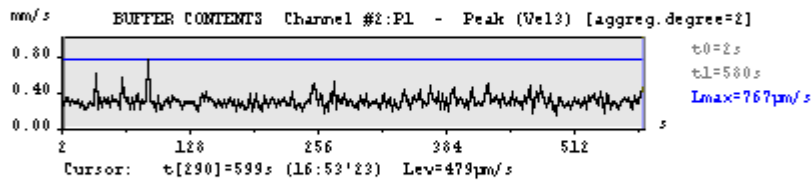
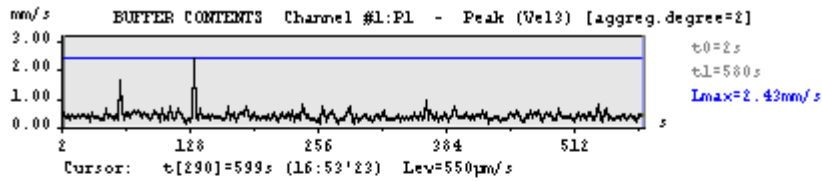
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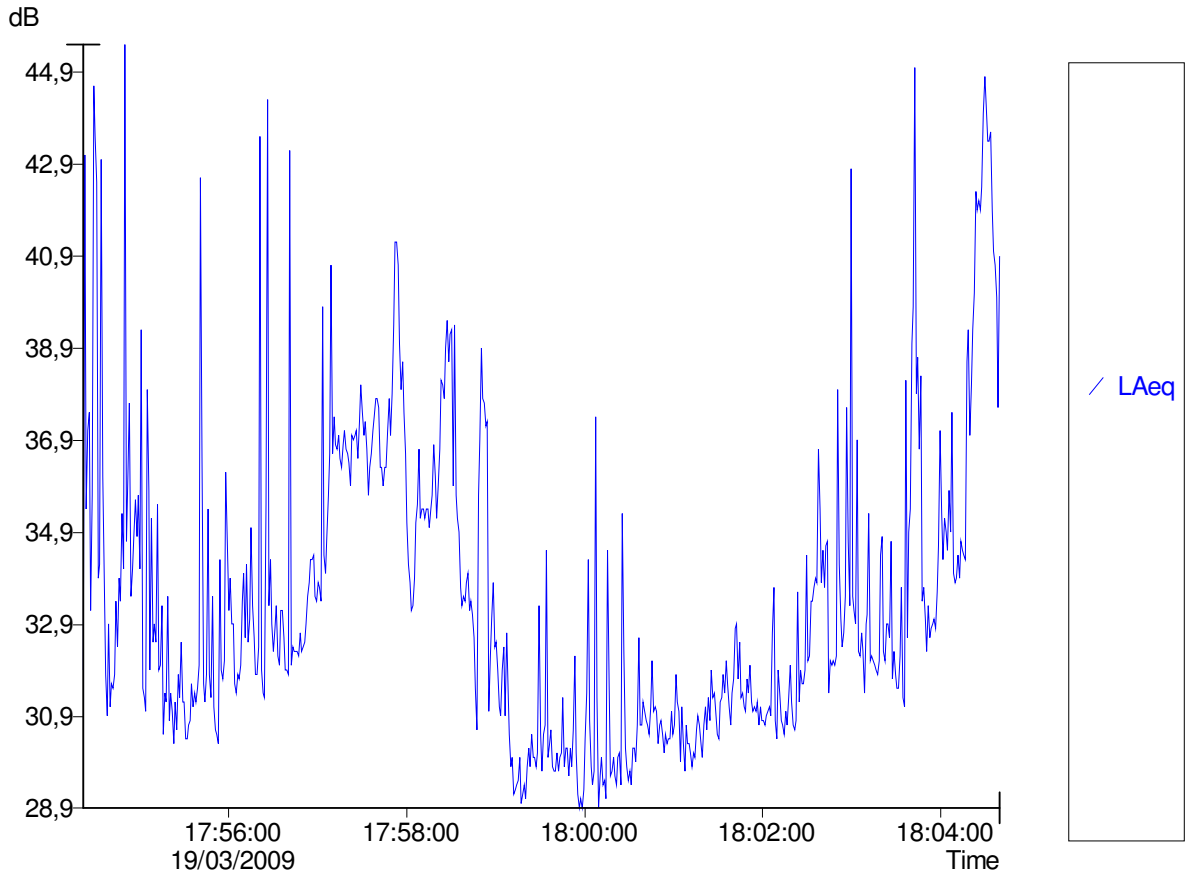
### Ponto 03 B



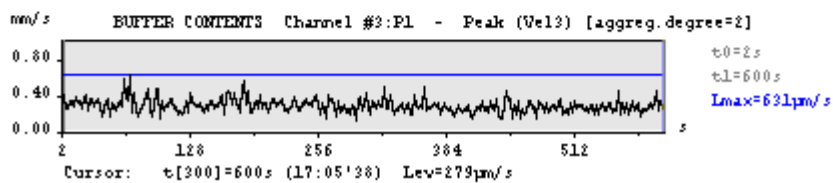
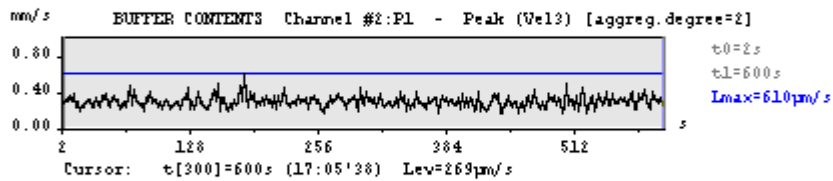
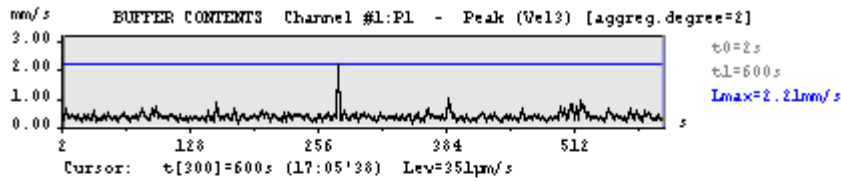
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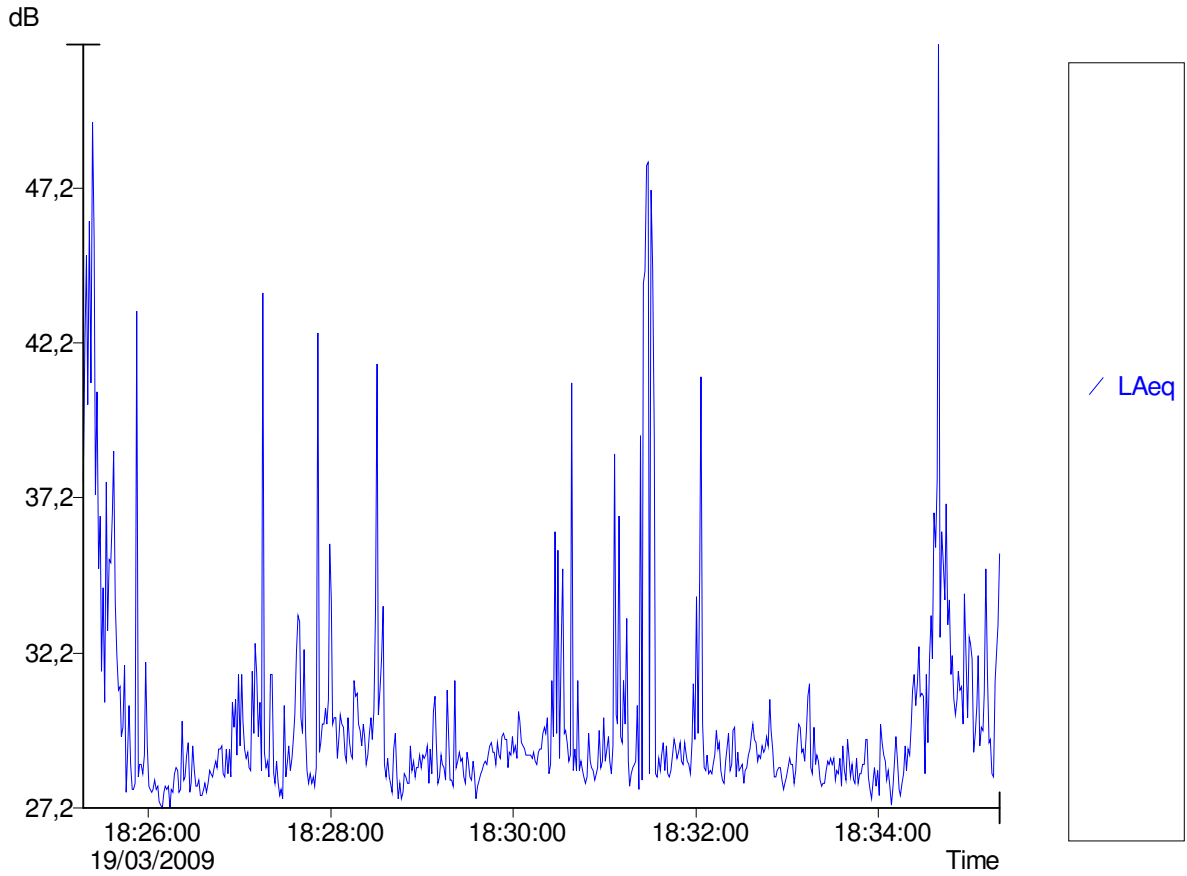
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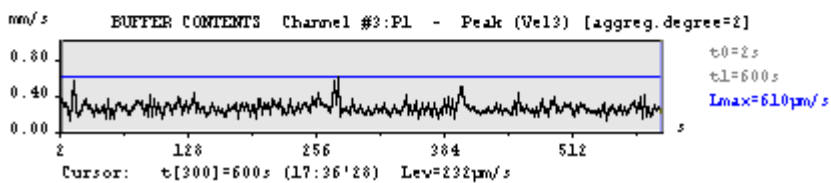
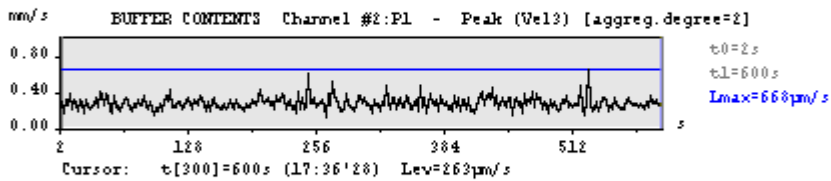
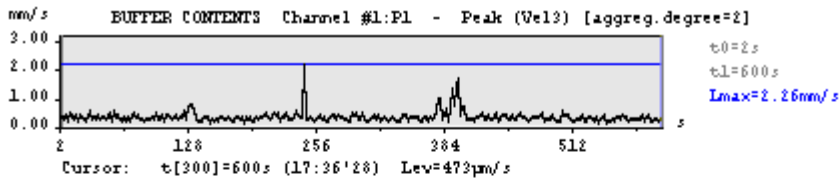
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Overall profile duration = 00:10:18 (618 samples)



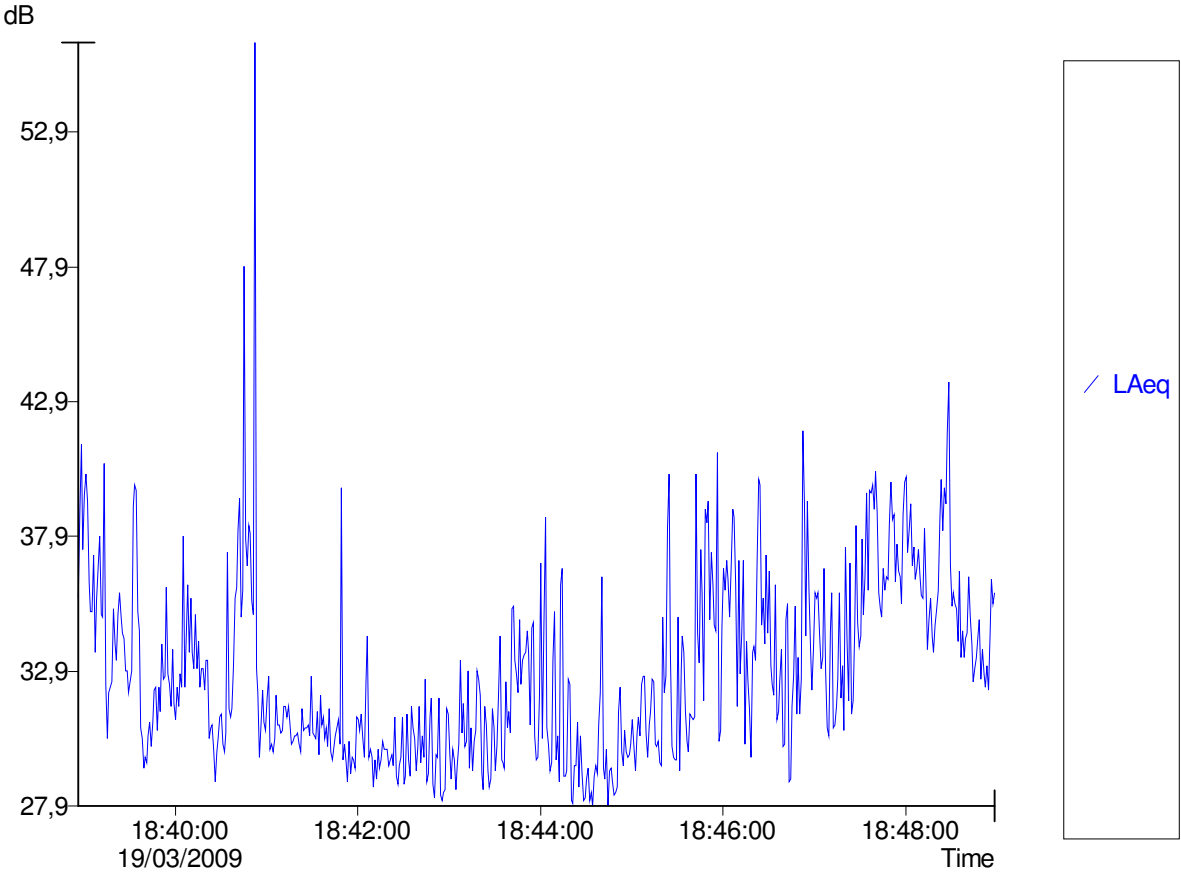
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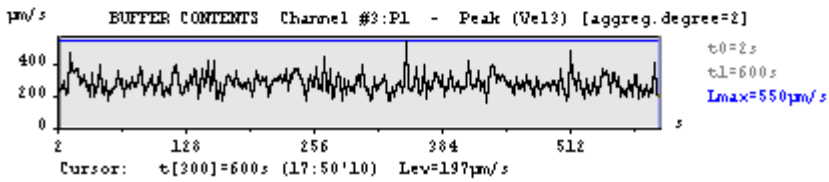
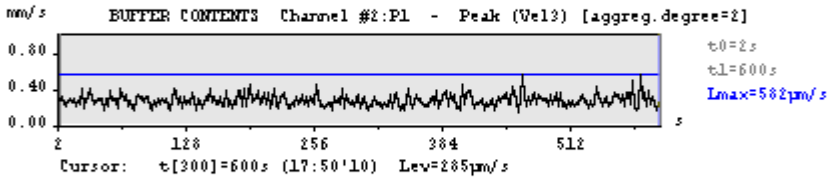
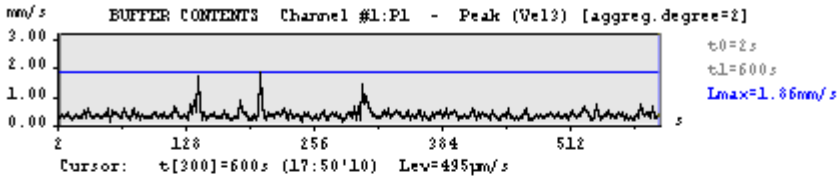
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 Overall profile duration = 00:10:03 (603 samples)



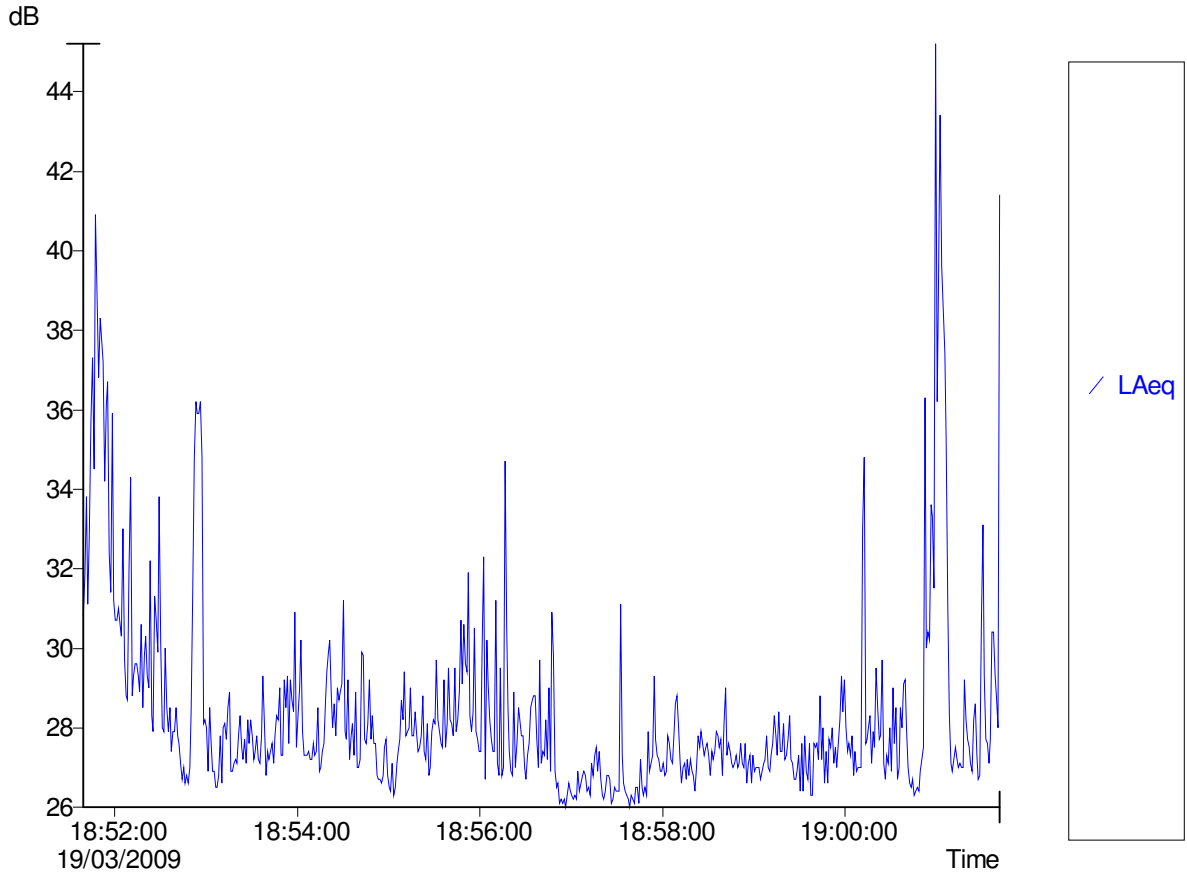
**Ponto 04 B**



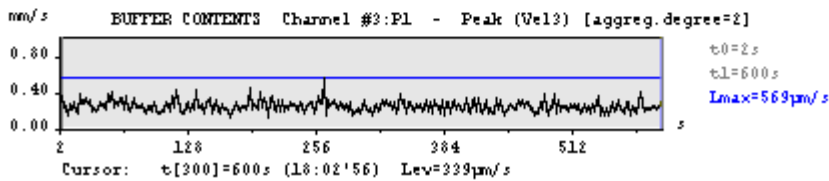
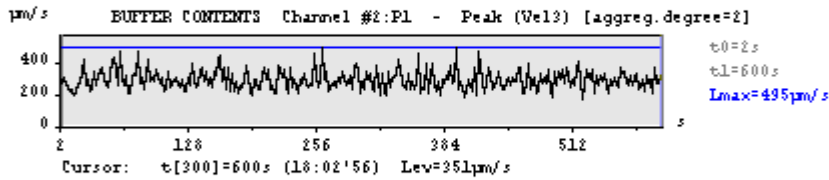
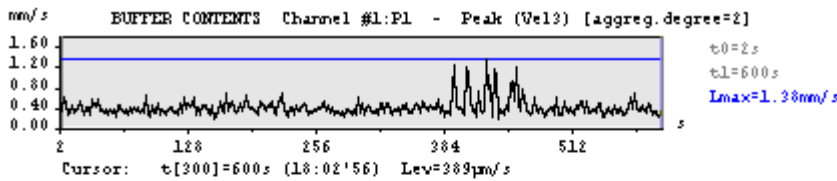
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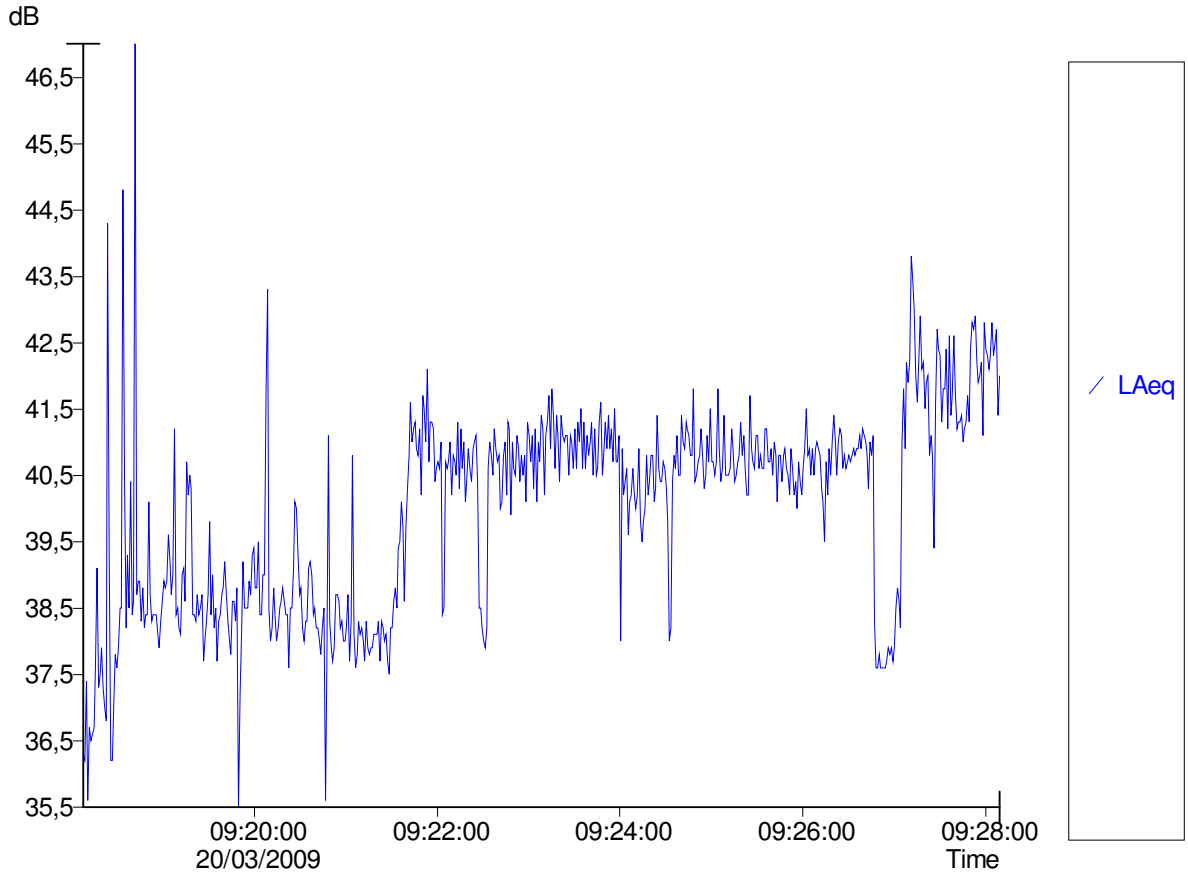
### Ponto 04 C



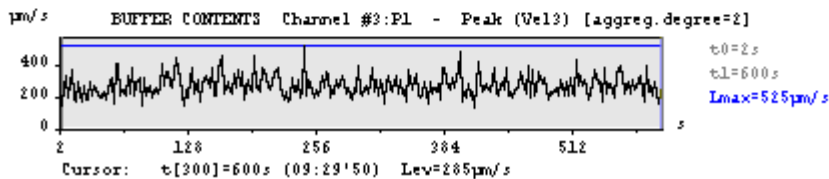
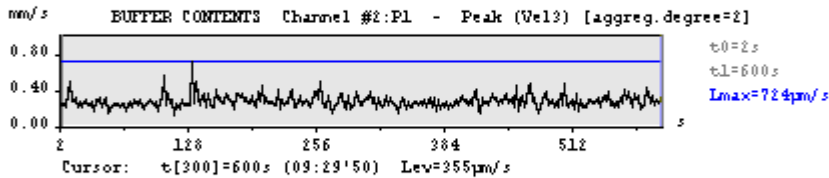
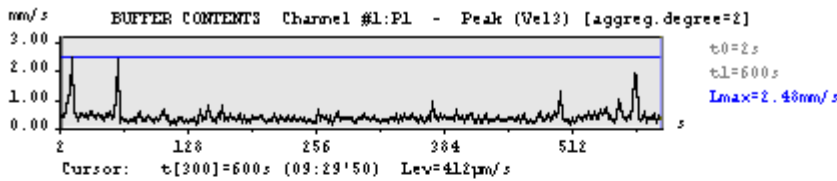
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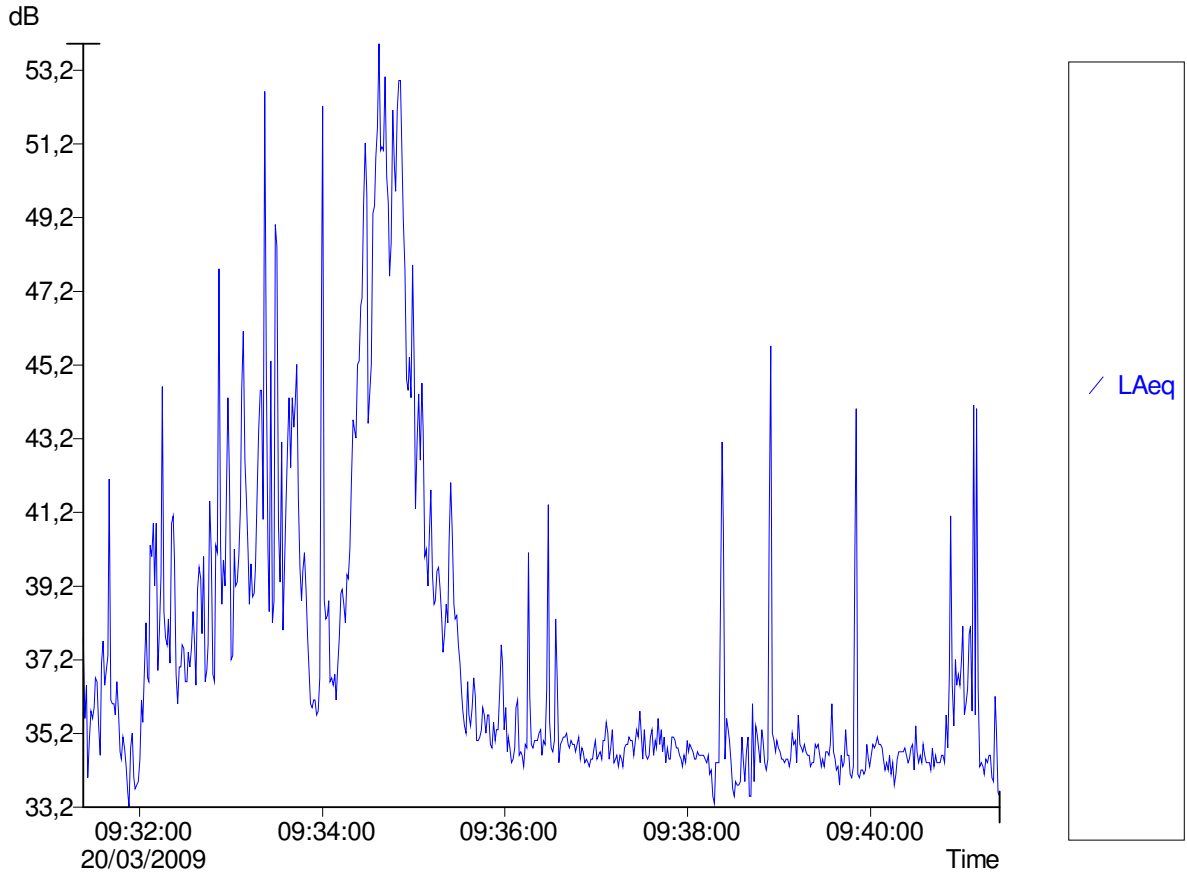
### Ponto 05 A



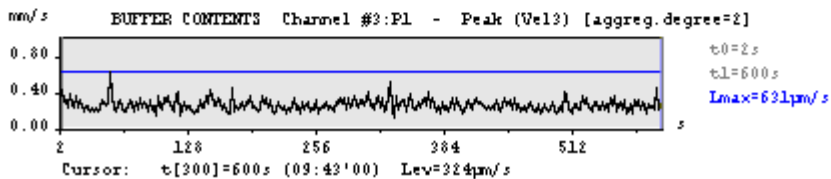
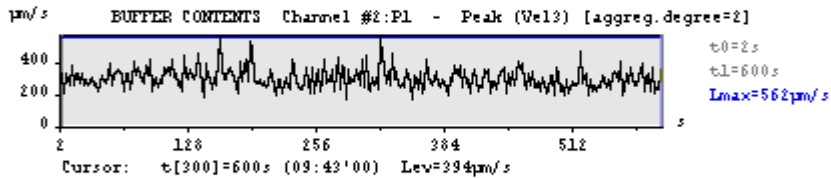
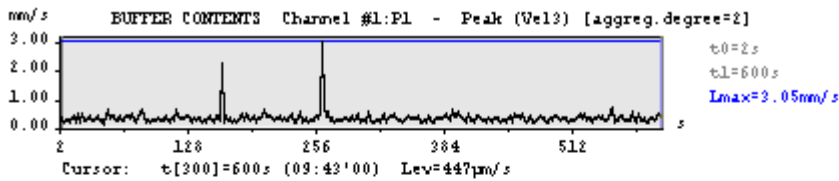
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Overall profile duration = 00:10:03 (603 samples)



### Ponto 05 B

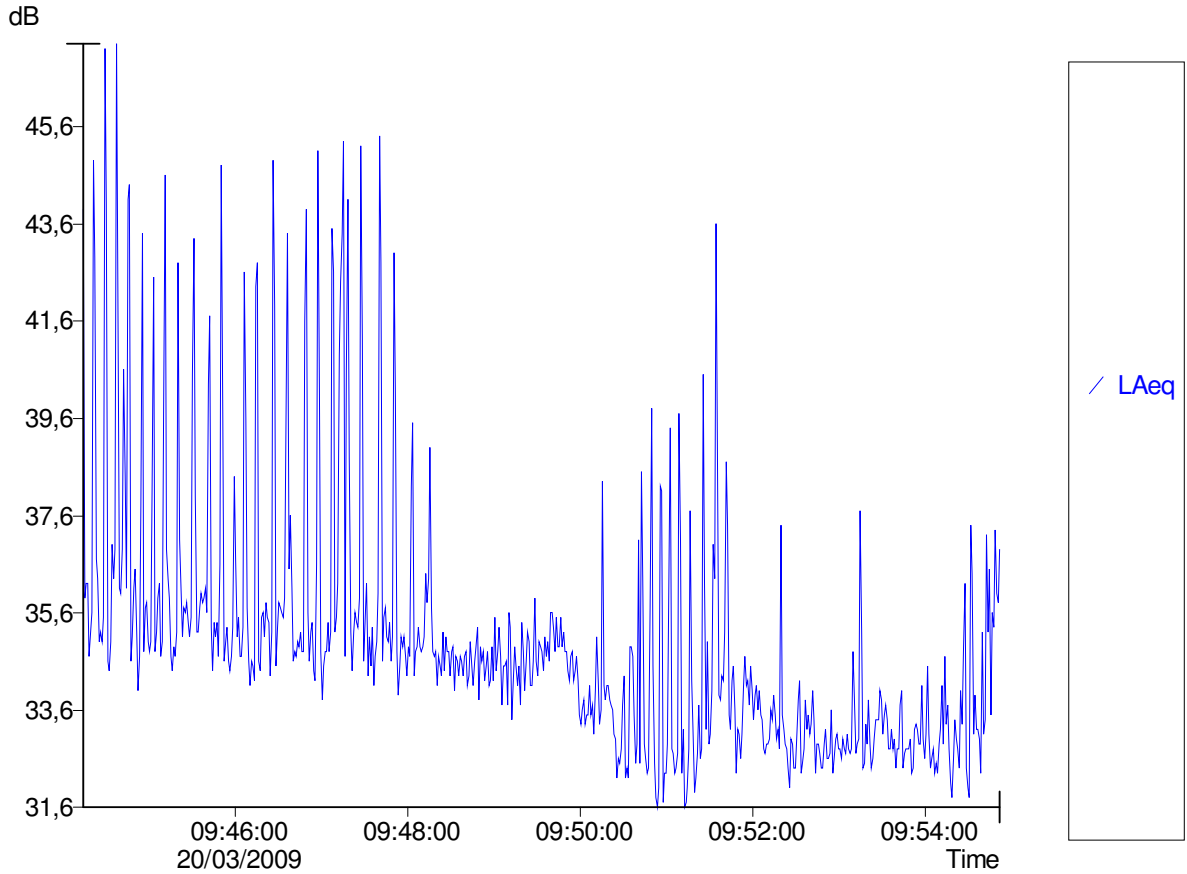


Y:\CRJ00020.DTA  
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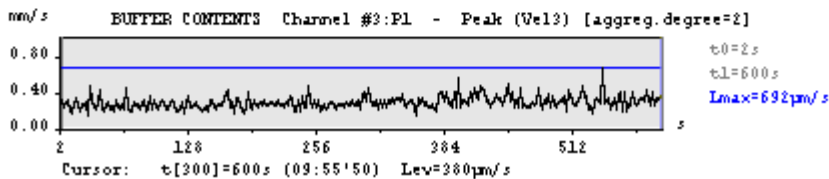
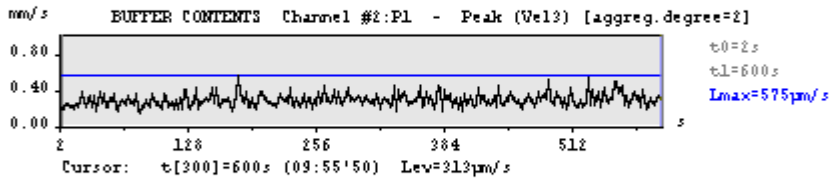
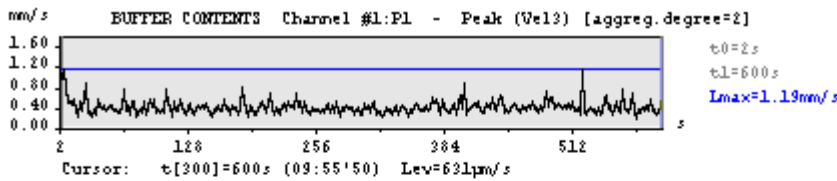




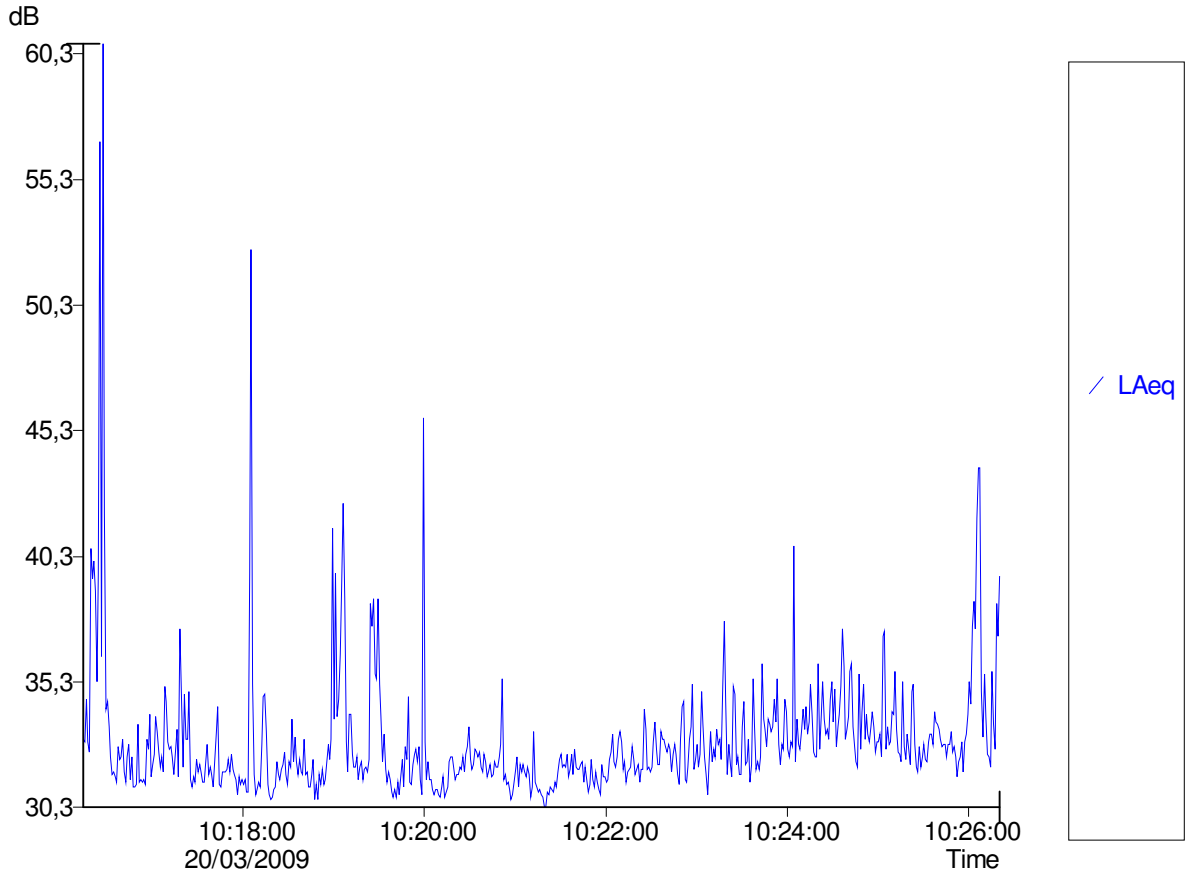
### Ponto 05 C



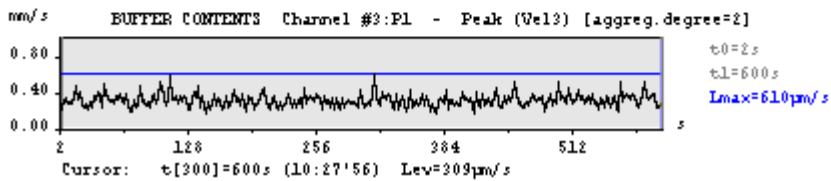
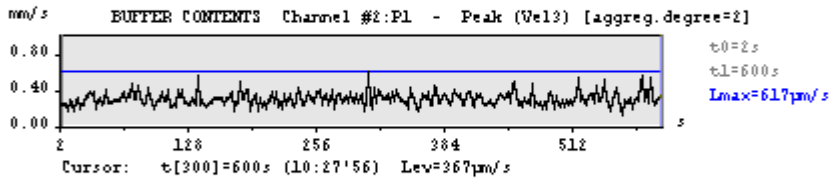
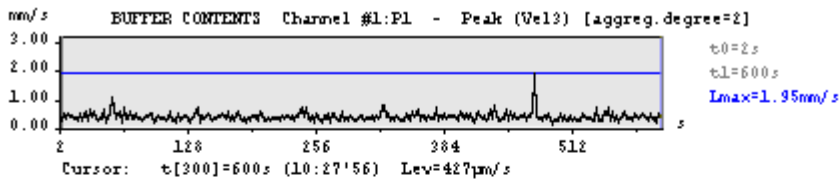
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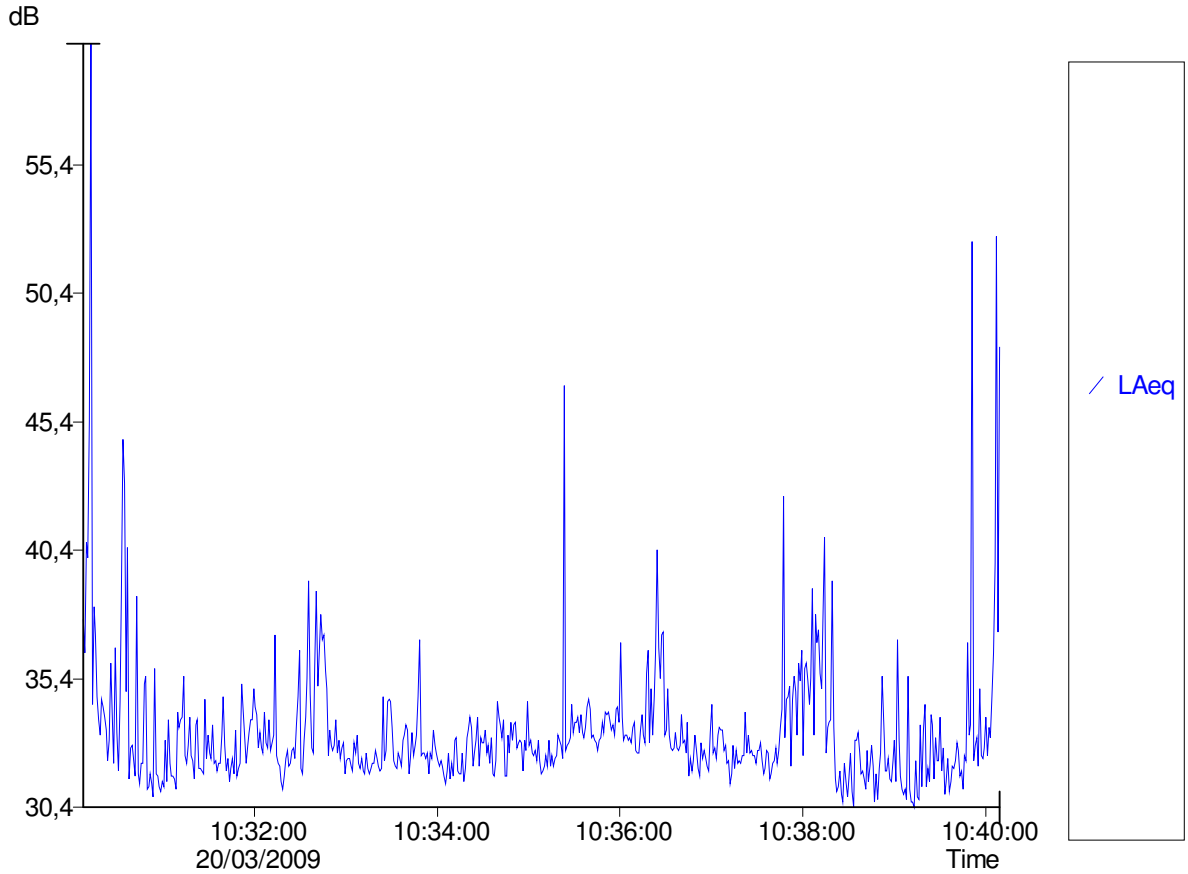
### Ponto 06 A



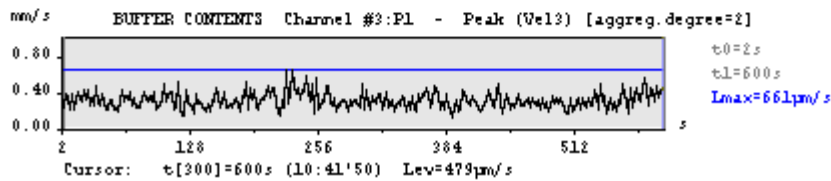
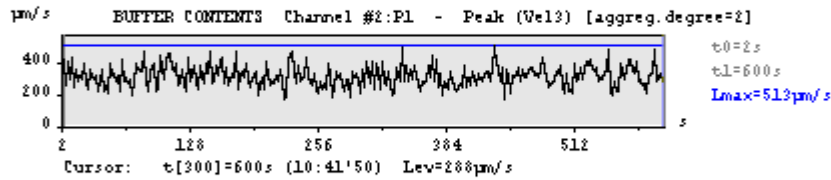
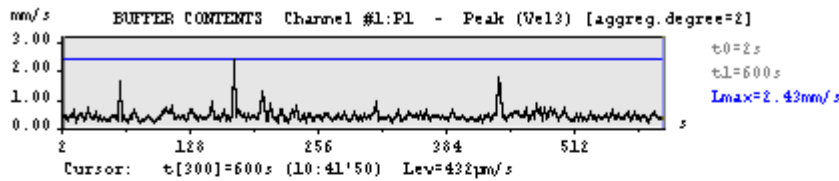
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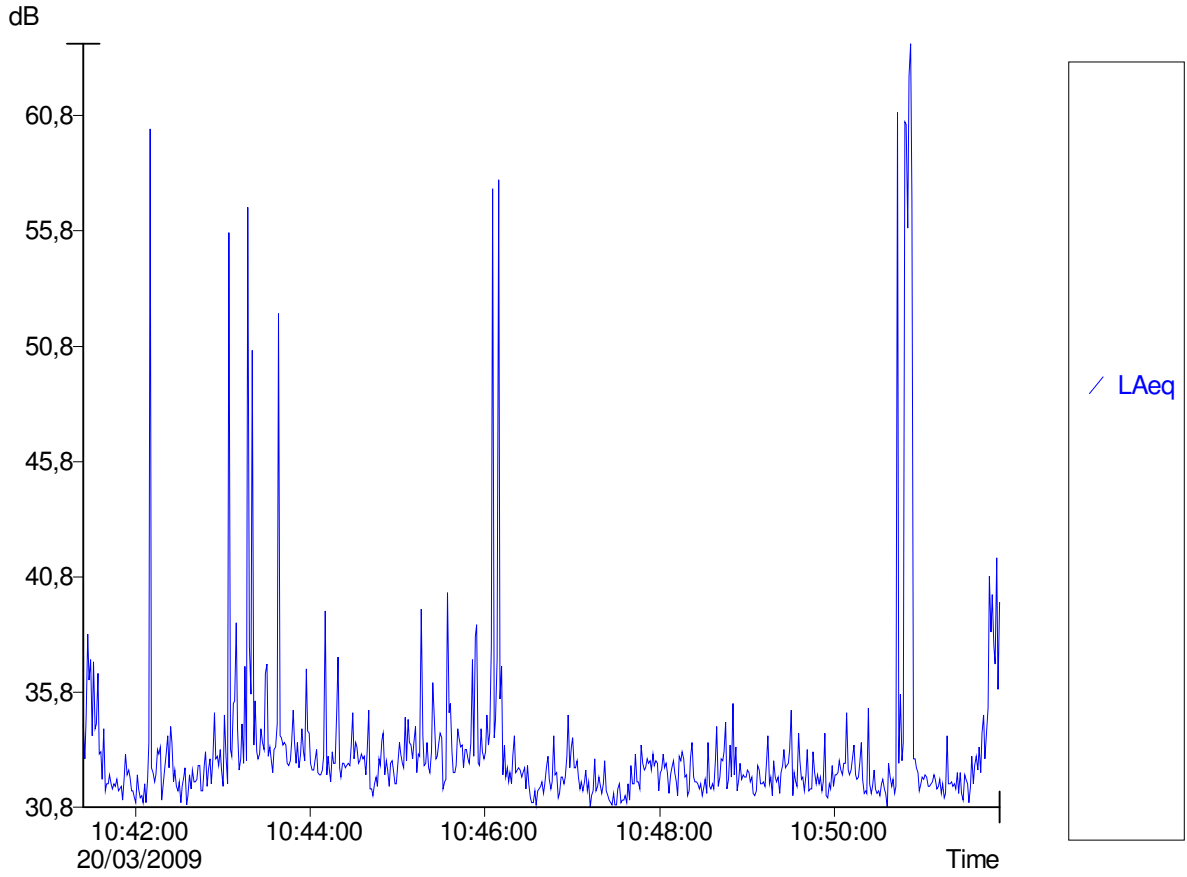
### Ponto 06 B



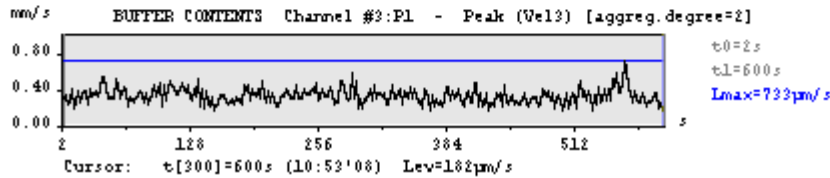
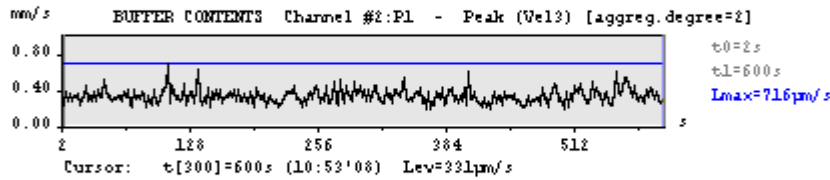
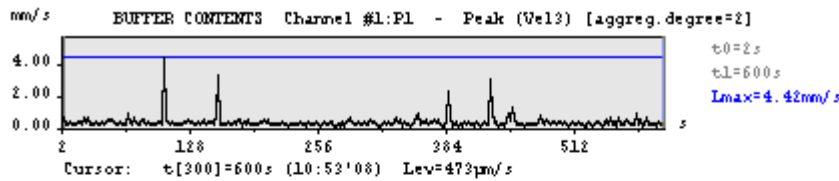
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 Overall profile duration = 00:10:03 (603 samples)



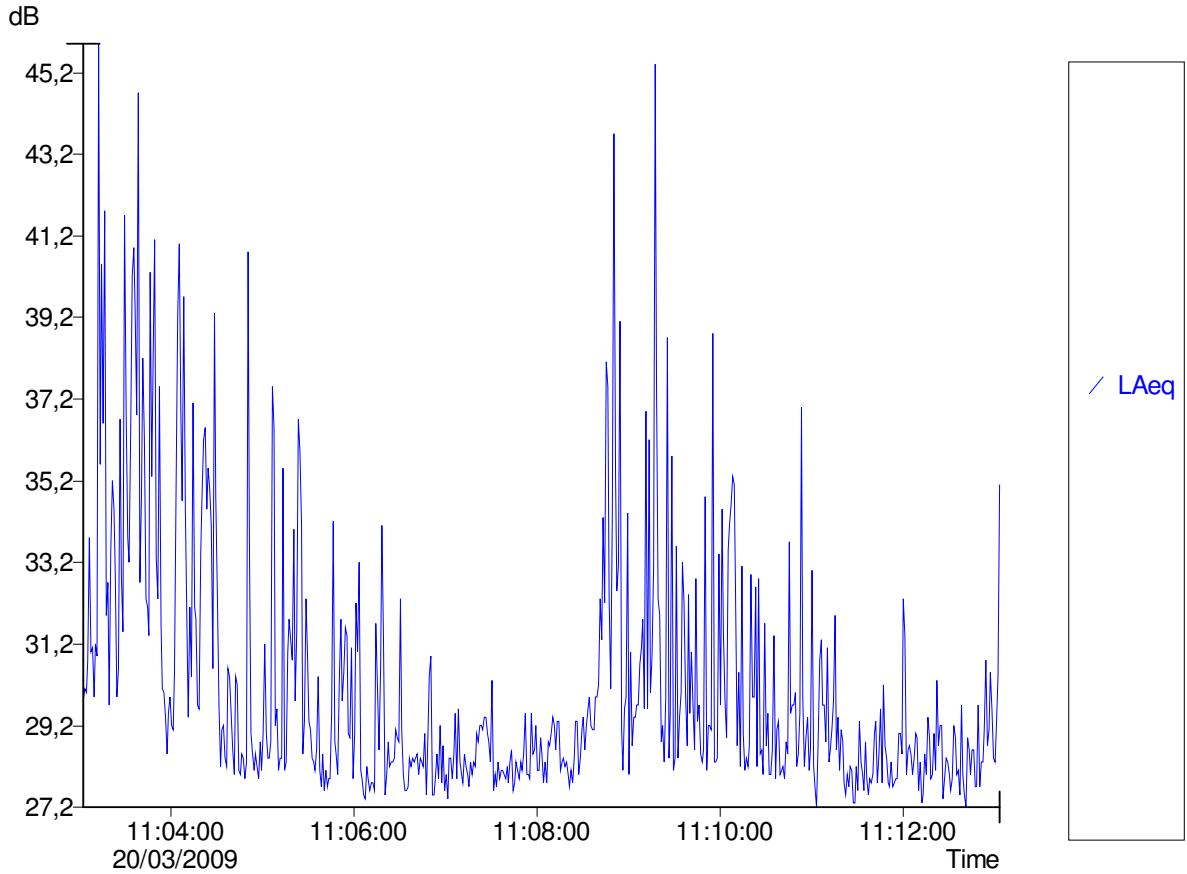
### Ponto 06 C



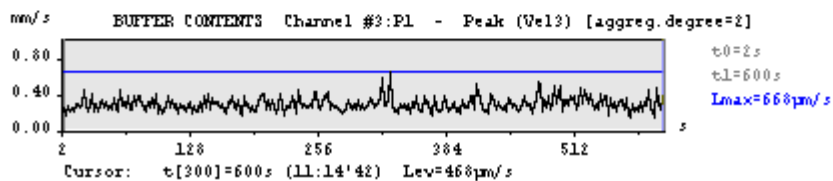
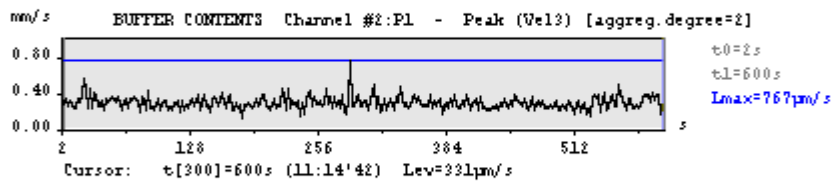
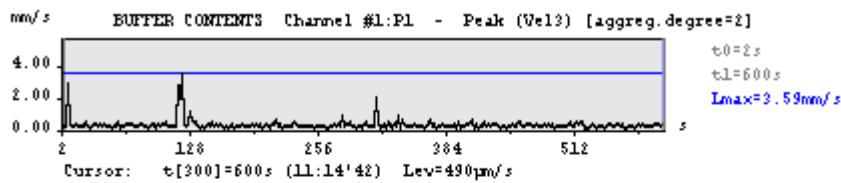
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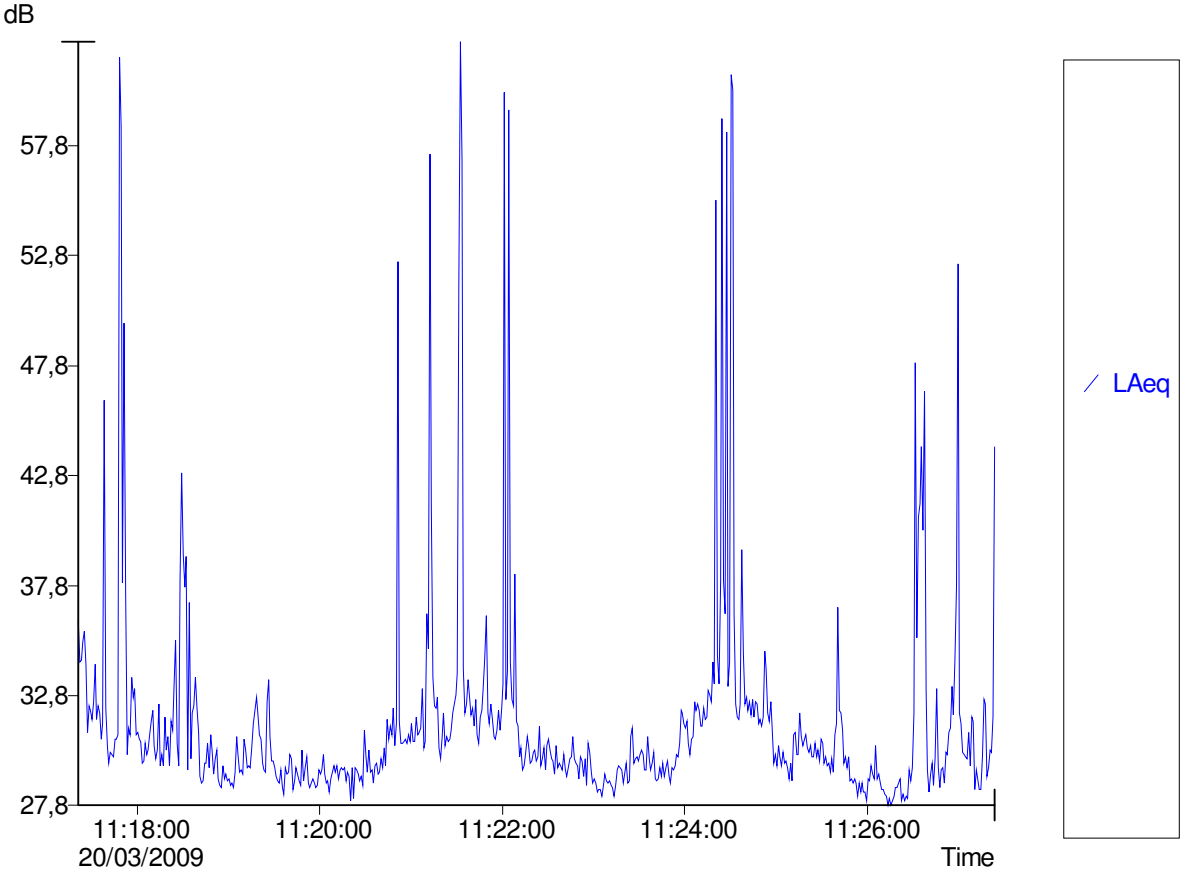
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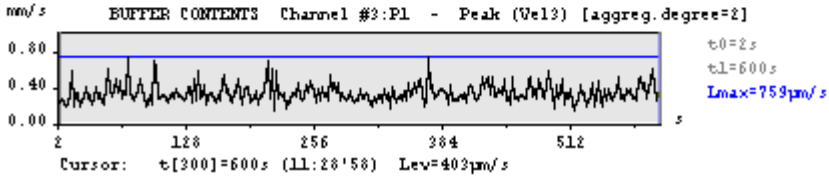
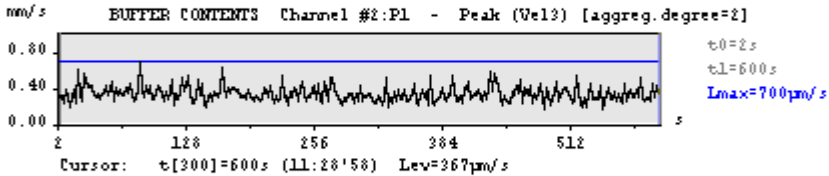
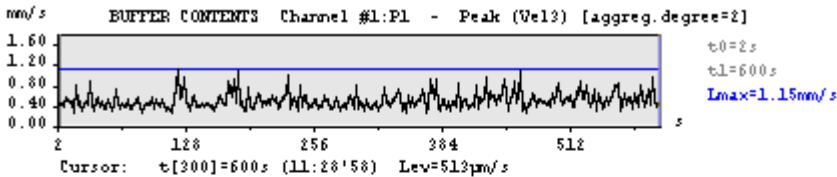
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Overall profile duration = 00:10:02 (602 samples)



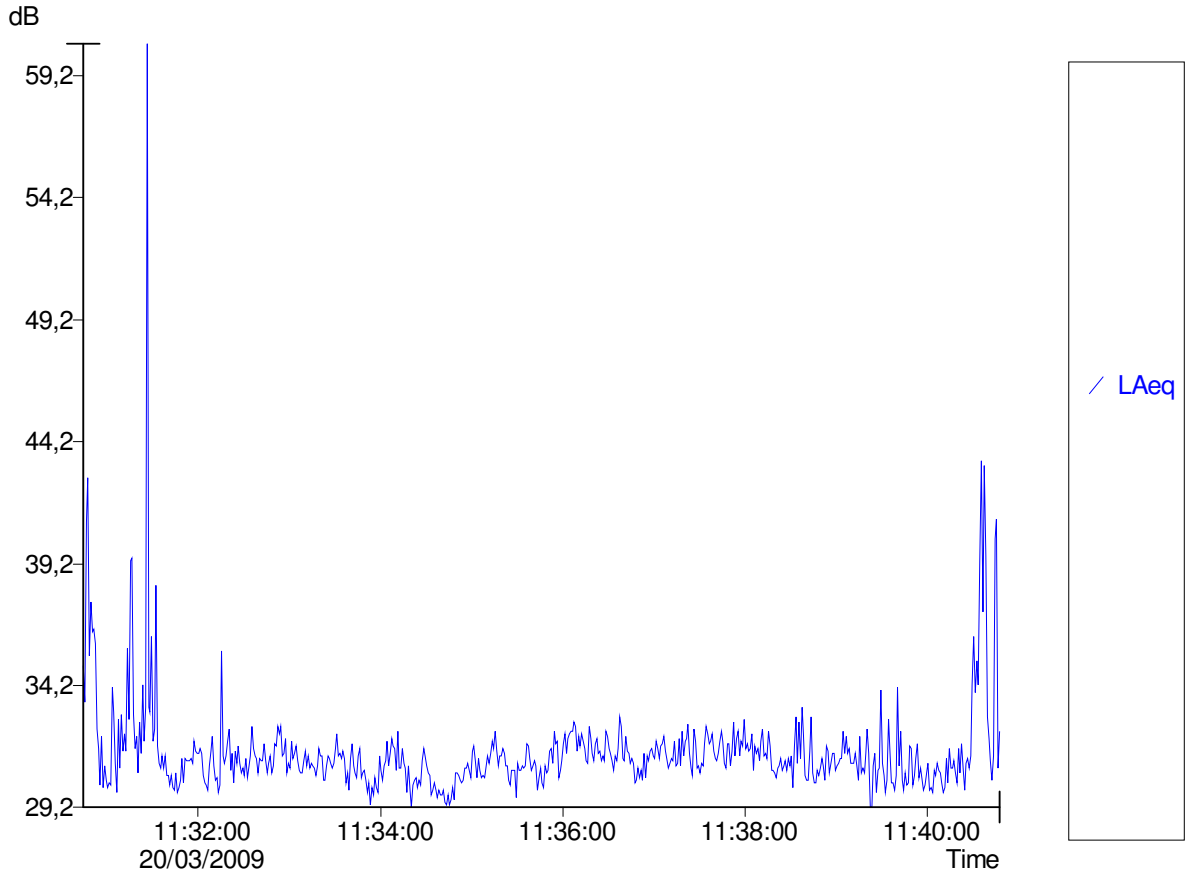
**Ponto 07 B**



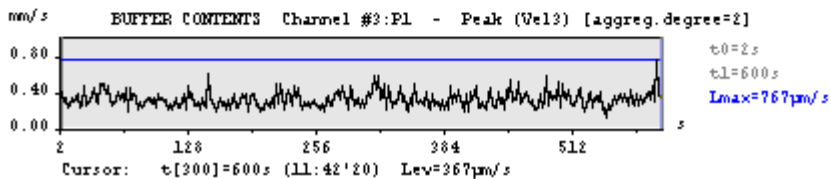
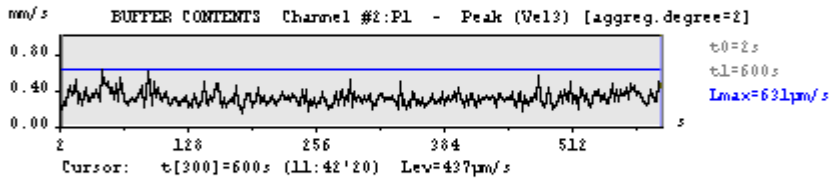
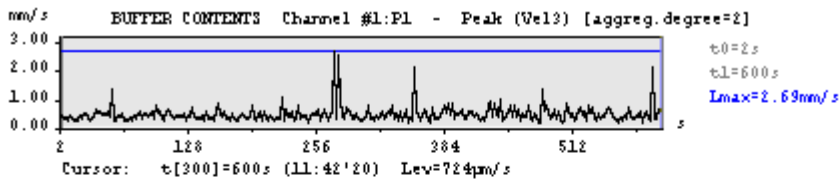
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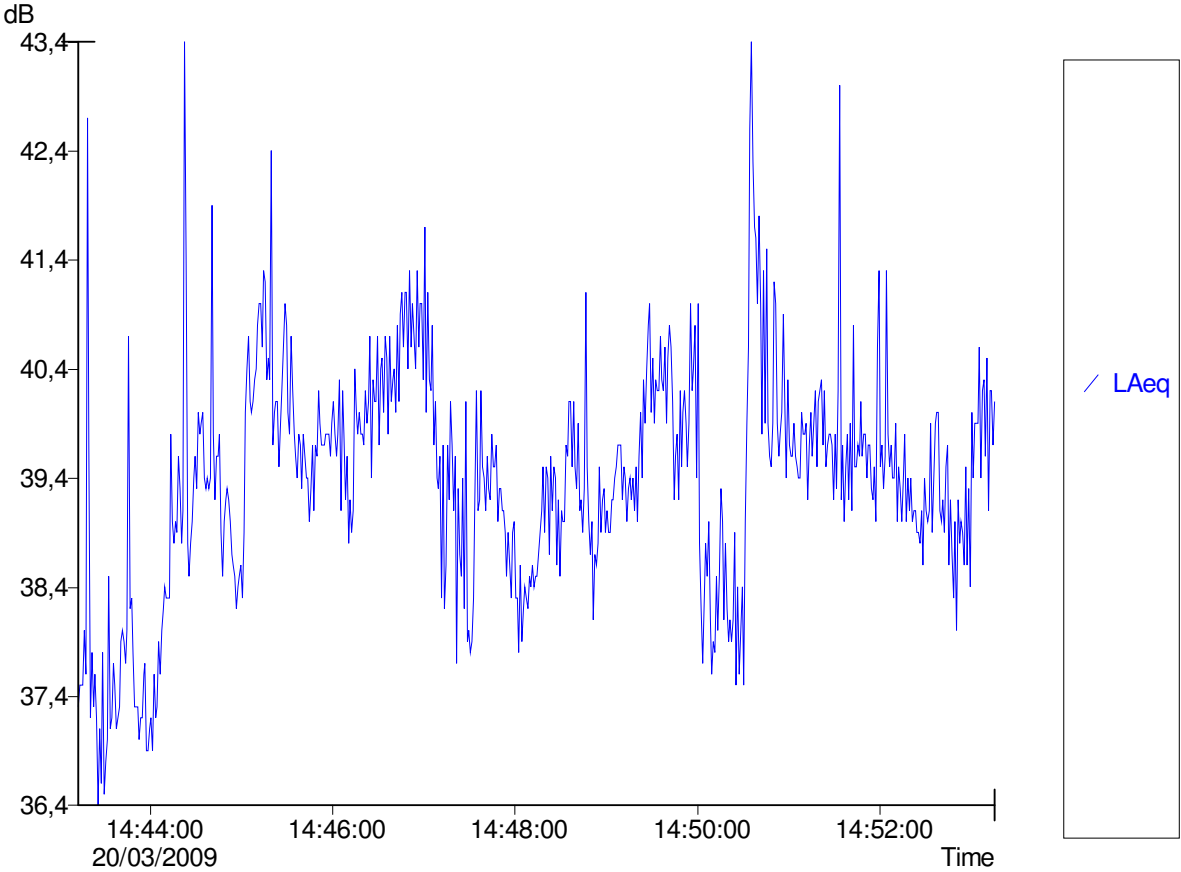
### Ponto 07 C



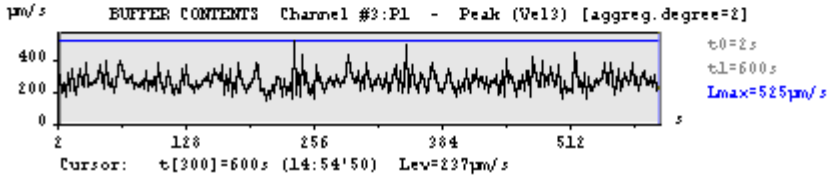
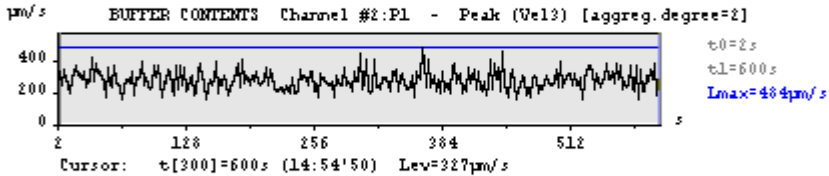
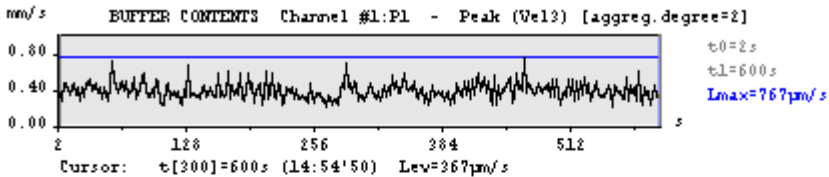
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**Ponto 08 A**

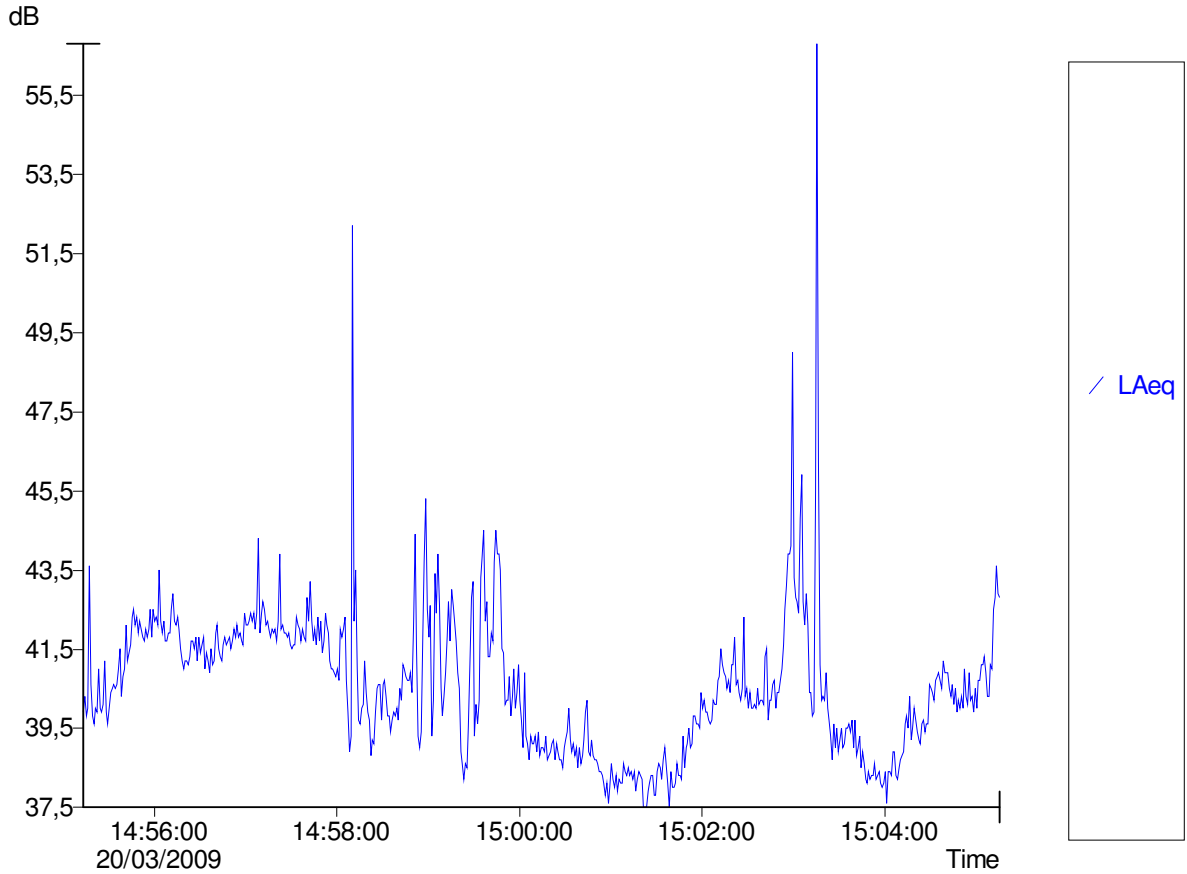


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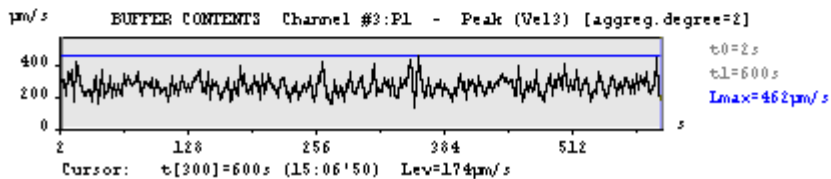
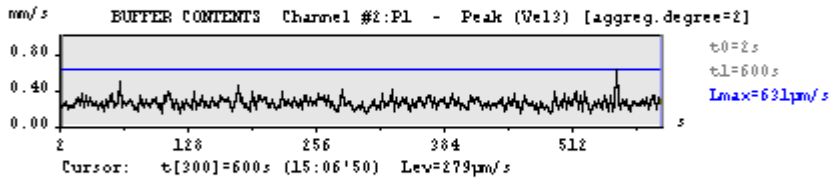
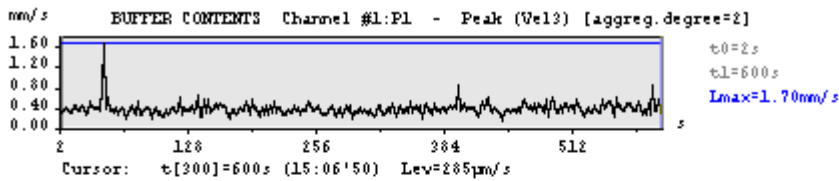




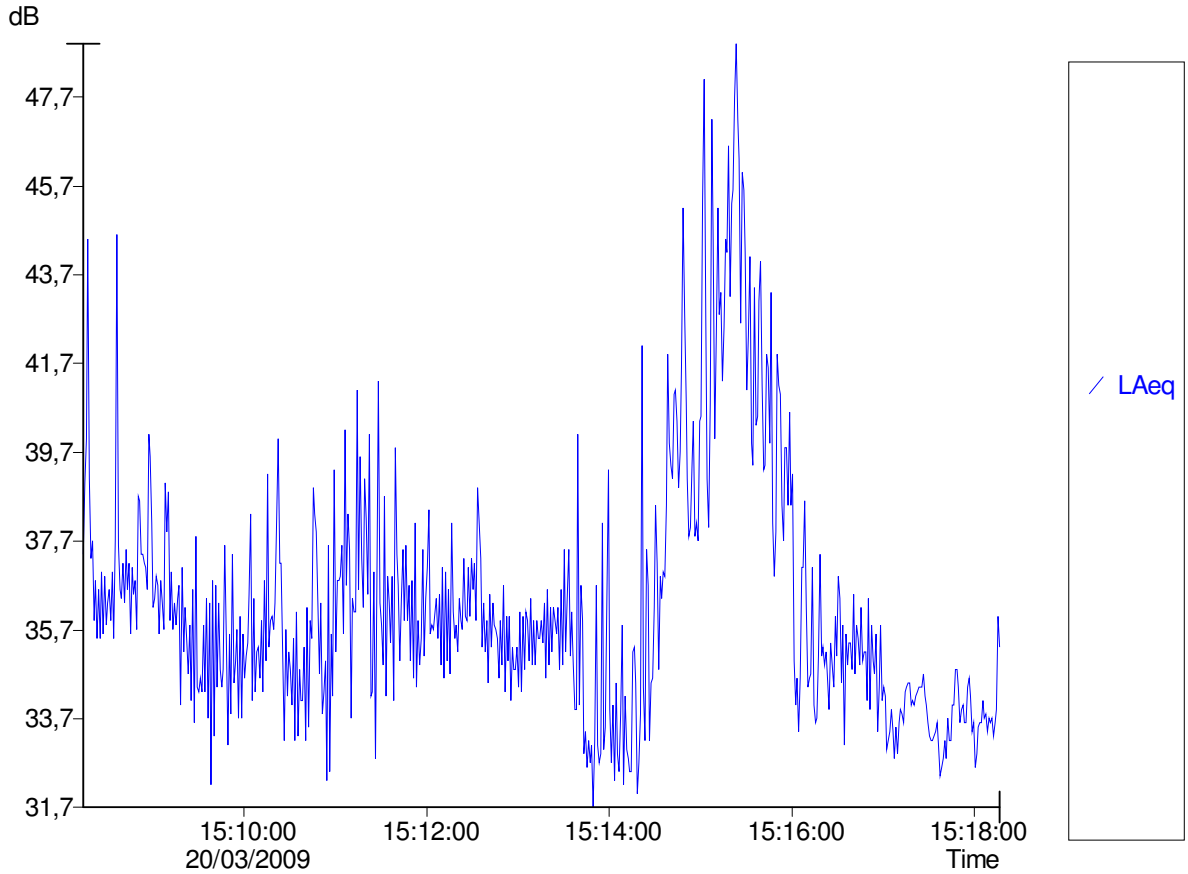
### Ponto 08 B



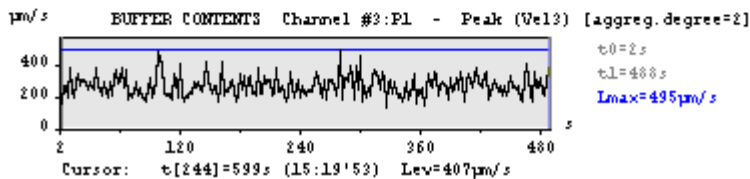
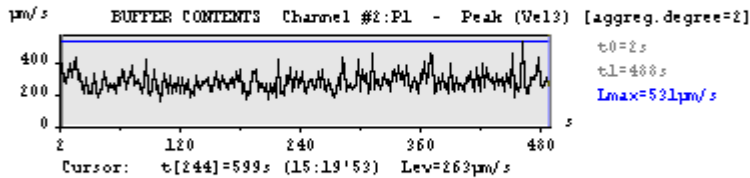
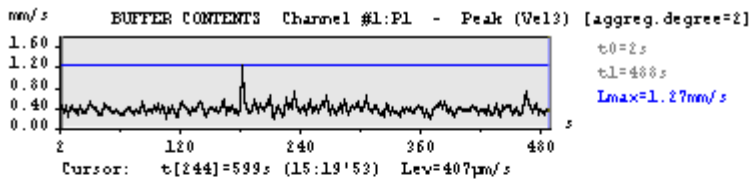
Y:\CRJ00029.DTA  
 Overall profile duration = 00:10:03 (603 samples)



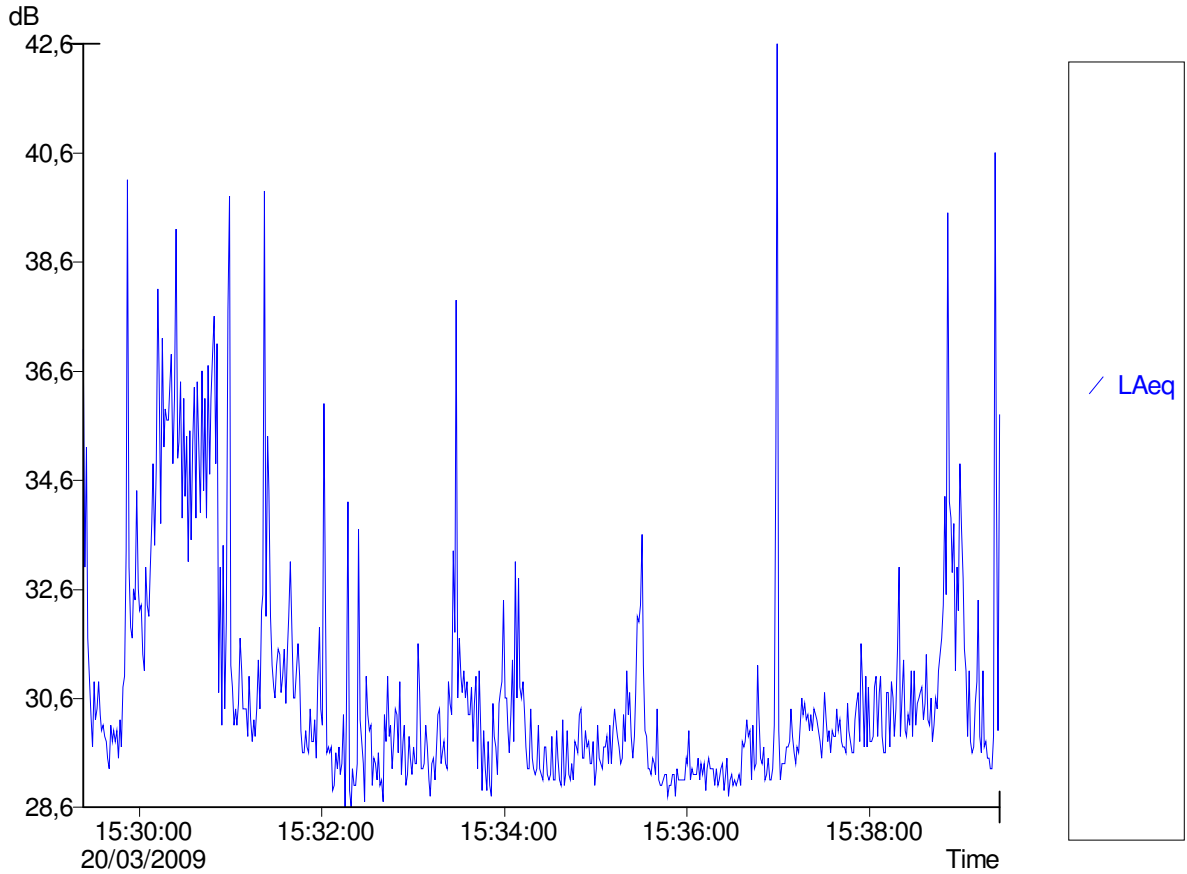
### Ponto 08 C



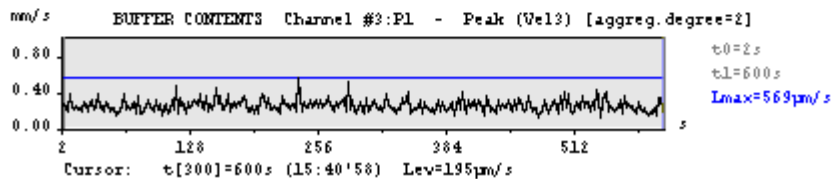
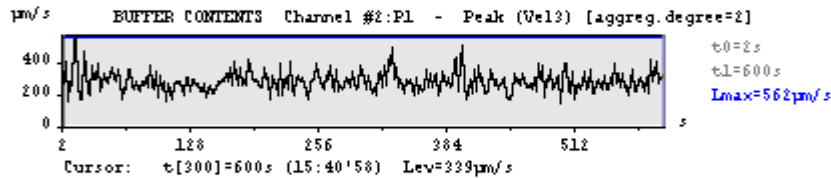
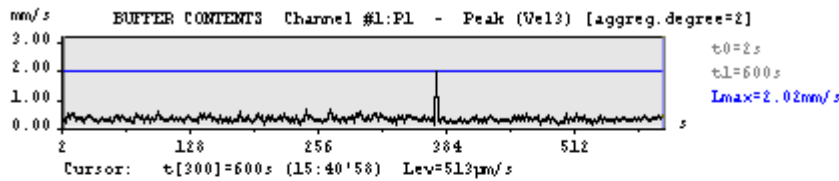
Y:\CRJ00030.DTA  
Overall profile duration = 00:10:03 (603 samples)



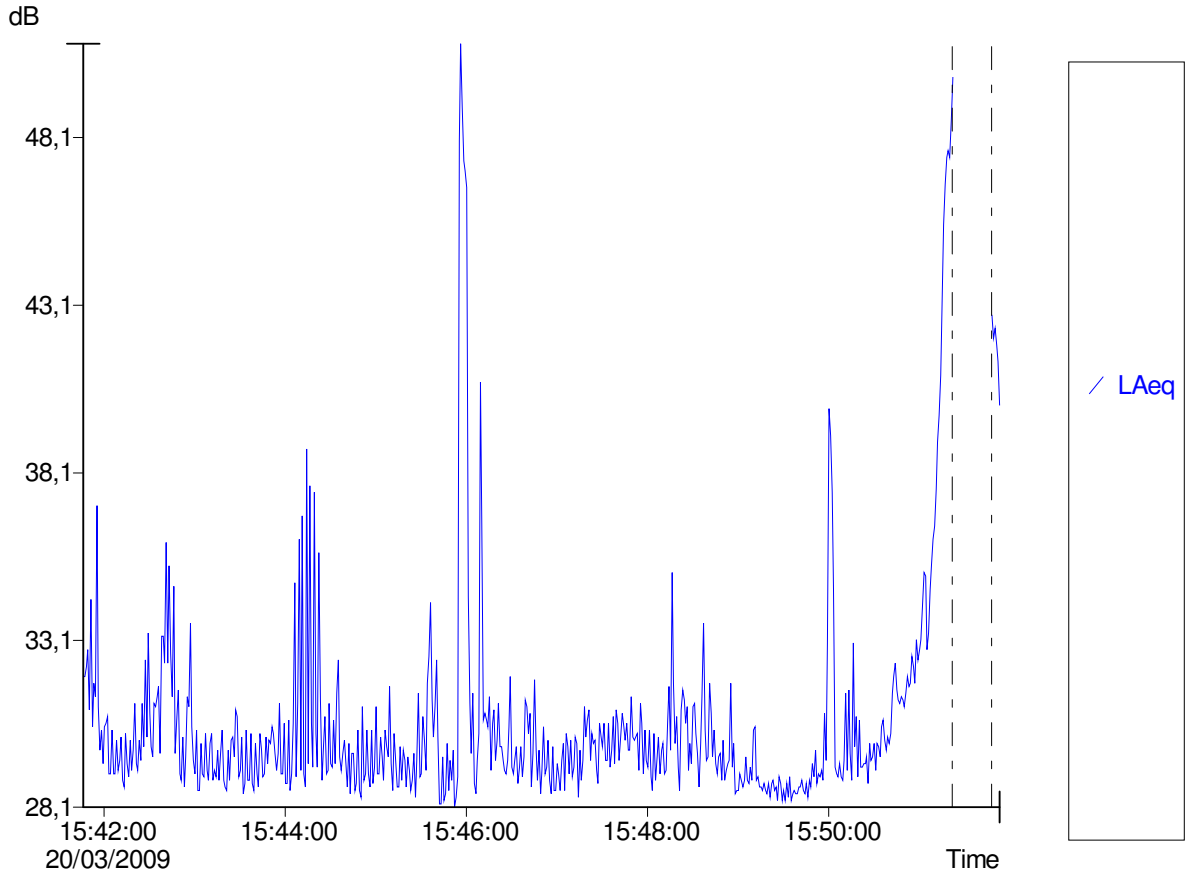
### Ponto 09 A



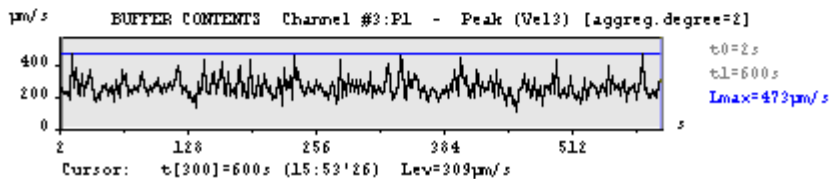
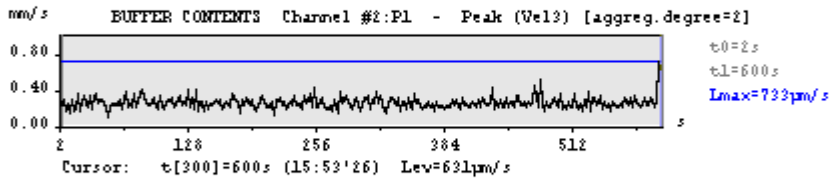
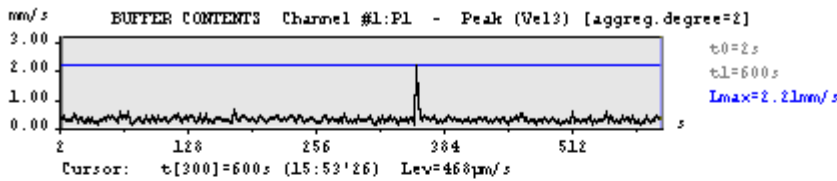
Y:\CRJ00031.DTA  
Overall profile duration = 00:10:03 (603 samples)



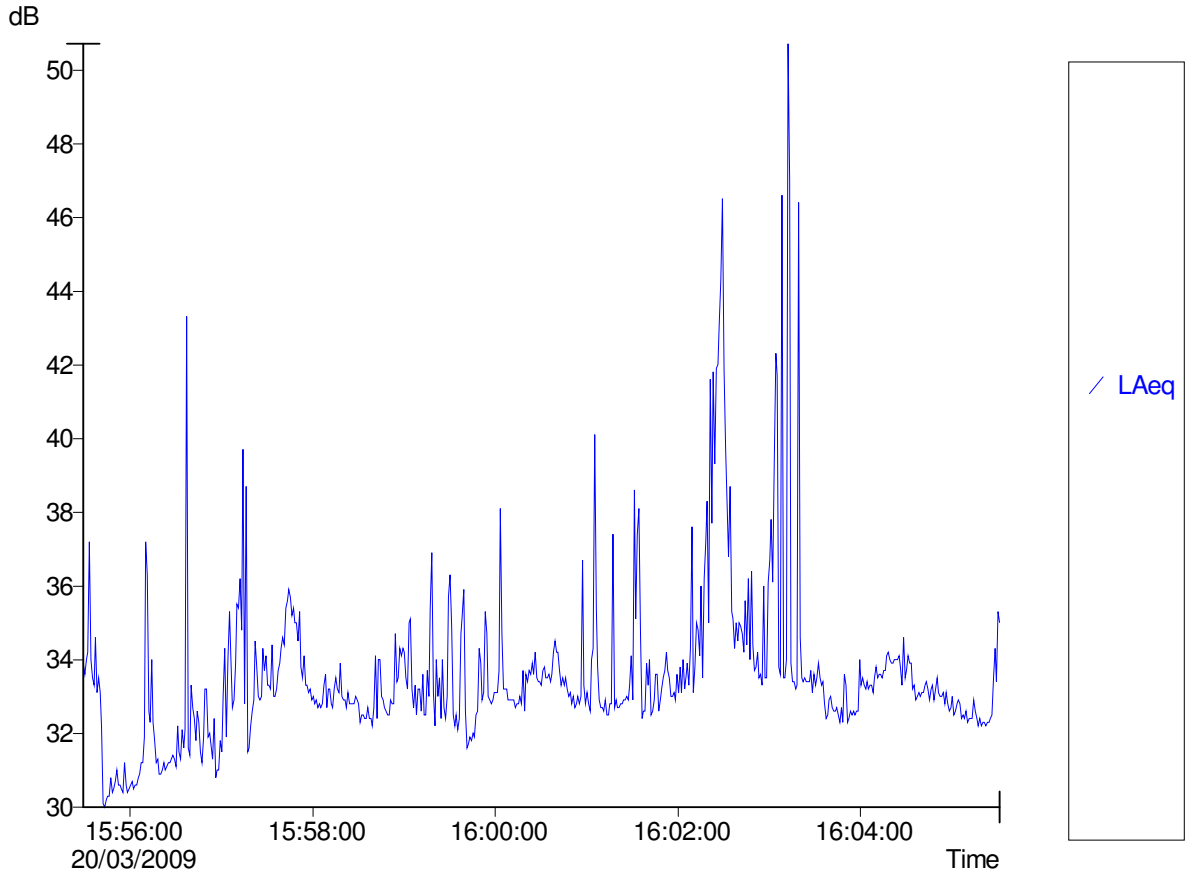
### Ponto 09 B



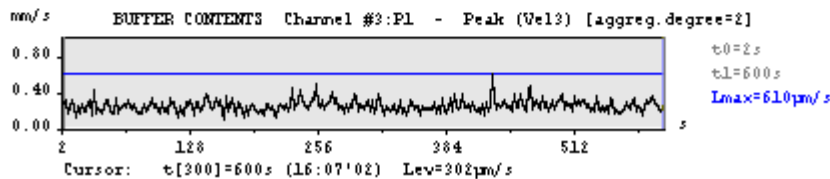
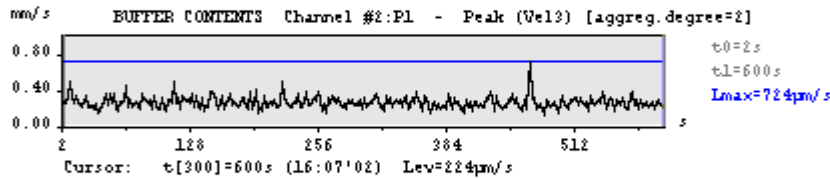
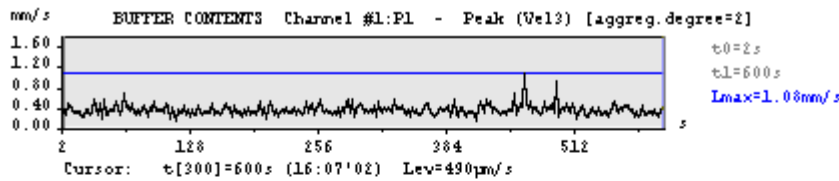
Y:\CRJ00032.DTA  
 Overall profile duration = 00:10:08 (608 samples)



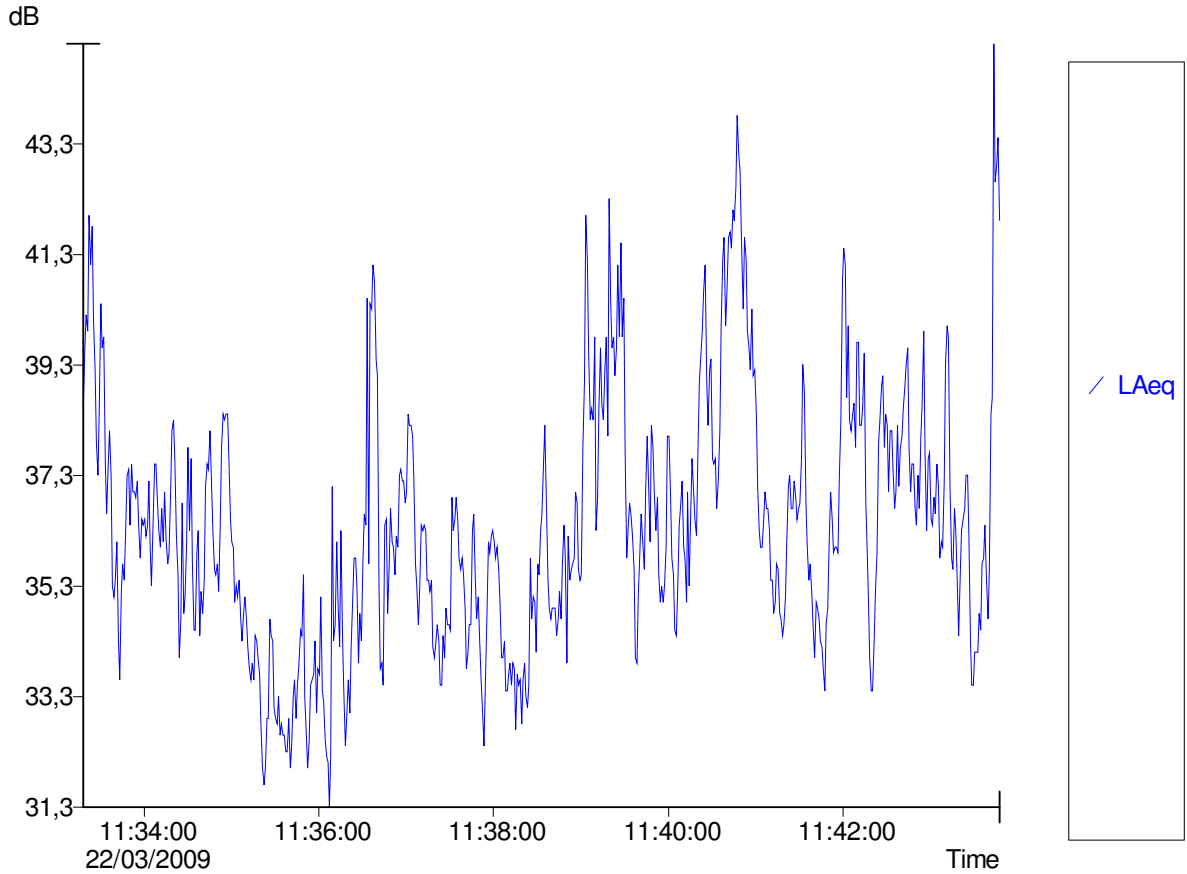
### Ponto 09 C



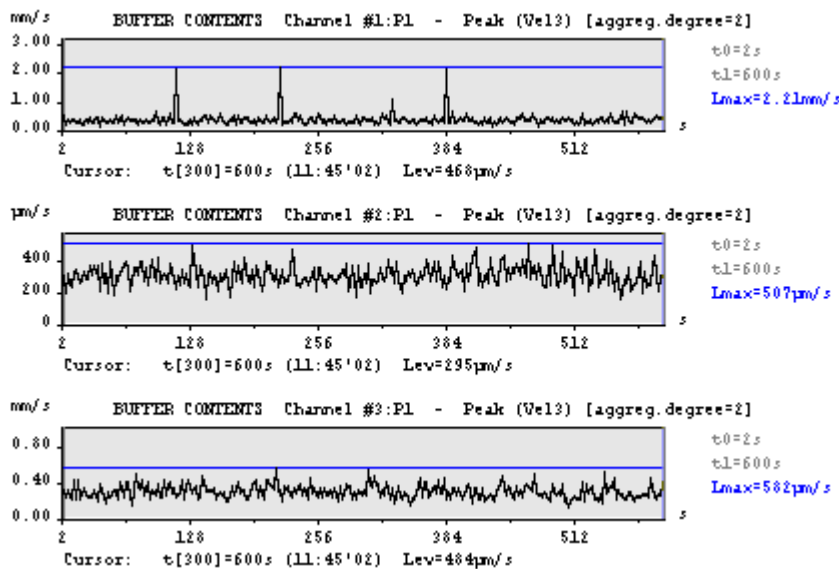
Y:\CRJ00033.DTA  
 Overall profile duration = 00:10:03 (603 samples)



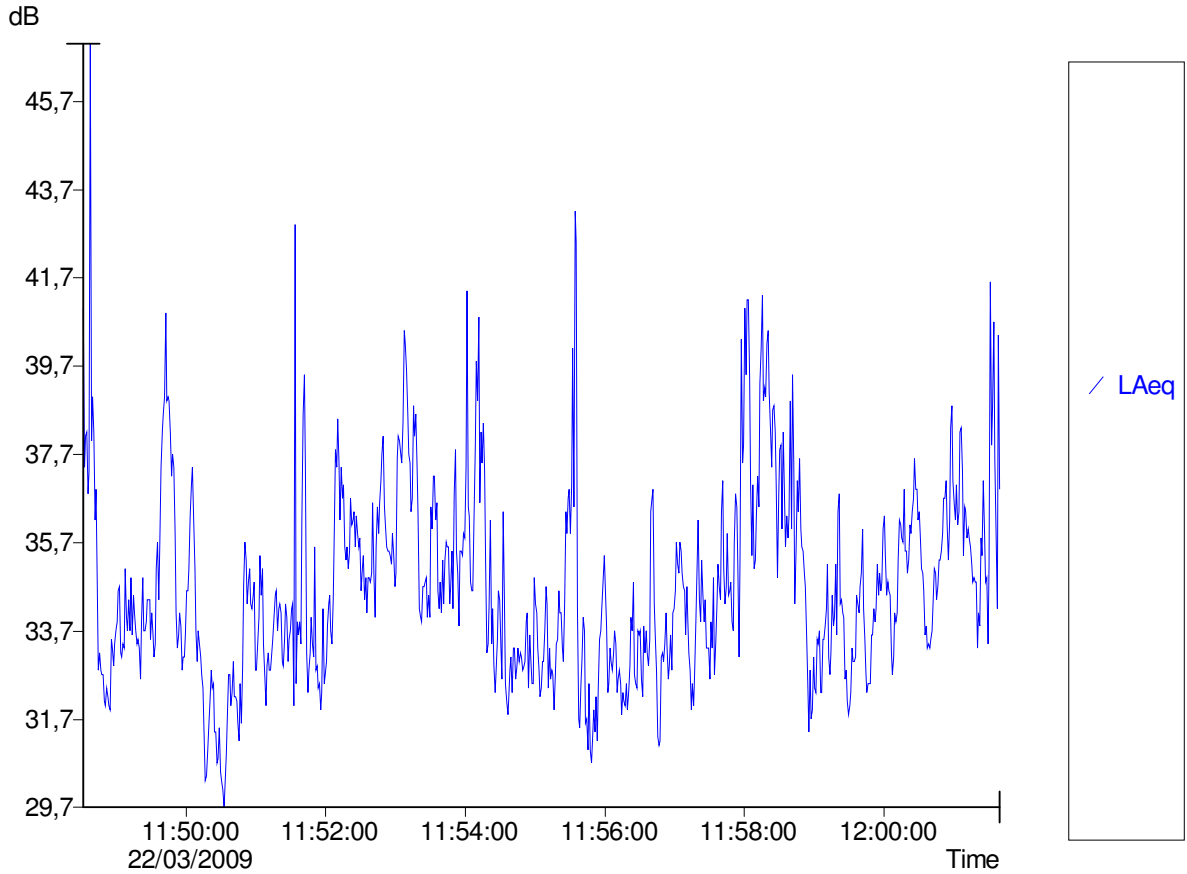
### Ponto 10 A



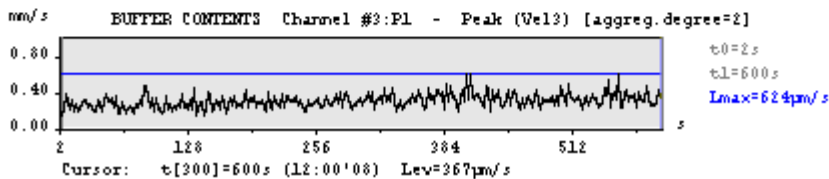
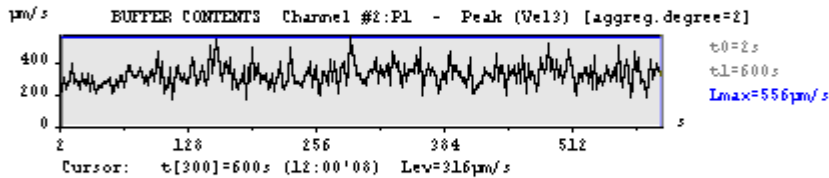
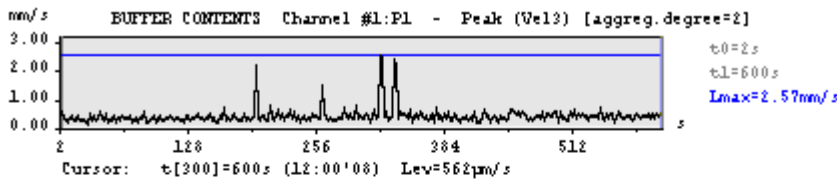
Y:\CRJ00064.DTA  
Overall profile duration = 00:10:30 (630 samples)



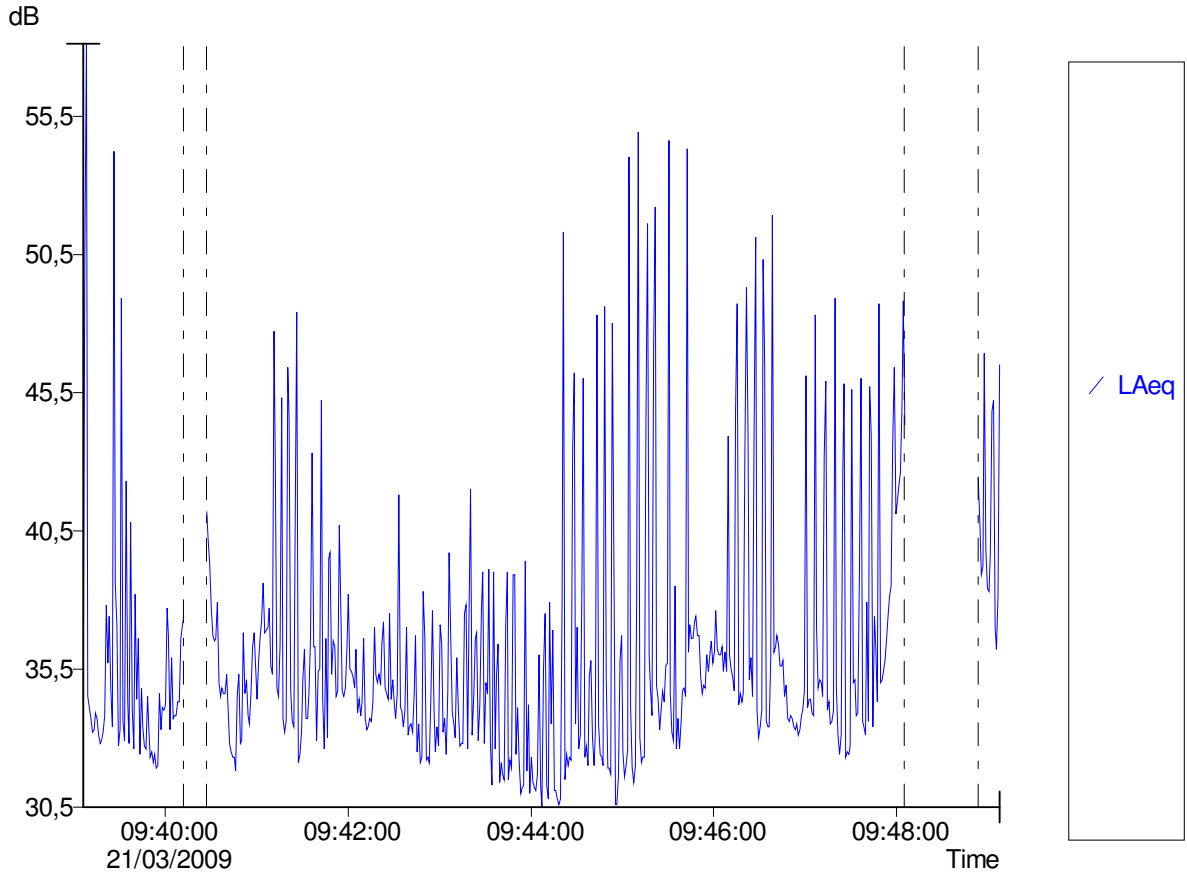
### Ponto 10 B



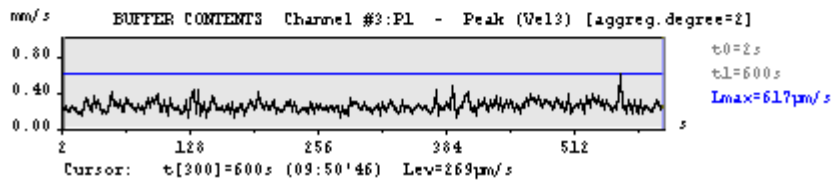
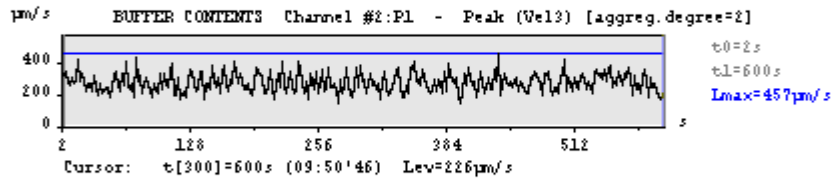
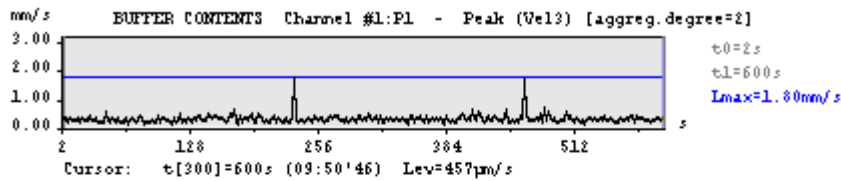
Y:\CRJ00065.DTA  
Overall profile duration = 00:13:09 (789 samples)



### Ponto 11 A

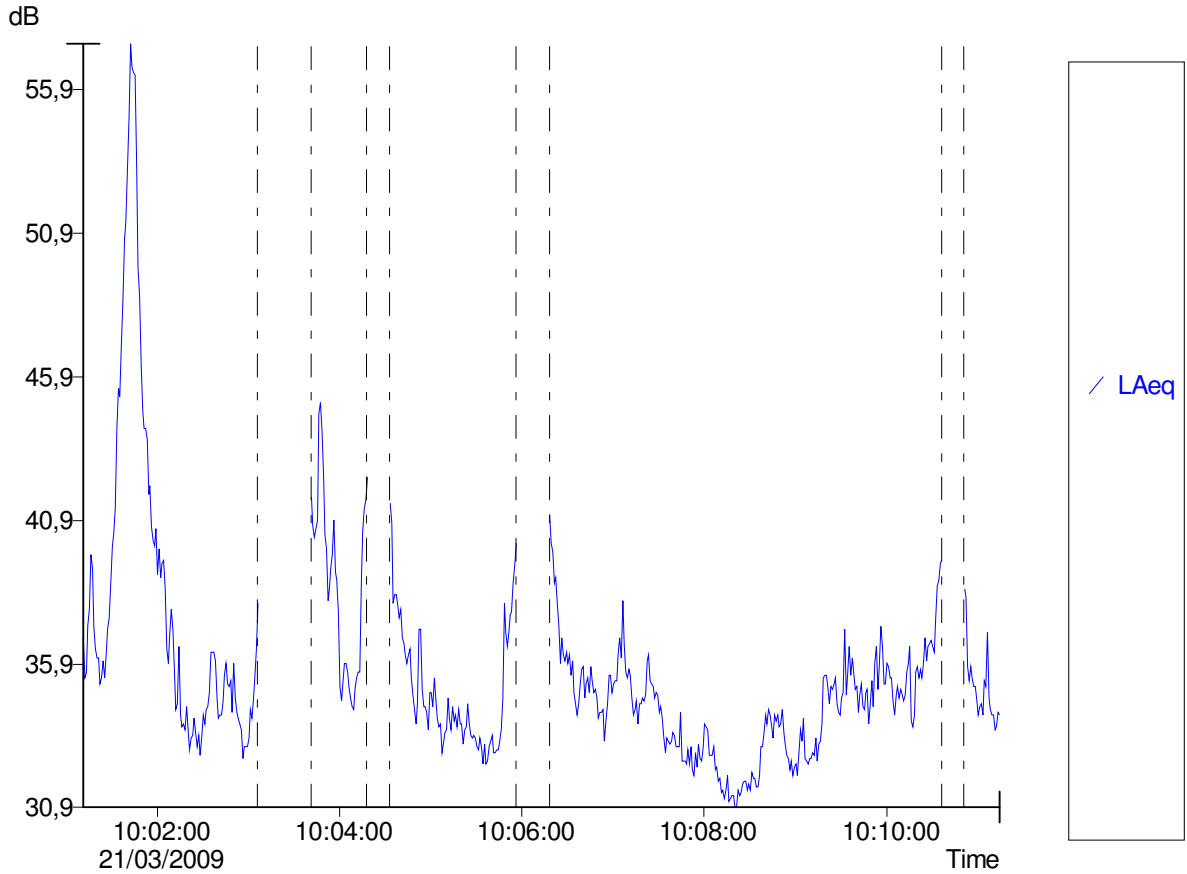


Y:\CRJ00040.DTA  
Overall profile duration = 00:10:02 (602 samples)

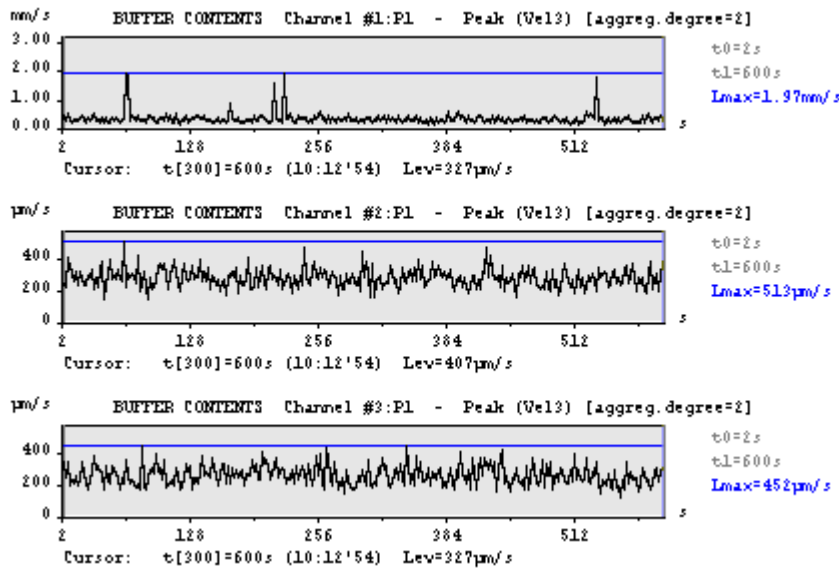




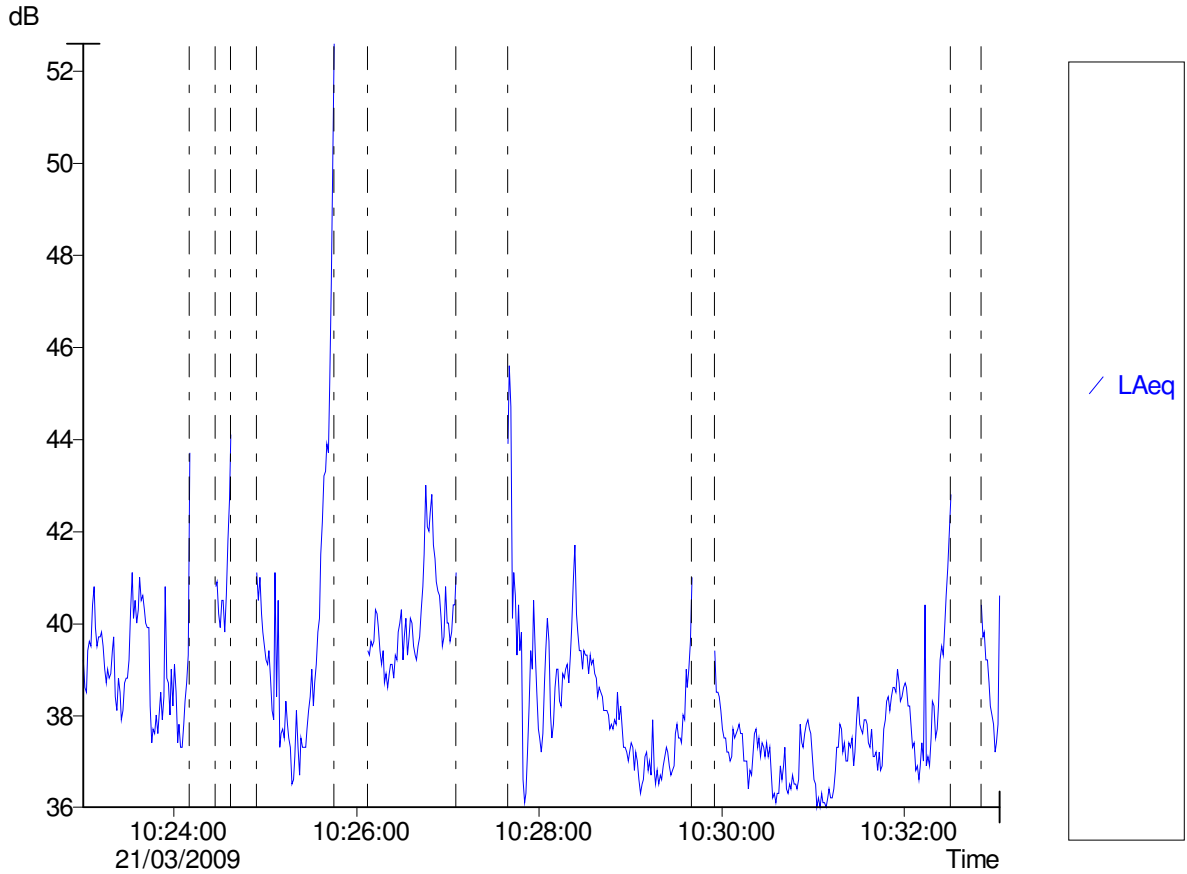
### Ponto 12 A



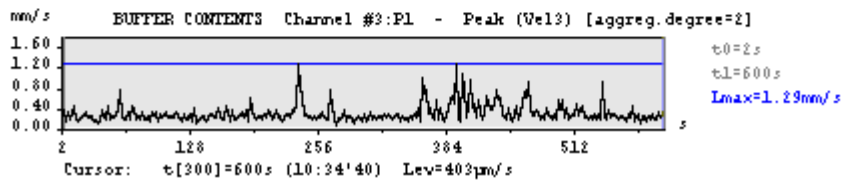
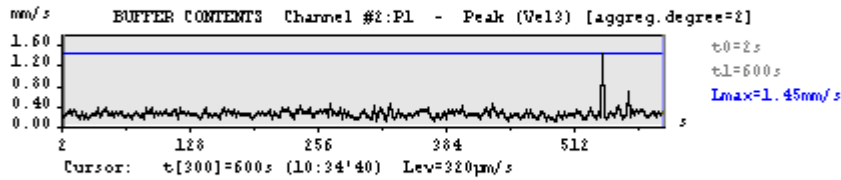
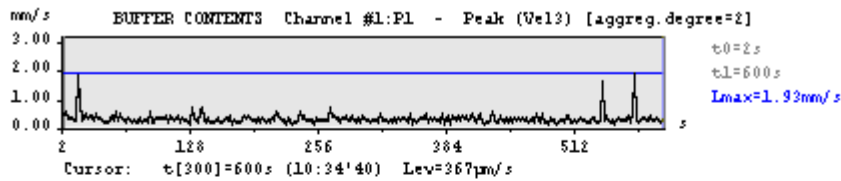
Y:\CRJ00041.DTA  
 Overall profile duration = 00:10:04 (604 samples)



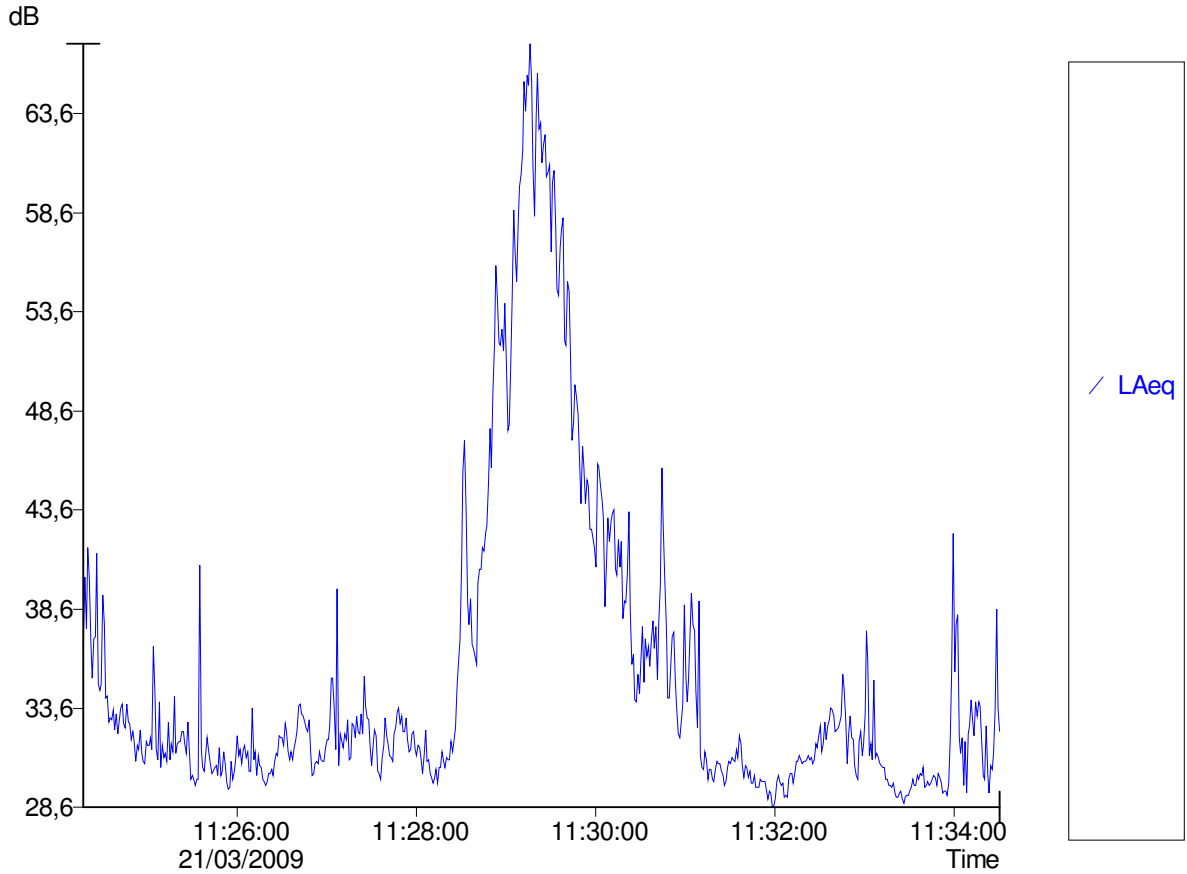
### Ponto 13 A



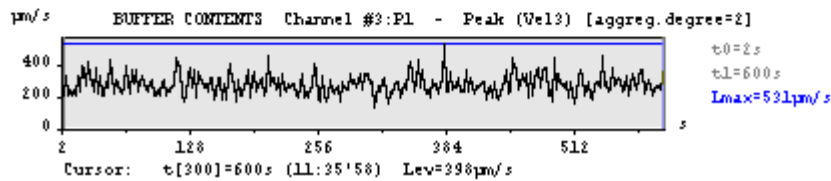
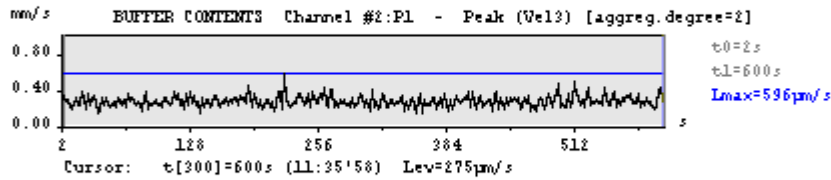
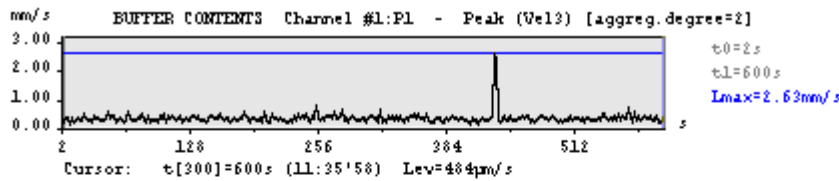
Y:\CRJ00042.DTA  
 Overall profile duration = 00:10:03 (603 samples)



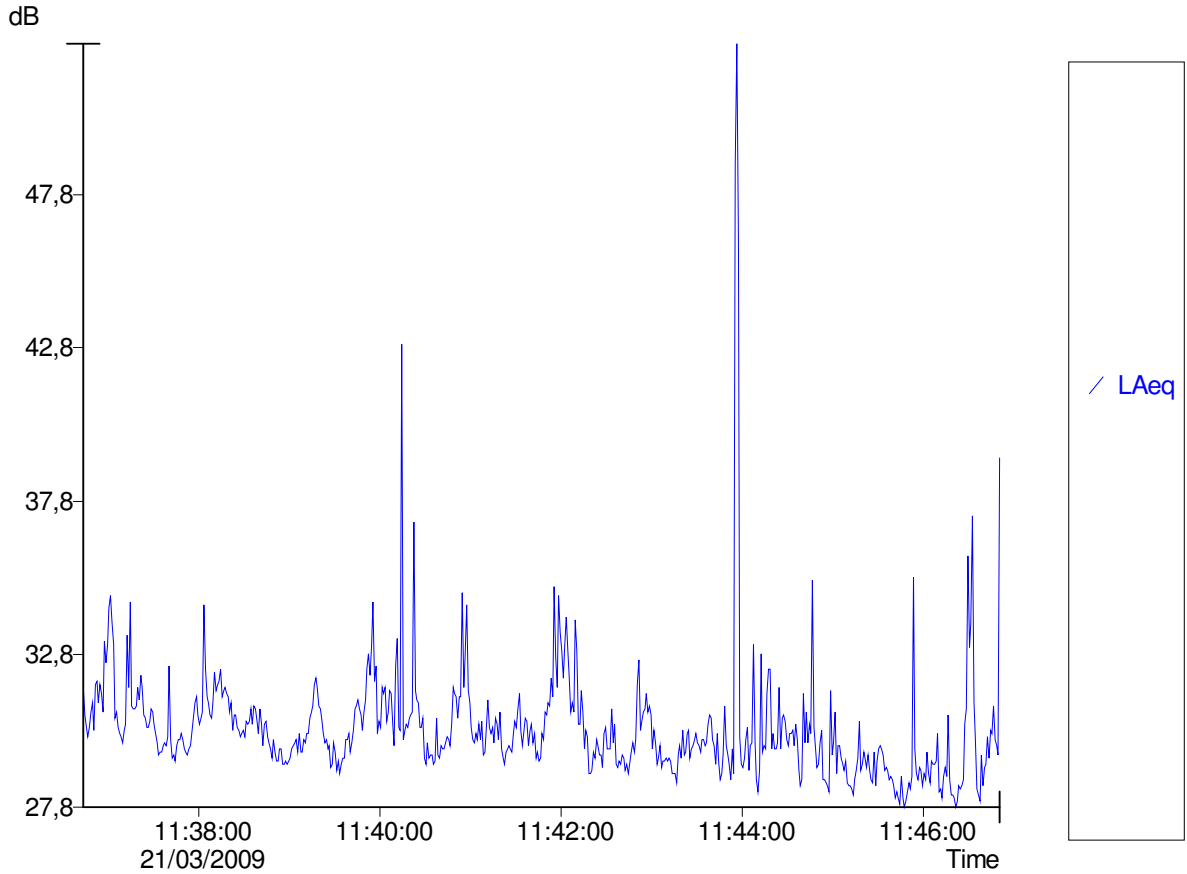
### Ponto 14 A



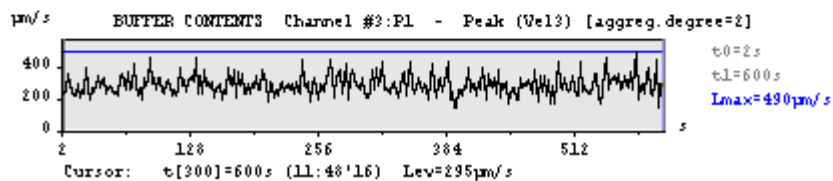
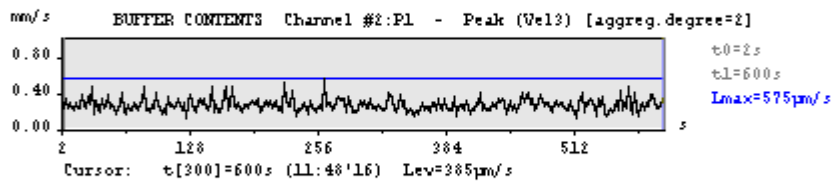
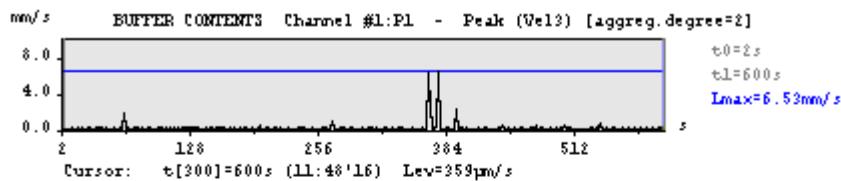
X:\CRJ00043.DTA  
Overall profile duration = 00:10:14 (614 samples)



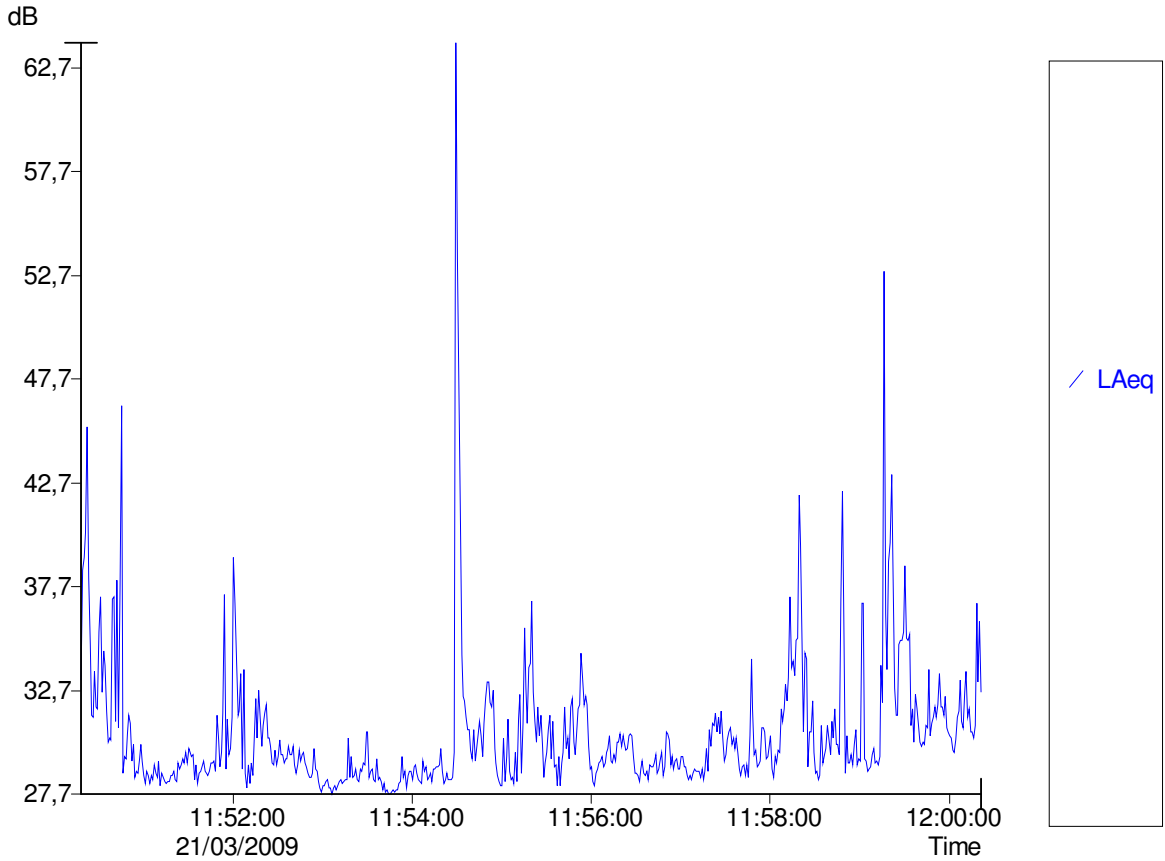
### Ponto 14 B



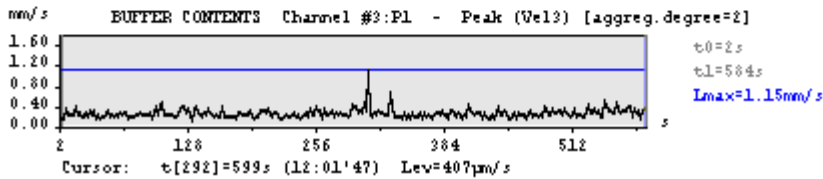
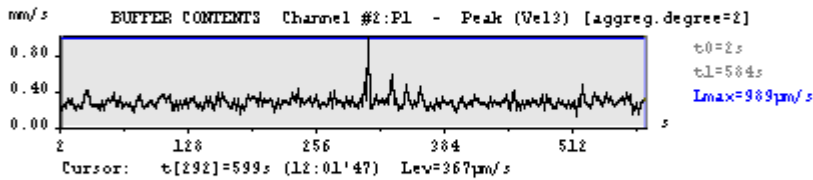
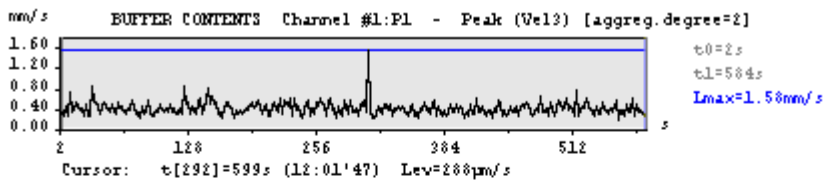
X:\CRJ00044.DTA  
Overall profile duration = 00:10:08 (608 samples)



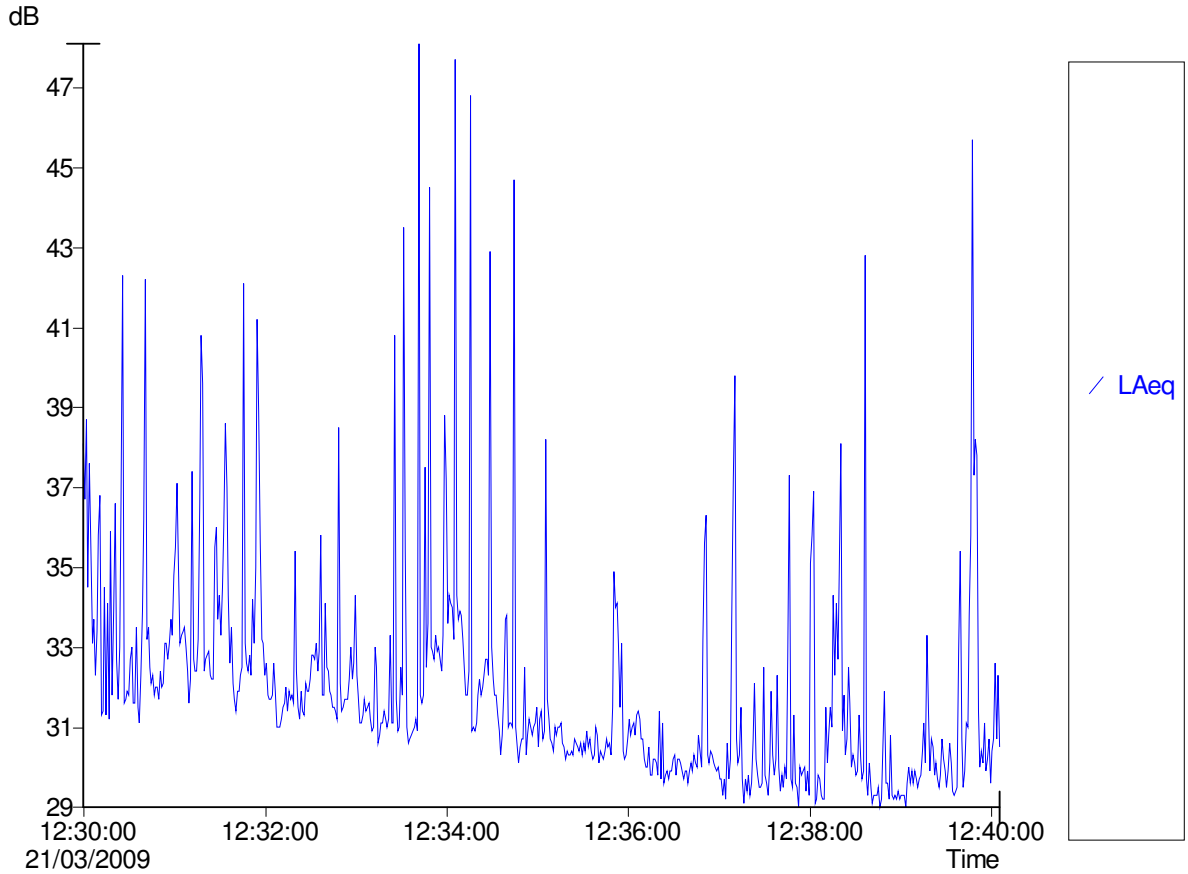
### Ponto 14 C



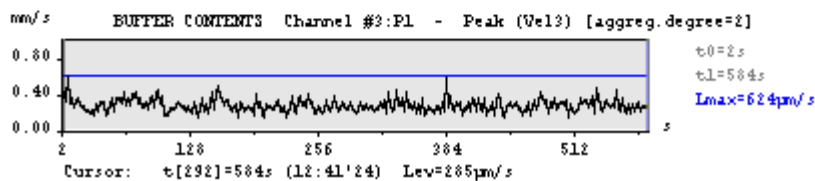
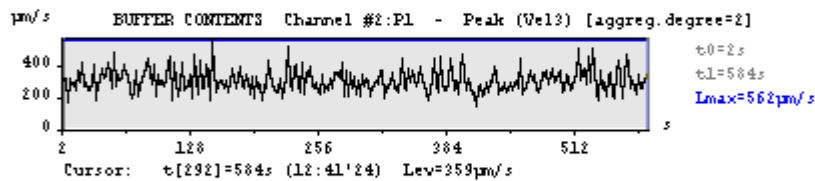
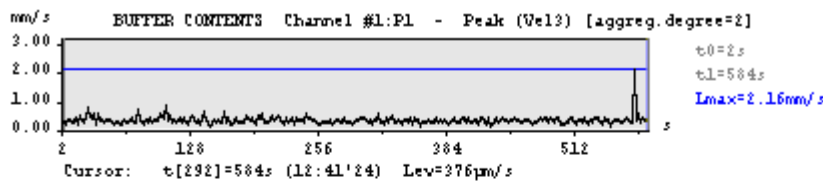
X:\CRJ00045.DTA  
Overall profile duration = 00:10:04 (604 samples)



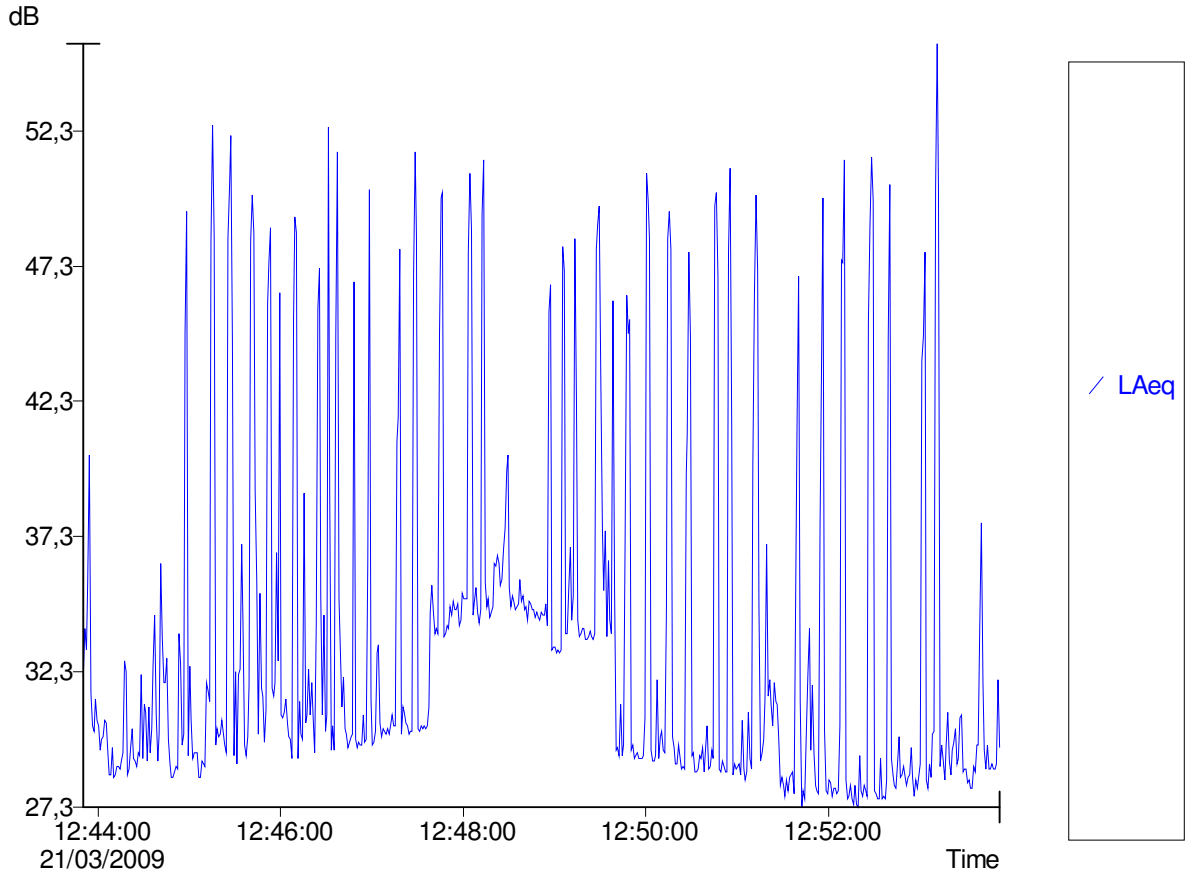
### Ponto 15 A



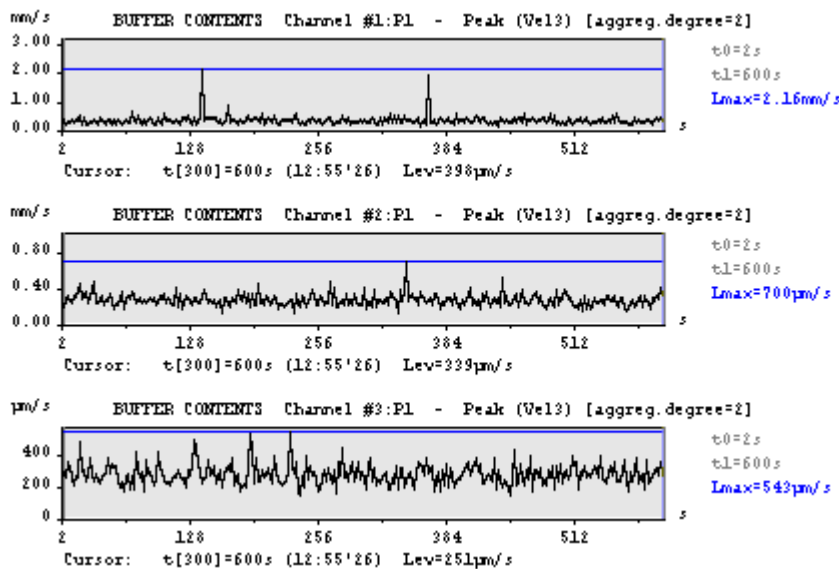
X:\CRJ00046.DTA  
Overall profile duration = 00:10:07 (607 samples)



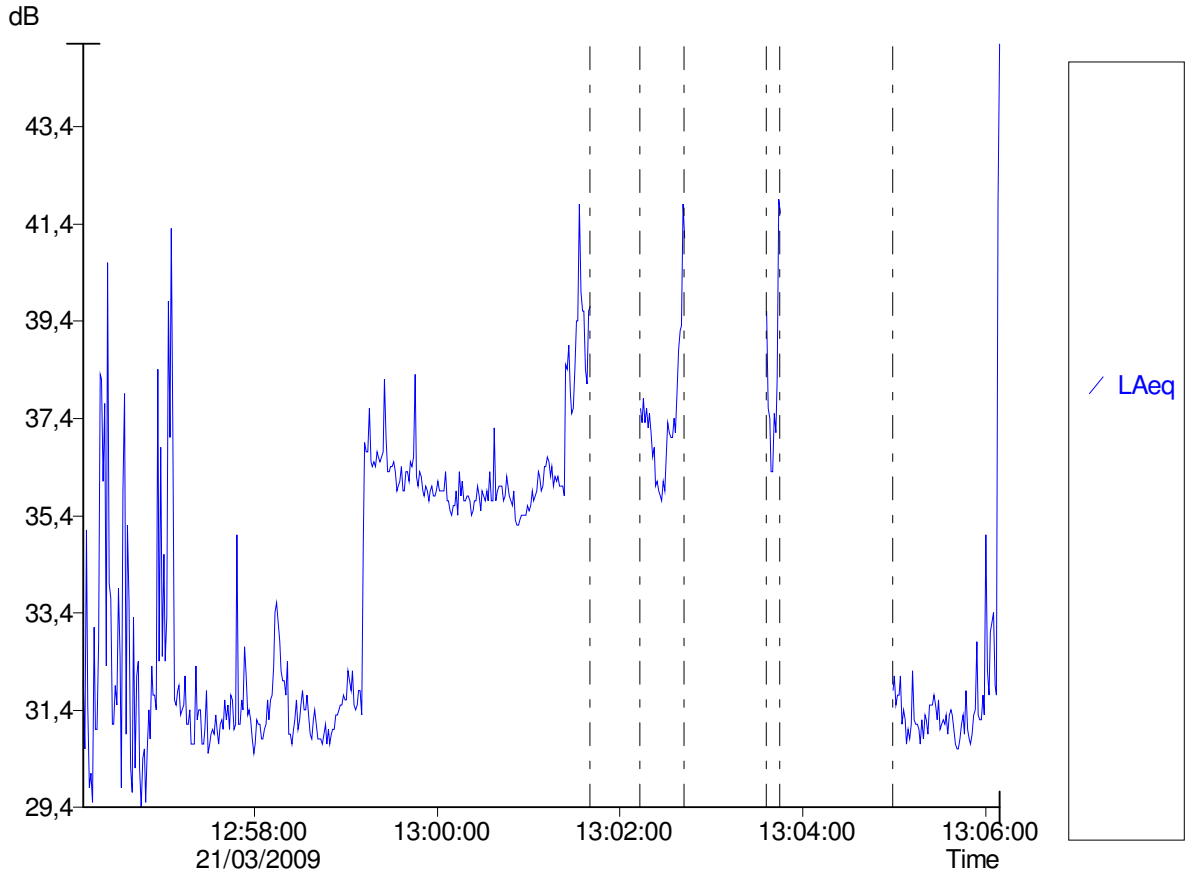
### Ponto 15 B



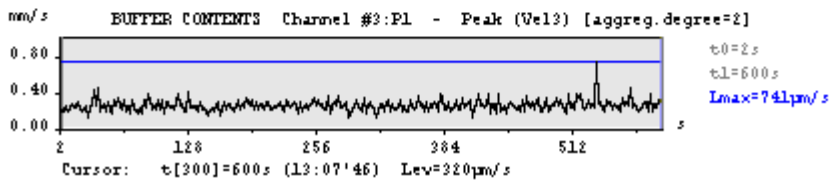
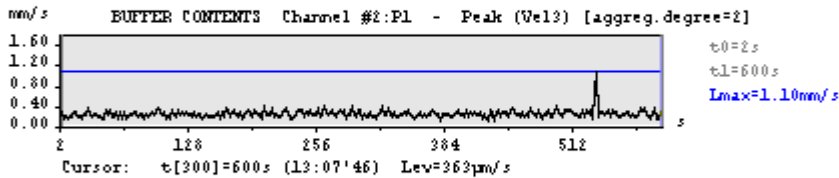
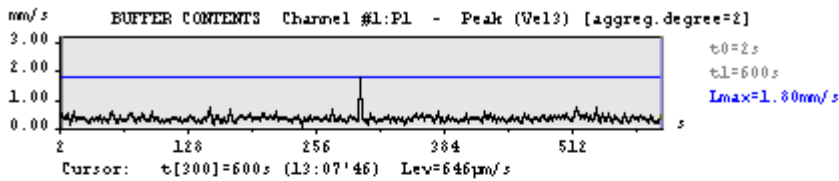
X:\CRJ00047.DTA  
 Overall profile duration = 00:10:03 (603 samples)



### Ponto 15 C

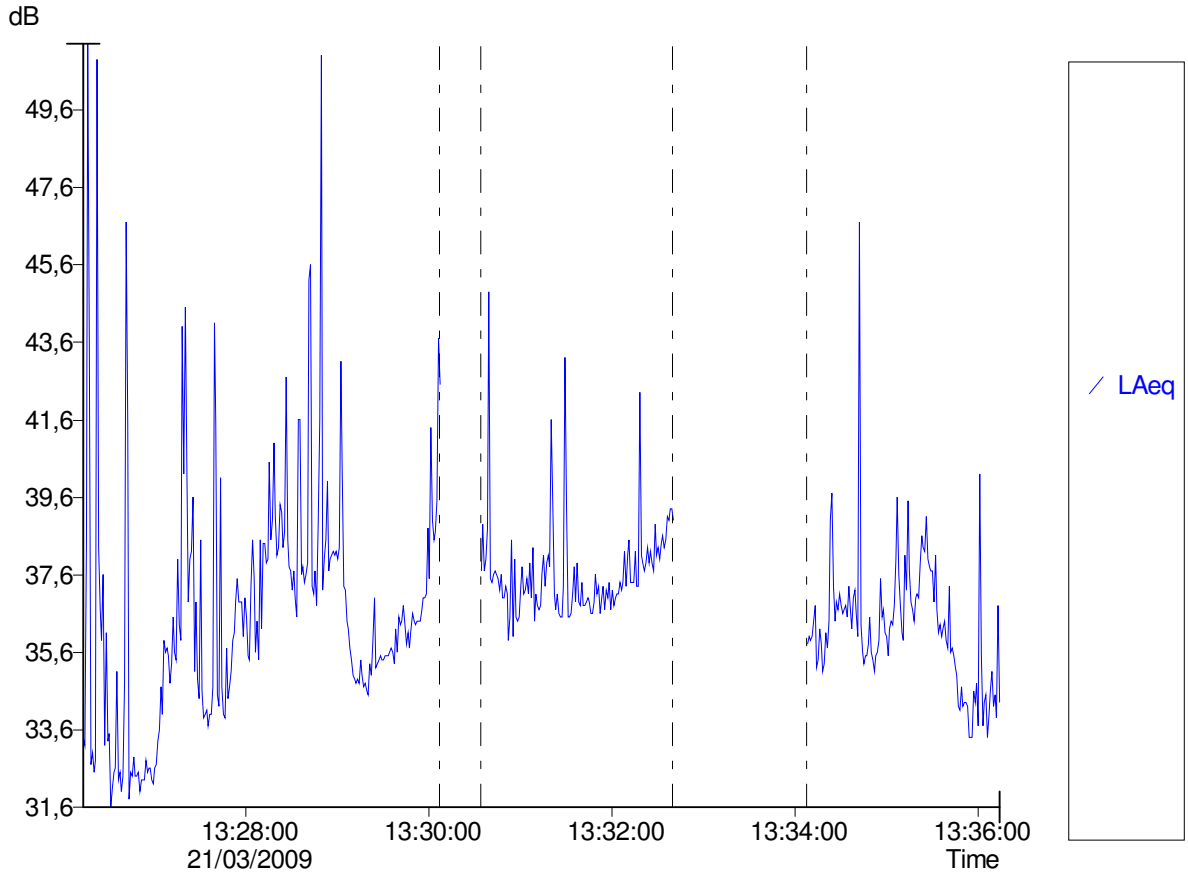


X:\CRJ00048.DTA  
Overall profile duration = 00:10:03 (603 samples)

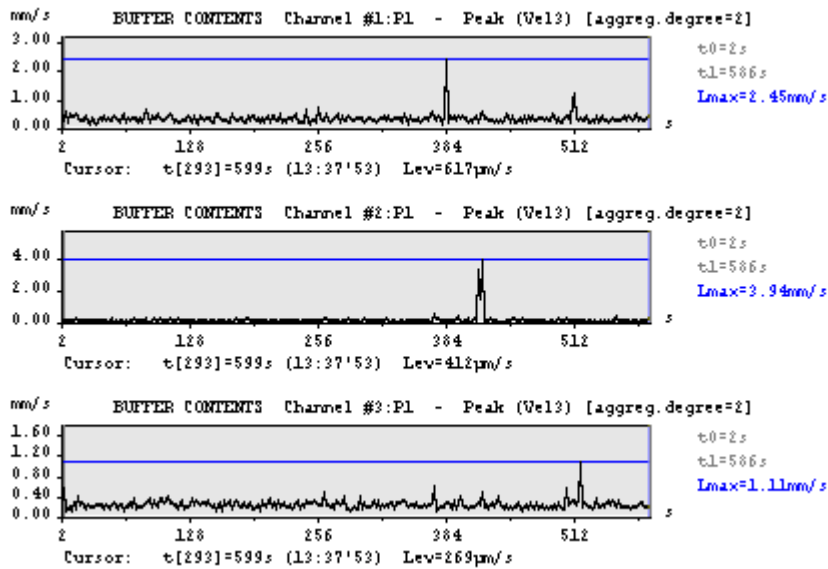




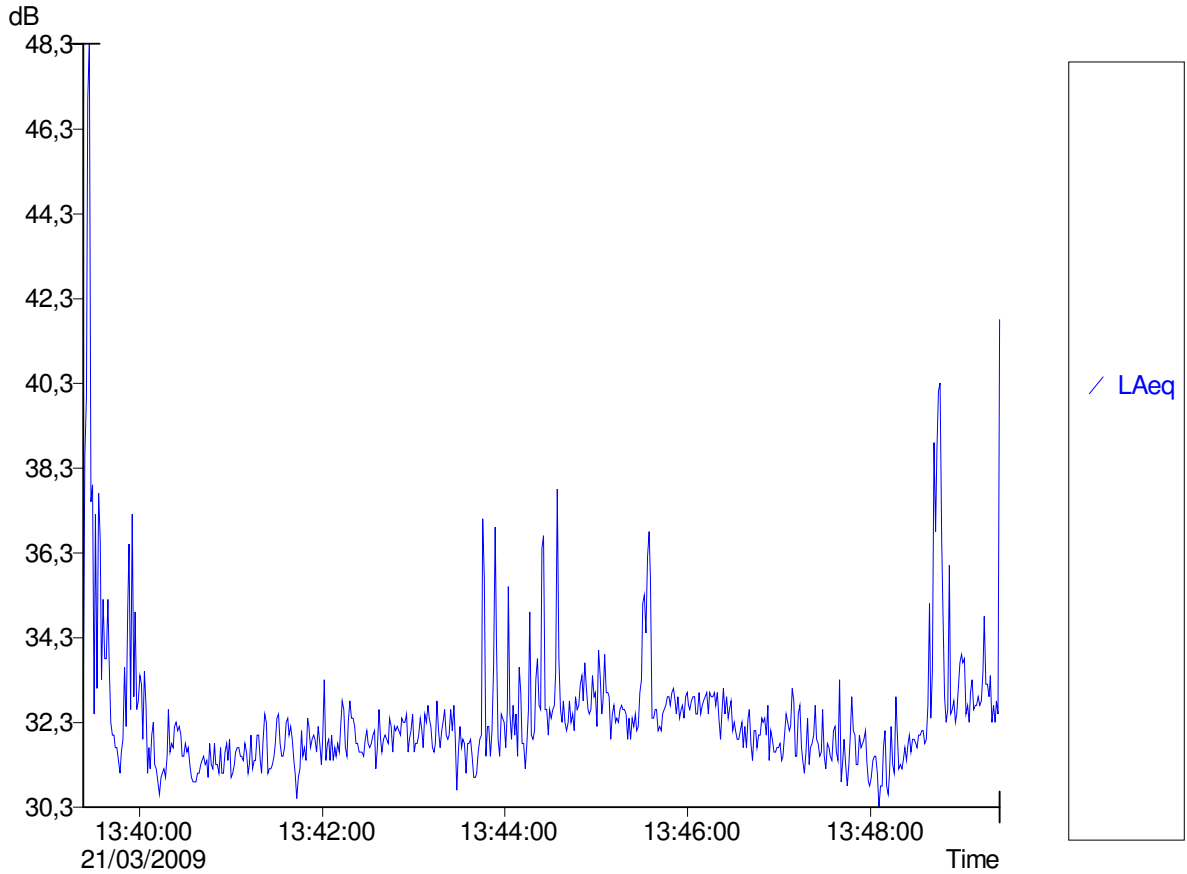
### Ponto 16 A



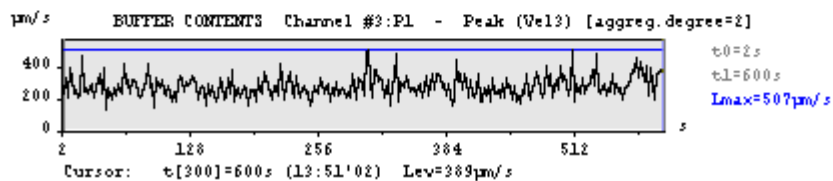
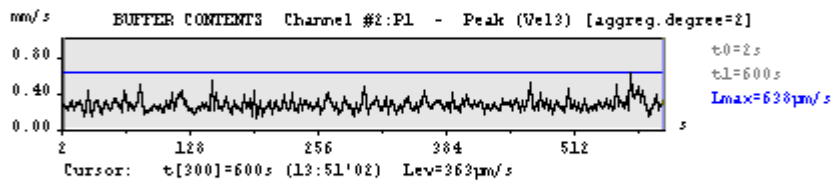
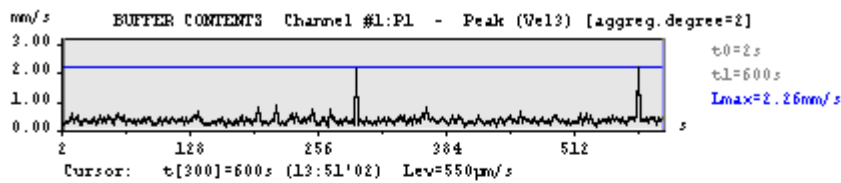
X:\CRJ00049.DTA  
Overall profile duration = 00:10:02 (602 samples)



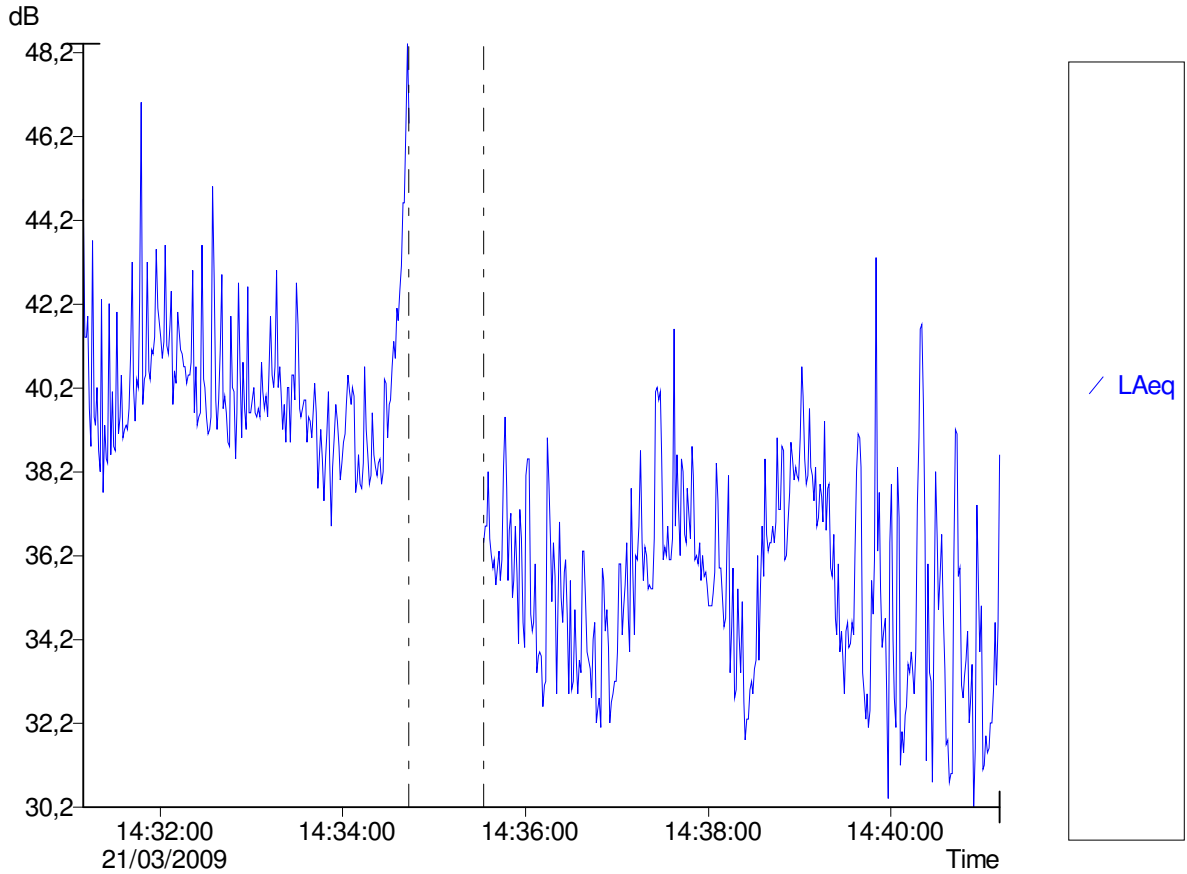
### Ponto 16 B



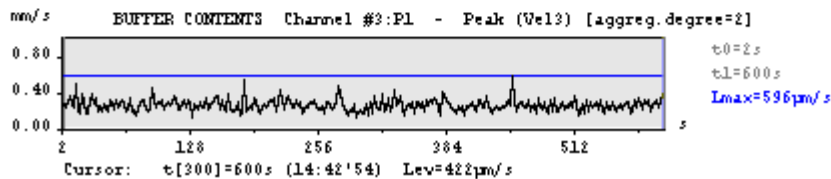
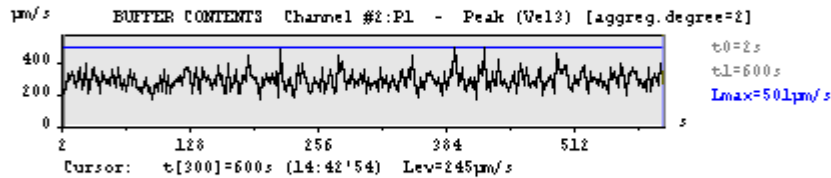
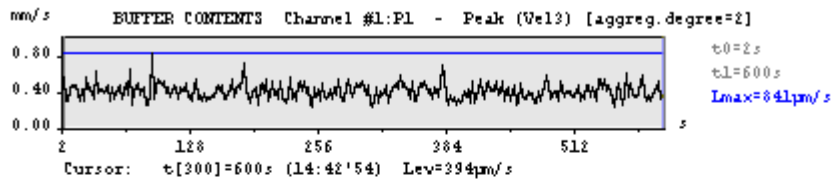
X:\CRJ00050.DTA  
Overall profile duration = 00:10:02 (602 samples)



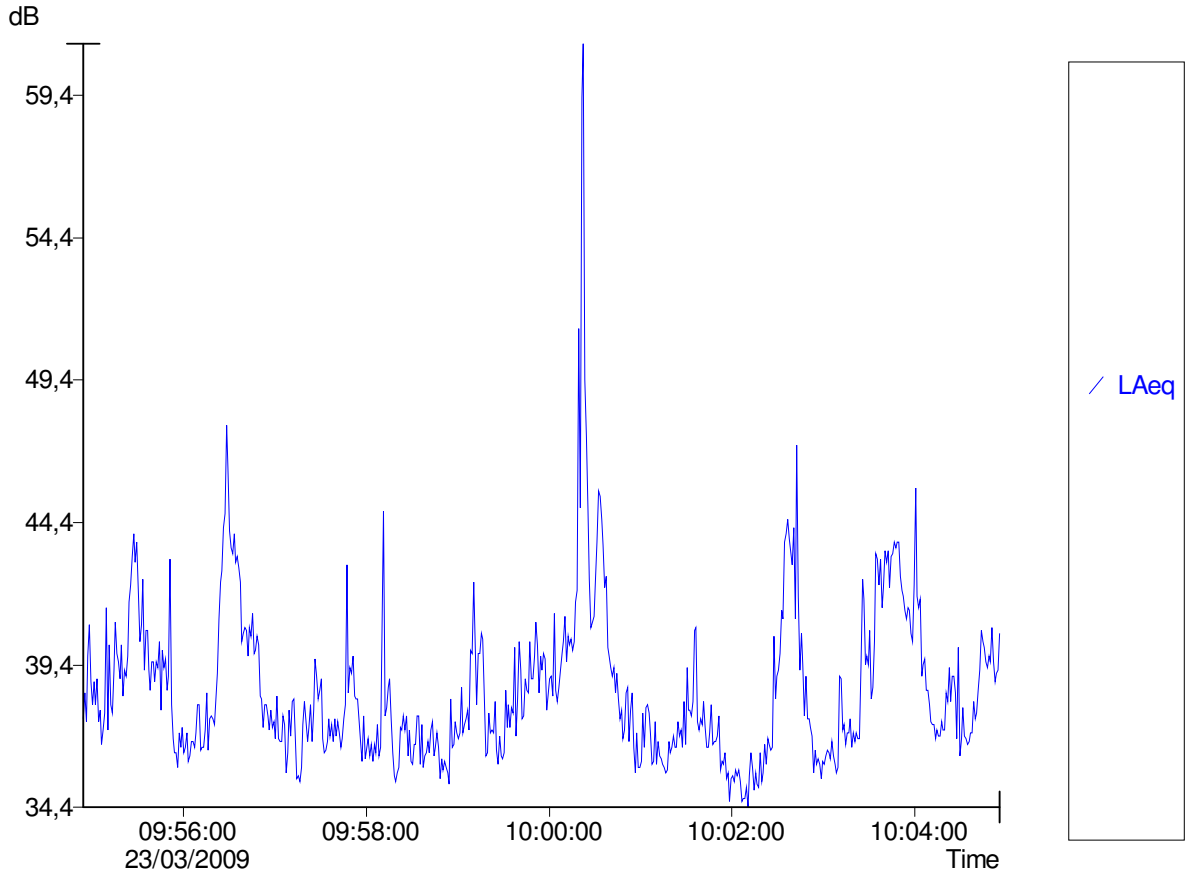
### Ponto 17 A



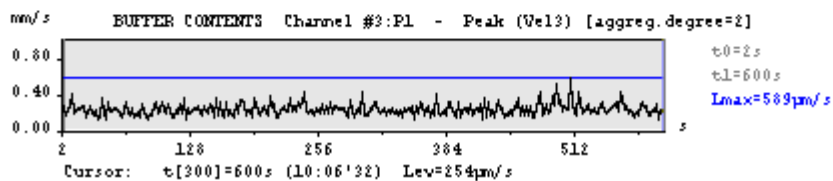
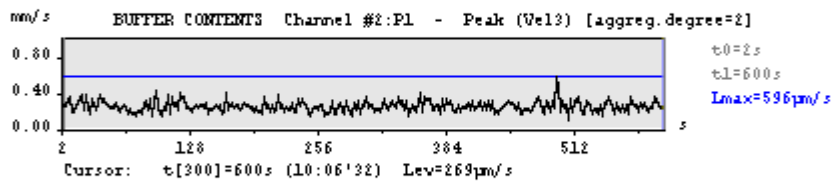
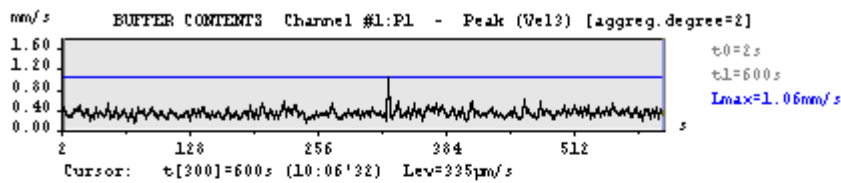
X:\CRJ00051.DTA  
Overall profile duration = 00:10:03 (603 samples)



### Ponto 18

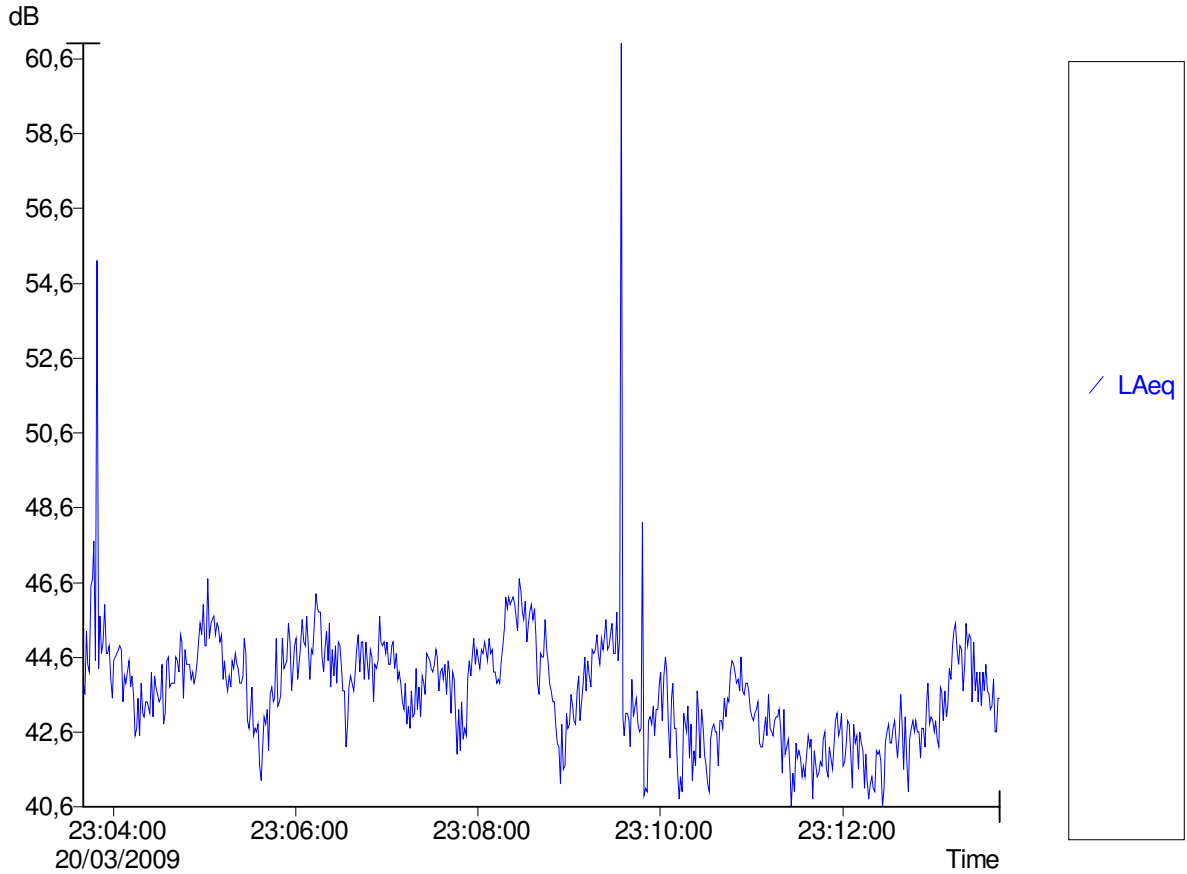


X:\CRJ00079.DTA  
 Overall profile duration = 00:10:02 (602 samples)

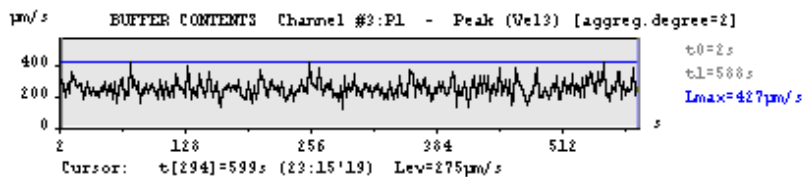
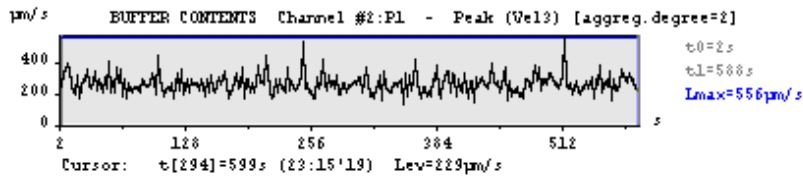
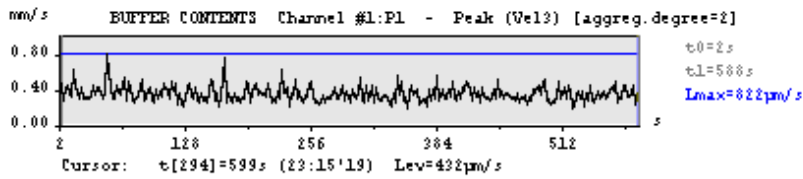


## NOTURNO

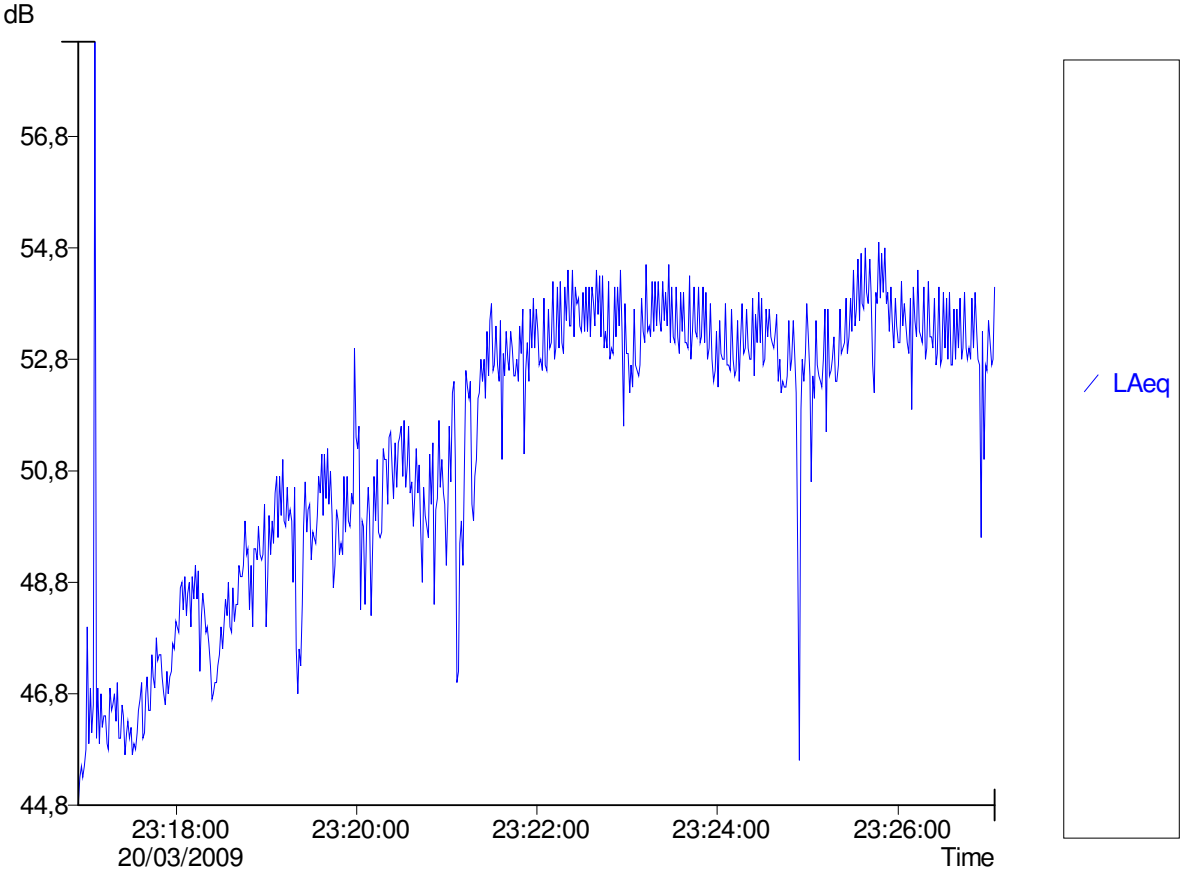
### Ponto 01 A



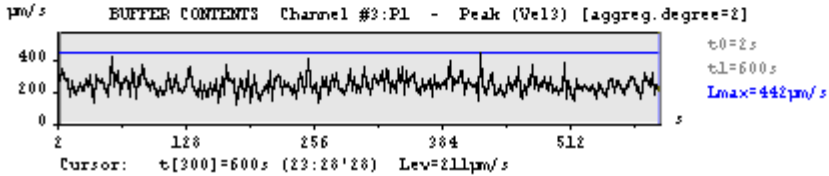
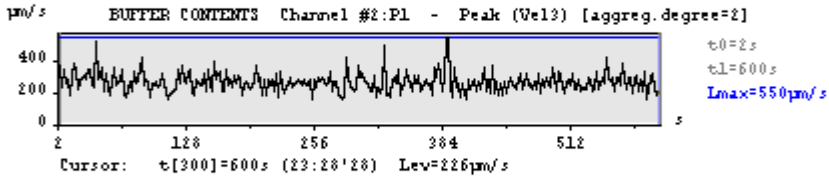
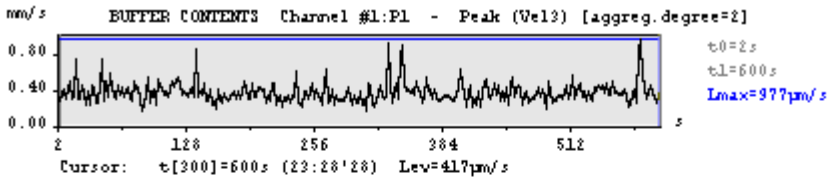
X:\CRJ00037.DTA  
Overall profile duration = 00:10:04 (604 samples)



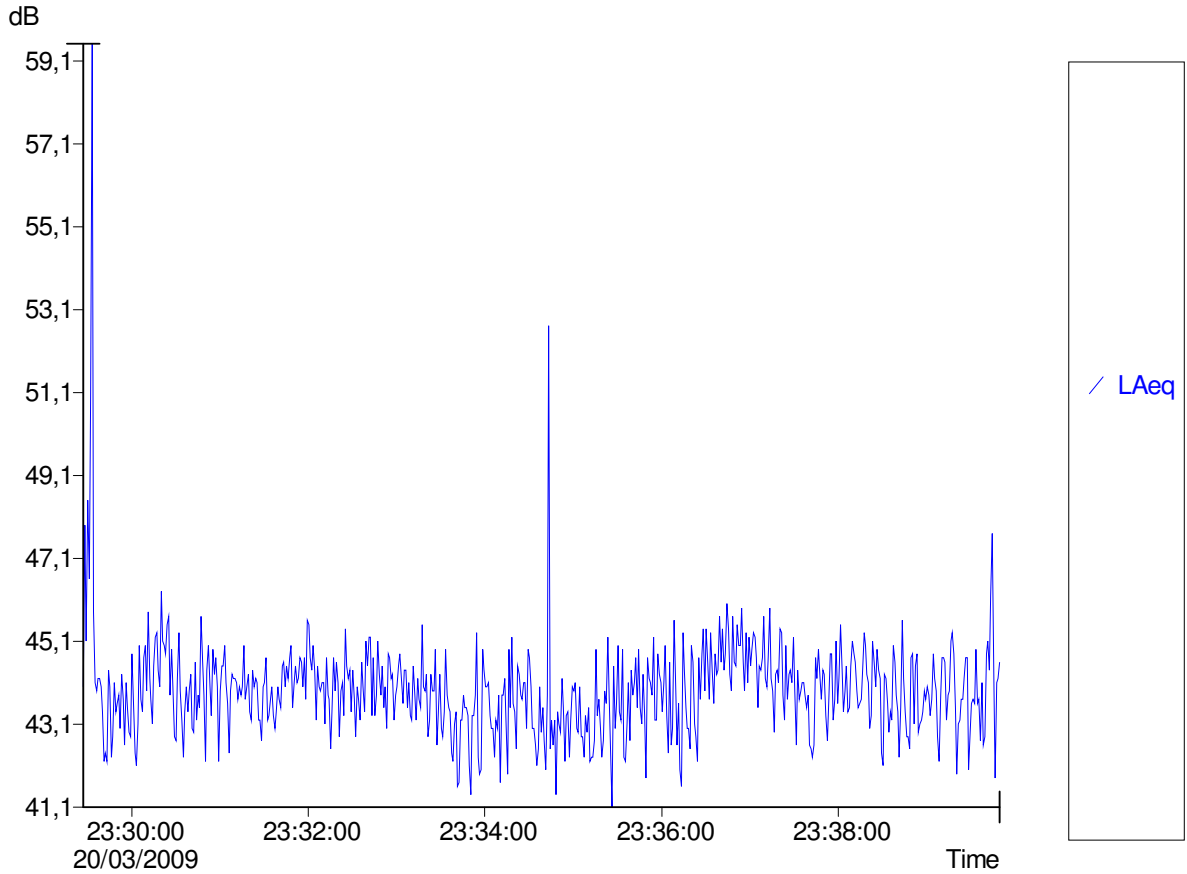
**Ponto 01 B**



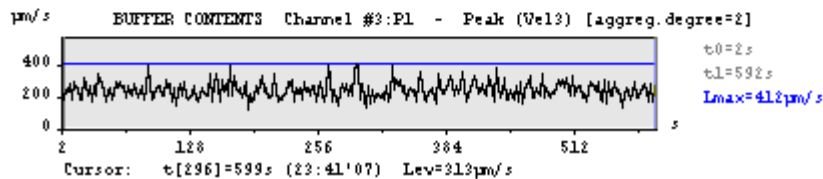
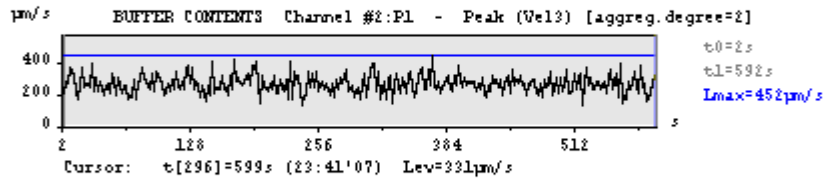
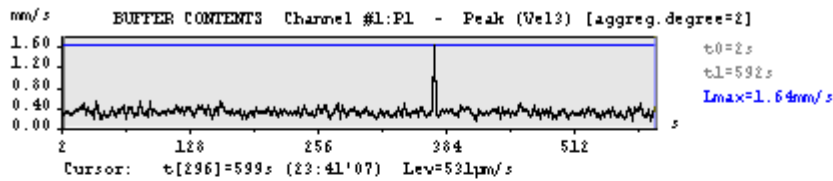
X:\CRJ00038.DTA  
 Overall profile duration = 00:10:11 (611 samples)



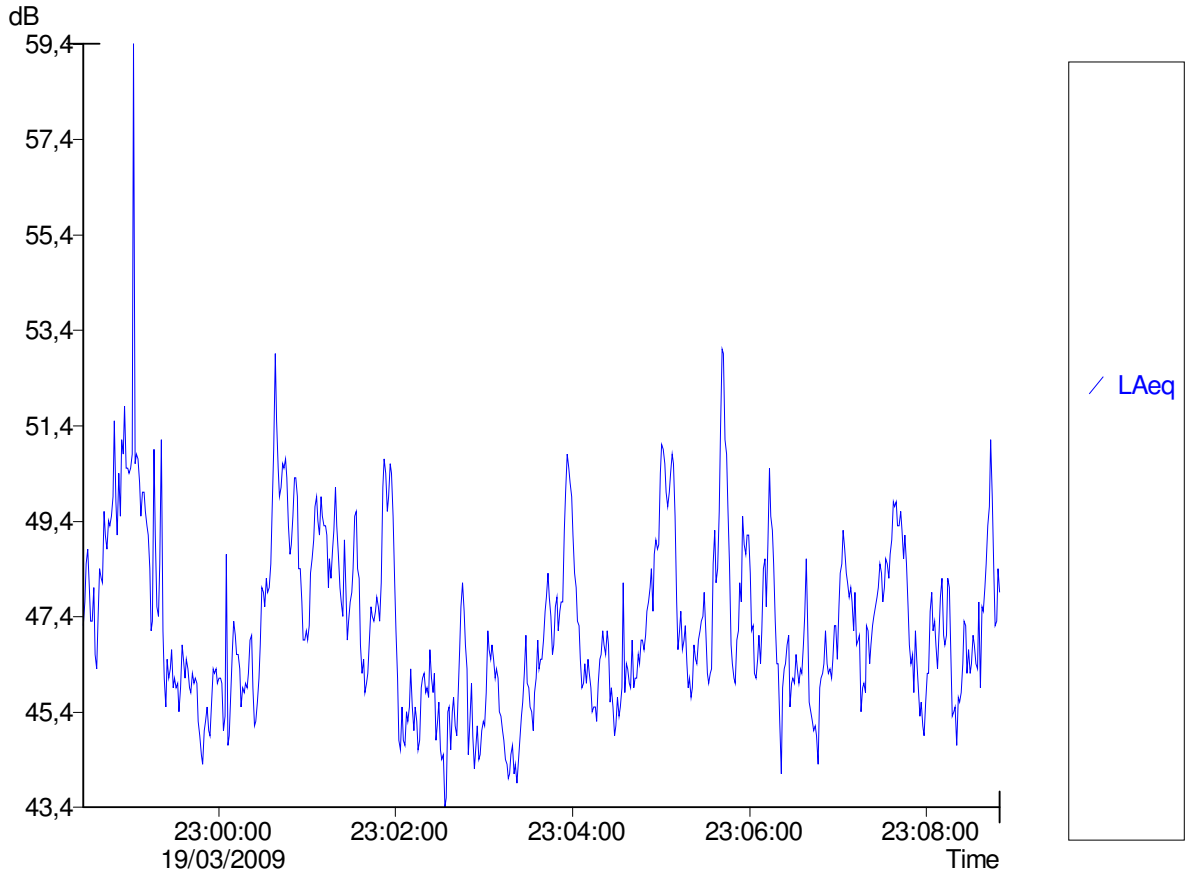
### Ponto 01 C



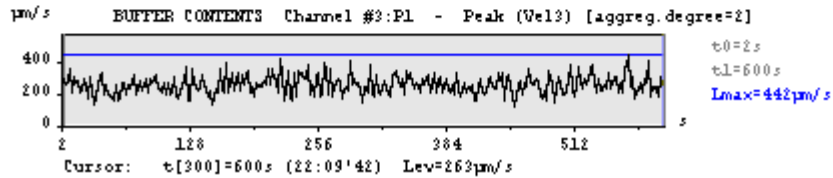
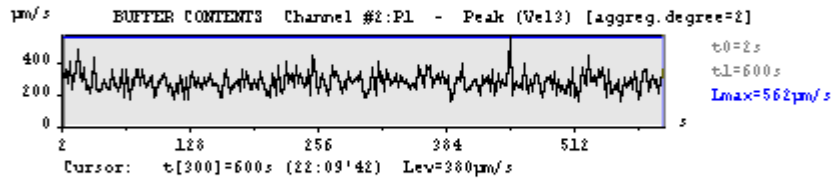
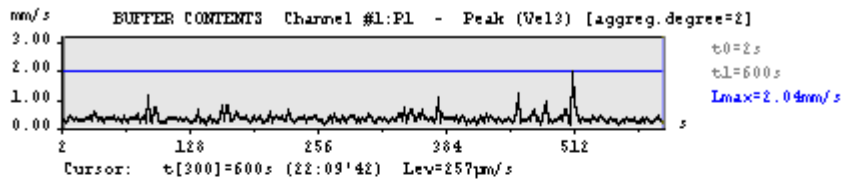
X:\CRJ00039.DTA  
Overall profile duration = 00:10:23 (623 samples)



### Ponto 02 A

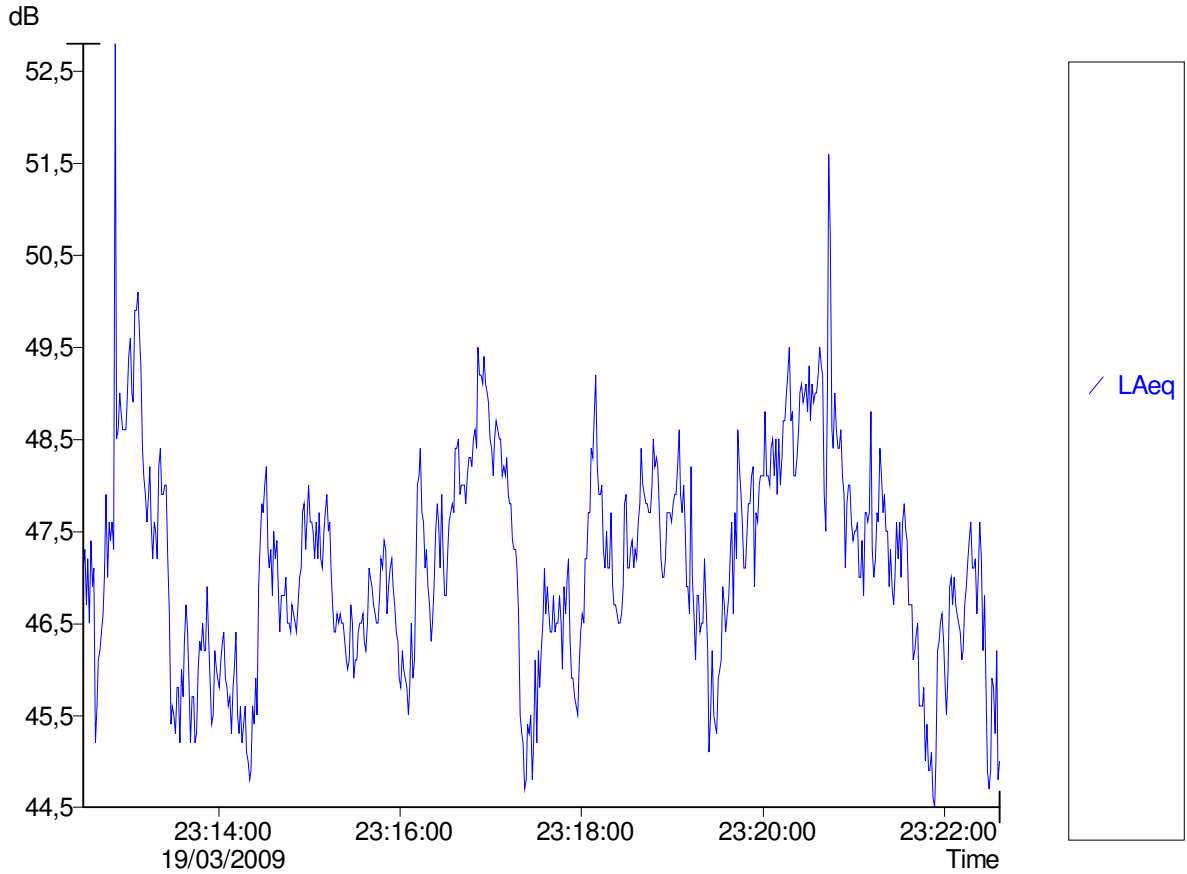


X:\CRJ00013.DTA  
 Overall profile duration = 00:10:22 (622 samples)

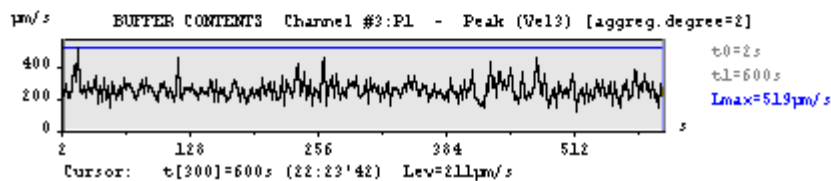
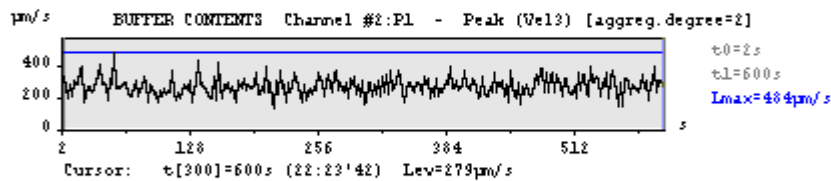
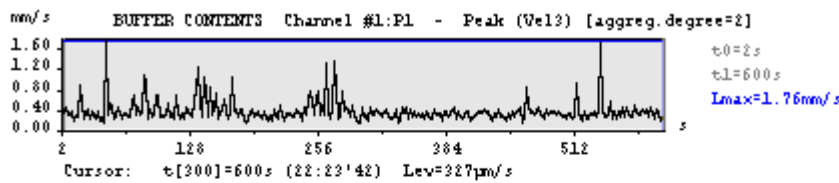




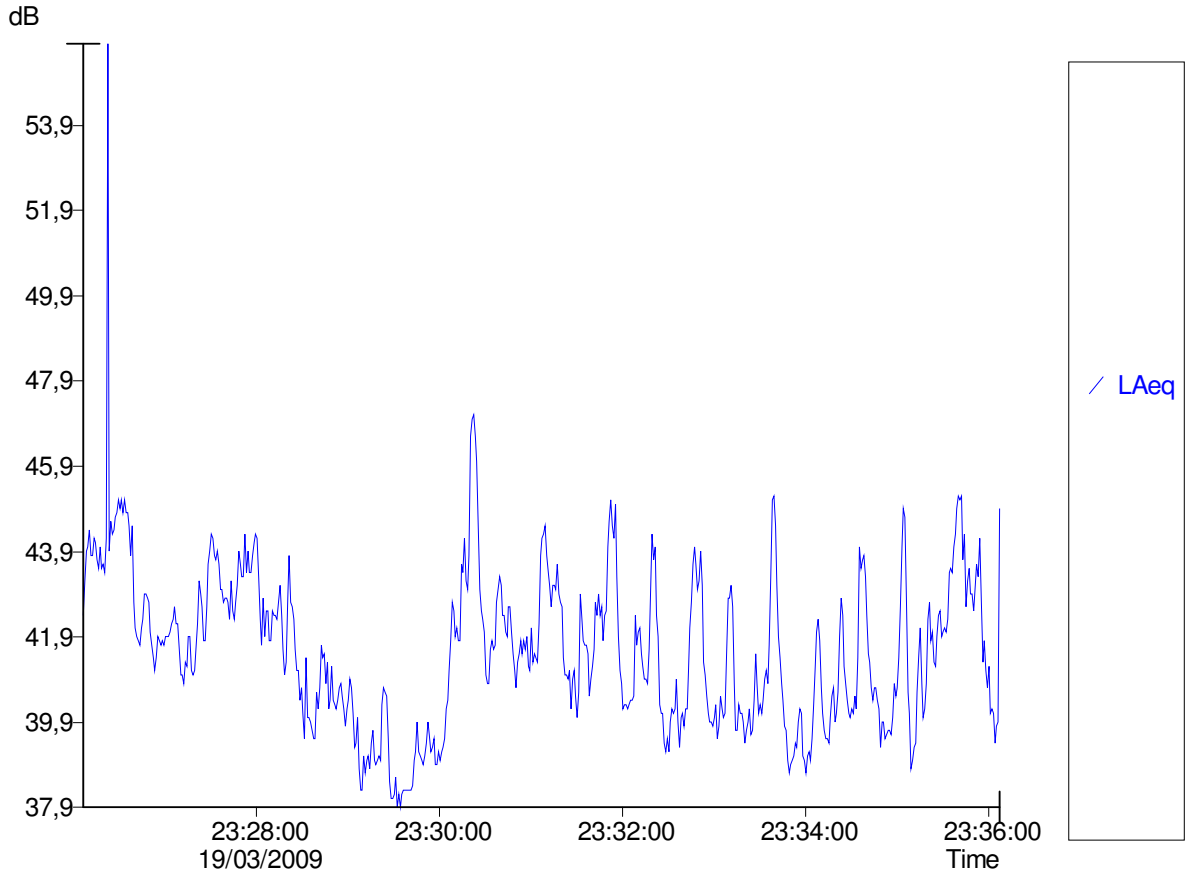
### Ponto 02 B



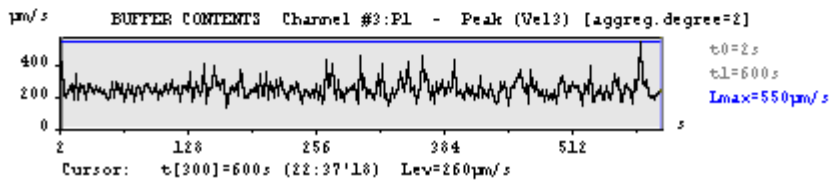
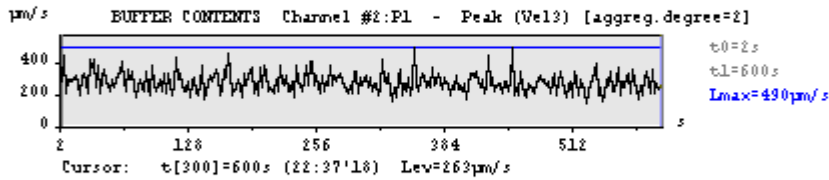
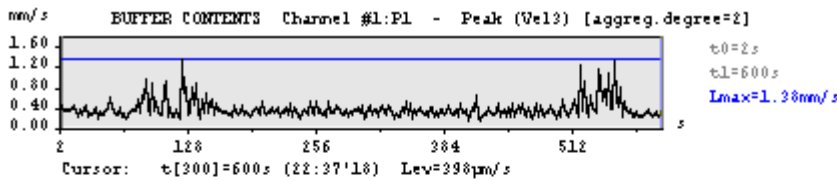
X:\CRJ00014.DTA  
Overall profile duration = 00:10:07 (607 samples)



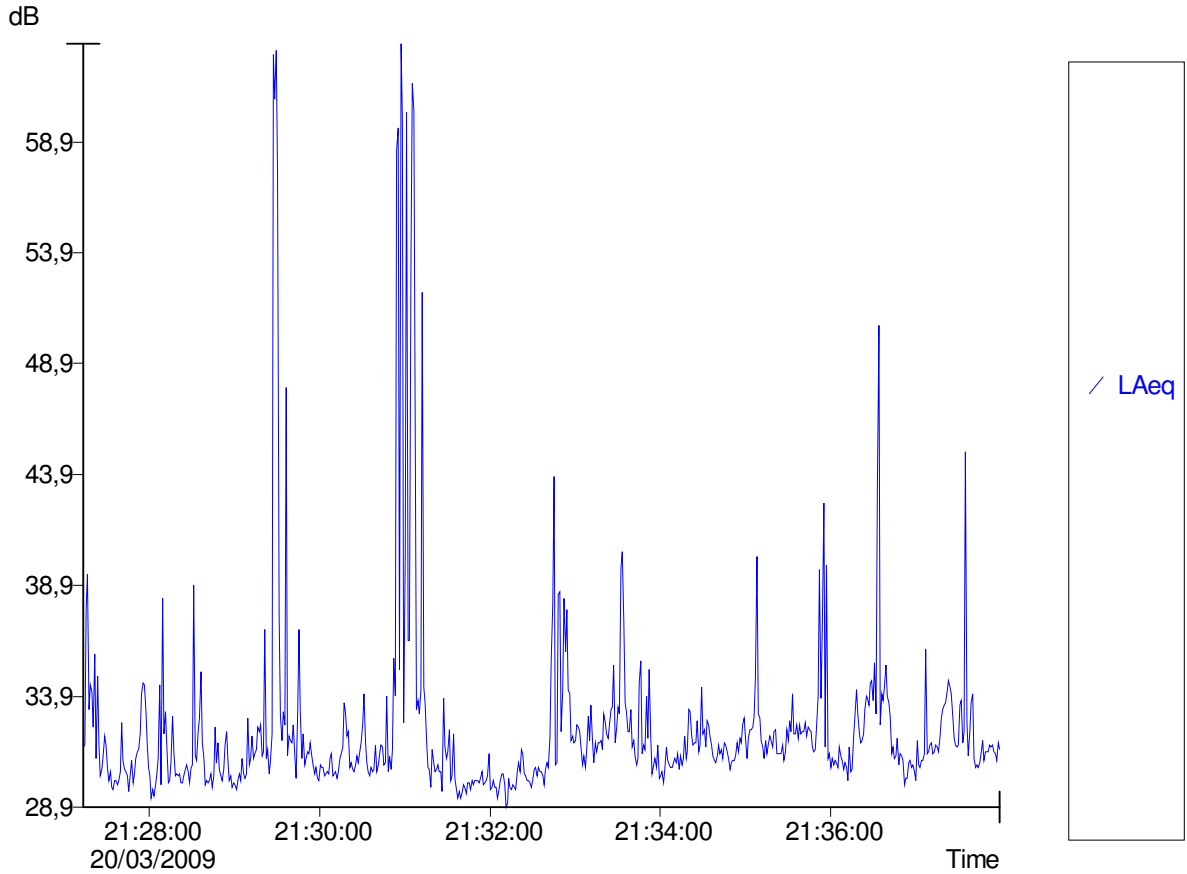
### Ponto 02 C



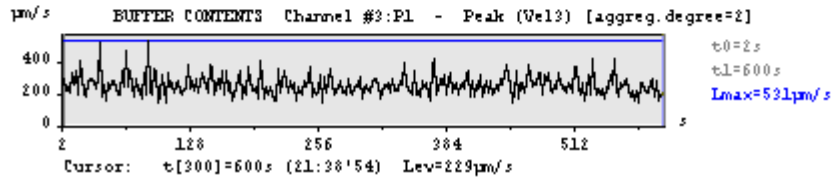
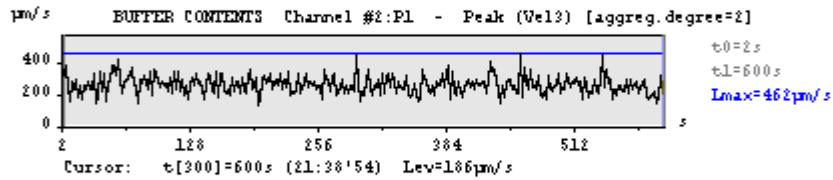
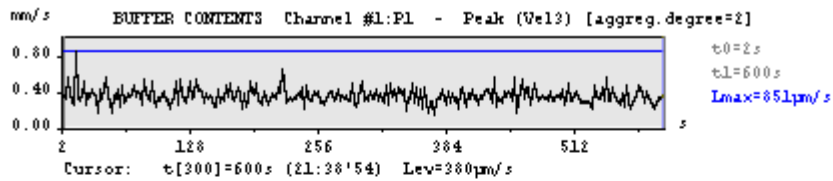
W:\CRJ00015.DTA  
Overall profile duration = 00:10:02 (602 samples)



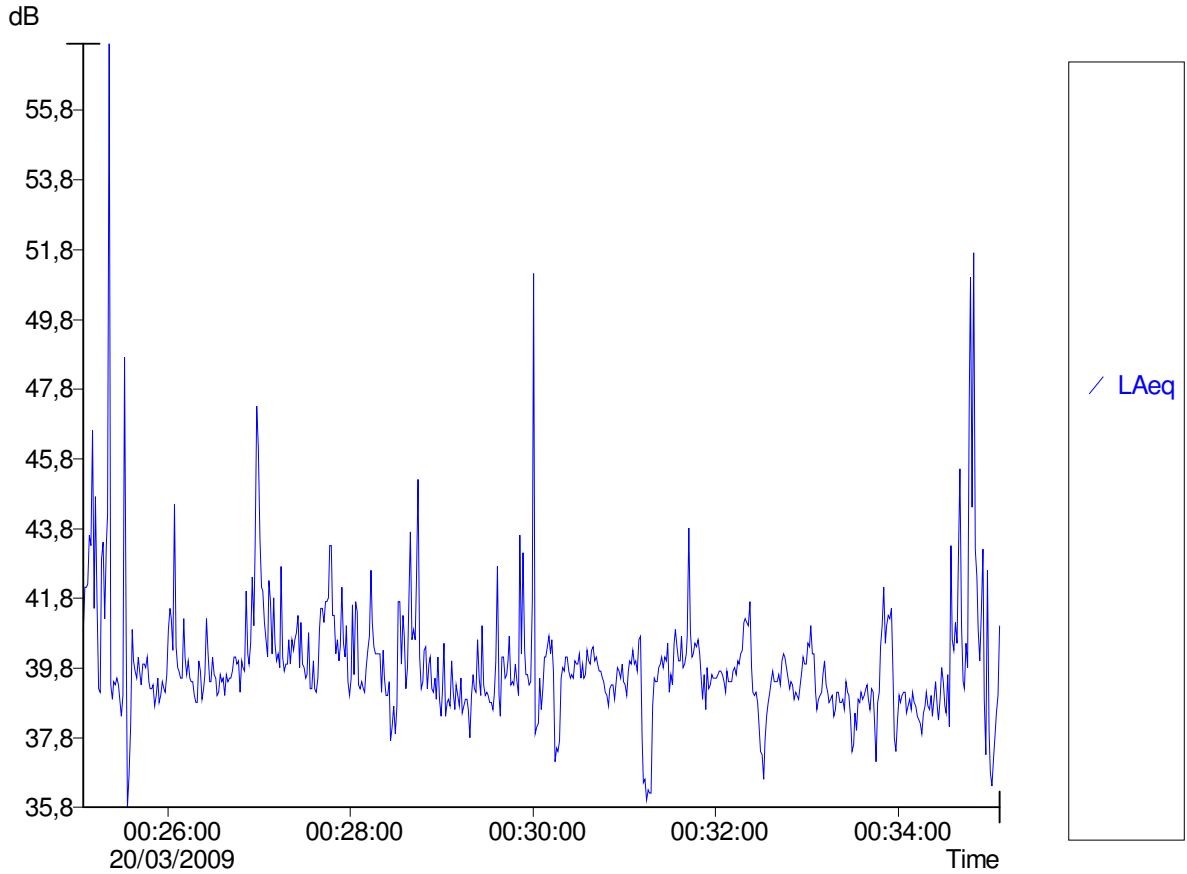
### Ponto 03 A



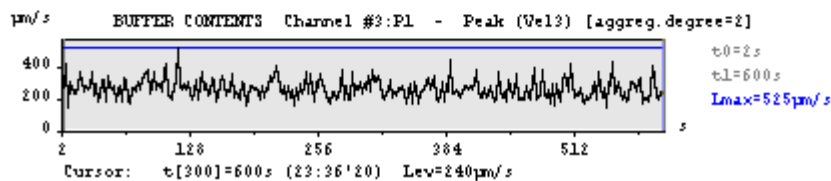
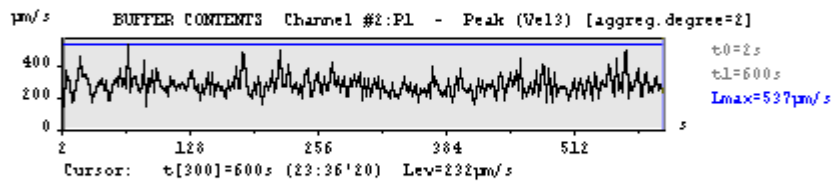
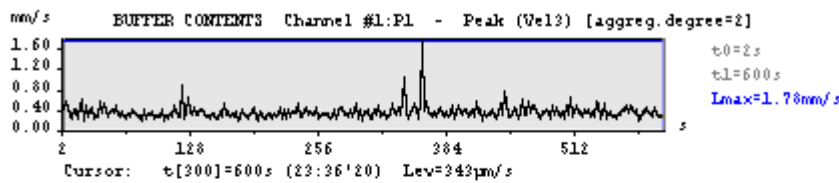
W:\CRJ00034.DTA  
 Overall profile duration = 00:10:47 (647 samples)



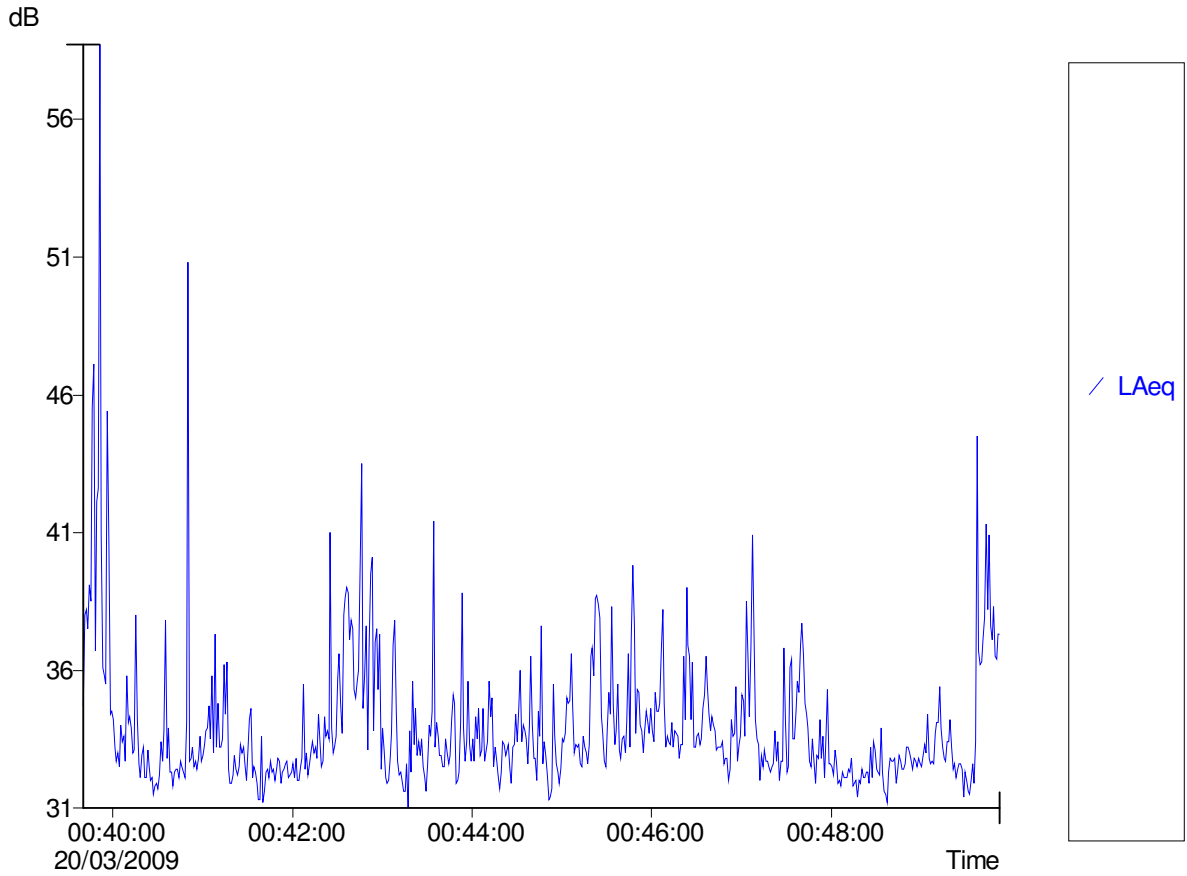
### Ponto 04 A



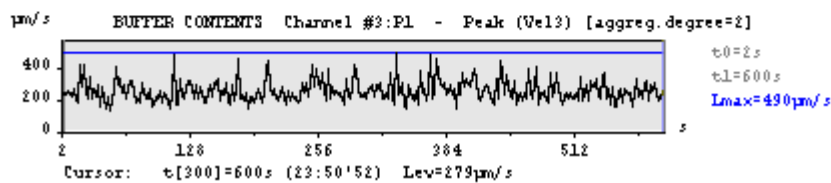
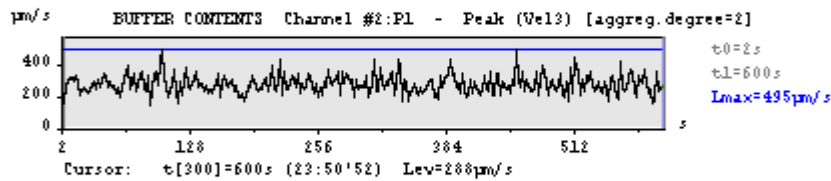
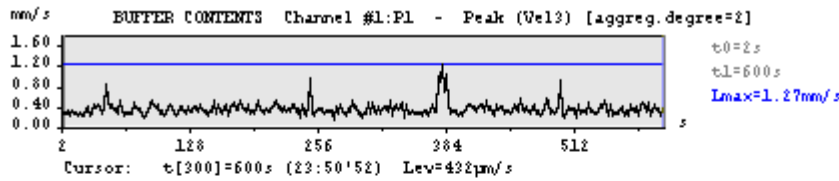
W:\CRJ00016.DTA  
Overall profile duration = 00:10:03 (603 samples)



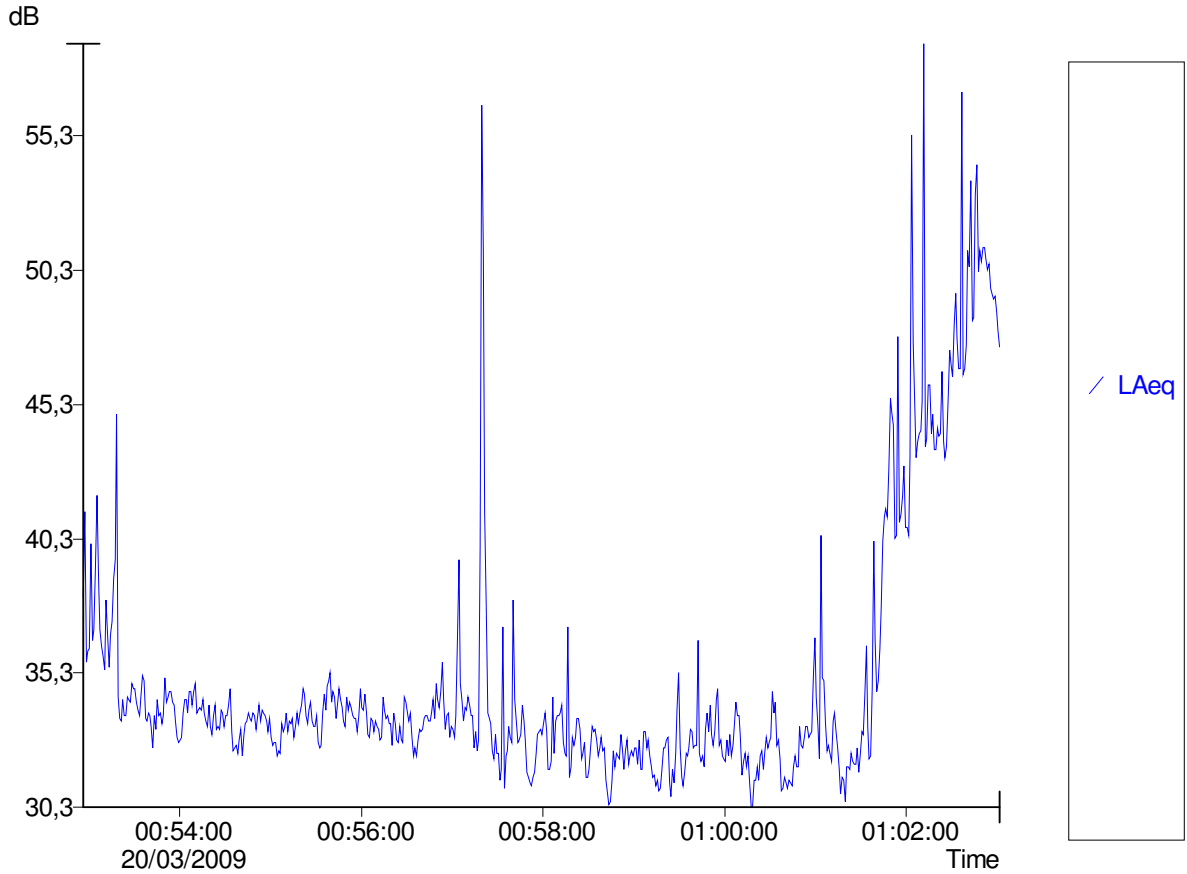
### Ponto 04 B



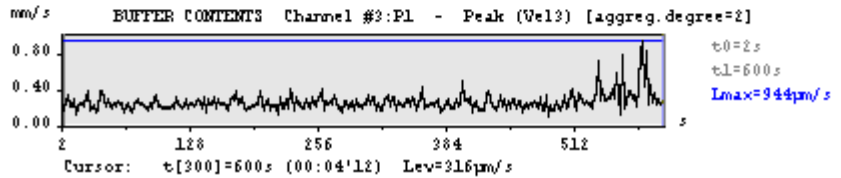
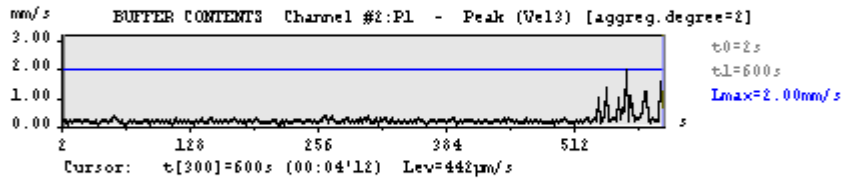
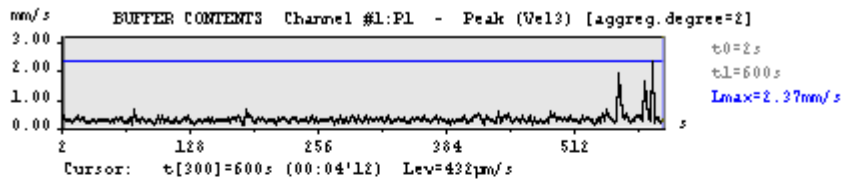
W:\CRJ00017.DTA  
Overall profile duration = 00:10:13 (613 samples)



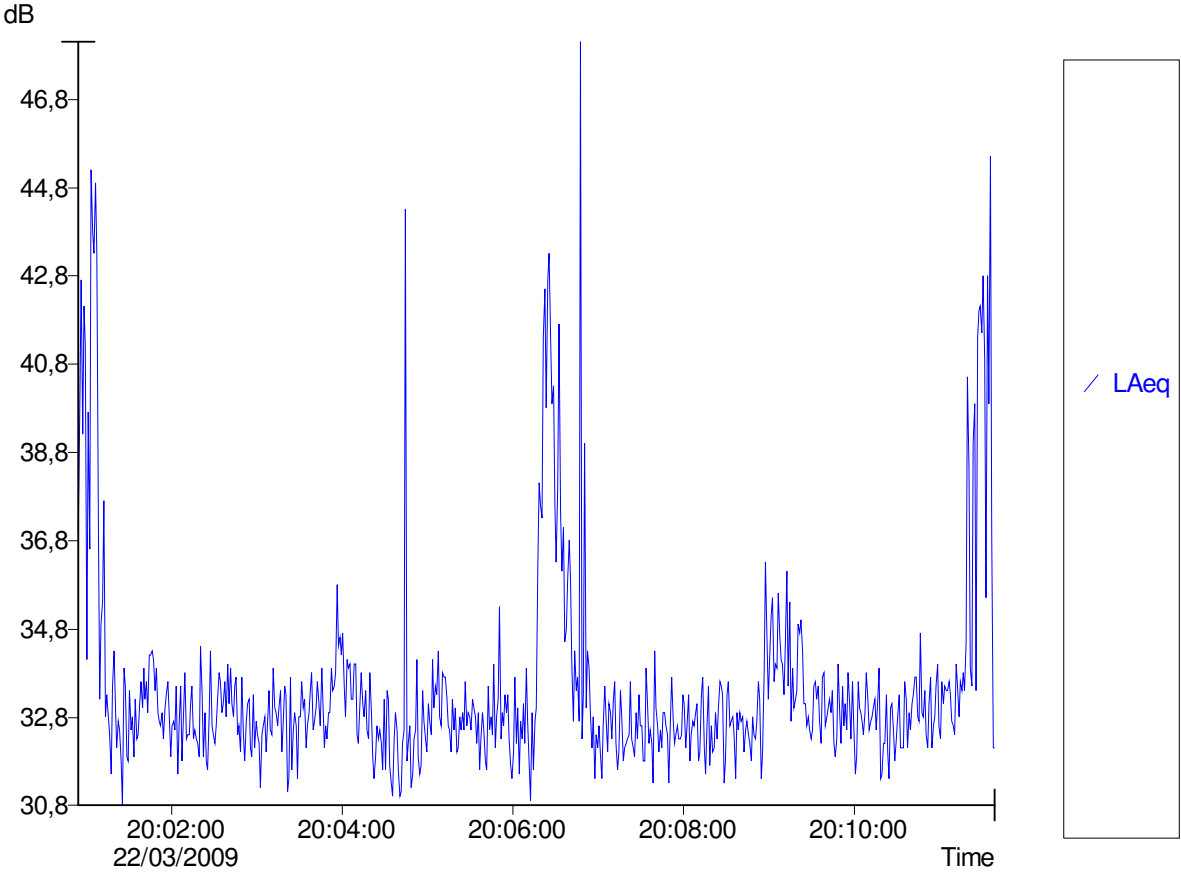
### Ponto 04 C



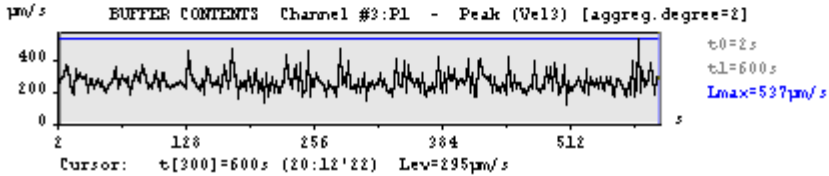
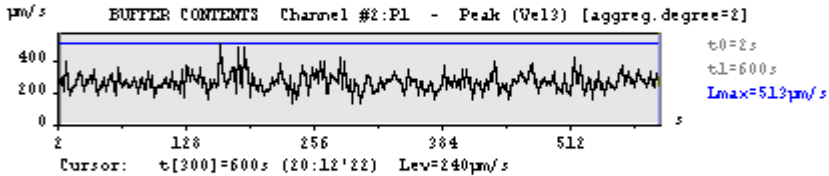
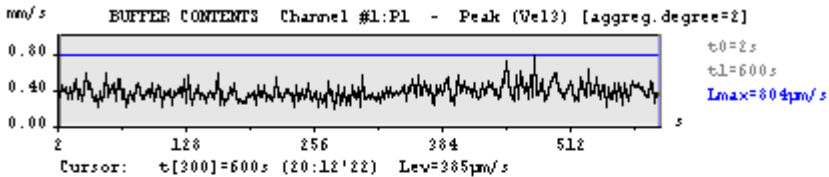
W:\CRJ00018.DTA  
 Overall profile duration = 00:10:06 (606 samples)



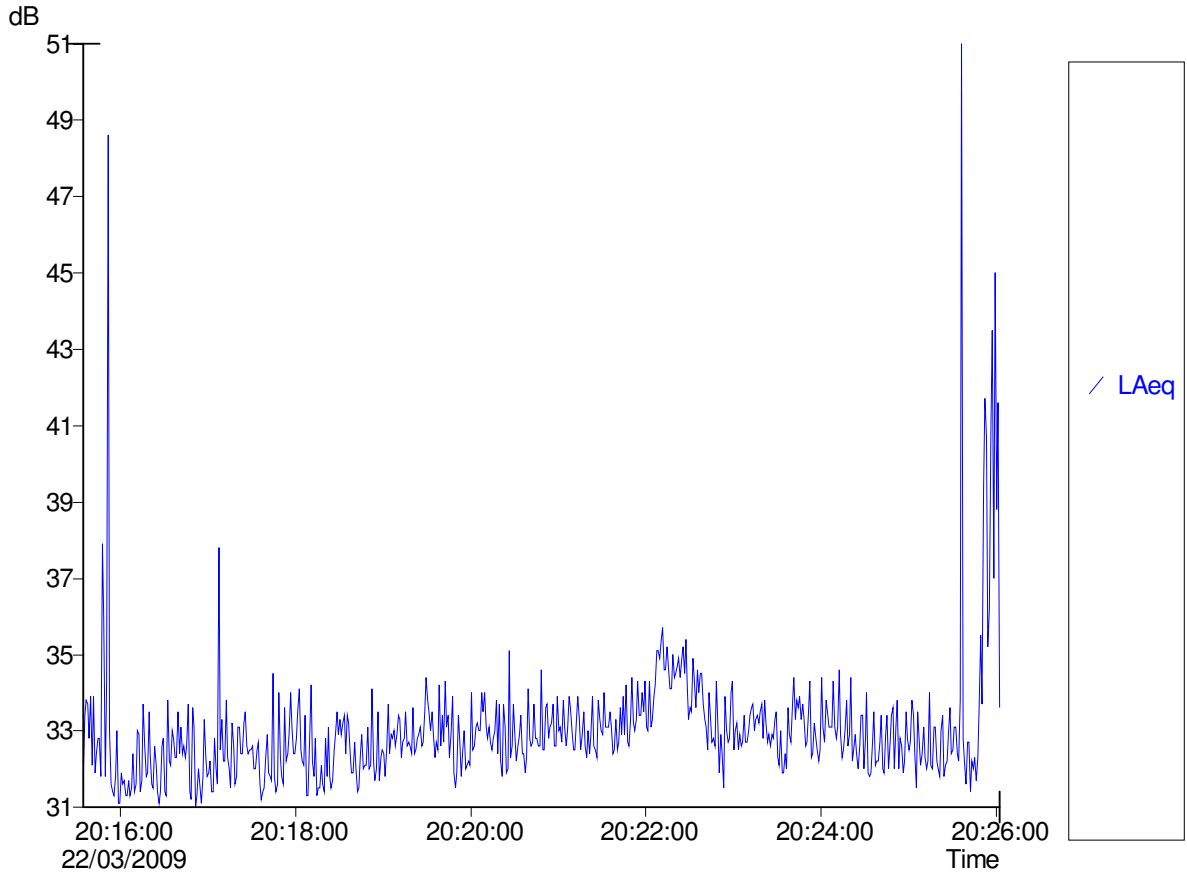
**Ponto 05 A**



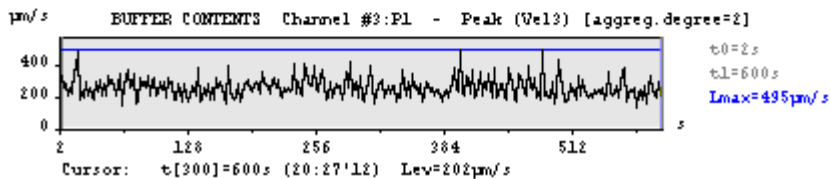
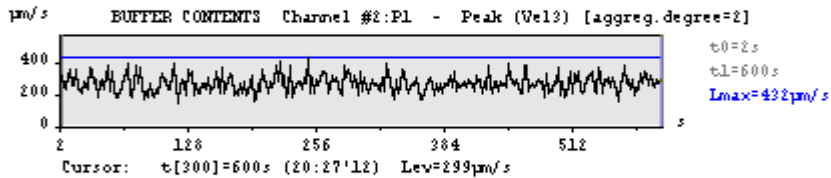
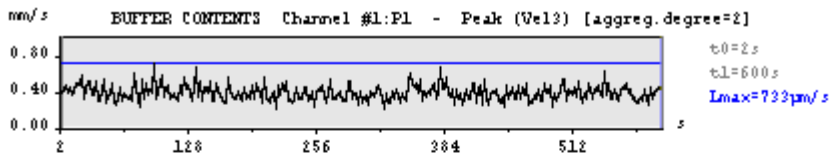
W:\CRJ00066.DTA  
Overall profile duration = 00:10:45 (645 samples)



### Ponto 05 B

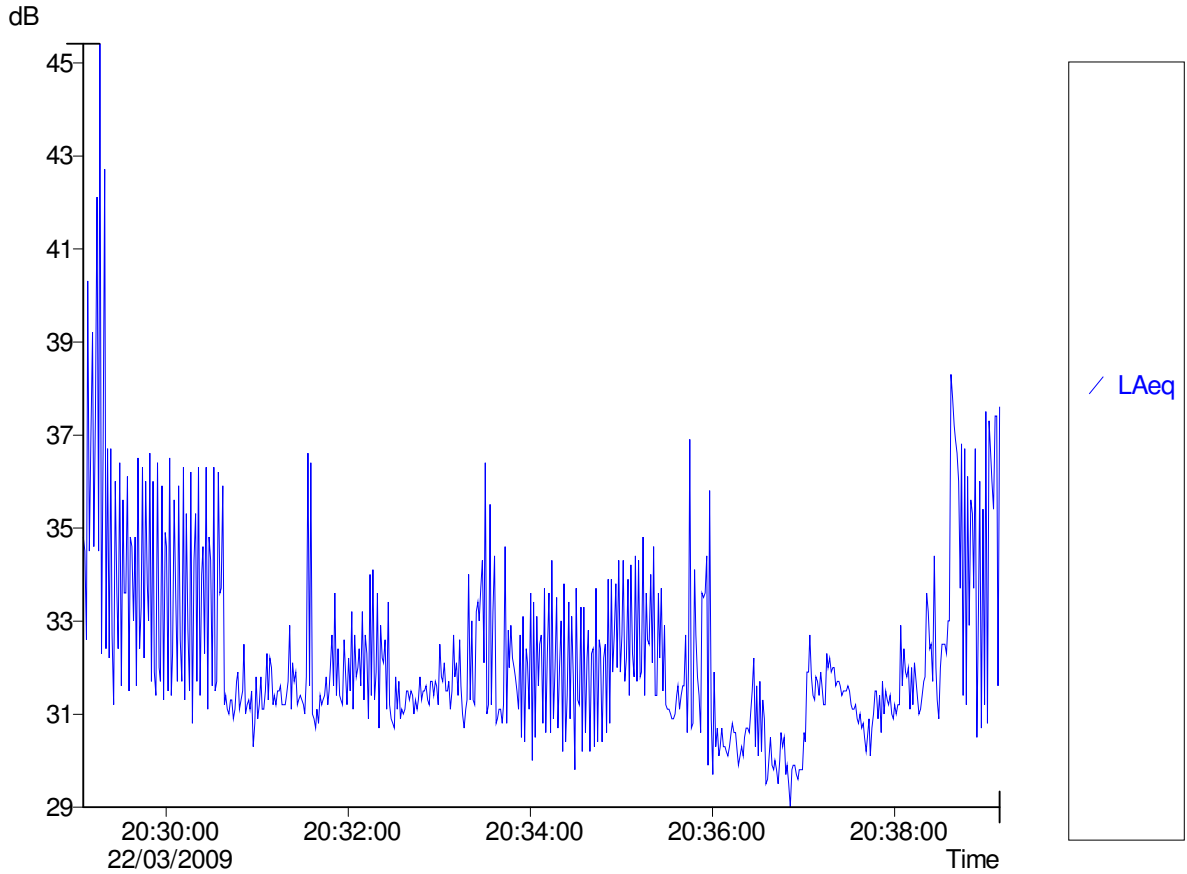


W:\CRJ00067.DTA  
 Overall profile duration = 00:10:29 (629 samples)

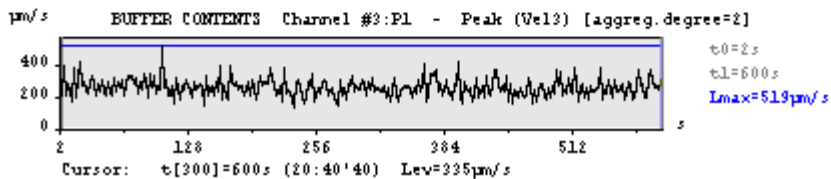
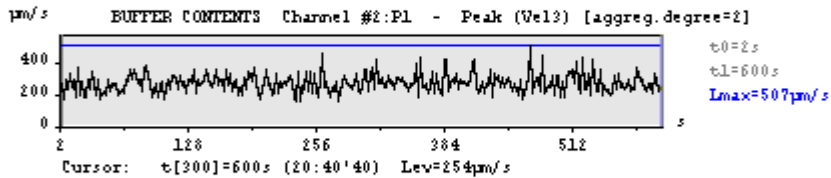
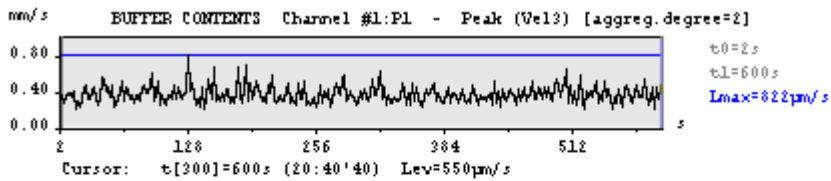




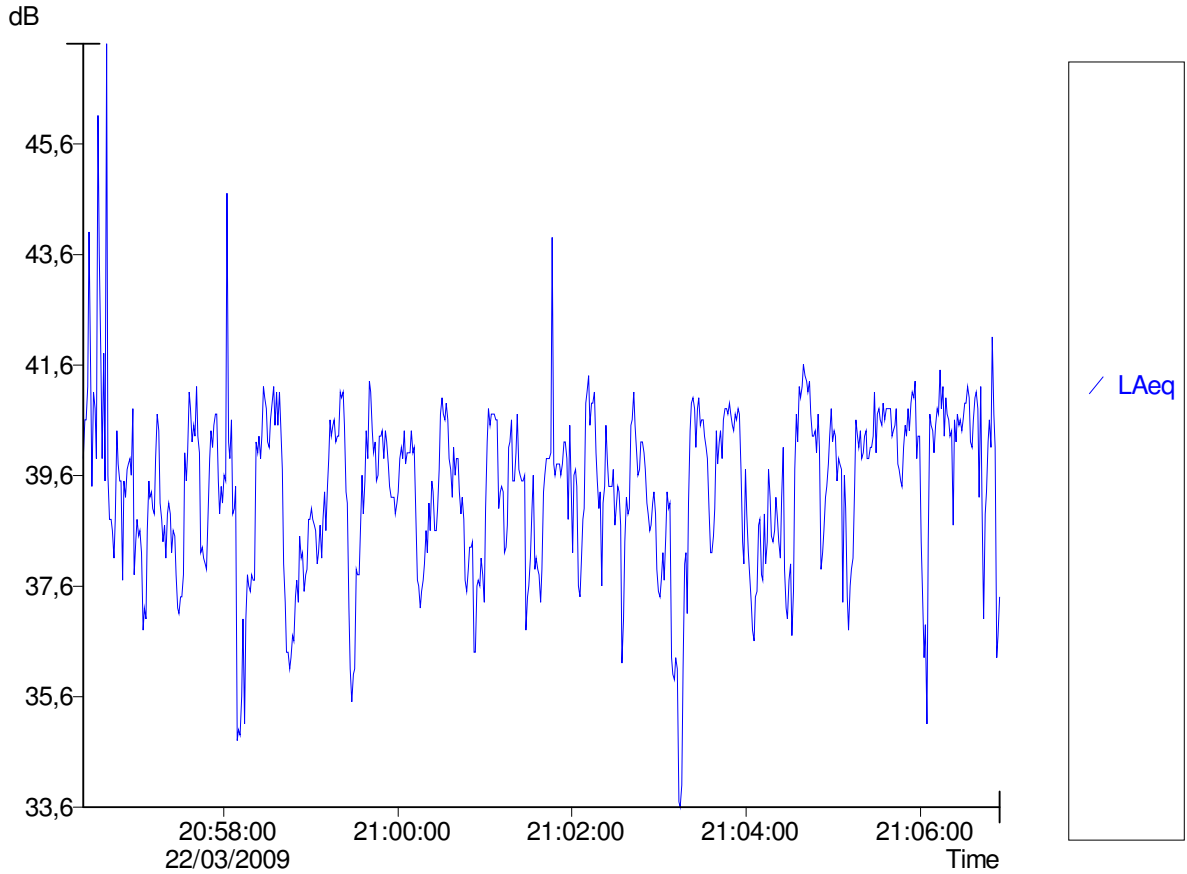
### Ponto 05 C



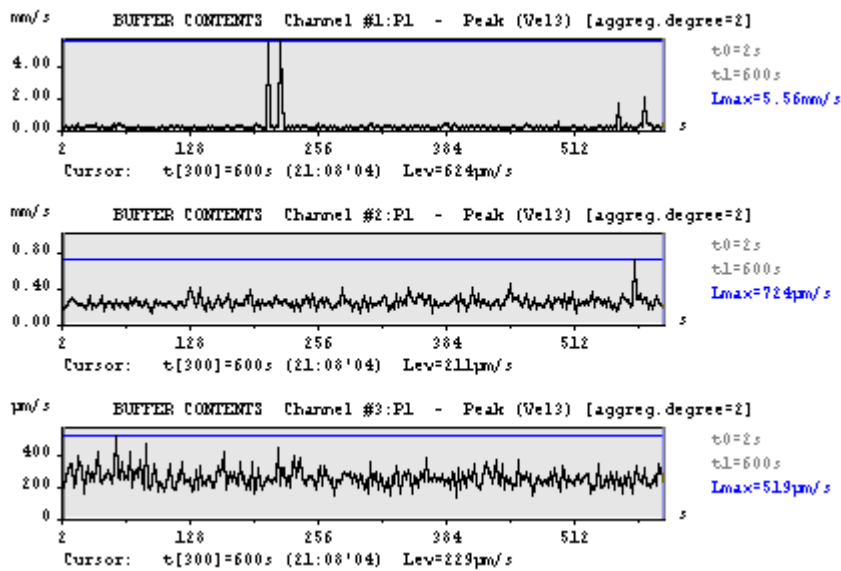
W:\CRJ00068.DTA  
 Overall profile duration = 00:10:05 (605 samples)



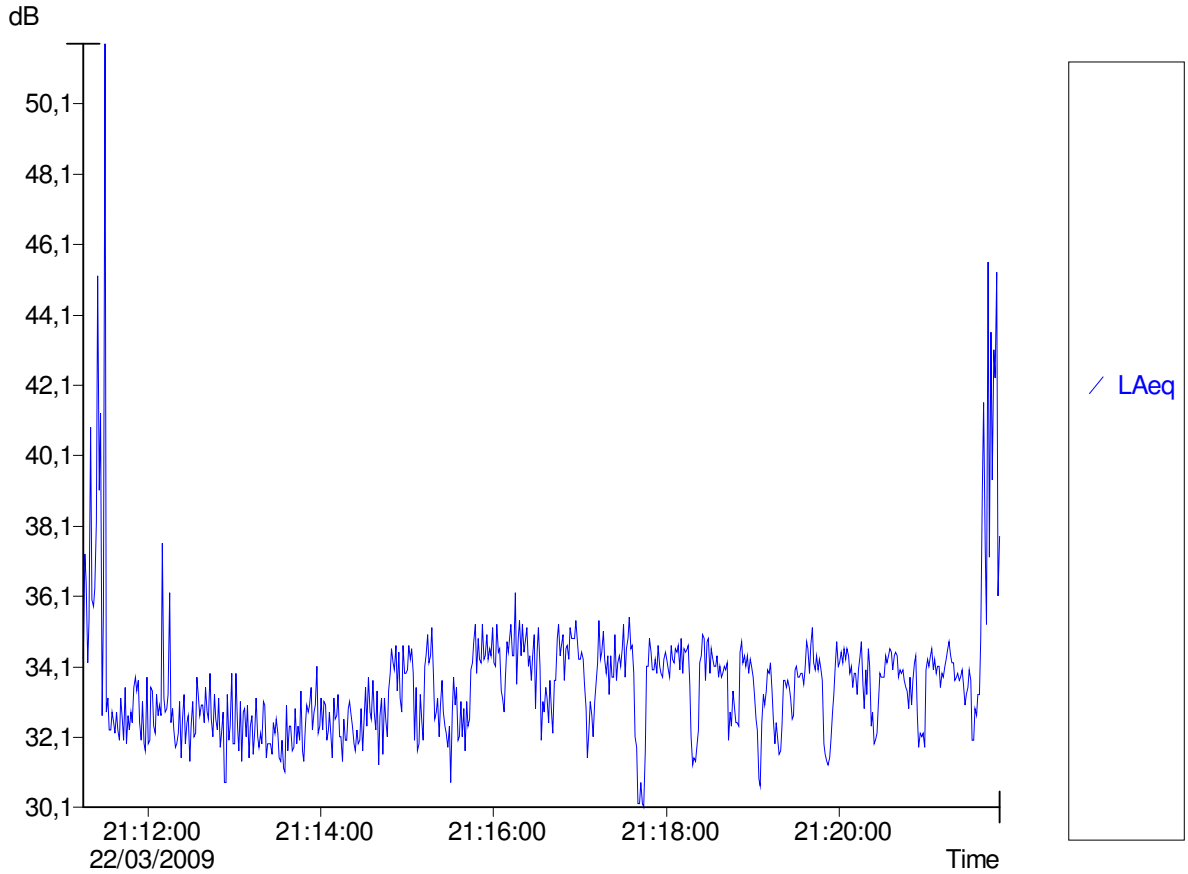
### Ponto 06 A



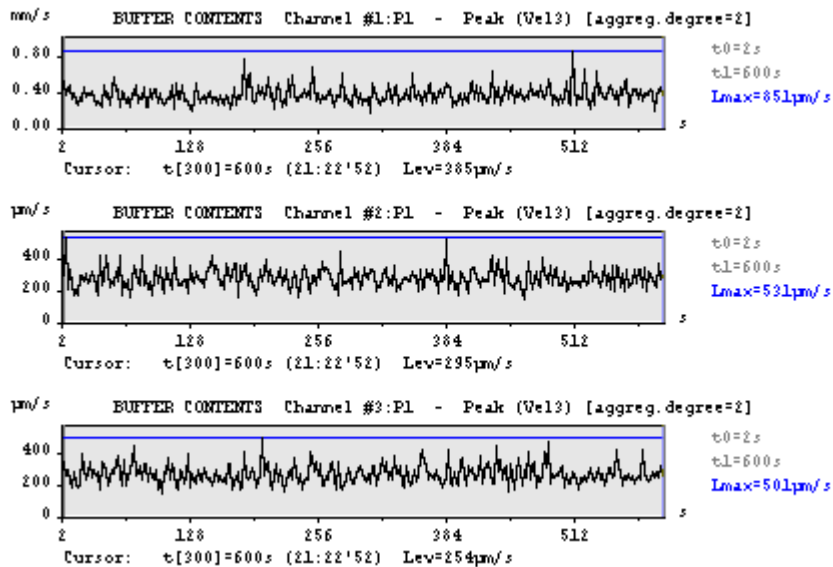
W:\CRJ00069.DTA  
 Overall profile duration = 00:10:32 (632 samples)



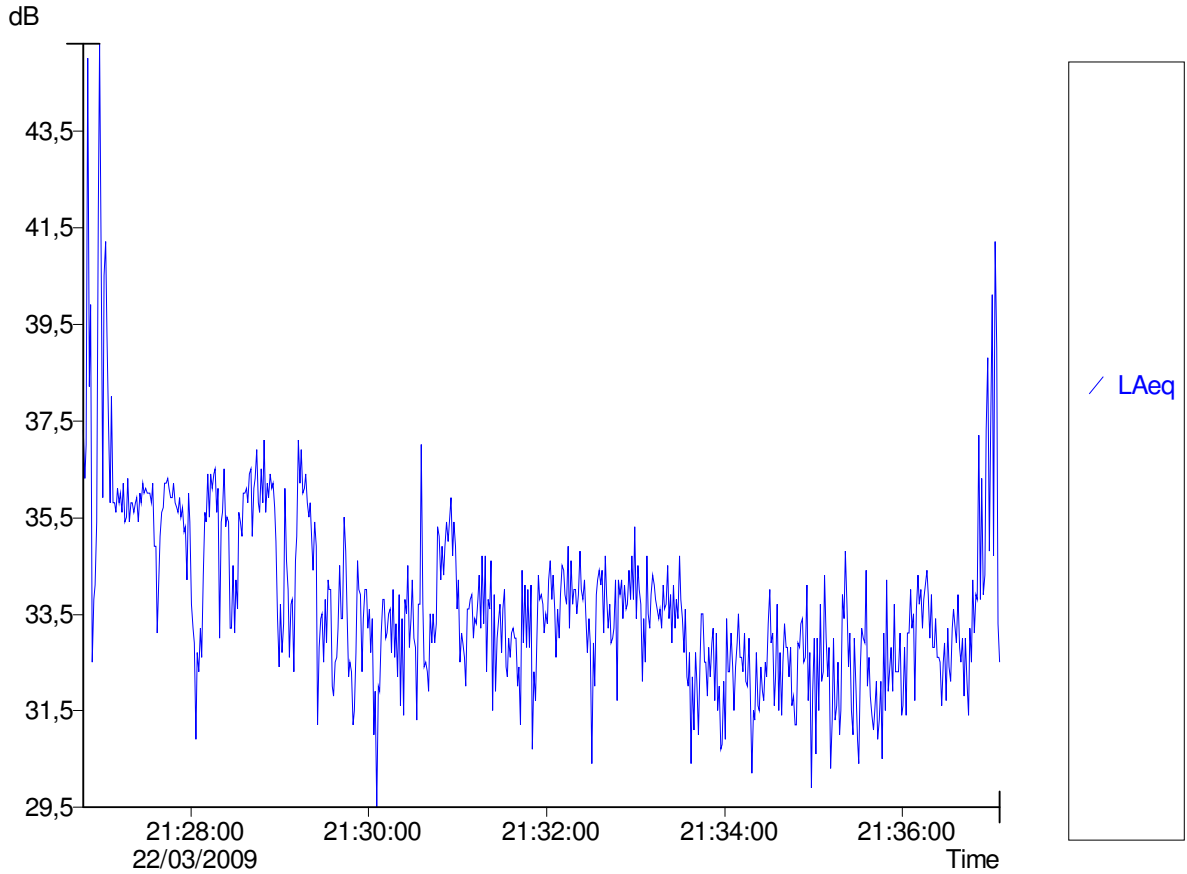
### Ponto 06 B



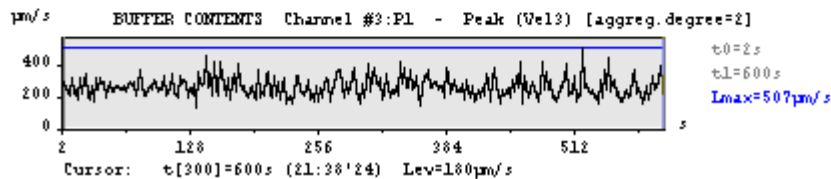
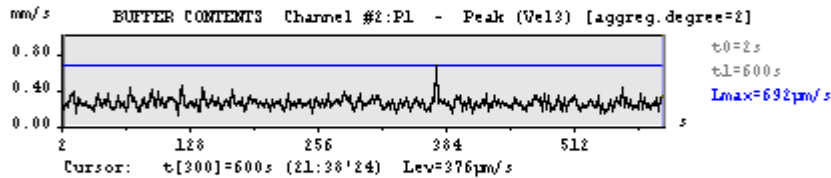
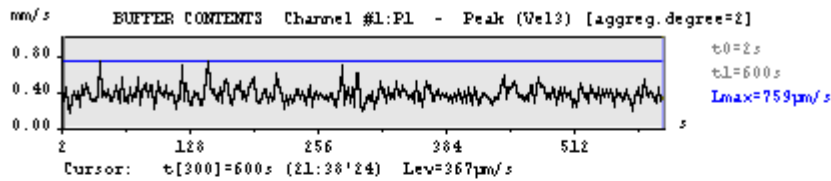
W:\CRJ00070.DTA  
Overall profile duration = 00:10:37 (637 samples)



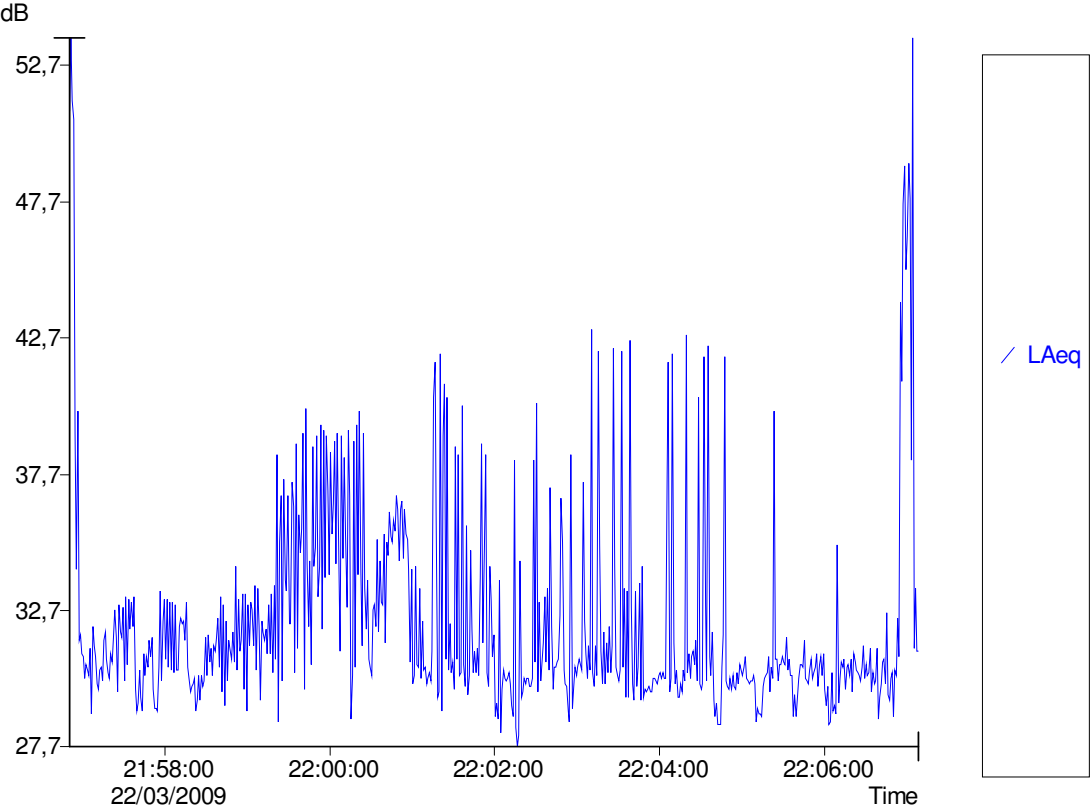
### Ponto 06 C



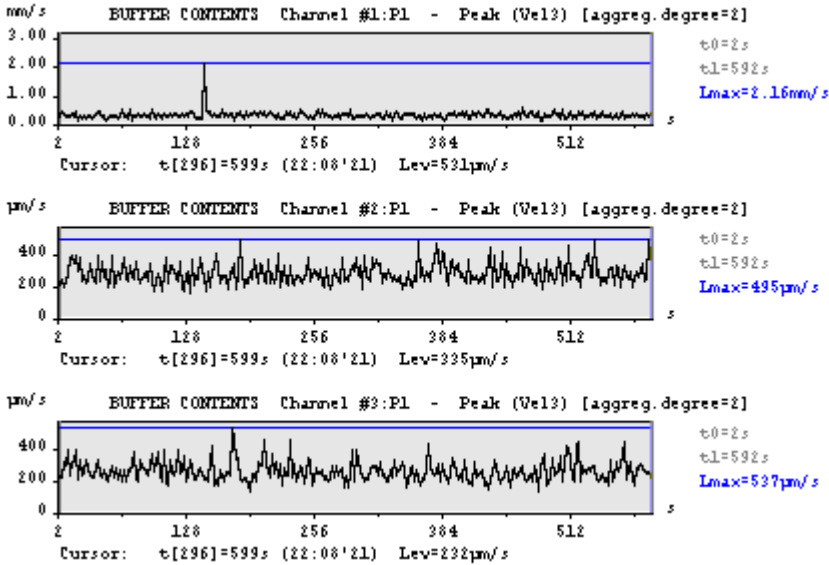
W:\CRJ00071.DTA  
Overall profile duration = 00:10:19 (619 samples)



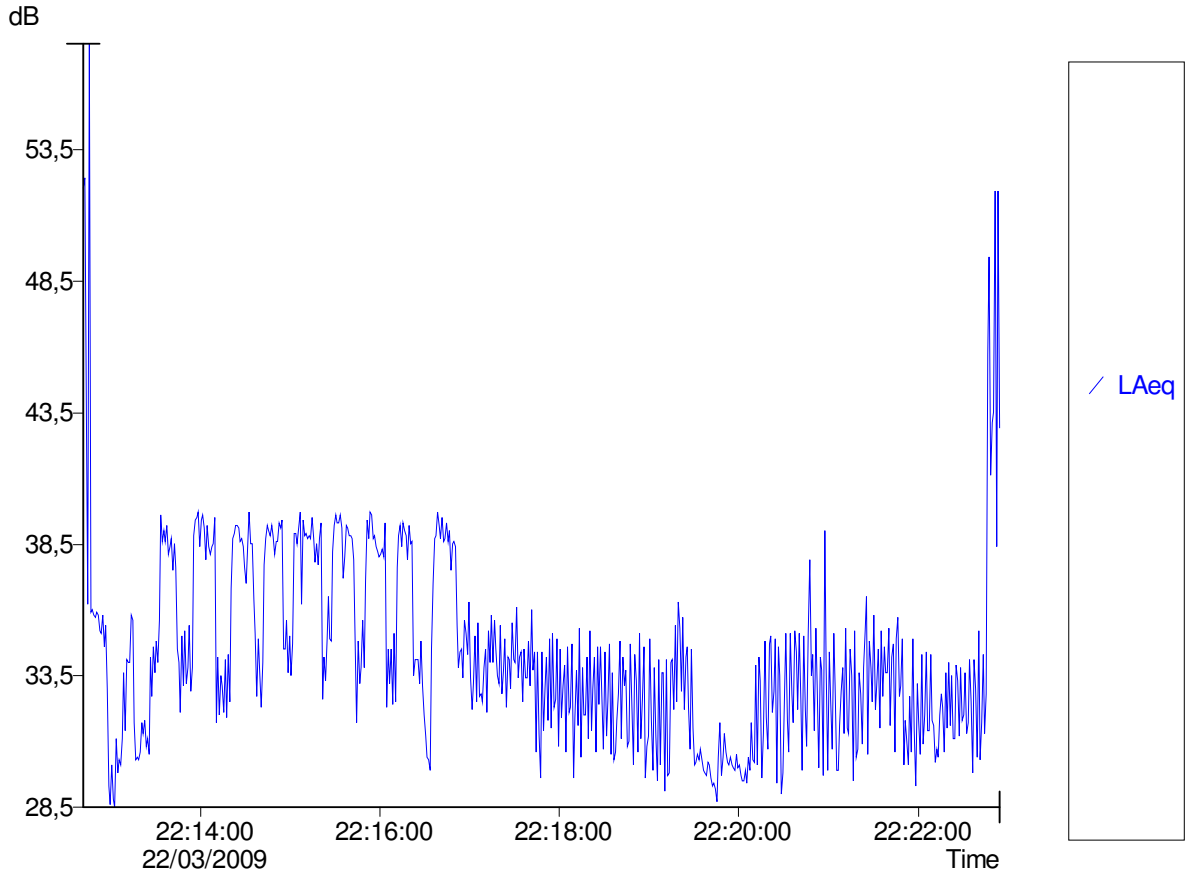
**Ponto 07 A**



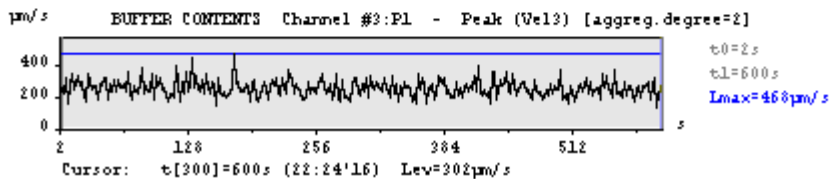
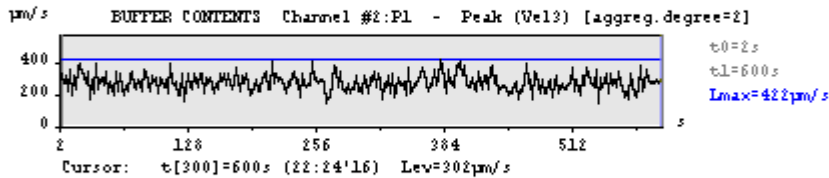
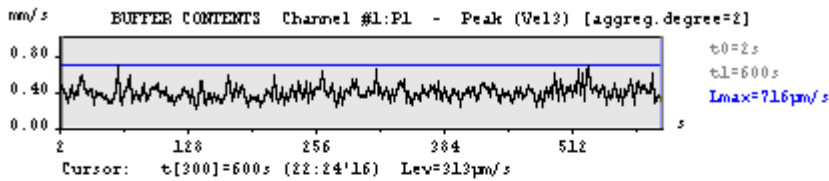
V:\CRJ00072.DTA  
 Overall profile duration = 00:10:19 (619 samples)



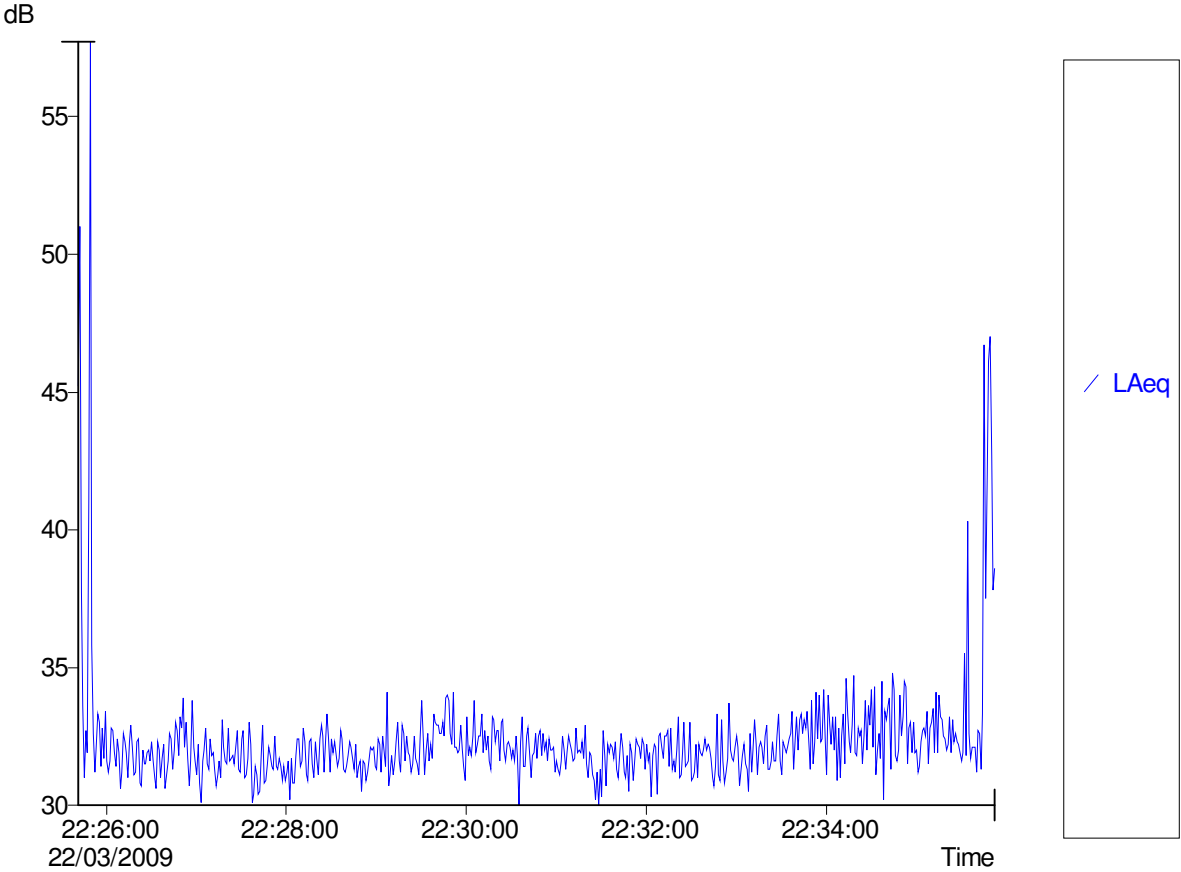
### Ponto 07 B



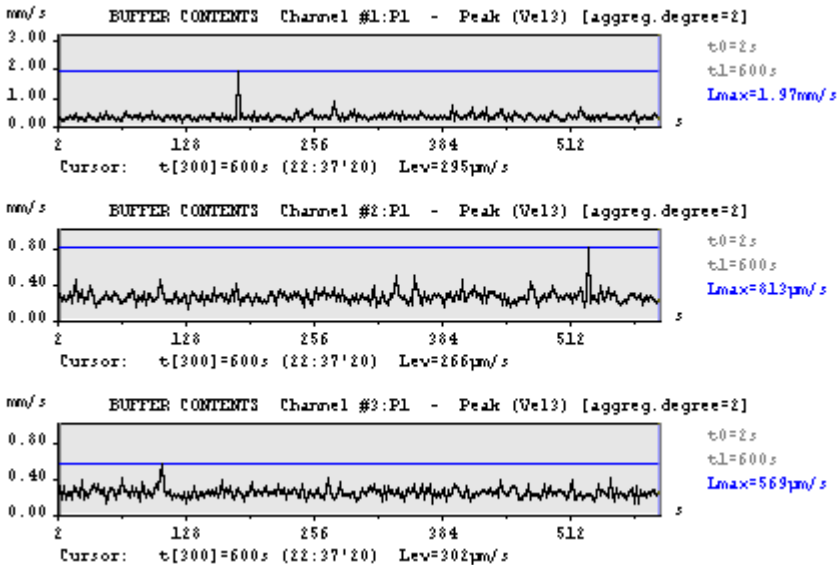
V:\CRJ00073.DTA  
 Overall profile duration = 00:10:14 (614 samples)



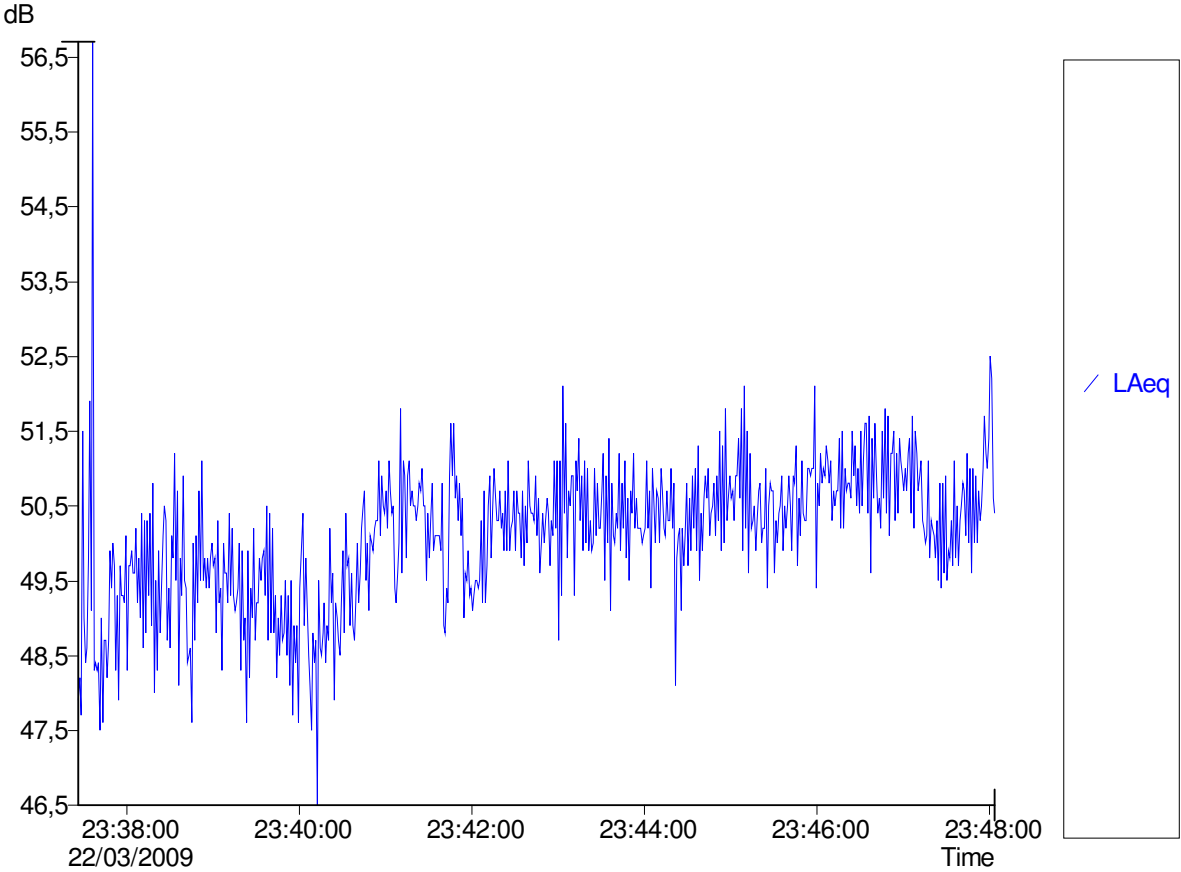
**Ponto 07 C**



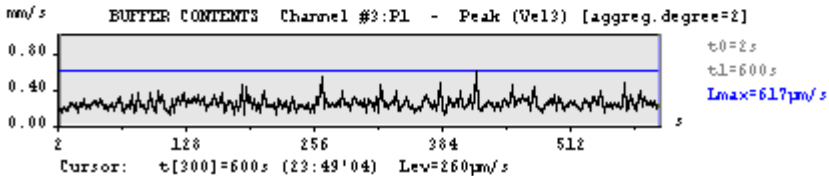
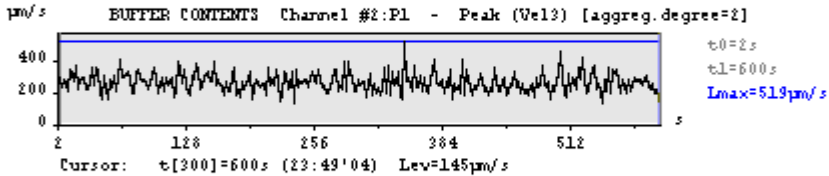
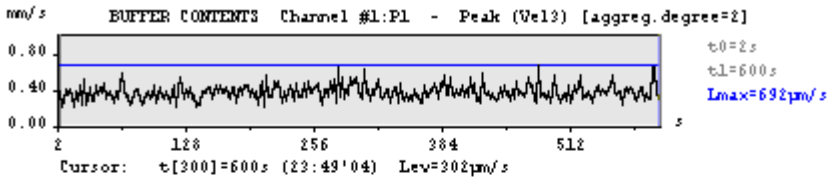
V:\CRJ00074.DTA  
 Overall profile duration = 00:10:12 (612 samples)



**Ponto 08 C**

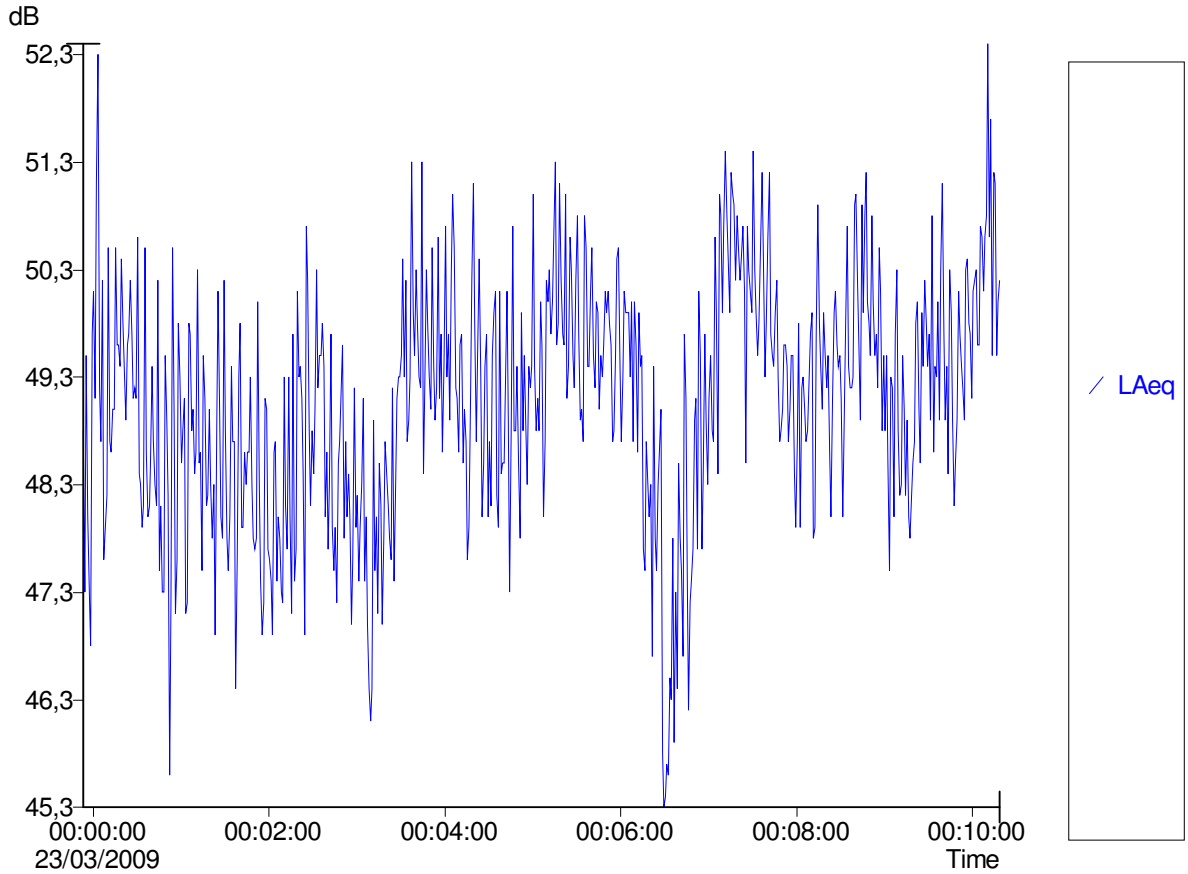


U:\CRJ00076.DTA  
Overall profile duration = 00:10:38 (638 samples)

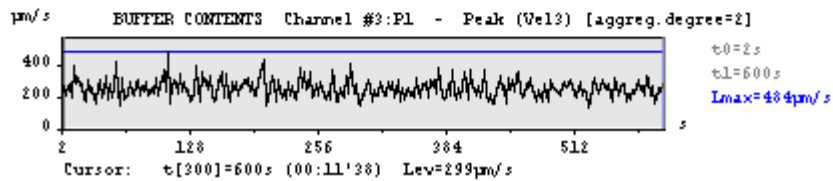
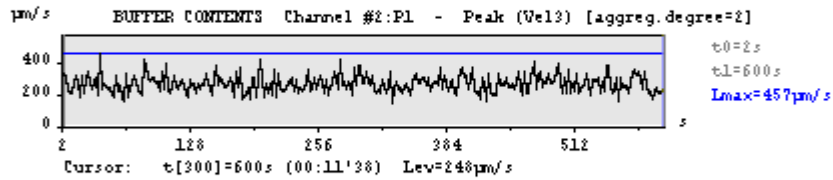
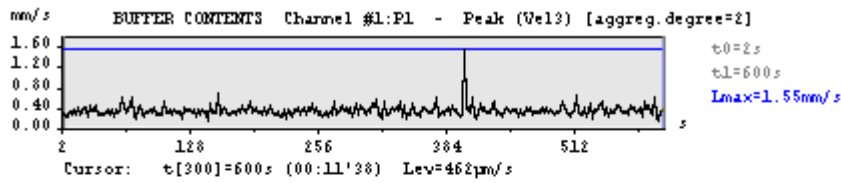




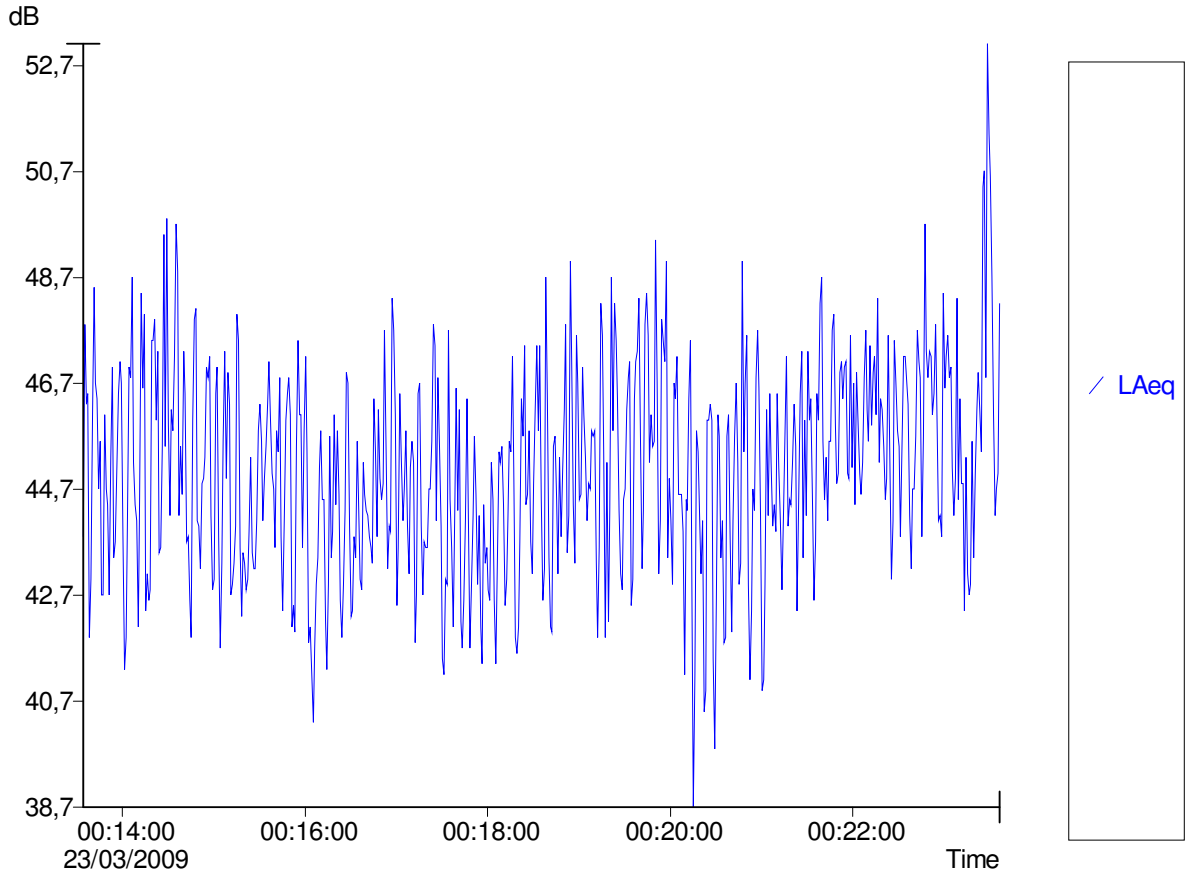
### Ponto 09 A 2



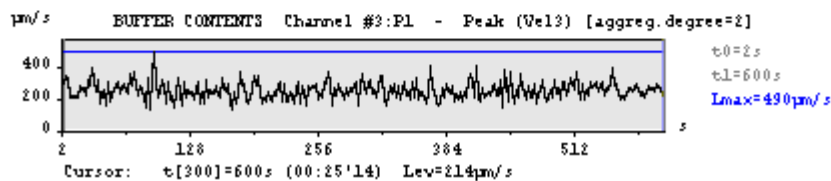
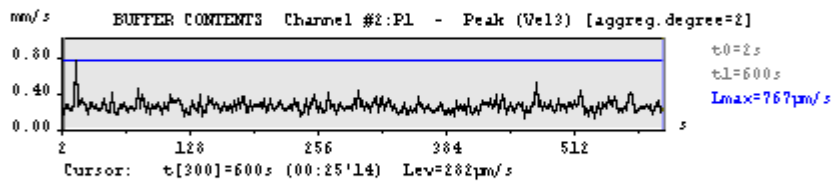
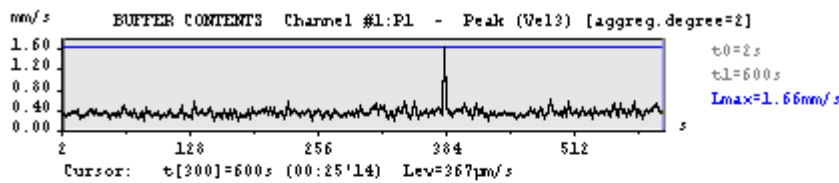
U:\CRJ00077.DTA  
Overall profile duration = 00:10:26 (626 samples)



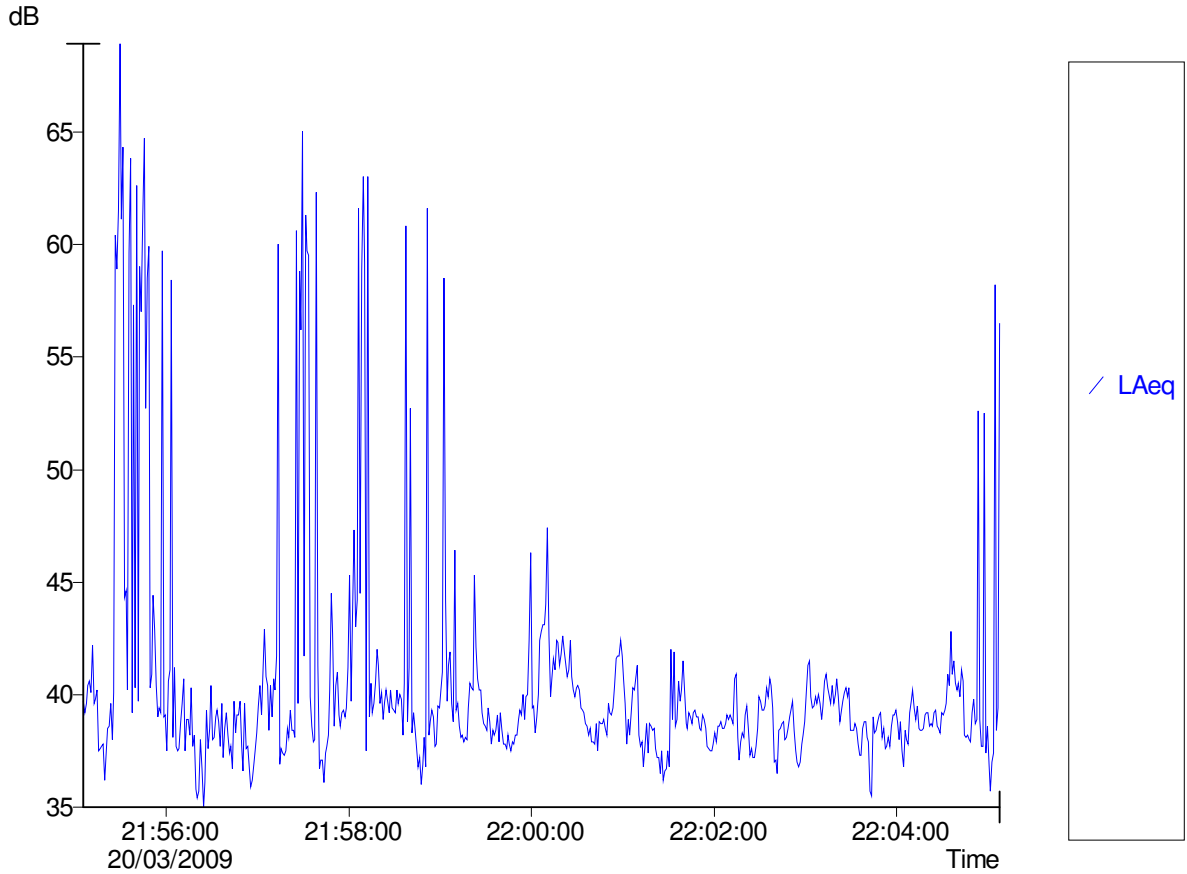
### Ponto 09 B 2



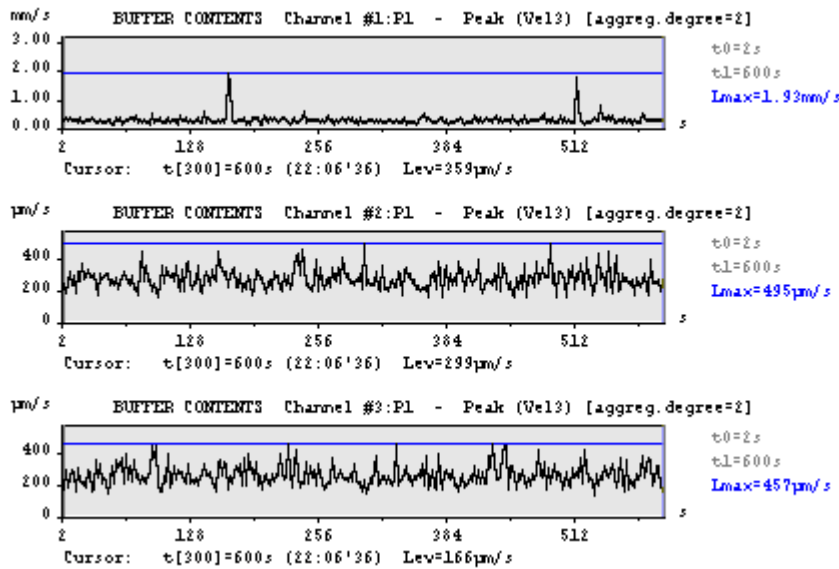
U:\CRJ00078.DTA  
Overall profile duration = 00:10:03 (603 samples)



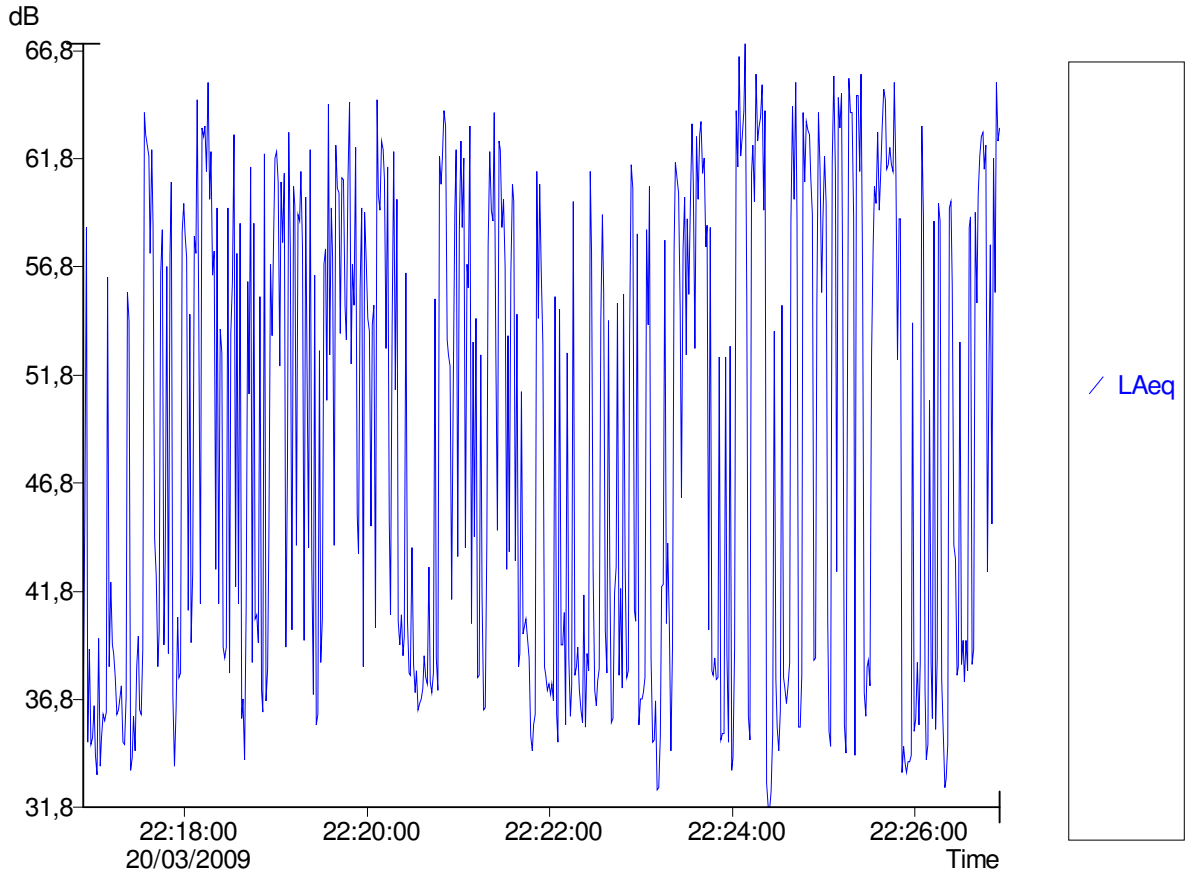
### Ponto 10 A



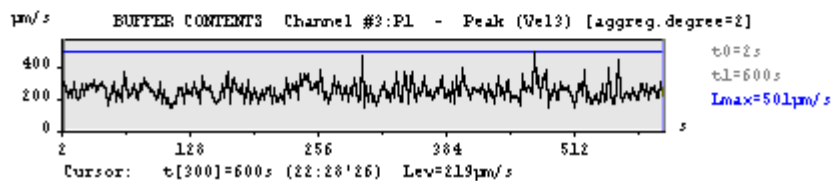
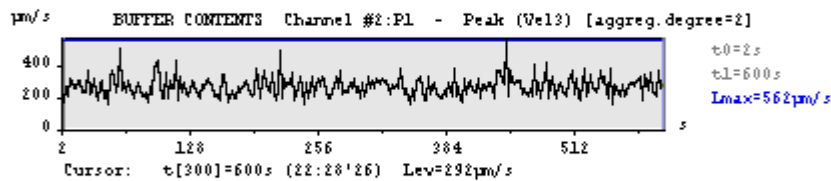
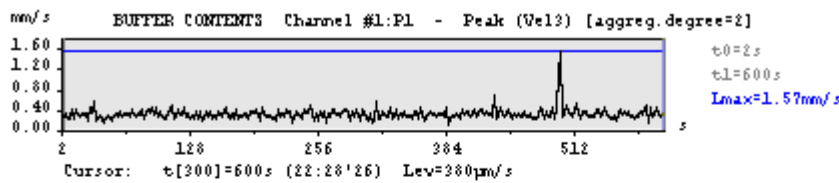
U:\CRJ\00035.DTA  
 Overall profile duration = 00:10:03 (603 samples)



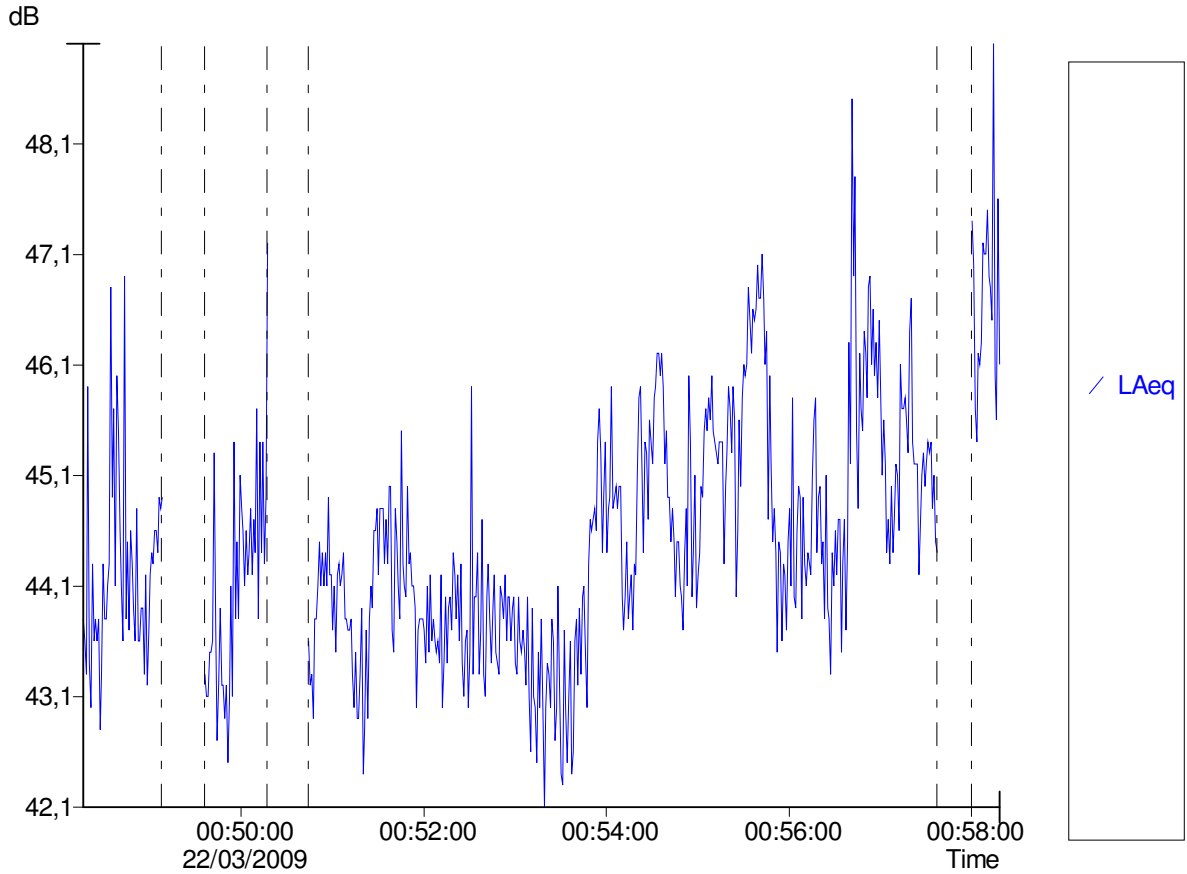
### Ponto 10 B



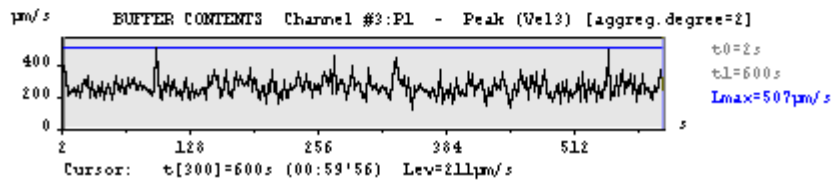
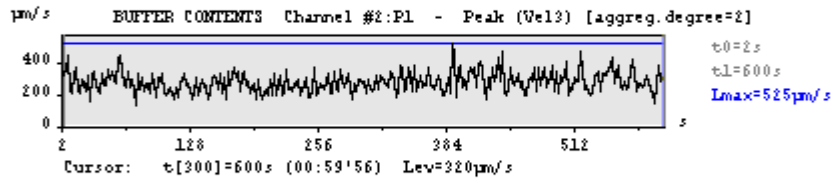
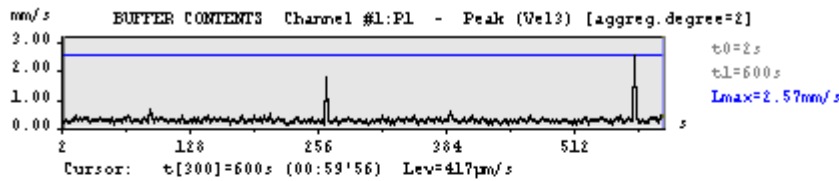
U:\CRJ00036.DTA  
Overall profile duration = 00:10:03 (603 samples)



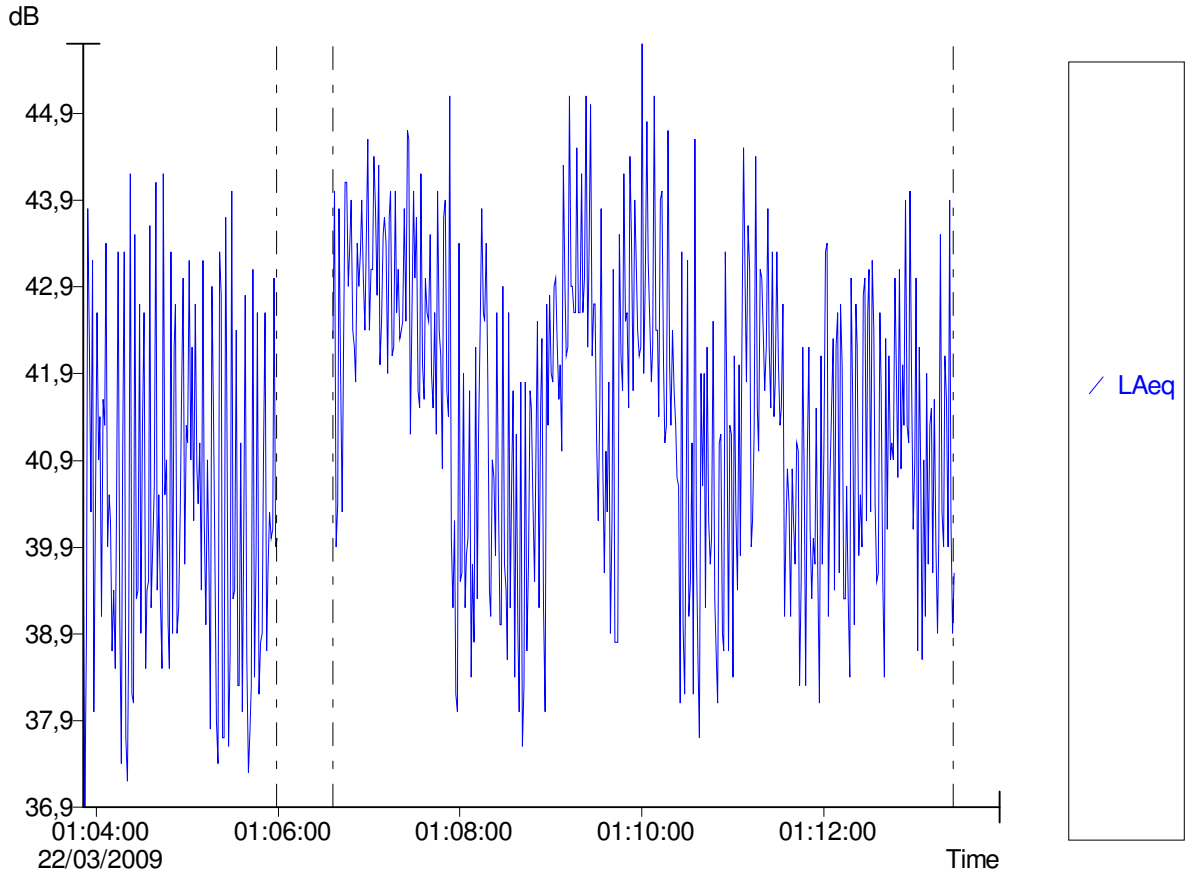
### Ponto 11 A



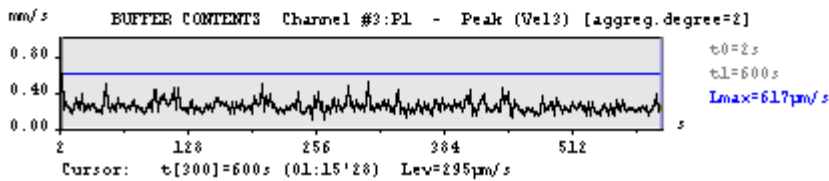
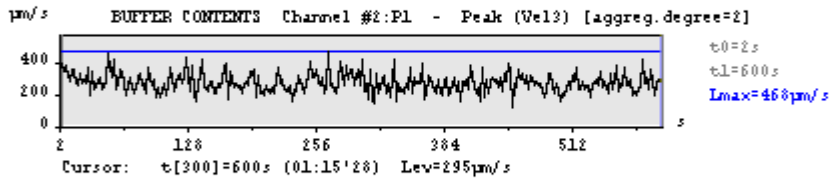
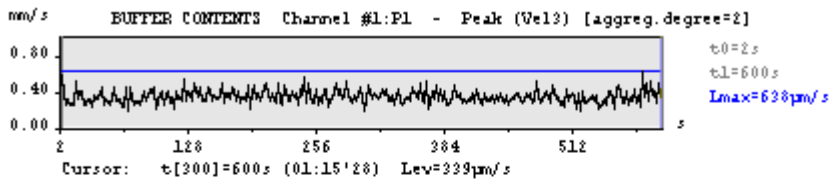
U:\CRJ\00060.DTA  
Overall profile duration = 00:10:03 (603 samples)



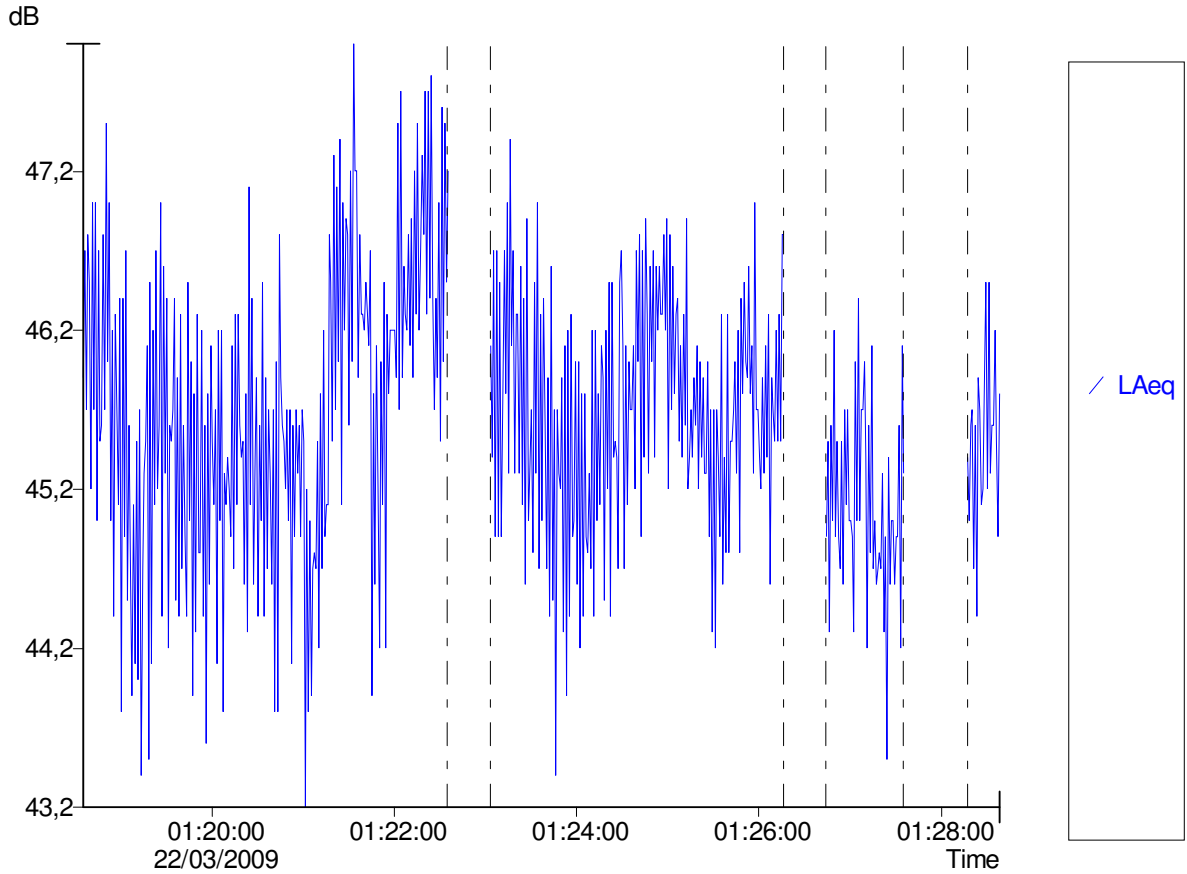
### Ponto 12 A



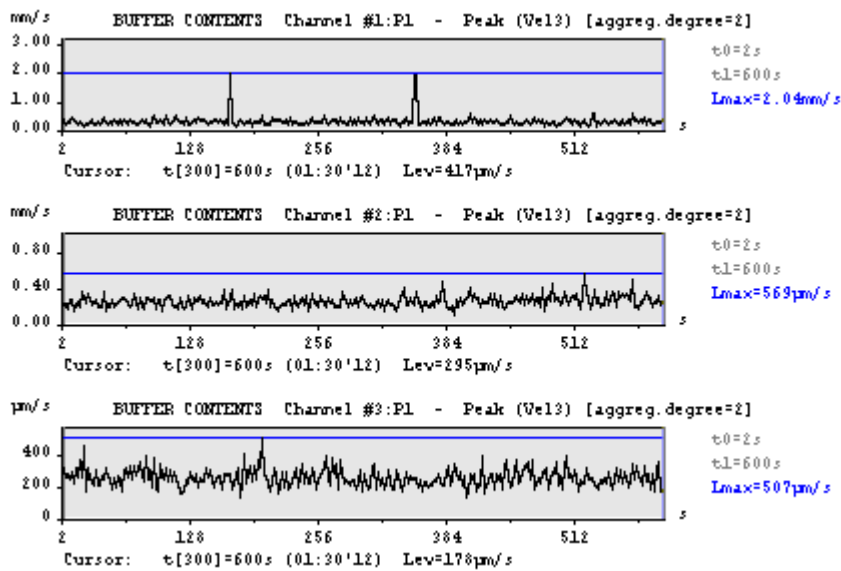
U:\CRJ00061.DTA  
Overall profile duration = 00:10:06 (606 samples)



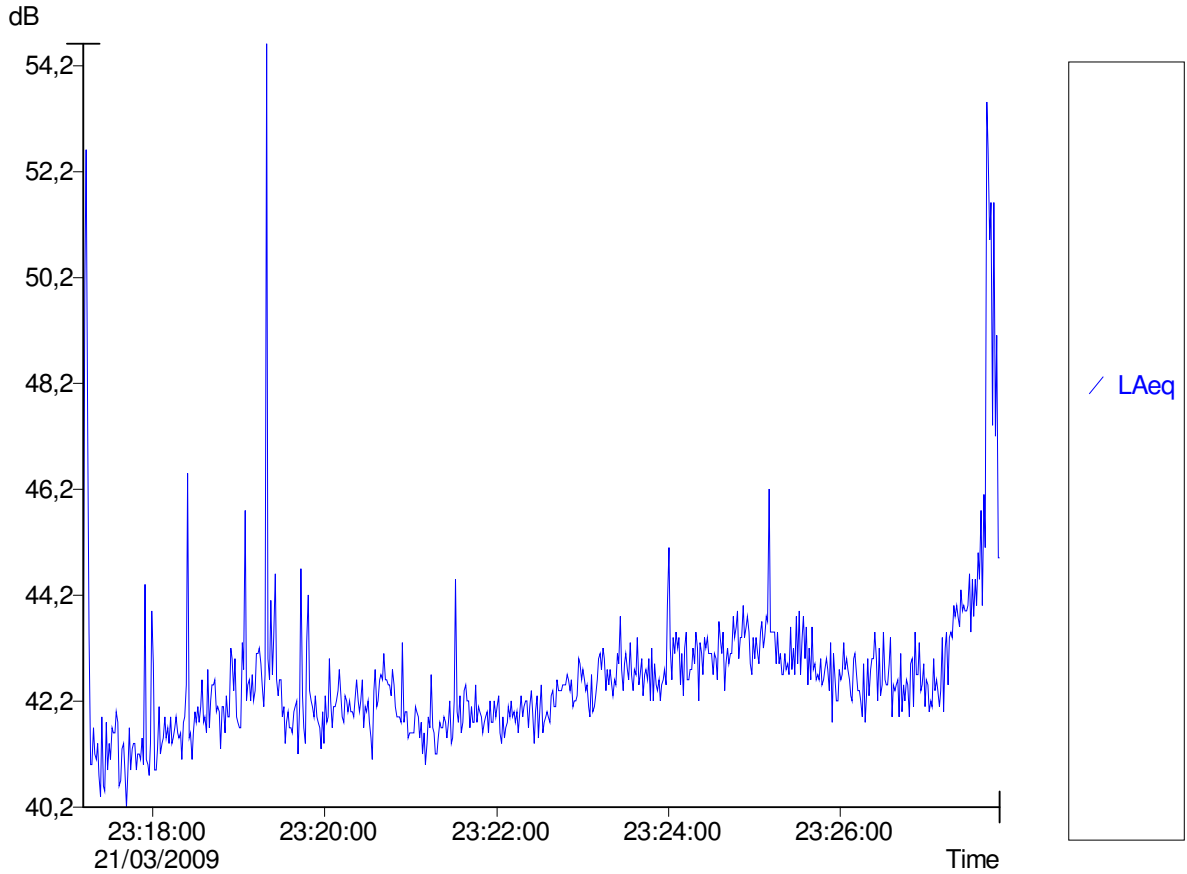
### Ponto 13 A



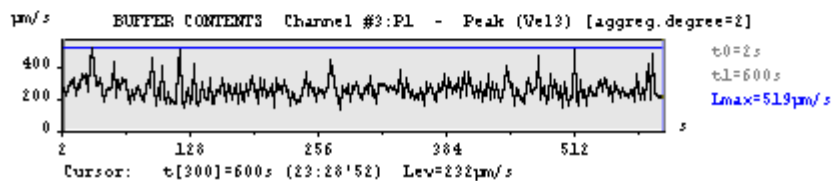
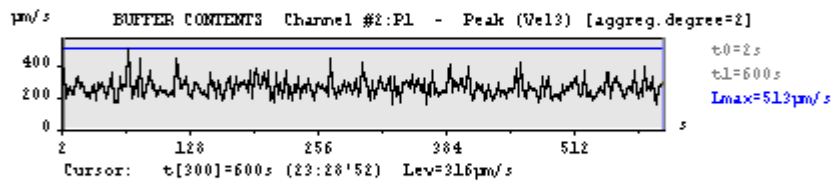
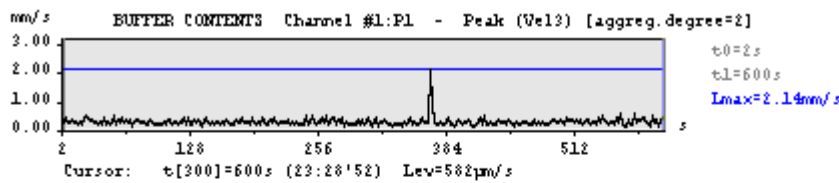
U:\CRJ00062.DTA  
 Overall profile duration = 00:10:04 (604 samples)



### Ponto 14 A

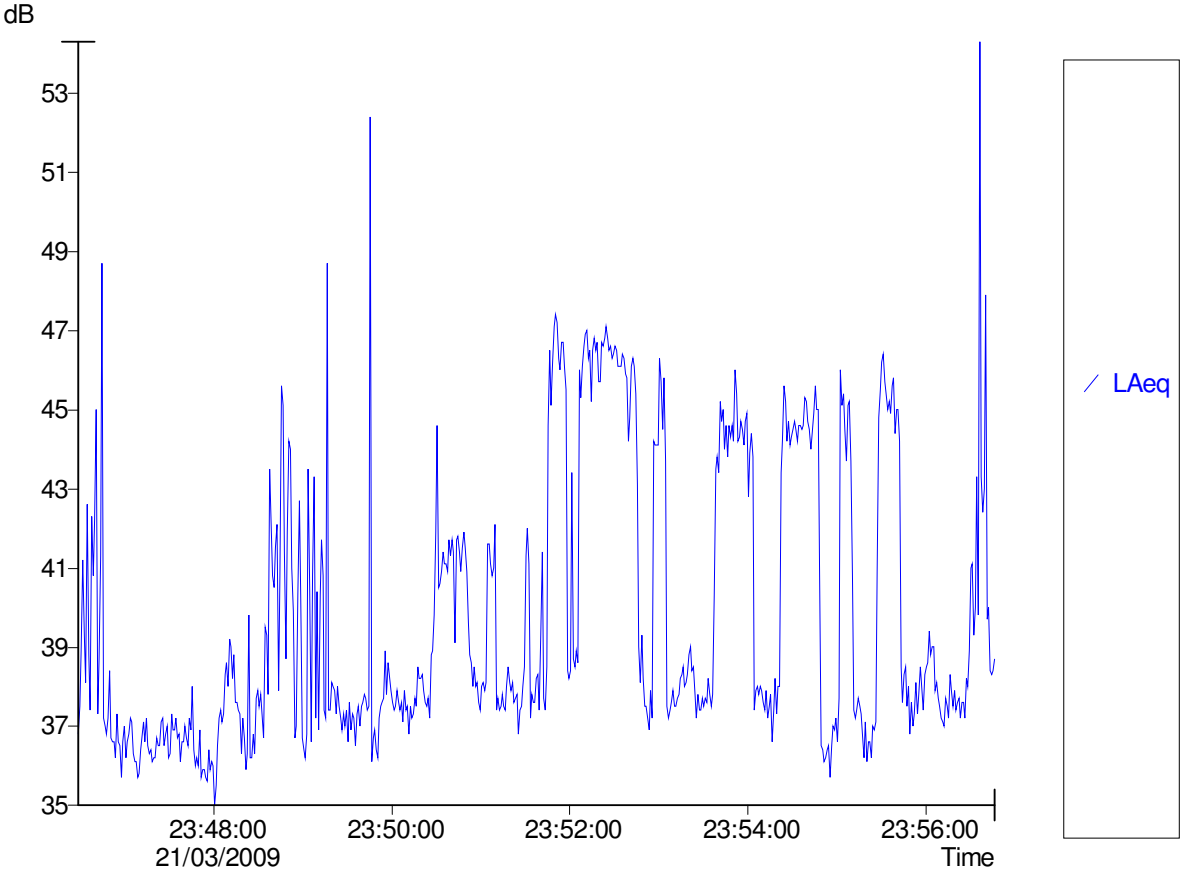


U:\CRJ00057.DTA  
 Overall profile duration = 00:10:41 (641 samples)

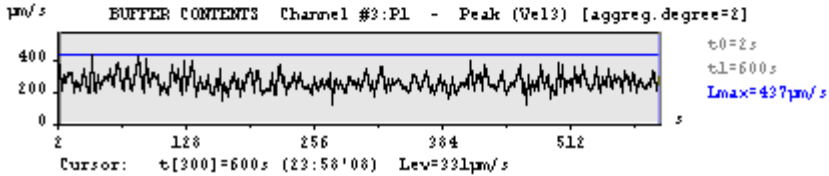
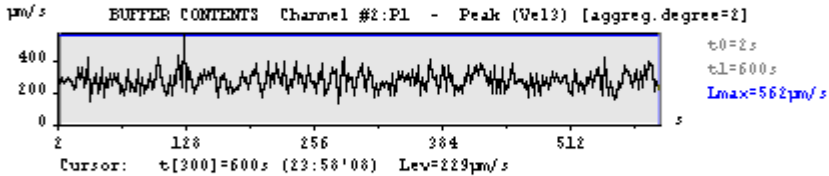
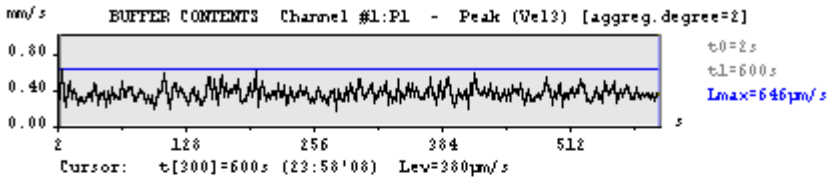




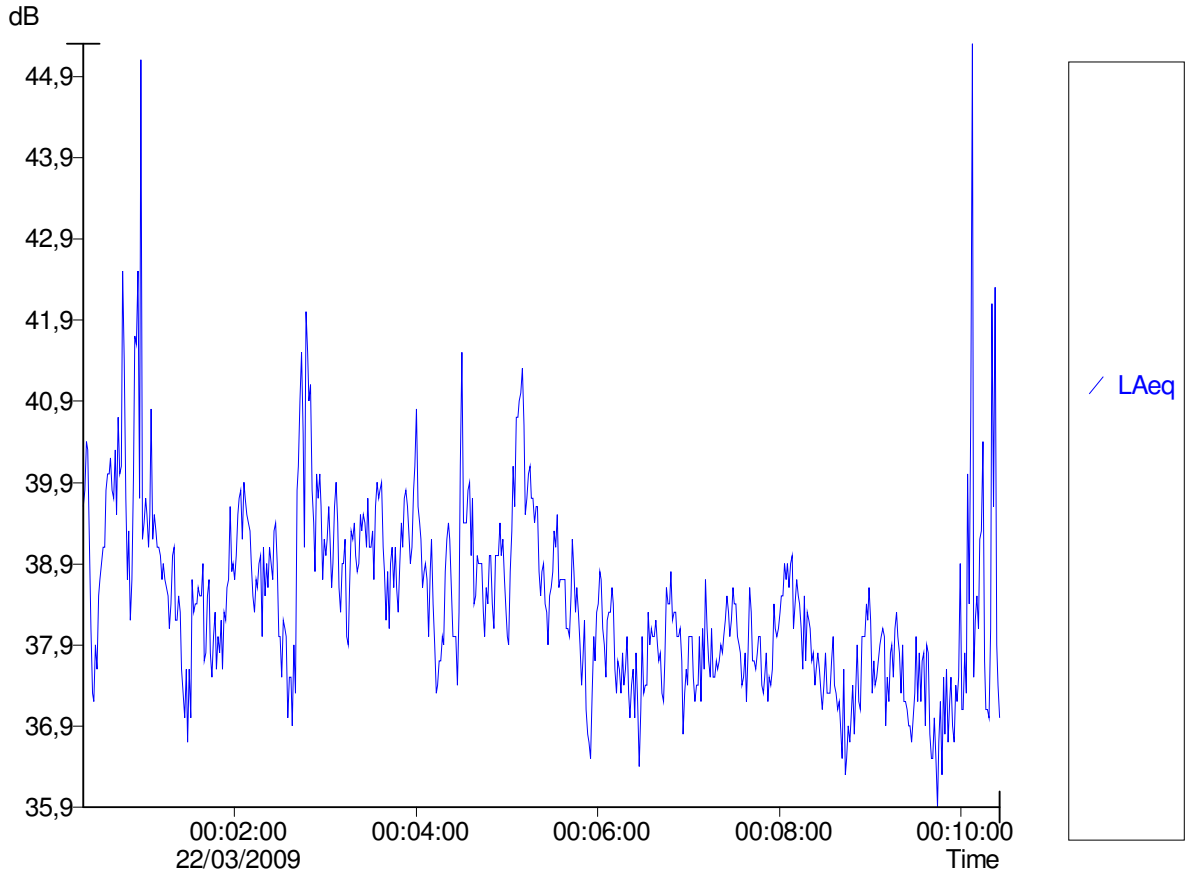
**Ponto 14 B**



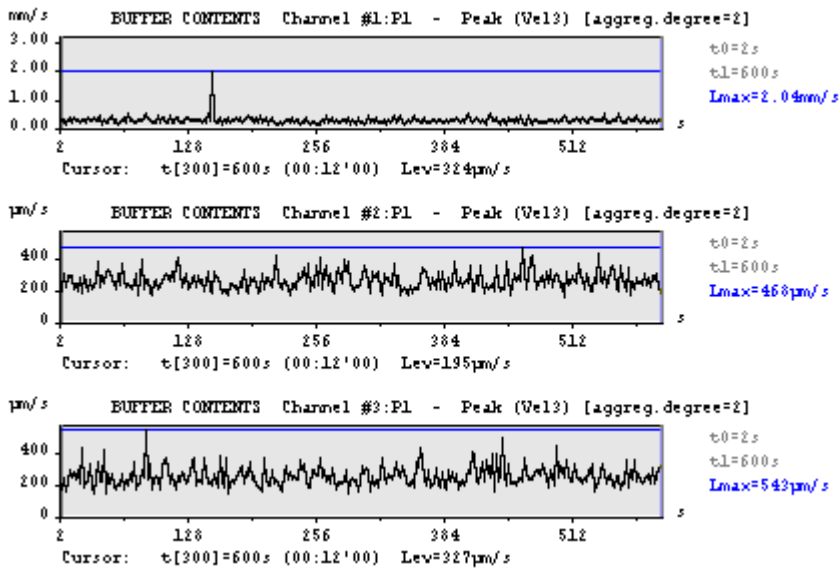
U:\CRJ00058.DTA  
 Overall profile duration = 00:10:19 (619 samples)



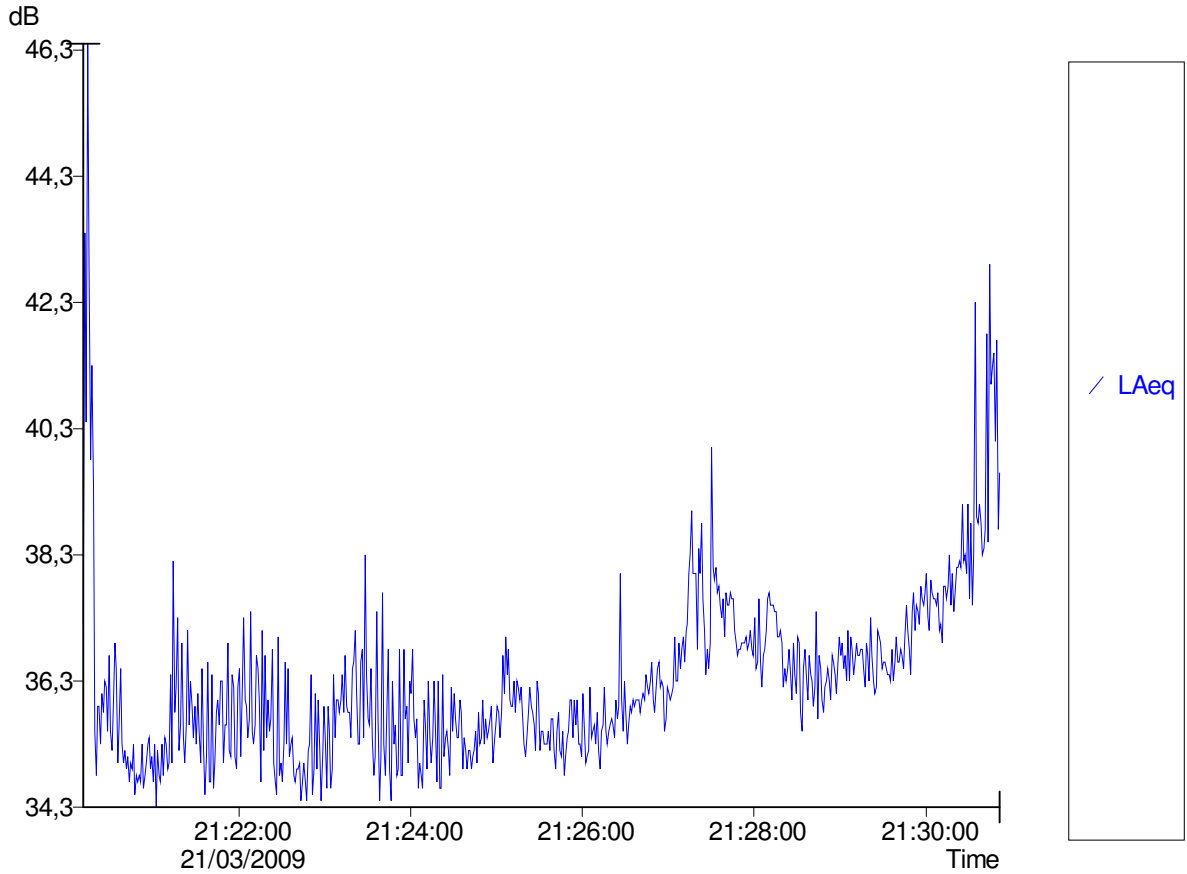
### Ponto 14 C



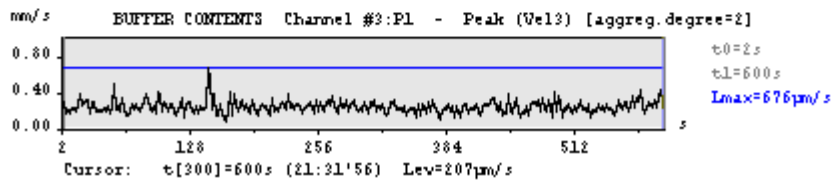
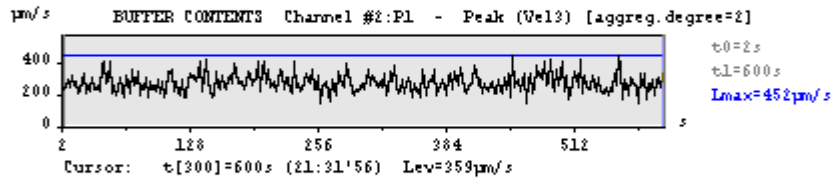
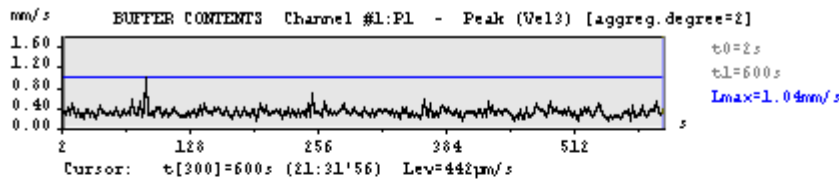
U:\CRJ\00059.DTA  
Overall profile duration = 00:10:06 (606 samples)



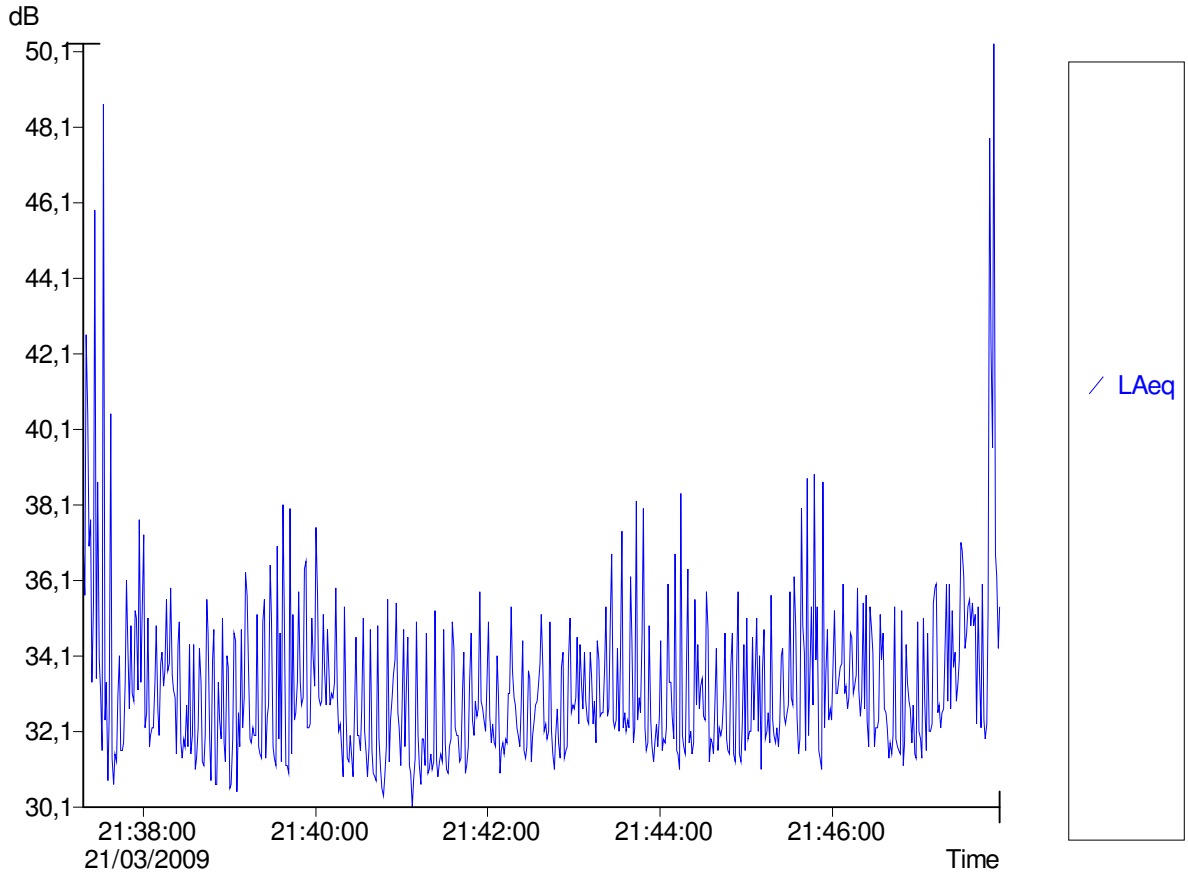
### Ponto 15 A



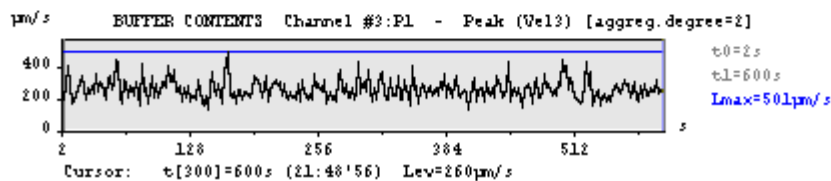
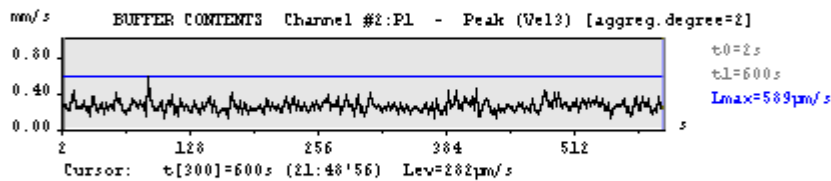
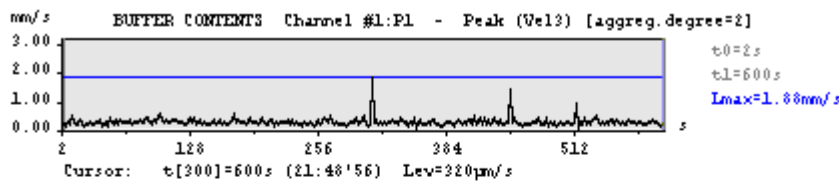
U:\CRJ00052.DTA  
Overall profile duration = 00:10:41 (641 samples)



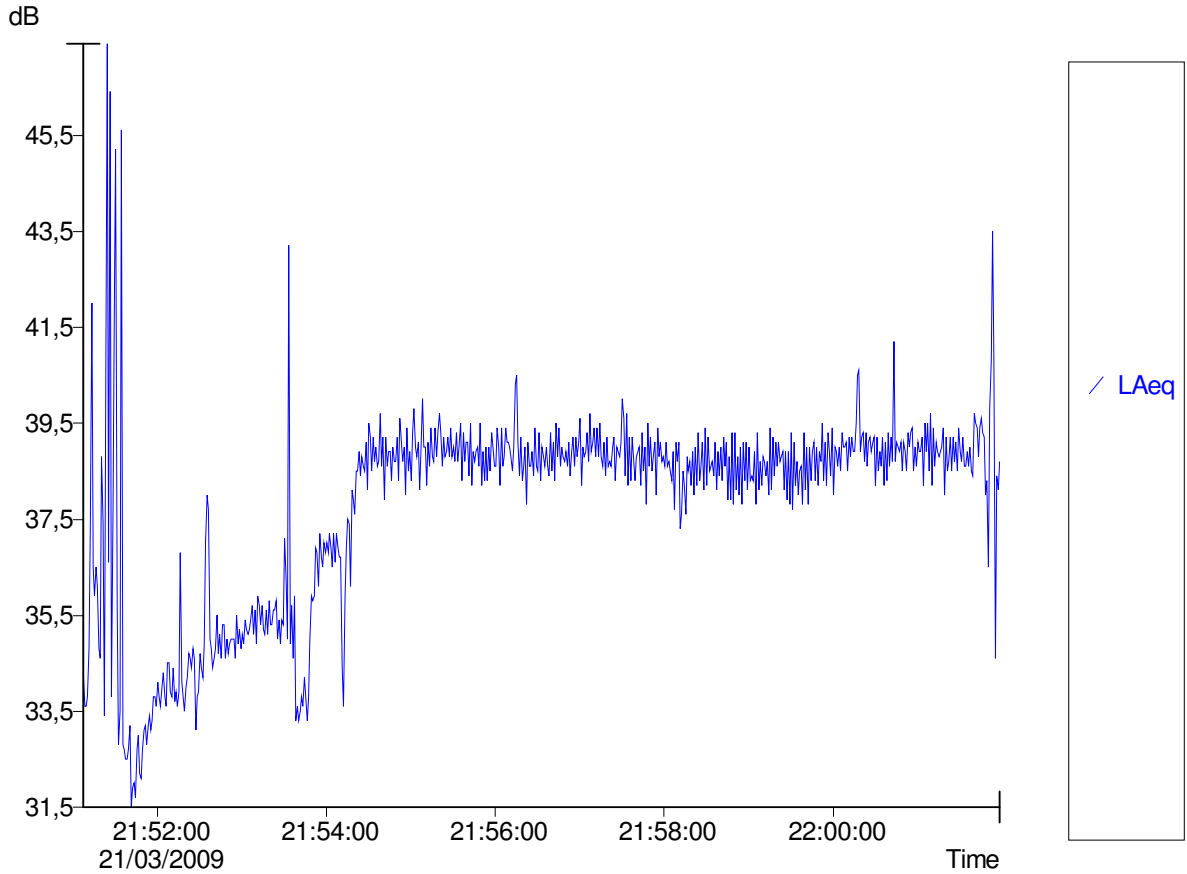
### Ponto 15 B



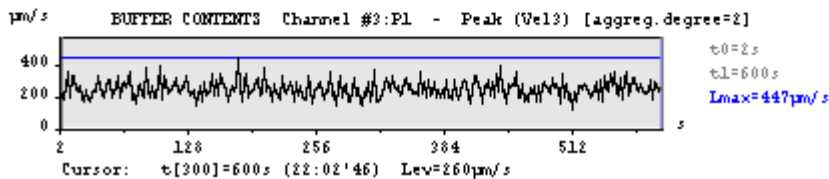
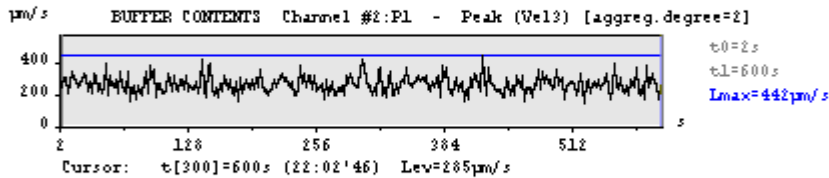
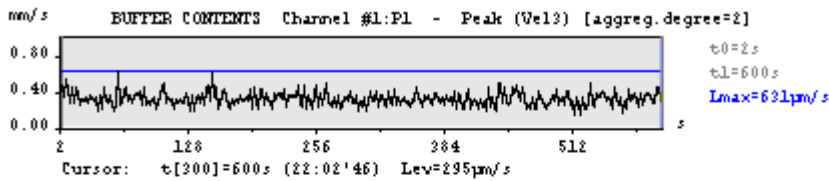
U:\CRJ00053.DTA  
Overall profile duration = 00:10:39 (639 samples)



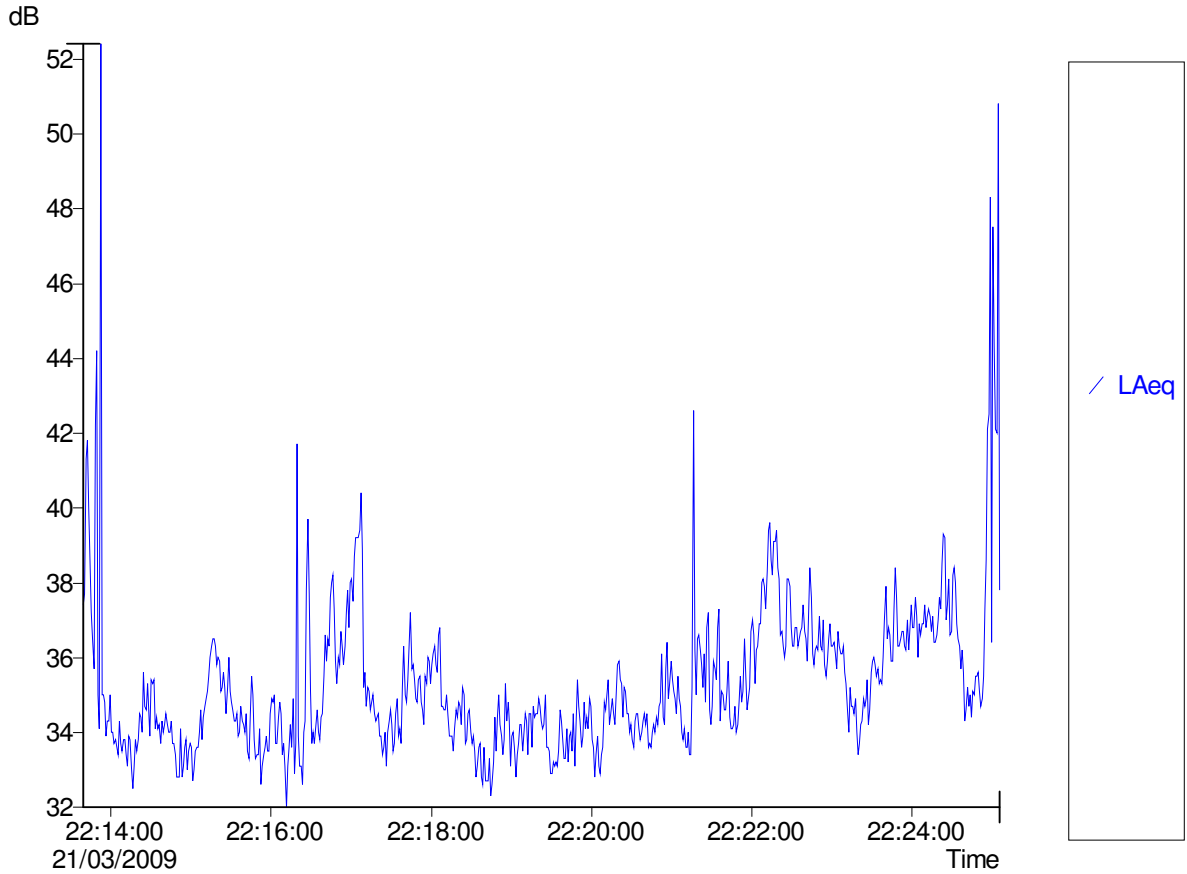
### Ponto 15 C



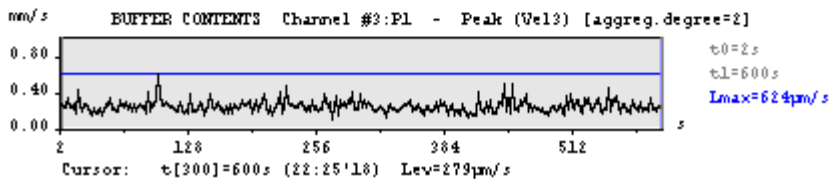
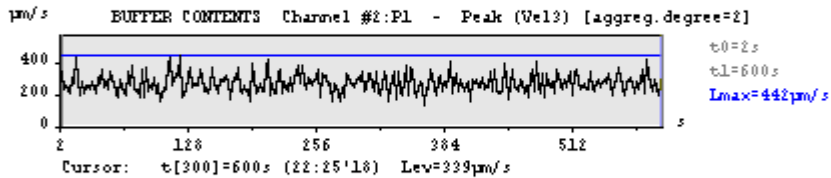
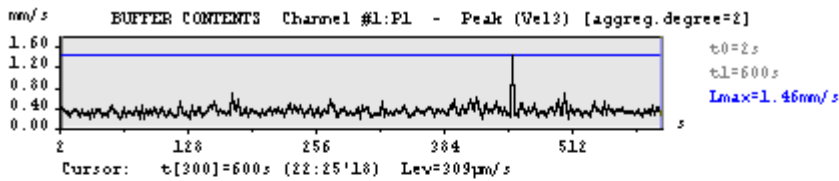
U:\CRJ00054.DTA  
 Overall profile duration = 00:10:52 (652 samples)



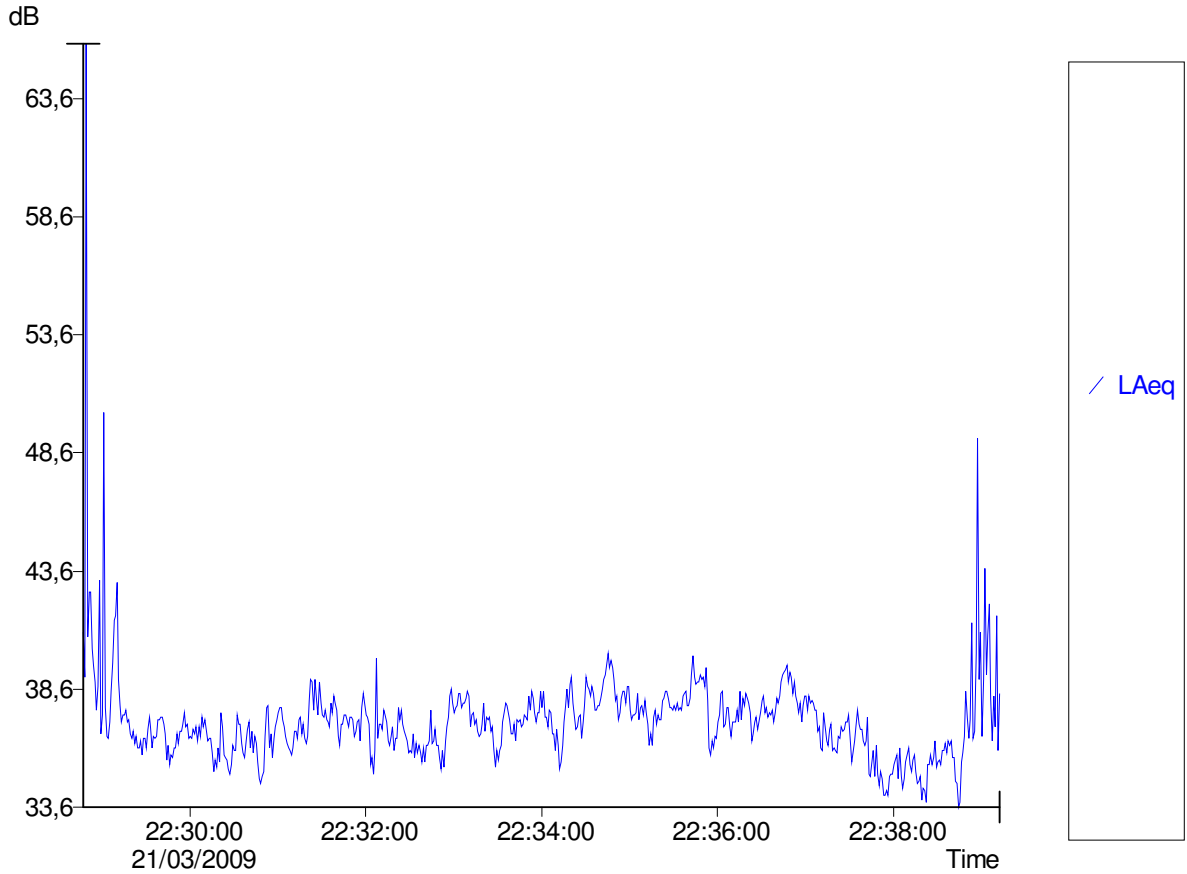
### Ponto 16 A



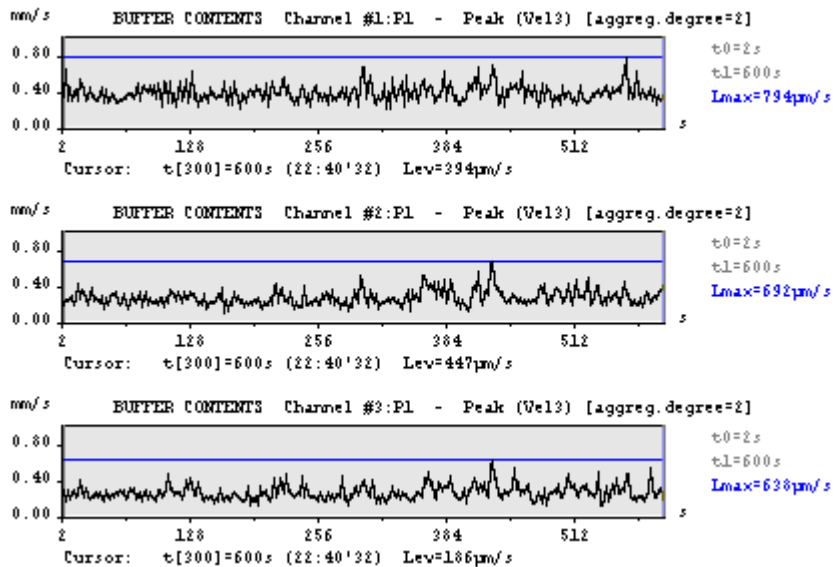
U:\CRJ\00055.DTA  
 Overall profile duration = 00:11:27 (687 samples)



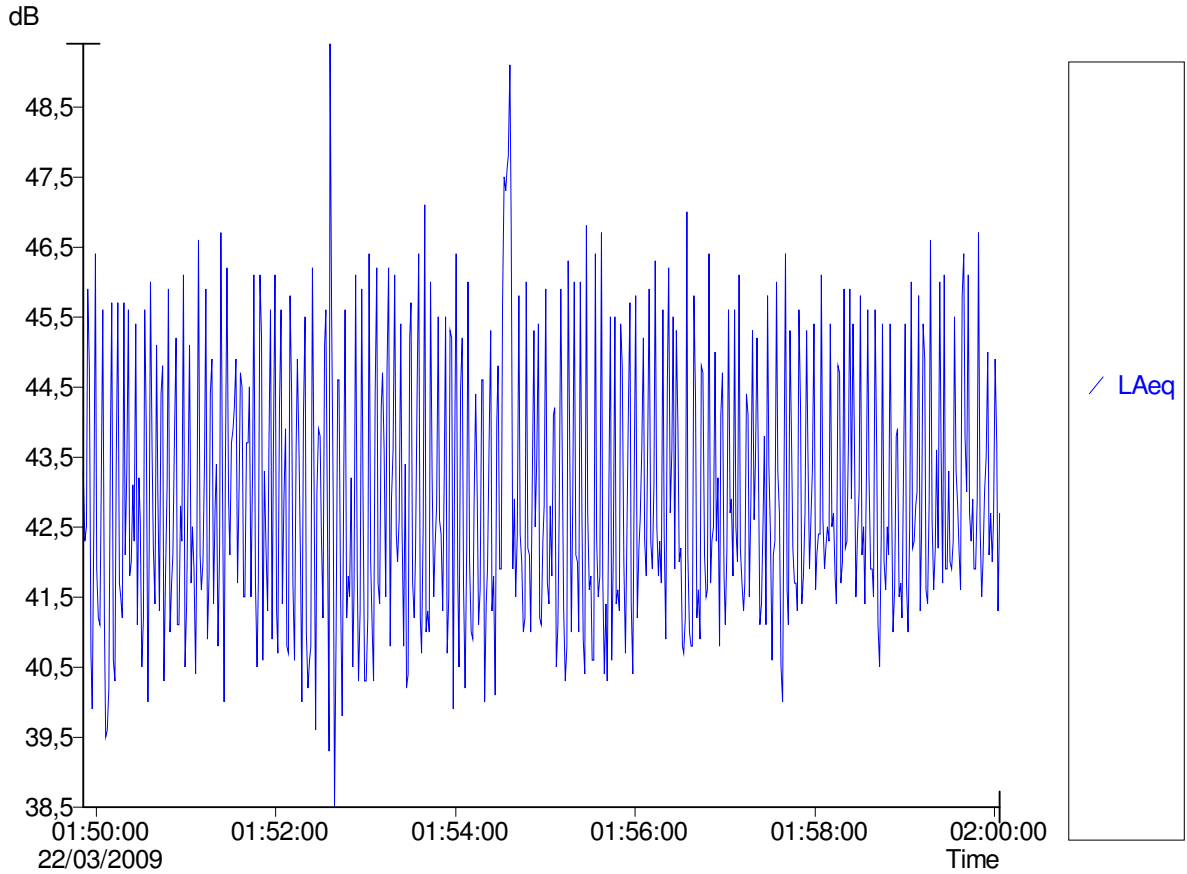
### Ponto 16 B



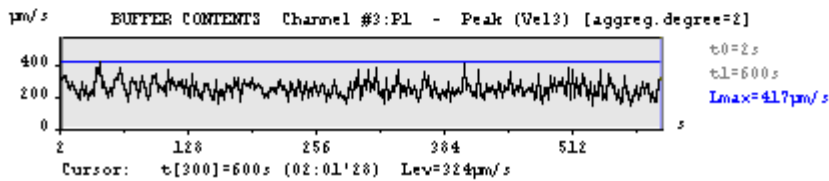
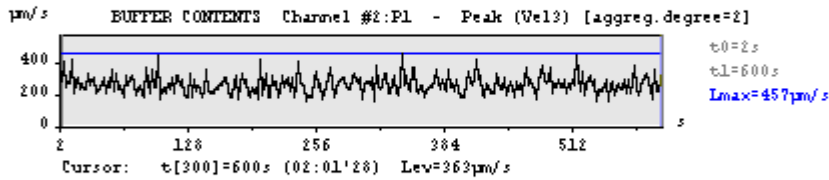
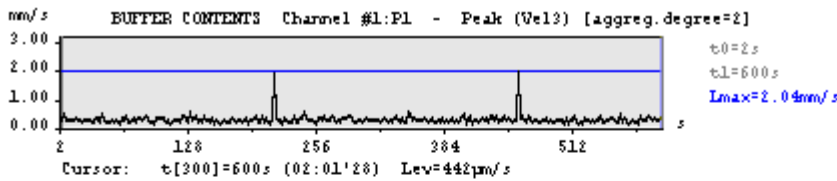
U:\CRJ00056.DTA  
 Overall profile duration = 00:10:26 (626 samples)



### Ponto 17 A

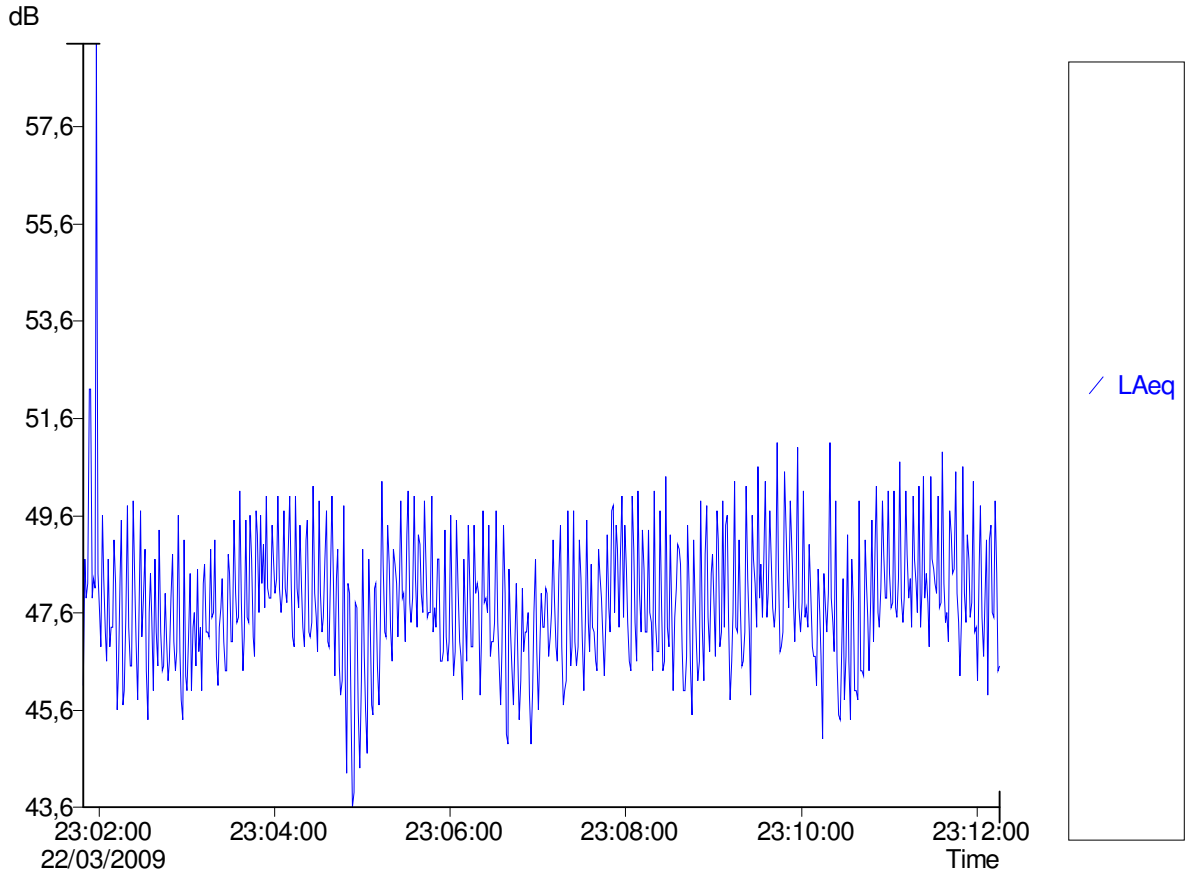


U:\CRJ00063.DTA  
Overall profile duration = 00:10:13 (613 samples)

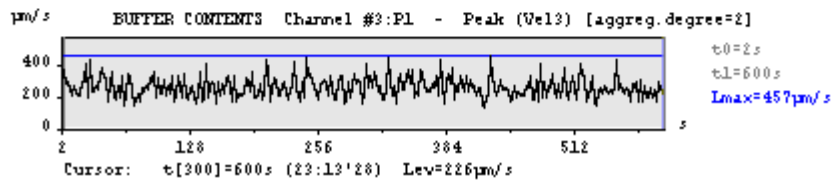
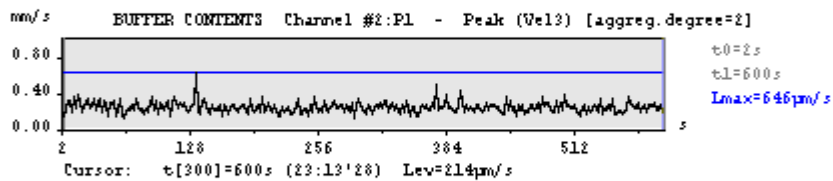
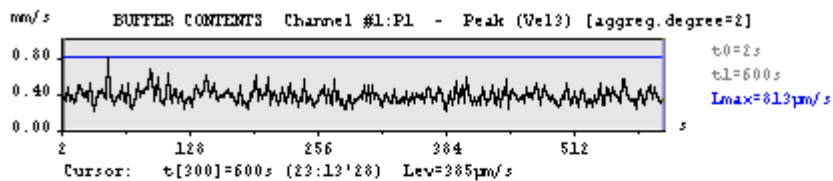




### Ponto 18



U:\CRJ00075.DTA  
Overall profile duration = 00:10:27 (627 samples)



## **2.2 - CERTIFICADO DE CALIBRAÇÃO**

**CALILAB - LABORATÓRIO DE ELETROACÚSTICA  
RBC - REDE BRASILEIRA  
DE CALIBRAÇÃO**



**CERTIFICADO DE CALIBRAÇÃO Nº: RBC2-6812-652**

**1- CLIENTE/ EQUIPAMENTO**

**Data da calibração:** 26/08/08  
**Processo:** 8564

**Nome:** Segma Engenharia de Segurança do Trabalho e Meio Ambiente Ltda.  
**Endereço:** Rua David Rabelo, 210 - Belo Horizonte - MG - Cep: 30820-260  
**Equipamento:** Calibrador de Nível Sonoro  
**Fabricante:** CEL **Modelo:** 282  
**Número de Série:** 2/11718397 **Classe:** 2  
**Identificação:** ---

**2- PADRÕES E INSTRUMENTAÇÃO**

Descrição	Código	Certificado	Emitente	Validade
Pistonphone	P101	DIMCI 1061/2008	INMETRO	11/07/2009
Multímetro Digital	P105	RBC2-7/0050	RBC	10/04/2009
Microfone: 1/2 polegada	P114		Barômetro Digital	P106
Pré-amplificador	P162		Higrômetro	P107
Fonte de Microfone	P104		Termômetro	P108
Multímetro Digital	P105			

**3- INFORMAÇÕES DA CALIBRAÇÃO**

**Procedimento:** IT-502: Método de calibração por comparação de acordo com IEC 60942:1988  
**Condições ambientais:** Temperatura: 23,6 °C, Umidade Relativa: 52 %, Pressão Atmosférica: 93,1 kPa.  
**Observações gerais:**  
1- Os resultados apresentados referem-se à média dos valores encontrados.  
2- A Incerteza Expandida de Medição relatada é declarada como a incerteza padrão de medição multiplicada pelo fator de abrangência k, para uma probabilidade de abrangência de aproximadamente 95%.  
3- O presente certificado de calibração é válido apenas para o calibrador de nível sonoro acima descrito, não sendo extensivo a quaisquer outros, ainda que similares.  
4- Este certificado de calibração somente pode ser reproduzido completo. Reproduções para fins de divulgação em material publicitário, bem como reproduções parciais, requerem autorização escrita do laboratório emitente. Nenhuma reprodução poderá ser usada de maneira enganosa.  
5- O Calibrador de Nível Sonoro sob teste tem correções de fornecidas pelo fabricante [pressão, volume]. As correções foram consideradas de maneira a apresentar os resultados, preferencialmente nas condições de referência.

*Cgcre/Inmetro is Signatory of the ILAC Mutual Recognition Arrangement. Cgcre/Inmetro is Signatory of a Bilateral Mutual Agreement with EA. Cgcre/Inmetro is signatory of the IAAC Mutual Recognition Arrangement.*

 **Página: 1/2**

Este certificado atende aos requisitos de acreditação pela Cgcre/Inmetro que avaliou a competência do laboratório e comprovou a sua rastreabilidade a padrões nacionais de medida (ou ao Sistema Internacional de Unidades - SI).

**CERTIFICADO DE CALIBRAÇÃO N°: RBC2-6812-652****4- RESULTADOS E DECLARAÇÃO DAS INCERTEZAS**

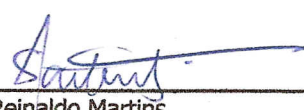
Valor Nominal	Valor Medido	Tolerância	Incerteza	Unidade
114	114,0	0,5	0,2	dB
1000 (114 dB)	1000,1	40,0	0,1	Hz

**Ajustes ou reparos (não fazem parte do escopo de acreditação do laboratório):**

Os resultados desta calibração foram obtidos após ajuste do Calibrador de Nível Sonoro. Os valores anteriores ao ajuste eram: [ 114,8 ] dB e [ 997,2 ] Hz, correspondentes aos valores nominais: [ 114 ] dB e [ 1000 ] Hz, respectivamente.

**Opiniões e Interpretações (não fazem parte do escopo de acreditação do laboratório):**

(campo vazio)

  
Reinaldo Martins  
Signatário Autorizado

Data da emissão: 28/08/2008

Página: 2/2

## FACTORY CALIBRATION DATA OF THE SVAN 948 No. 9368

### SOUND LEVEL METER

#### 1. CALIBRATION (electrical)

LEVEL METER; Filter: LIN; Input signal =114.0dB,  $f_{sin}=1\text{kHz}$

	Range 105dB		Range 130dB	
	Indication [dB]	Error [dB]	Indication [dB]	Error [dB]
Channel 1	113.98	-0.02	114.02	0.02
Channel 2	113.97	-0.03	114.02	0.02
Channel 3	113.98	-0.02	114.02	0.02
Channel 4	113.97	-0.03	114.02	0.02

#### 2. CALIBRATION\* (acoustical)

LEVEL METER; Range: 130 dB; Reference frequency: 1000Hz; Calibration factors: -0.4dB, -0.4dB, -0.4dB, -0.4dB

Filter	LIN		A		C	
	Indication [dB]	Error [dB]	Indication [dB]	Error [dB]	Indication [dB]	Error [dB]
Channel 1	113.9	0.1	113.9	0.1	113.9	0.1
Channel 2	113.9	0.1	113.9	0.1	113.9	0.1
Channel 3	113.9	0.1	113.9	0.1	113.9	0.1
Channel 4	113.9	0.1	113.9	0.1	113.9	0.1

Calibration measured with the microphone SVANTEK type SV22 No. 4010479.

#### 3. LINEARITY TEST (electrical)

LEVEL METER; Range: 105 dB; Filter: A;  $f_{sin}=1000\text{Hz}$

	Input [dB]	24.0	30.0	40.0	50.0	60.0	70.0	80.0	90.0	100.0	110.0	114.0
Channel 1	Error [dB]	-0.16	-0.07	-0.01	-0.02	-0.01	-0.01	0.00	0.00	0.00	0.01	0.00
Channel 2	Error [dB]	-0.11	-0.05	0.00	-0.01	0.00	0.00	0.01	0.00	0.01	0.02	0.01
Channel 3	Error [dB]	0.06	0.08	0.02	-0.01	-0.01	-0.01	0.00	0.00	0.00	0.01	0.00
Channel 4	Error [dB]	0.06	0.08	0.02	-0.01	-0.01	-0.01	0.00	0.00	0.01	0.01	0.01

LEVEL METER; Range: 130 dB; Filter: A;  $f_{sin}=1000\text{Hz}$

	Input [dB]	45.0	50.0	60.0	70.0	80.0	90.0	100.0	110.0	120.0	130.0	135.0
Channel 1	Error [dB]	-0.08	-0.06	-0.02	-0.01	0.01	0.01	0.01	0.01	-0.01	0.01	0.00
Channel 2	Error [dB]	-0.05	-0.04	-0.02	-0.01	0.00	0.00	0.01	0.01	-0.01	0.01	0.00
Channel 3	Error [dB]	0.26	0.15	0.04	0.00	0.01	0.00	0.01	0.01	-0.01	0.00	0.00
Channel 4	Error [dB]	0.29	0.16	0.04	0.00	0.00	0.00	0.00	0.00	-0.02	0.00	0.00

1/3 OCTAVE (1kHz); Range: 130 dB; Filter: A;  $f_{sin}=1000\text{Hz}$

	Input [dB]	35.0	40.0	50.0	60.0	70.0	80.0	90.0	100.0	110.0	120.0	130.0	135.0
Channel 1	Error [dB]	0.20	-0.19	-0.08	-0.01	-0.01	0.01	0.00	0.01	0.01	-0.01	-0.00	-0.00
Channel 2	Error [dB]	0.23	-0.15	-0.05	-0.02	-0.01	0.01	0.00	0.01	0.01	-0.01	-0.00	-0.00
Channel 3	Error [dB]	0.62	0.21	0.15	0.04	0.01	0.01	0.01	0.01	0.01	-0.01	-0.00	-0.00
Channel 4	Error [dB]	0.59	0.24	0.13	0.04	0.00	0.00	0.00	0.01	0.01	-0.01	-0.00	-0.00

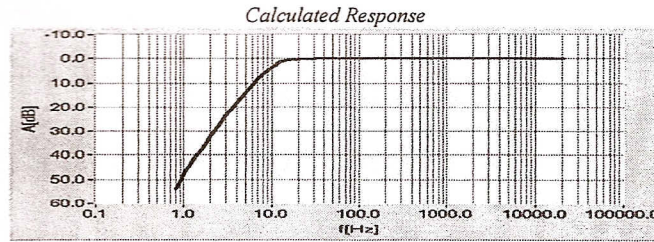
#### 4. RMS DETECTOR ACCURACY\*

LEVEL METER; Range: 130 dB; Input signal =120dB; RMS detector: Impulse

	Crest factor	≤3	≤5	≤10
Channel 1	Max Error [dB]	-0.2	-0.5	-1.4
Channel 2	Max Error [dB]	-0.2	-0.5	-1.4
Channel 3	Max Error [dB]	-0.2	-0.4	-1.4
Channel 4	Max Error [dB]	-0.3	-0.5	-1.4

## 5. FREQUENCY RESPONSE (electrical)

LEVEL METER; Filter: LIN; Range: 130 dB; Input signal =135 dB;



Measured Response (f-frequency, An-attenuation in channel n)

f [Hz]	A1[dB]	A2[dB]	A3[dB]	A4[dB]	f [Hz]	A1[dB]	A2[dB]	A3[dB]	A4[dB]
0.8	53.8	53.8	53.8	53.8	6.3	9.5	9.5	9.5	9.5
1	48.1	48.1	48.1	48.1	8	5.9	5.9	5.9	5.9
1.25	42.6	42.6	42.6	42.6	10	3.1	3.1	3.1	3.1
1.6	37.2	37.2	37.2	37.2	12.5	1.3	1.3	1.3	1.3
2	32.1	32.1	32.1	32.1	16	0.4	0.4	0.4	0.4
2.5	27.1	27.1	27.1	27.1	20	0.1	0.1	0.1	0.1
3.15	22.4	22.4	22.4	22.4	25	0.0	0.0	0.0	0.0
4	17.8	17.8	17.8	17.8	31.5	-0.1	-0.1	-0.1	-0.1
5	13.6	13.6	13.6	13.6	40	-0.1	-0.1	-0.1	-0.1

f [Hz]	A1[dB]	A2[dB]	A3[dB]	A4[dB]	f [Hz]	A1[dB]	A2[dB]	A3[dB]	A4[dB]	f [Hz]	A1[dB]	A2[dB]	A3[dB]	A4[dB]
50	-0.1	-0.1	-0.1	-0.1	400	0.0	0.0	0.0	0.0	3150	0.0	0.0	0.0	0.0
63	0.0	0.0	0.0	0.0	500	0.0	0.0	0.0	0.0	4000	0.0	0.0	0.0	0.0
80	0.0	0.0	0.0	0.0	630	0.0	0.0	0.0	0.0	5000	0.0	0.0	0.0	0.0
100	0.0	0.0	0.0	0.0	800	0.0	0.0	0.0	0.0	6300	0.0	0.0	0.0	0.0
125	0.0	0.0	0.0	0.0	1000	0.0	0.0	0.0	0.0	8000	0.0	0.0	0.0	0.0
160	0.0	0.0	0.0	0.0	1250	0.0	0.0	0.0	0.0	10000	0.0	0.0	0.0	0.0
200	0.0	0.0	0.0	0.0	1600	0.0	0.0	0.0	0.0	12500	0.0	0.0	0.0	0.0
250	0.0	0.0	0.0	0.0	2000	0.0	0.0	0.0	0.0	16000	0.0	0.0	0.0	0.0
315	0.0	0.0	0.0	0.0	2500	0.0	0.0	0.0	0.0	20000	0.0	0.0	0.0	0.0

All frequencies are nominal center values for the 1/3 octave bands

## 6. INTERNAL NOISE LEVEL\* (electrical)

LEVEL METER; Range: 105 dB; Back-light – off

	Filter	LIN	A	C
Channel 1	Level [dB]	15.2	11.3	10.0
Channel 2	Level [dB]	14.7	11.1	10.0
Channel 3	Level [dB]	15.0	11.5	10.0
Channel 4	Level [dB]	15.3	11.3	10.0

\* measured with preamplifier SVANTEK type SV12L No. 1992.

## VIBRATION LEVEL METER

### 1. CALIBRATION (electrical)

LEVEL METER; Filter: HP10; Input signal =140.0dB (10.0 m/s<sup>2</sup>), f<sub>sin</sub>=79,6Hz

	Range 145dB		Range 170dB	
	Indication [dB]	Error [dB]	Indication [dB]	Error [dB]
Channel 1	139.99	-0.01	140.03	0.03
Channel 2	139.98	-0.02	140.03	0.03
Channel 3	139.99	-0.01	140.03	0.03
Channel 4	139.98	-0.02	140.03	0.03

### 2. CALIBRATION (vibrational)

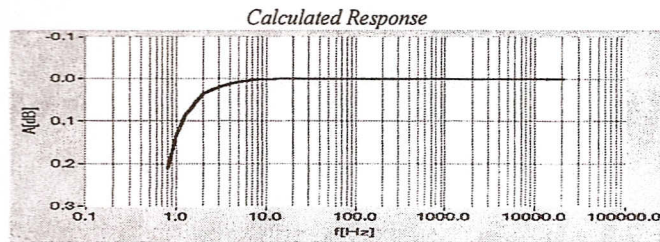
LEVEL METER; Range: 145dB; Input signal: 120dB; Calibration factors: -0.1dB, -0.1dB, -0.1dB, -0.1dB

Filter	HP1		HP10		Wd		Wm		Wh	
	Indication [dB]	Error [dB]	Indication [dB]	Error [dB]	Indication [dB]	Error [dB]	Indication [dB]	Error [dB]	Indication [dB]	Error [dB]
Channel 1	119.8	-0.2	119.8	-0.2	108.2	0.1	115.4	0.1	106.0	-0.1
Channel 2	119.9	-0.1	119.9	-0.1	108.2	0.1	115.4	0.1	106.0	-0.1
Channel 3	119.9	-0.1	119.9	-0.1	108.3	0.2	115.4	0.1	106.0	-0.1
Channel 4	119.9	-0.1	119.9	-0.1	108.2	0.1	115.4	0.1	106.0	-0.1

Calibration measured with the accelerometer DYTRAN type 3185D No. 2442.

### 3. FREQUENCY RESPONSE (electrical)

1/3 OCTAVE; Filter: HP; Range: 170 dB; input=175 dB;



Measured Response (f-frequency, An-attenuation in channel n)

f [Hz]	A1[dB]	A2[dB]	A3[dB]	A4[dB]	f [Hz]	A1[dB]	A2[dB]	A3[dB]	A4[dB]
0.8	0.16	0.16	0.15	0.17	6.3	-0.02	-0.02	-0.02	-0.02
1	0.14	0.14	0.14	0.15	8	-0.01	-0.01	-0.01	0.00
1.25	0.10	0.10	0.10	0.10	10	0.00	0.00	0.00	0.00
1.6	0.06	0.06	0.06	0.06	12.5	-0.03	-0.03	-0.02	-0.02
2	0.03	0.03	0.03	0.04	16	0.00	0.00	0.00	0.00
2.5	0.01	0.01	0.01	0.02	20	0.01	0.01	0.01	0.01
3.15	0.02	0.02	0.02	0.02	25	0.02	0.02	0.02	0.02
4	0.01	0.02	0.02	0.02	31.5	0.02	0.02	0.02	0.02
5	0.00	0.01	0.01	0.01	40	-0.01	-0.01	0.00	0.00

f [Hz]	A1[dB]	A2[dB]	A3[dB]	A4[dB]	f [Hz]	A1[dB]	A2[dB]	A3[dB]	A4[dB]	f [Hz]	A1[dB]	A2[dB]	A3[dB]	A4[dB]
50	0.01	0.01	0.01	0.01	400	-0.01	-0.01	-0.01	0.00	3150	0.01	0.01	0.01	0.01
63	0.00	0.00	0.00	0.00	500	-0.01	-0.01	-0.01	0.00	4000	0.01	0.01	0.01	0.02
80	0.00	0.00	0.00	0.00	630	-0.01	-0.01	-0.01	0.00	5000	0.01	0.02	0.01	0.02
100	0.00	0.00	0.00	0.00	800	-0.01	0.00	0.00	0.00	6300	0.03	0.03	0.02	0.03
125	-0.01	-0.01	0.00	0.00	1000	0.00	0.00	0.00	0.00	8000	0.04	0.04	0.03	0.04
160	-0.01	-0.01	-0.01	0.00	1250	0.00	0.00	0.00	0.00	10000	0.05	0.05	0.04	0.05
200	-0.01	-0.01	0.00	0.00	1600	0.00	0.00	0.00	0.00	12500	0.05	0.05	0.04	0.05
250	-0.01	-0.01	-0.01	0.00	2000	0.00	0.00	0.00	0.00	16000	0.03	0.03	0.02	0.03
315	-0.01	-0.01	-0.01	0.00	2500	0.00	0.00	0.00	0.01	20000	0.01	0.02	0.03	0.01

All frequencies are nominal center values for the 1/3 octave bands

### 4. INTERNAL NOISE LEVEL (electrical)

LEVEL METER func.; Range: 145 dB; Back-light – off

	Filter	HP1	HP10	Wd	Wm	Wh
Channel 1	Indication [dB]	55.4	51.7	46.9	40.4	38.0
Channel 2	Indication [dB]	55.6	52.2	47.0	40.6	38.0
Channel 3	Indication [dB]	55.7	52.2	46.6	40.5	38.1
Channel 4	Indication [dB]	55.8	52.7	46.5	40.0	38.5

### ENVIRONMENTAL CONDITIONS

Temperature	Relative humidity	Ambient pressure
23 °C	39 %	995 hPa

### TEST EQUIPMENT

Item	Manufacturer	Model	Serial no.	Description
1.	SVANTEK	SVAN 401	87	Signal generator
2.	SVANTEK	SVAN 912A	0	Sound & Vibration Analyser
3.	SOAR	3430	90CA1811	Digital voltmeter
4.	SVANTEK	SV30A	5369	Acoustic calibrator
5.	SVANTEK	ST02	-	Microphone equivalent electrical impedance (18pF)
6.	DYTRAN	3120A	1306	Reference accelerometer

### CONFORMITY & TEST DECLARATION

1. Herewith Svantek company declares that this instrument has been calibrated and tested in compliance with the internal ISO9001 procedures and meets all specification given in the Manual(s) or respectively surpass them.
2. Traceability of the calibration is guaranteed by the above mentioned ISO9001 procedures.
3. The information appearing on this sheet has been compiled specifically for this instrument. This form is produced with advanced equipment & procedures which permit comprehensive quality assurance verification of all data supplied herein.
4. This calibration sheet shall not be reproduced except in full, without written permission of the SVANTEK Ltd.

Calibration specialist: Mariusz Mucha ..... *M. Mucha* .....

Test date: 2006-05-30

## **2.3 – ANOTAÇÃO DE RESPONSABILIDADE TÉCNICA (ART)**



**CREA-MG**

CONSELHO REGIONAL DE ENGENHARIA ARQUITETURA E AGRONOMIA DE MINAS GERAIS  
 Av. Álvares Cabral, 1600 - Fone 31 3299-8700 - Fax 31 3299-8720 - CEP 30170-001 - Belo Horizonte - Minas Gerais  
 Ouvidoria: 0800 28 30 273 - Atendimento: 0800 031 2732

VIA 02  
 ART Nº  
 1-40474039

## ANOTAÇÃO DE RESPONSABILIDADE TÉCNICA - ART MATRIZ OBRA / SERVIÇO

### CONTRATADO

04 Nome do profissional responsável pela Obra ou Serviço <b>RODRIGO KASBERGEN SILVA</b>		05 Registro no CREA <b>MG-80559/D</b>	07 CPF <b>024.435.576-26</b>
06 Título(s) do Profissional <b>ENGENHEIRO MECANICO</b>			08 Telefone <b>(0031)3418-2026</b>
09 Endereço Residencial do Profissional <b>RUA MAURETTE JOSE DOS SANTOS, 000125 CASTELO, BELO HORIZONTE/MG</b>			10 CEP <b>30840-590</b>
11 Nome da Empresa Contratada <b>SEGMA ENGENHARIA DE SEGURANCA DO TRABALHO E MEIO AMBIENTE</b>			
12 Registro no CREA <b>022765</b>	13 CNPJ <b>66.353.590/0001-44</b>	14 Capital Social <b>21000</b>	15 Telefone <b>(0031)3416-6565</b>
16 Endereço para Correspondência <b>RUA DAVID RABELO, 000210 CASA - INCONFIDENCIA, BELO HORIZONTE/MG</b>			17 CEP <b>30820-260</b>

### CONTRATANTE

18 Nome do Contratante <b>AMPLIO TREINAMENTO E CONSULTORIA LTDA</b>		19 CPF ou CNPJ <b>04.590.934/0001-81</b>
20 Endereço para Correspondência <b>RUA BUENOPOLIS, 45 SALA 301, SANTA TEREZA, BELO HORIZONTE/MG</b>		21 CEP <b>31015-120</b>

### DADOS DA OBRA / SERVIÇO

22 Nome do Proprietário <b>AMPLIO TREINAMENTO E CONSULTORIA S/C LTDA</b>		23 CPF ou CNPJ <b>04.590.934/0001-81</b>							
24 Endereço da Obra ou Serviço <b>RUA BUENOPOLIS 45 SALA 301, SANTA TEREZA,</b>									
25 Município <b>BELO HORIZONTE/MG</b>		26 CEP <b>31015-120</b>							
28 Atividade Técnica									
01 Geral Tipo <b>34 30</b>	02 Geral Tipo	03 Geral Tipo	04 Geral Tipo	05 Geral Tipo	06 Geral Tipo	07 Geral Tipo	08 Geral Tipo	09 Geral Tipo	10 Geral Tipo
30 Finalidade <b>34113</b>	34 Ent. Classe <b>0140</b>	35 Quantificação <b>0,00</b>	36 Unidade	37 Valor da Obra/Serviço <b>34.108,80</b>			38 Honorários <b>0,00</b>	39 Tipo Contrato <b>7</b>	

40 Descrição Complementar  
**CARACTERIZAÇÃO DE RUÍDO E VIBRAÇÃO NOS PROJETOS N4/N5 E LINHA DE TRANSMISSÃO**

### ASSINATURAS

41 Responsabilizamos-nos pela veracidade das informações prestadas

#### VINCULAÇÃO LEGAL

A ART é regida pela Lei 6496/77 e, na falta de outro documento, vale para todos os efeitos legais, como contrato entre as partes.

LEMBRETE - Concluída a obra ou serviço, há a necessidade de solicitar baixa da ART no CREA-MG. Cada ART baixada incorpora-se ao acervo técnico do profissional, do qual pode-se obter certidão mediante requerimento. O acervo técnico é documento de grande valia, principalmente como currículo, para participação de licitações e comprovações junto à previdência para efeito de aposentadoria.

LOCAL E DATA

PROFISSIONAL

CONTRATANTE

**ESTA ART SÓ É VÁLIDA APÓS A COMPROVAÇÃO DO SEU PAGAMENTO.**

42 Data de Pagamento	43 Valor da Taxa de ART <b>300,00</b>	Esta ART foi verificada eletronicamente pelo CREA-MG em 07/04/2009. Documento válido após a comprovação do pagamento. É de responsabilidade do profissional o envio da via do CREA-MG para fins de registro no acervo técnico.
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AUTENTICAÇÃO MECÂNICA

VIA DA OBRA/SERVIÇO



**Bradesco Net Empresa**

**Comprovante de Pagament  
Boleto de Cobranç**

Data: 07/04/200

Banco: **1 - BANCO DO BRASIL S.A.**  
Boleto Nº: **00194.58652 90000.831405 47403.900211 1 00000000030000**  
Data do Pagamento: **07/04/2009**  
Data de Vencimento: **17/04/2009**  
Reverecido Informado: **ART 1-40474039 AMPLO TREINAMENTO**  
Debitado da: **Conta Corrente**

Valor do Pagamento: **300,00**

A cobrança acima foi paga através do(a) NetEmpresa, dentro das condições especificadas.  
O lançamento consta no extrato do(a) cliente SEGMA ENGENHARIA DE SEGURANÇA DO TRABALH Agência 2828 - Conta 1654, da data de pagamento, sob o número de protocolo **0002946**.

Nº Controle: **846.164.847.079.321.575**

**Banco Bradesco S.**  
<http://www.bradesco.com>

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IMPRIMIR

FECHAR