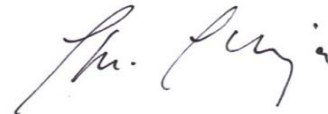

Sterling Chemical Malta
Ltd.
HF 51, Hal Far
Industrial Estate,
Birzebbugia BBG3000 –
Malta

Noise survey.

Prepared by:



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Introduction

Acoustical Consultancy has been asked by Sterling Chemical Malta Ltd.. to conduct a noise survey of their new plant in Hal-Far. Sterling Chemical Malta is a pharmaceutical API manufacturer specializing in steroid production. The new plant is situated in HF 51, Hal Far Industrial Estate, Birzebbugia BBG3000 – Malta. The survey was requested for IPPC licensing.

The main noise source areas are located at the back and the side of the factory with ancillary equipment such as chillers and VRF HVAC, situated on the roof. The noise sources are within the factory perimeter. (See Figures 2 &3).

Methodology

The directivity of the noise emanating from the factory perimeter is not evenly distributed radiation and is being radiated primarily (at road level emission) from the rear and northern side of the factory. Since there are no residents in the vicinity, and the noise directivity is uneven the use of ISO 8297: 1994 *Acoustics -- Determination of sound power levels of multisource industrial plants for evaluation of sound pressure levels in the environment -- Engineering method* has been excluded and the use of BS 4142:1997 *Method for rating industrial noise affecting mixed residential and industrial areas* has been considered an appropriate method with good representative averaging periods for a stable noise source such as in this case. Although there are no NSPs in the vicinity of the factory, three representative positions/locations have been chosen, just outside the factory perimeter, to represent emissions from said premises. These locations are being shown in Figure 1.



Figure 1 Measurement Locations

A programme of measurements was setup as following:

- A night time measurement at each location when the factory was operational,
- A night time measurement at each location when the factory was not operational,
- A daytime measurement at each location when the factory was operational,
- A daytime measurement at each location when the factory was not operational.

The night time measurements were conducted over a minimum period of 10 minutes to cover two representative night time measurements according to BS4142 i.e. suggested reference time interval 5 minute averaging period. The operational day time measurements were conducted over a period of 1 hour according to said standard. The day time measurements on the non operational days were taken over half an hour as the noise levels in the area were stable and very little activity from the factory and its environs, except for other distant factory noise sources, was evident.

The equipment used was:

- Norsonic 121 Type 1 environmental noise analyzer Ser.No. 281711 – UKAS 0789
- Norsonic 1252 Type 1 Calibrator Ser.No.25966 –UKAS 07374
- Kestrel 4000NV pocket weather meter Ser. No.626651– UKAS traceable.



Figure 2 Visual from measurement positions 1 and 2- rear of factory.



Figure 3 Visual from measurement position 3.

Date and Time	Measurement Position		Wind Speed ms ⁻¹	Wind Direction	Barometric Pressure	Humidity %	Temperature °C	Overall L _{Aeq}	L _{AF} 90%	Averaging Time	Averaging periods
10/01/2014 02:00	2		1.6	North Westernly	1016	79.1	14.8	49.8	48.9	5 mins.	2
10/01/2014 02:15	1		1.6	North Westernly	1016	83	14.8	53.3	50.9	5 mins.	2
10/01/2014 02:27	3		1.6	North Westernly	1016	83	14	55.7	54.8	5 mins.	2
12/01/2014 02:07	2		0	-	1015	90	14	43.4	40.9	5 mins.	2
12/01/2014 02:19	1		0	-	1015	95	14.6	45.8	44.1	5 mins.	2
12/01/2014 02:33	3		0	-	1015	95	14.6	57.4	49.4	5 mins.	2
14/01/2014 13:50	2		0.4-1.4	North Westernly	1006	60	18.5-20	62.8	49.8	1Hour	1
14/01/2014 14:51	1		0.4-1.4	North Westernly	1006.4	76.5	16.1-15.8	64	51.6	1Hour	1
14/01/2014 15:55	3		0.7-2.2	North Westernly	1006.5	78-81	15.8-15.2	62.1	55.2	1Hour	1
19/01/2014 13:54	1		1.1-3.5	Southernly	1000.4	76.5	18.7	57.3	41.5	1Hour	0.5 Stable
19/01/2014 14:28	3		0.6-2.9	Southernly	1000.2	74.3	21.8	58.6	49.1	1Hour	0.5 Stable
19/01/2014 15:00	2		1-2.9	Southernly	1000.2	72.3	20.1	58.9	46.1	1Hour	0.5 Stable

Figure 4 Summary of global measurement and weather data.

Results

Below are being supplied the noise profiles of the measurements taken. Note that the base level of measurements at Position three and two are affected by noise from distant factories – see Figures 15 and 16.

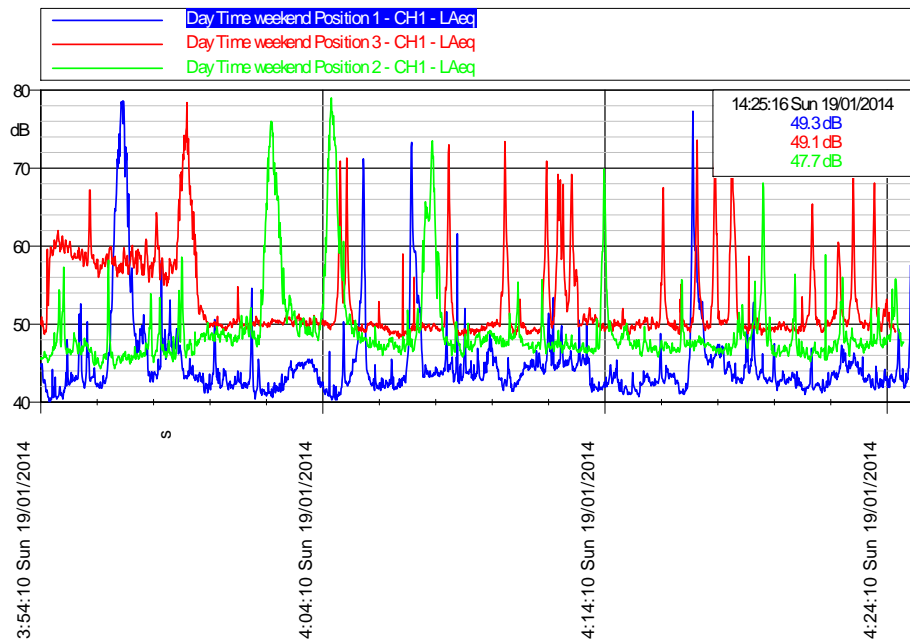


Figure 5 Day time measurement - comparison of three positions - factory not operational.

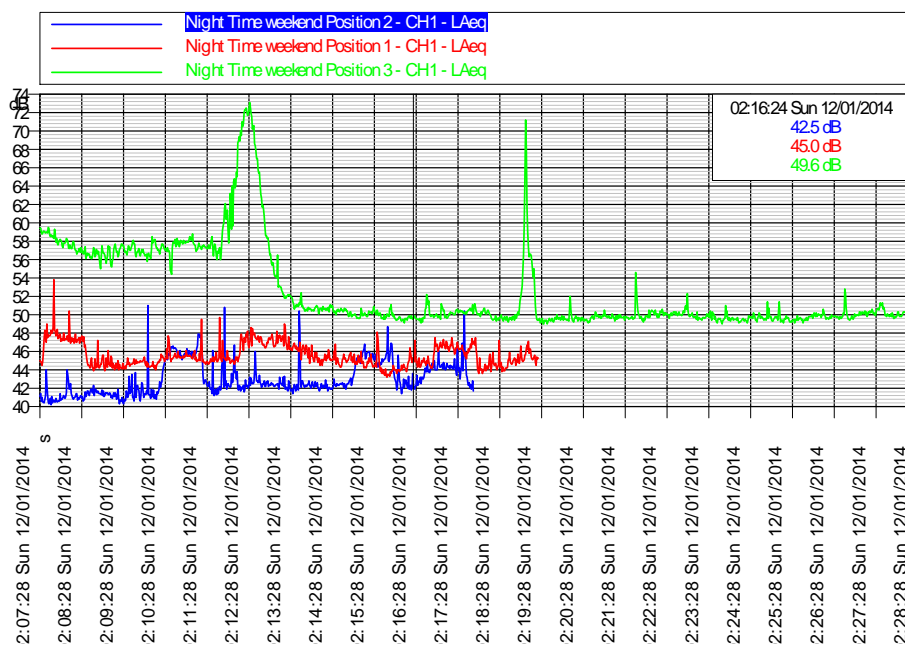


Figure 6 Night time measurement - comparison of three positions - factory not operational.

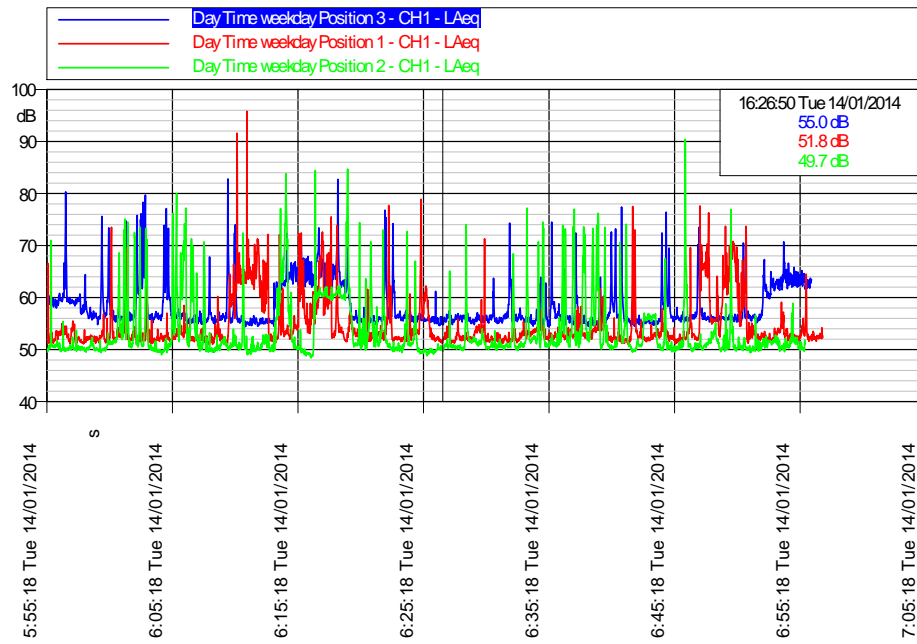


Figure 7 Day time measurement - comparison of three positions - factory operational.

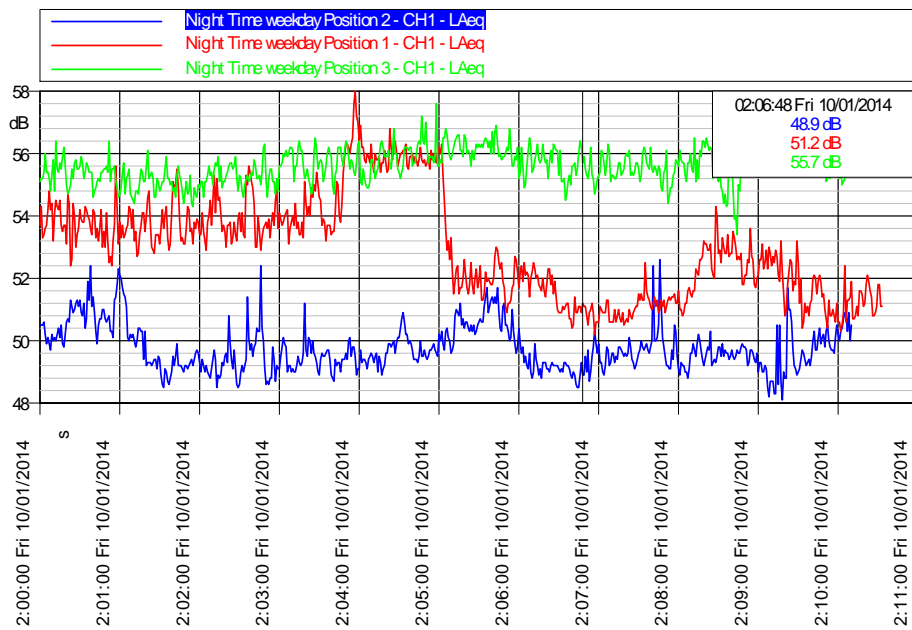


Figure 8 Night time measurement - comparison of three positions - factory operational.

Comparison of representative time period when Factory operational and not, at the same location.

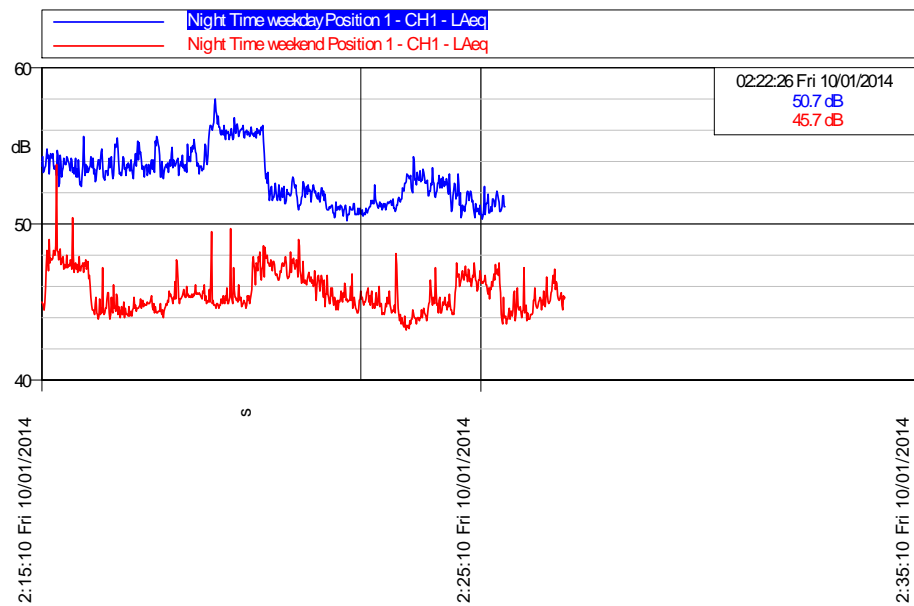


Figure 9 Night Time variation at Position 1.

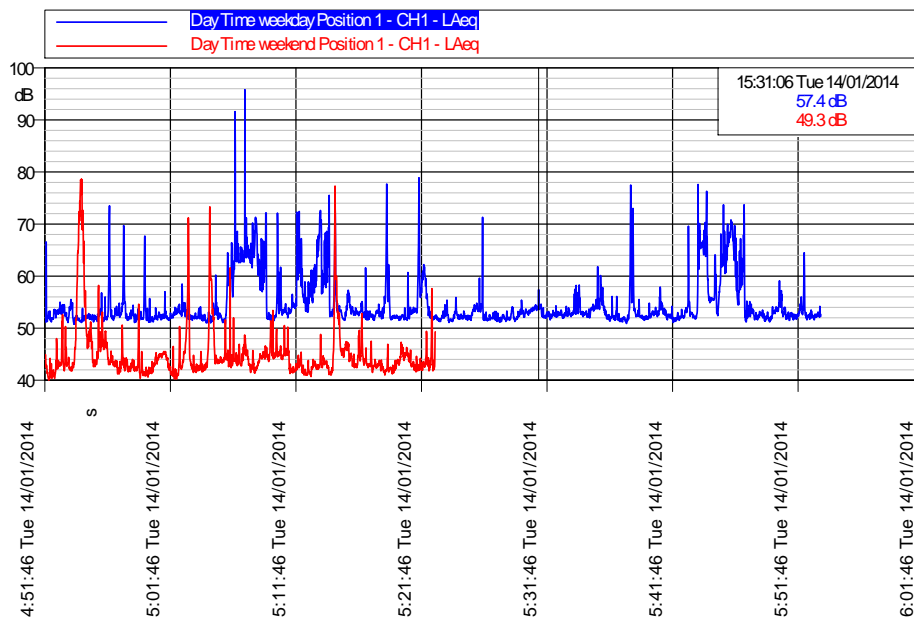


Figure 10 Day Time variation at Position 1.

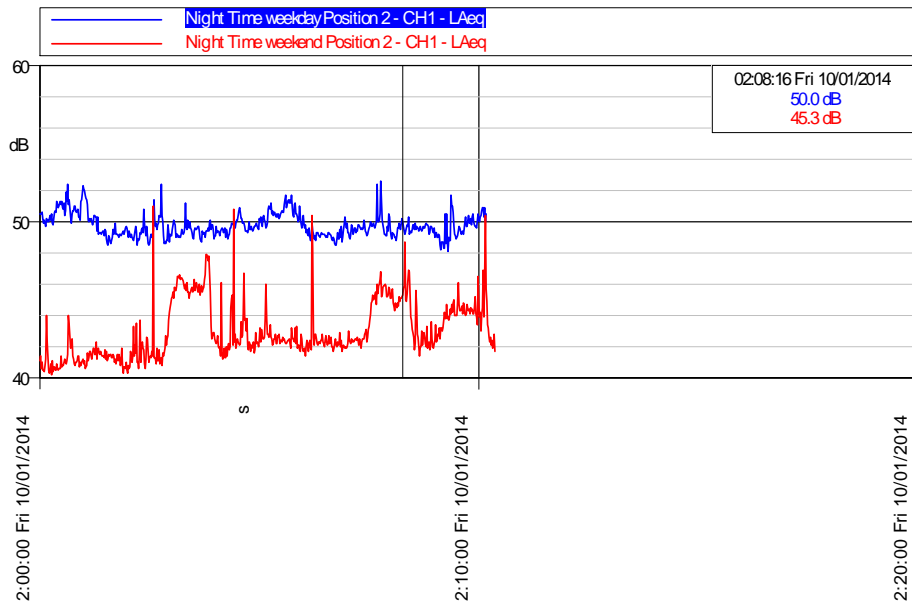


Figure 11 Night Time variation at Position 2.

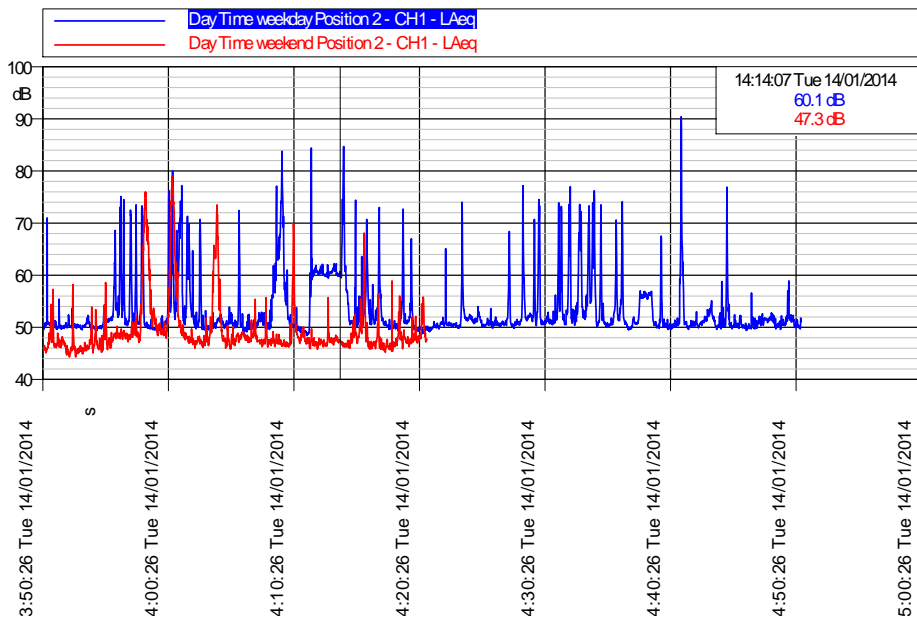


Figure 12 Day Time variation at Position 2. – Note that the ‘spikes’ are from passing cars.

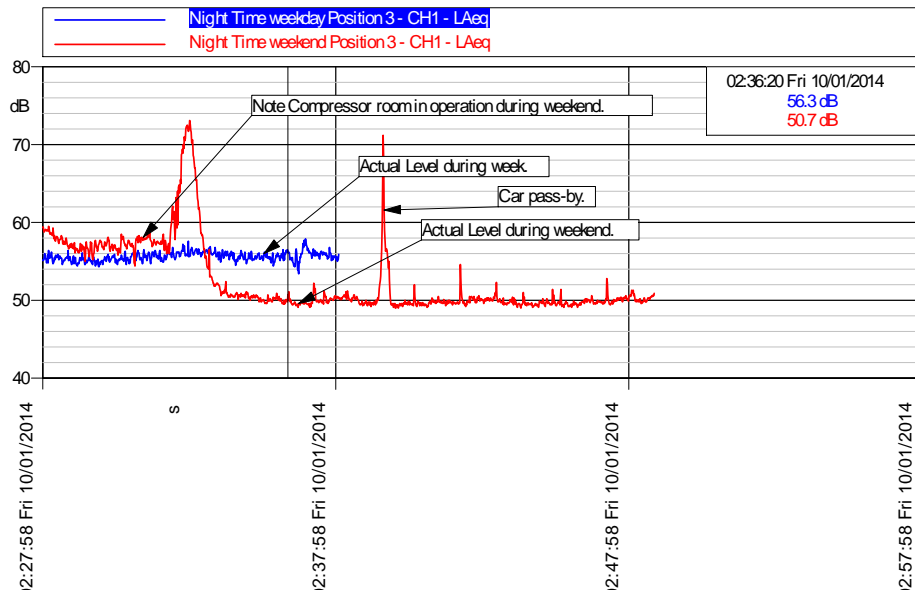


Figure 13 Night Time variation at Position 3.

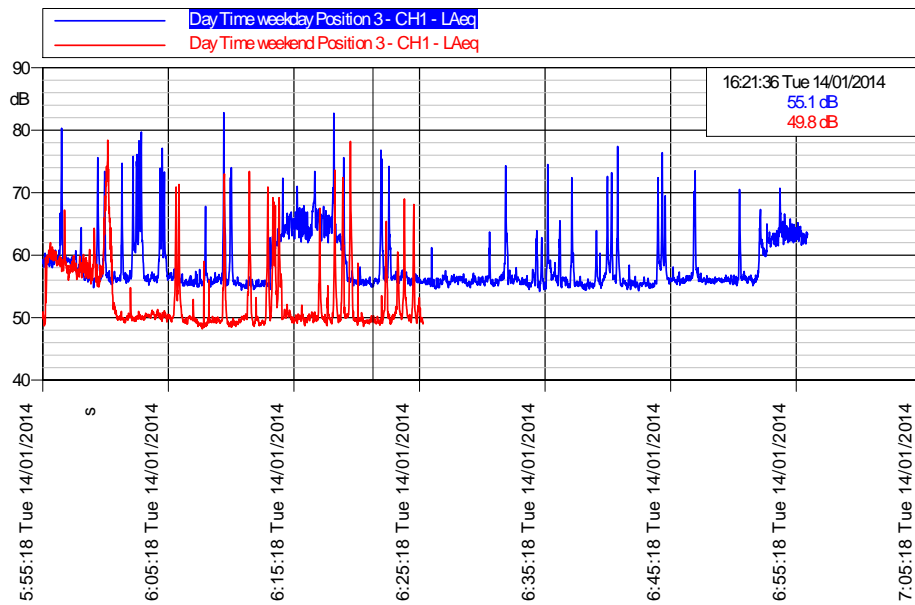


Figure 14 Day Time variation at Position 3.



Figure 15 Visual of distant factories affecting measurement position 3.



Figure 16 Distant factories in relation to measurement positions 1 and 2.

Measurement Spectra

The spectra of the measurements are being provided should any future reference be required. The spectra at each location and measurement are being presented – Channel 1 is the $L_{AF,90\%}$ (background level according to BS4142), and the Flat equivalent level L_{fFeq} in each frequency band in Channel 1.

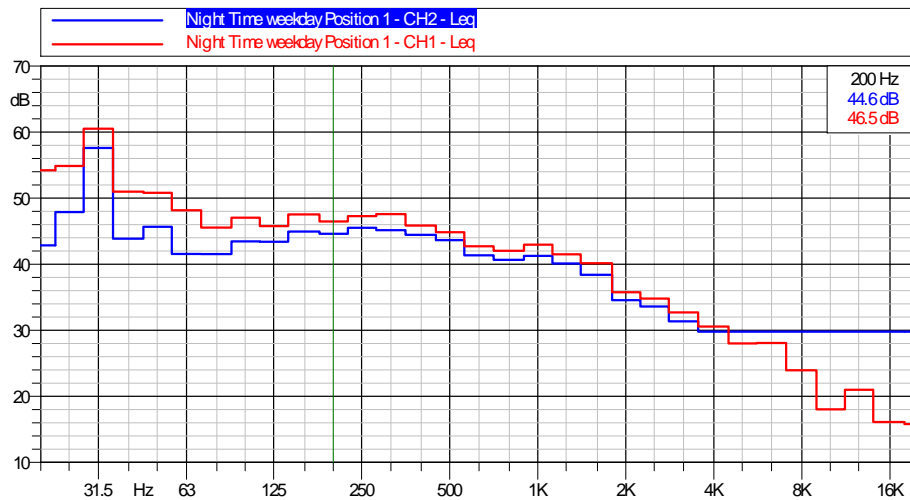


Figure 17 L_{fFeq} Ch 1, $L_{AF,90\%}$ Ch2 at measurement Position 1 Night time - Factory operational.

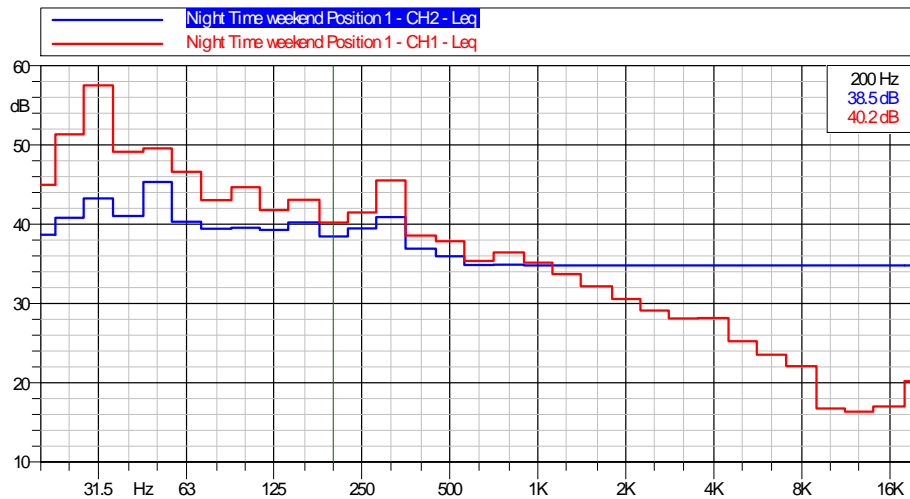


Figure 18 L_{fFeq} Ch 1, $L_{AF,90\%}$ Ch2 at measurement Position 1 Night time - Factory non operational.

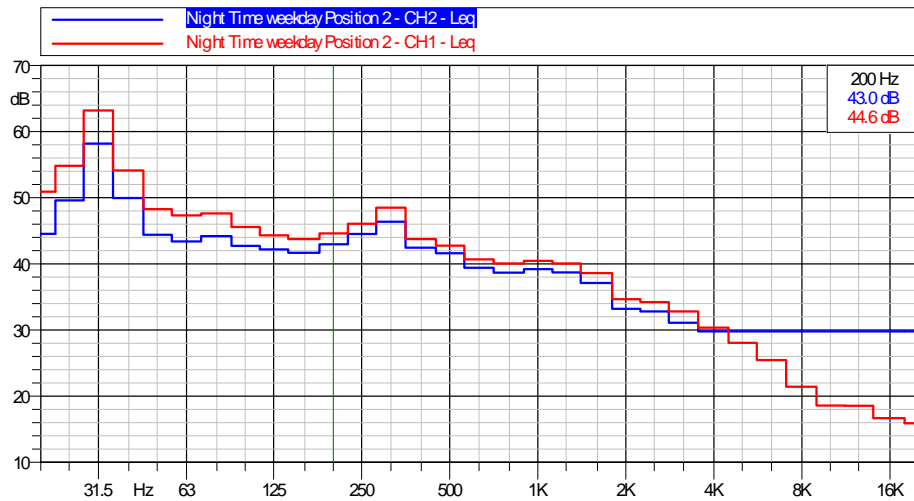


Figure 19 LfFreq Ch 1, LAF,90% Ch2 at measurement Position 2 Night time - Factory operational.

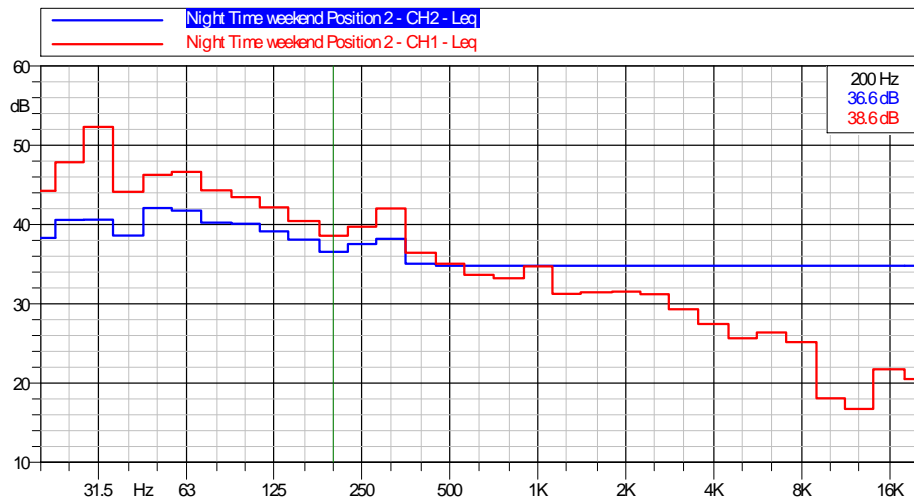


Figure 20 LfFreq Ch 1, LAF,90% Ch2 at measurement Position 2 Night time – Factory non operational.

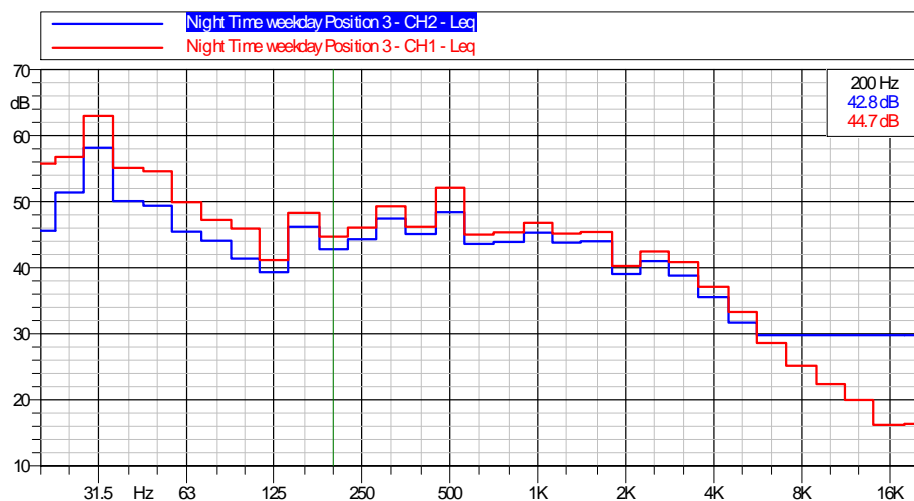


Figure 21 LfFreq Ch 1, LAF,90% Ch2 at measurement Position 3 Night time - Factory operational.

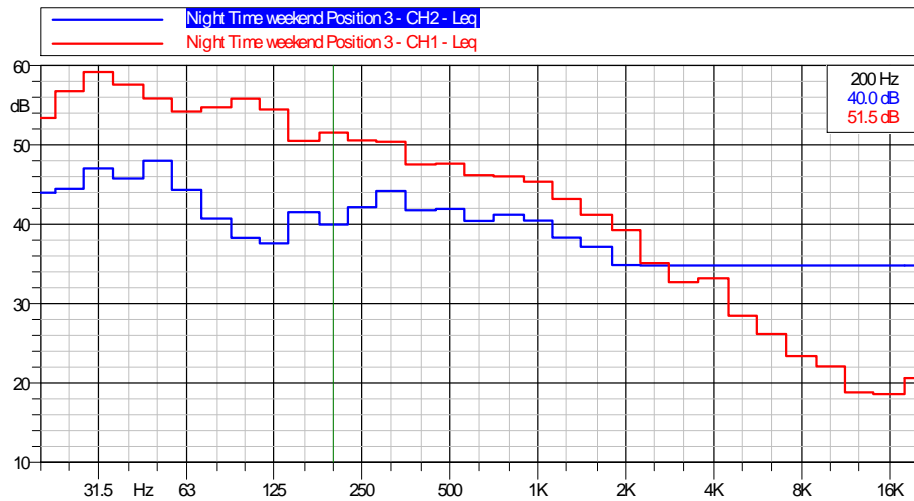


Figure 22 LfFreq Ch 1, LAF,90% Ch2 at measurement Position 3 Night time - Factory non operational.

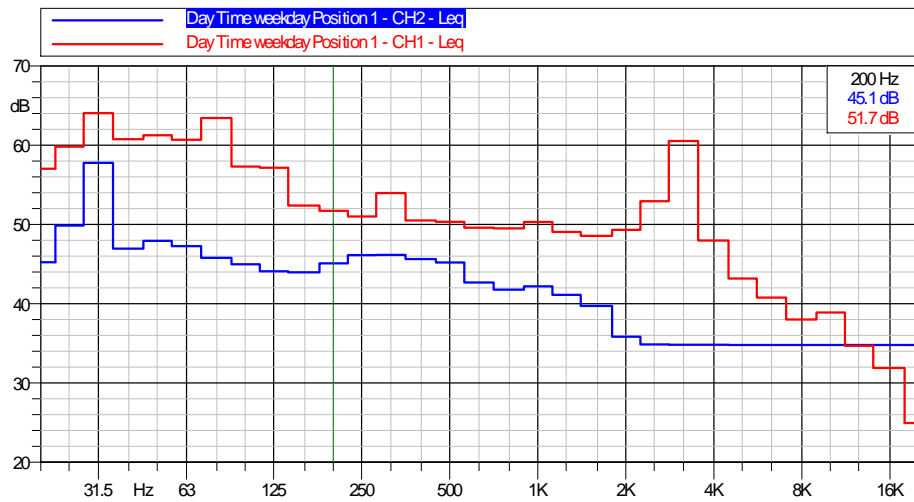


Figure 23 LfFreq Ch 1, LAF,90% Ch2 at measurement Position 1 Day time - Factory operational.

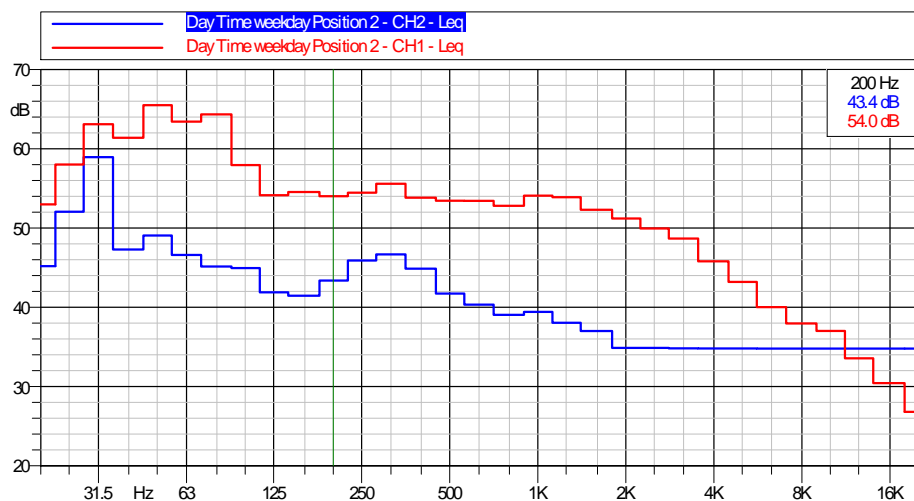


Figure 24 LfFreq Ch 1, LAF,90% Ch2 at measurement Position 2 Day time - Factory operational.

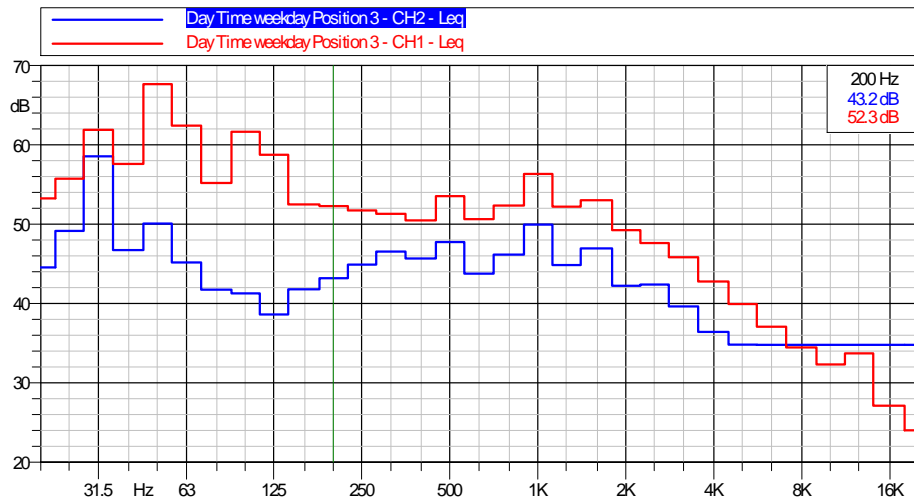


Figure 25 LfFeq Ch 1, LAF,90% Ch2 at measurement Position 3 Day time - Factory operational.

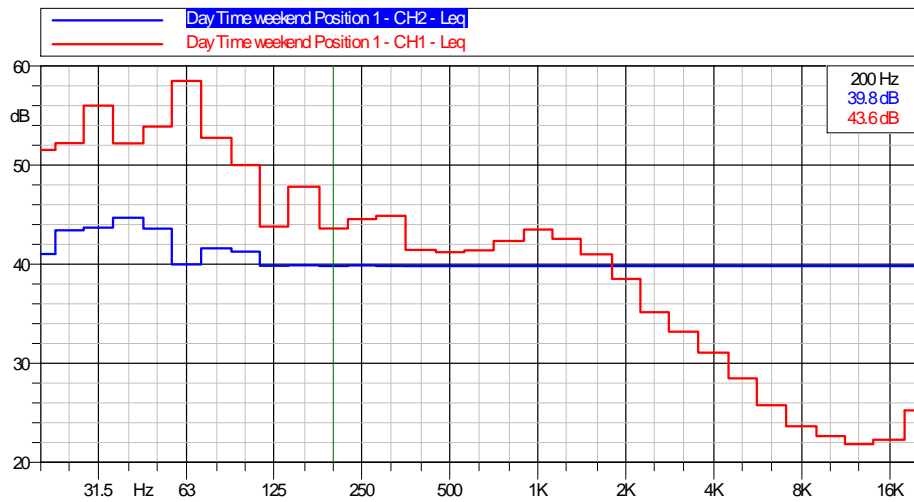


Figure 26 LfFeq Ch 1, LAF,90% Ch2 at measurement Position 1 Day time - Factory non operational.

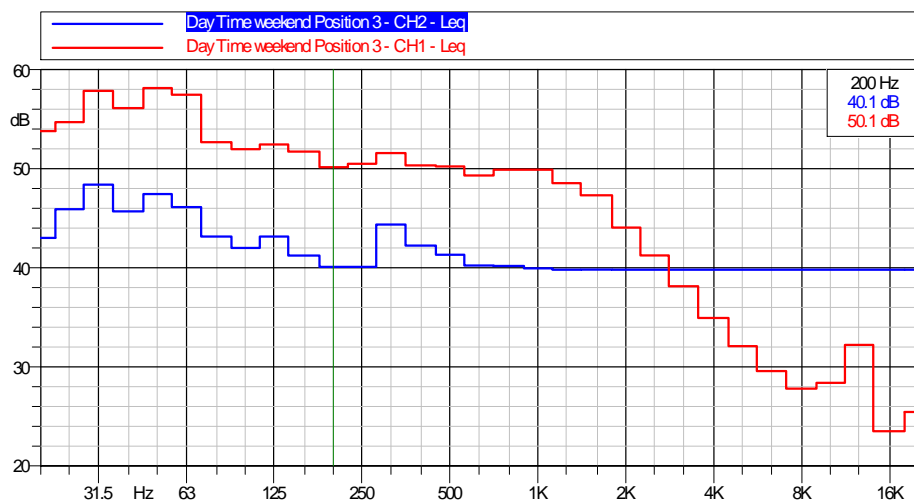


Figure 27 LfFeq Ch 1, LAF,90% Ch2 at measurement Position 3 Day time - Factory non operational.

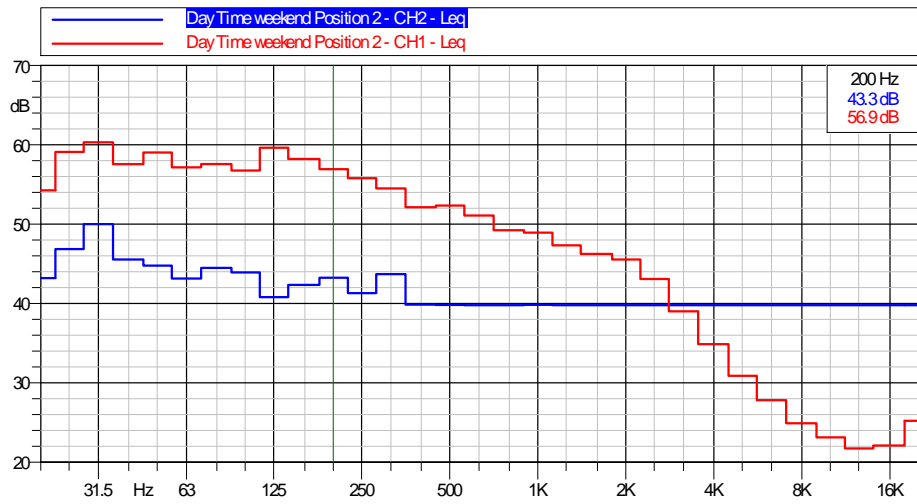


Figure 28 LfFeq Ch 1, LAF,90% Ch2 at measurement Position 2 Day time - Factory non operational.