



NATURAL VENTILATION STUDY

2 MANDALA PARADE, CASTLE HILL

WF350-01F05(REV0)- NV REPORT

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DOCUMENT CONTROL

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EXECUTIVE SUMMARY

This report presents the results of the natural ventilation wind tunnel study of the 2 Mandala Parade development located in Castle Hill. The natural ventilation performance of the development has been assessed by calculating the hourly mean difference in pressures acting on the various openings of each unit. The results are presented as tabulated mean differential pressures between openings for each unit.

The mean pressures have been subjected to a directional probability weighting summed over the various wind directions to calculate the 50th percentile pressures within the target wind model. The target wind model includes all wind events that occur between temperatures of 20°C to 29.5°C, which are the conditions when occupants are mostly likely to utilise natural ventilation to regulate thermal comfort. Note that the target wind model shows a decreased influence of the westerly winds, which are prevalent during the colder months.

Testing was performed at Windtech's boundary layer wind tunnel facility. The wind tunnel has a 3.0m wide working section and a fetch length of 14m, and measurements were taken from 16 wind directions at 22.5 degree increments. Testing was carried out using a 1:300 scale model of the development. The effects of nearby buildings and land topography have been accounted for through the use of a proximity model which represents an area with a radius of 375m.

The wind tunnel study models of the buildings were fitted with a total of 324 pressure sensors spread across the external openings for the natural ventilation analysis. The mean pressure differentials were calculated for each wind direction using a total of 574 flow paths.

The results of the initial study indicate that 44.8% of units (87 out of 194) are deemed to satisfy the guidelines set out in the Apartment Design Guide (ADG) for openings on opposite or orthogonal aspects. When compared to these units, an additional 21.6% of units (42 out of 194) also have a significant pressure differential at the openings that is equivalent or better than a unit that is deemed to satisfy the ADG. Therefore, the development can achieve a total of 66.5% (129 out of 194) of residential apartments that satisfy the ADG requirements for natural cross-ventilation through locating openings in significantly different pressure regions.

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Appendix A Results of the Mean External Pressure Coefficients

Appendix B Tabulated Results of the annual median absolute mean pressures between openings for each unit (For Warm Climate)

Appendix C Layout of Pressure Sensors and Opening Locations

Appendix D Flow Performance Through a Typical Apartment

Appendix E Velocity and Turbulence Intensity Profiles

Appendix F Methodology

INTRODUCTION

A wind tunnel study has been undertaken for the determination of the mean external pressures acting on the various openings of the subject development. The test procedures followed for this wind tunnel study were based on the guidelines set out in the Australasian Wind Engineering Society Quality Assurance Manual (AWES-QAM-1-2019), ASCE-7-16 (Chapter C31), and CTBUH (2013). Further details of the wind tunnel data acquisition procedure are provided in Appendix F.

The close agreement between Windtech's wind tunnel pressure measurement results and full-scale data observed from the Texas Tech Experimental Building provides some indication of the accuracy of Windtech's wind tunnel results (A.W. Rofail, 1995). Windtech's pressure results show the closest recorded comparison to full-scale results, within an accuracy of $\pm 5\%$.

A scale model of the development was prepared, including the surrounding buildings and land topography. The model was fitted with pressure sensors spread across the external openings on the façade of the development. Testing was performed at Windtech's boundary layer wind tunnel facility. The wind tunnel has a 3.0m wide working section and a fetch length of 14m. Measurements were taken from 16 wind directions at 22.5-degree increments, and the wind tunnel was configured to the appropriate boundary layer wind profile. All pressures were measured simultaneously. Mean external pressure coefficients were obtained from the wind tunnel measurements for each individual pressure sensor for each wind direction tested. Tabulated results and plots of the recorded directional pressure coefficients are provided in Appendix A for each pressure sensor. Further details on how the pressure coefficients are defined are provided in Appendix F.

WIND TUNNEL MODEL

Wind tunnel testing was carried out using a 1:300 scale model of the development and surroundings. The study model incorporates all necessary architectural features on the façade of the development to ensure an accurate wind flow is achieved around the model, and was constructed using a Computer Aided Manufacturing (CAM) process to ensure that a high level of detail and accuracy is achieved. The effect of nearby buildings and land topography has been accounted for through the use of a proximity model, which represents a radius of 375m from the development site. It is noted that several other developments are proposed nearby, and hence testing for this tower was conducted with those proposed development taken into consideration.

Photographs of the wind tunnel model are presented in Figures 1. A plan of the proximity model is provided in Figure 2.

The wind tunnel study model of the building was fitted with a total of 324 pressure sensors spread across the external openings for the natural ventilation analysis. The mean pressure differentials were calculated for each wind direction using 574 flow paths, assuming an annual median probability of occurrence. These calculations are for wind events that occur when temperatures are between 20°C to 29.5°C, which are the conditions when occupants are mostly likely to utilise natural ventilation. This has been further detailed in Section 4.

The name and location of these pressure sensors are shown in the form of marked-up drawings in Appendix C.1.



Figure 1a: Photograph of the Wind Tunnel Model - Proposed Scenario (view from the north-east)



Figure 1b: Photograph of the Wind Tunnel Model - Proposed Scenario (view from the south-east)



Figure 1c: Photograph of the Wind Tunnel Model - Proposed Scenario (view from the south-west)



Figure 1d: Photograph of the Wind Tunnel Model - Proposed Scenario (view from the north-west)



Figure 1e: Photograph of the Wind Tunnel Model - Proposed Scenario (view from the south-east)



Figure 2: Proximity Model Plan

BOUNDARY LAYER WIND PROFILES AT THE SITE

The roughness of the surface of the earth has the effect of slowing down the wind near the ground. This effect is observed up to the boundary layer height, which can range between 500m to 3km above the earth's surface depending on the roughness of the surface (i.e. oceans, open farmland, etc.). Within this range the prevailing wind forms a boundary layer wind profile.

Various wind codes and standards and other publications classify various types of boundary layer wind flows depending on the surface roughness z_0 . Descriptions of typical boundary layer wind profiles, based on D.M. Deaves and R.I. Harris (1978), are summarised as follows:

- Flat terrain ($0.002\text{m} < z_0 < 0.003\text{m}$). Examples include inland water bodies such as lakes, dams, rivers, etc., and the open ocean.
- Semi-open terrain ($0.006\text{m} < z_0 < 0.01\text{m}$). Examples include flat deserts and plains.
- Open terrain ($0.02\text{m} < z_0 < 0.03\text{m}$). Examples include grassy fields, semi-flat plains, and open farmland (without buildings or trees).
- Semi-suburban/semi-forest terrain ($0.06\text{m} < z_0 < 0.1\text{m}$). Examples include farm land with scattered trees and buildings and very low-density suburban areas.
- Suburban/forest terrain ($0.2\text{m} < z_0 < 0.3\text{m}$). Examples include suburban areas of towns and areas with dense vegetation such as forests, bushland, etc.
- Semi-urban terrain ($0.6\text{m} < z_0 < 1.0\text{m}$). Examples include centres of small cities, industrial parks, etc.
- Urban terrain ($2.0\text{m} < z_0 < 3.0\text{m}$). Examples include centres of large cities with many high-rise towers, and also areas with many closely-spaced mid-rise buildings.

The boundary layer wind profile does not change instantly due to changes in the terrain roughness. It can take many kilometres (at least 100km) of a constant surface roughness for the boundary layer wind profile to achieve a state of equilibrium. Hence an analysis of the effect of changes in the upwind terrain roughness is necessary to determine an accurate boundary layer wind profile at the development site location.

For this study this has been undertaken based on the method given in ESDU-82026:2002 and ESDU-83045:2002. Aerial images showing the surrounding terrain are presented in Figures 3 for ranges of 5km and 50km from the edge of the proximity model used for the wind tunnel study. The resulting mean and gust terrain and height multipliers at the site location are presented in Table 1, referenced to the study reference height of 71.3m. Note that the approaching winds to the site vary in speed with respect to height above ground. For each of the 16 wind directions tested in this study, the approaching boundary layer wind profiles modelled in the wind tunnel closely matched the profiles listed in Table 1. Plots of the boundary layer wind profiles used for the wind tunnel testing are presented in Appendix D of this report.

Table 1: Mean Terrain and Height Factors (at the reference height)

Wind Direction	Mean Terrain and Height Factors $k_{tr,T=1hr}$
N	0.75
NNE	0.75
NE	0.76
ENE	0.77
E	0.78
ESE	0.78
SE	0.78
SSE	0.77
S	0.74
SSW	0.71
SW	0.70
WSW	0.71
W	0.71
WNW	0.73
NW	0.74
NNW	0.74

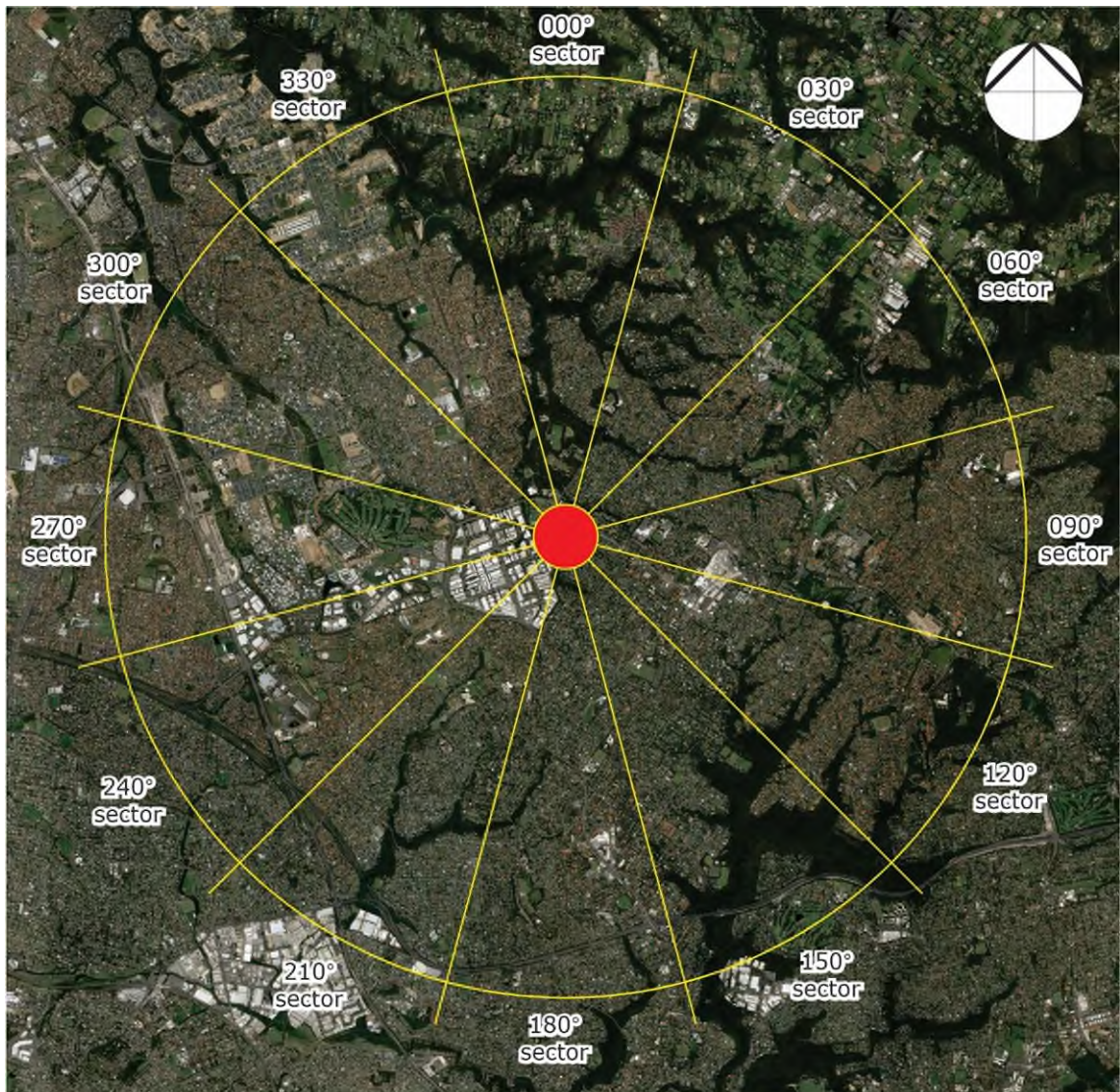


Figure 3a: Aerial Image of the Surrounding Terrain
(radius of 5km from the edge of the proximity model)



Figure 3b: Aerial Image of the Surrounding Terrain
(radius of 50km)

4 REGIONAL WIND MODEL

The regional wind model used in this study was determined from an analysis of measured directional mean wind speeds obtained at the meteorological recording station located at Bankstown Airport. Data was collected from 1993 to 2016, excluding wind events outside of the temperature range from 20°C to 29.5°C, and corrected so that it represents wind speeds over standard open terrain at a height of 10m above ground for each wind direction. From this analysis directional frequencies of occurrence for the region are determined and are presented in Figure 4. The calculations presented in this report are based on the directional wind speed event frequency table.

The wind climate data indicates that the north-easterly and south-easterly winds are the most frequent winds for the region during warmer weather. The temperature range was selected to represent the warmer conditions when natural ventilation is most desirable to improve occupant thermal comfort.

Table 2: Directional Probabilities of Occurrence of Wind Events

Wind Direction	Daily Average Mean Wind Speeds (m/s)	Directional Probability of Wind Event (%) (Temperatures between 20-29.5°C)
N	4.5	5.4
NNE	4.5	5.2
NE	5.5	10.2
ENE	5.5	11.1
E	5.1	7.6
ESE	5.7	10.3
SE	6.1	10.7
SSE	6.2	7.9
S	5.0	4.6
SSW	3.6	2.6
SW	4.3	3.0
WSW	5.0	3.3
W	5.1	3.7
WNW	5.0	4.7
NW	4.2	4.6
NNW	4.4	5.3

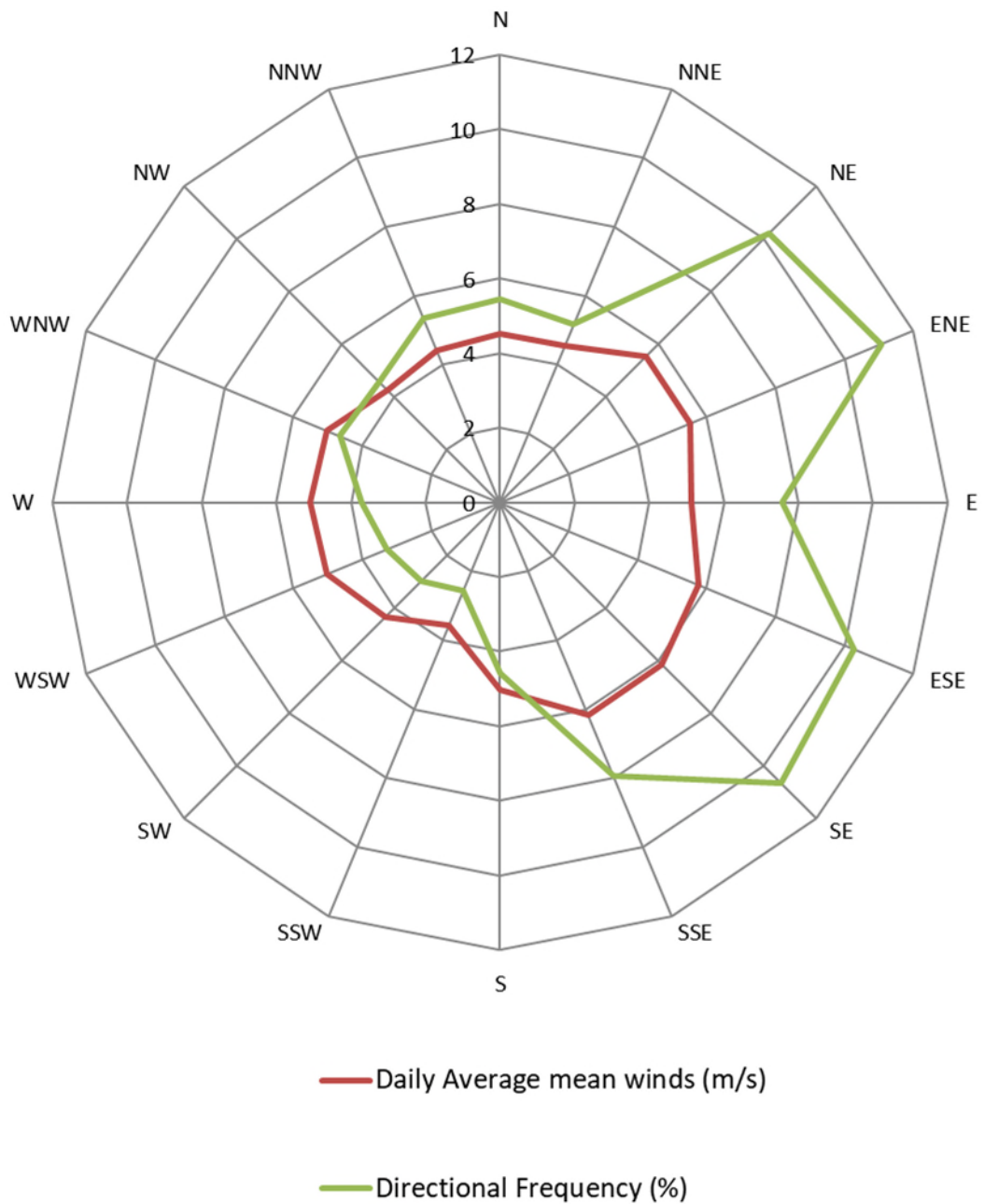


Figure 4: Daily Average Winds and Directional Frequencies of Wind Events for the region (Obtained from Bankstown Airport between 1993 to 2016 Corrected to Open Terrain, at 10m Height)

5 NATURAL VENTILATION PRINCIPLES AND CRITERIA

Natural ventilation is a primary design concept to reduce or remove the requirement for mechanical ventilation and/or air-conditioning of a building. This provides an environmental benefit by reducing greenhouse gas emissions due to the constant demand for mechanical ventilation and air-conditioning by the occupants. Natural ventilation is not only environmentally beneficial but also has financial benefits in terms of both construction and running costs of the development. Although a naturally ventilated designed building will require more window openings, the benefit of not having to install mechanical ventilation units greatly outweighs this cost. Running costs are also reduced with no ongoing mechanical ventilators and benefits from reduced reliance on artificial lighting (Peddie and Rofail, 2010)

Natural ventilation of indoor areas can be used to improve both the level of occupant comfort and the air quality of an internal space. It is also beneficial in improving occupant comfort during warmer temperatures when the occupants will generally have windows and doors open, while during cooler temperatures it is considered primarily beneficial for air quality purposes only. The predominant wind directions for the region have been analysed in Section 4 of this report.

Furthermore, it has been found that a naturally ventilated building reduces what is commonly known as Sick Building Syndrome (SBS) (Chenvidyakarn, 2010 and Awbi, 2010). Occupants of mechanical or air-conditioned buildings are known to be susceptible to symptoms including itchy eyes, coughs, sneezes and drowsiness. This commonly leads to lower productivity or higher incidences of sickness then when compared to naturally ventilated buildings.

The NSW State Environmental Planning Policy No. 65 (SEPP65) Apartment Design Guide (ADG) states that, for a development to be considered naturally ventilated, at least 60% of the individual apartments in the first nine storeys of the building must be considered to be naturally cross ventilated. Apartments at ten storeys or greater are deemed to be cross ventilated only if any enclosure of the balconies at these levels allows adequate natural ventilation and cannot be fully enclosed.

The ADG states that natural cross ventilation is achieved by apartments having more than one aspect with direct exposure to the prevailing winds, or windows located in significantly different pressure regions, rather than relying on purely wind driven air. Examples of apartments which are classified as being naturally cross ventilated by SEPP65 are shown in Figures 5a and 5b below, which also show examples of flow paths for natural cross ventilation through the apartments.

The ADG does provide design guidance for the layout and design of single aspect apartments to maximise natural ventilation. While these are not considered naturally cross ventilated, they provide guidance in situations where there are site restraints to achieve design excellence in single aspect apartments. The design allows for the inclusion of plenums, vertical ventilation shafts and building indentations with a width to depth ratio of 2:1 or 3:1 to ensure effective air circulation and avoid trapped smells.

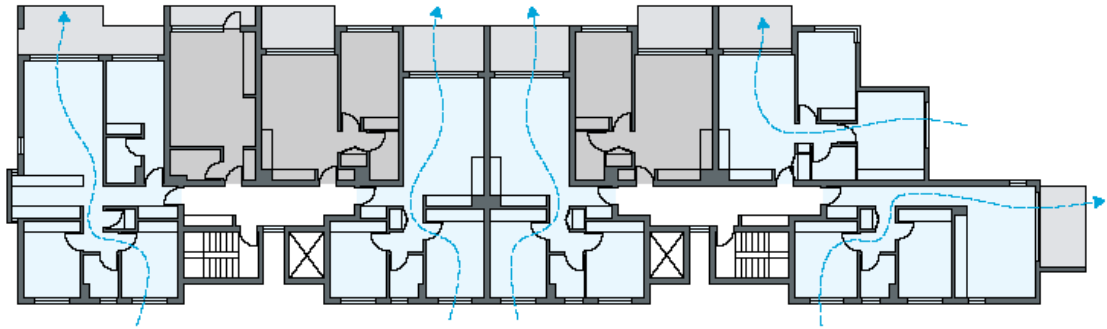


Figure 5a: Examples of Apartments Achieving Effective Natural Cross Ventilation
(from ADG, floor plan of a typical residential building)

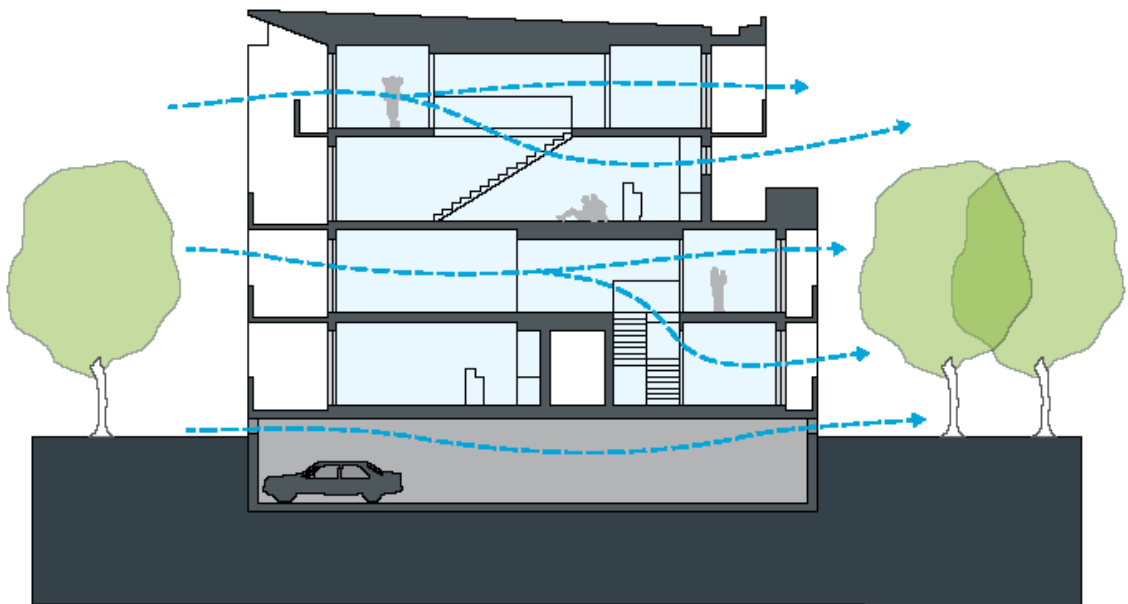


Figure 5b: Examples of Apartments Achieving Effective Natural Cross Ventilation
(from ADG, section of a typical residential building)

To be effective, the ventilating flow paths in an apartment should flow through the entire apartment, particularly the bedrooms and living spaces, driven by a significant pressure differential at the openings. According to the ADG, the flow paths should generally remain under 18m to maximise the air flow through the apartment. It should be noted that flow paths that flow through a bathroom have not been considered to be a valid flow path due to issues with odours.

Due to the complicated nature of flow paths driven by pressure differentials at different openings of an apartment, apartment design which are outside of those presented in Figures 5a and 5b have the potential to achieve the same or exceed the same levels of pressure differential for a flow path that satisfies the design guidance in the ADG of a deemed to satisfy apartment, and therefore provide effective natural ventilation.

6.1 Additional Openings

The study model has been instrumented and analysed with additional pressure sensors to account for openings in the building façade that are required for natural cross ventilation. These openings are listed below:

- C301_W04 and C301_W04 on the eastern aspect of Unit C301
- D305_W05 and D305_W06 on the eastern aspect of Unit D305

The results for these openings are shown in Appendix B.

Note that the choice of window types can have a significant impact on the natural ventilation performance of an apartment. For sliding windows above 2m high from the ground, it is standard practice to install a child safety device that restricts opening sizes to a maximum opening size of 125mm. Comparative performance of opening types for a typical generic apartment is presented in Appendix D.

RESULTS AND DISCUSSION

The results of the study for each individual apartment are shown in Tables 3. The flow path achieving the highest pressure differential has been presented for each apartment being assessed against the units that are deemed to satisfy the ADG. The mean pressure differential (ΔP) for a 50% probability of occurrence has been given in pascals (Pa), where flow paths that meet the requirements of the ADG have been deemed to satisfy. The results for all other apartments have been compared to a pressure differential for a flow path that clearly satisfies all the requirements of the ADG. The selected mean differential pressure for an apartment which satisfies the guidelines of the ADG is 0.34Pa. This occurs for unit C304 between the openings C304_W02 and C304_W04 which are on opposite aspects.

Each flow path analysed has been included in Appendix B, where for each apartment, the various openings have been numbered sequentially in a clockwise manner around the exterior of the building, based on the architectural drawings received on June 15, 2021 as shown in Appendix C.2.

The results of the initial study indicate that 44.8% of units (87 out of 194) are deemed to satisfy the guidelines set out in the Apartment Design Guide (ADG) for openings on opposite or orthogonal aspects. When compared to these units, an additional 21.6% of units (42 out of 194) also have a significant pressure differential at the openings that is equivalent or better than a unit that is deemed to satisfy the ADG. Therefore, the development can achieve a total of 66.5% (129 out of 194) of residential apartments that satisfy the ADG requirements for natural cross-ventilation through locating openings in significantly different pressure regions.

The results of the study are summarised in Table 4 as well as Appendix C.2. If in the future there is a significant change in the form of the development, the addition or alteration of the facade elements, or a significant change in the layout of surrounding buildings in the immediate vicinity, Windtech should be contacted to review the results presented in this report.

Table 3a: Apartment Ventilation Performance Results

Apartment No.	Deemed to Satisfy (DTS) ADG	ΔP (Pa)	Opening 1	Opening 2	Naturally Cross-Ventilated Result
A201	NO	0.06	A201_W01	A201_W03	FAIL
A202	YES	0.49	A202_W02	A202_W04	DTS
A203	NO	0.05	A203_W01	A203_W02	FAIL
A204	NO	0.00	A204_W01	A204_W02	FAIL
A205	NO	0.00	A205_W01	A205_W02	FAIL
A206	YES	0.61	A206_W04	A206_W05	DTS
A207	YES	0.99	A207_W02	A207_W03	DTS
A208	NO	0.16	A208_W01	A208_W03	FAIL
A209	YES	1.96	A209_W01	A209_W04	DTS
A301	NO	0.00	A301_W01	A301_W02	FAIL
A302	YES	0.80	A302_W01	A302_W05	DTS
A303	NO	0.00	A303_W01	A303_W02	FAIL
A304	NO	0.00	A304_W01	A304_W02	FAIL
A305	NO	0.00	A305_W01	A305_W03	FAIL
A306	YES	0.61	A306_W04	A306_W05	DTS
A307	YES	0.83	A307_W03	A307_W05	DTS
A308	NO	1.06	A308_W01	A308_W04	PASS
A309	NO	0.10	A309_W01	A309_W03	FAIL
A310	YES	2.03	A310_W01	A310_W04	DTS
A401	NO	0.02	A401_W02	A401_W03	FAIL
A402	YES	0.80	A402_W01	A402_W05	DTS
A403	NO	0.00	A403_W01	A403_W02	FAIL
A404	NO	0.00	A404_W01	A404_W02	FAIL
A405	NO	0.00	A405_W01	A405_W02	FAIL
A406	YES	1.01	A406_W01	A406_W05	DTS
A407	YES	1.16	A407_W02	A407_W03	DTS
A408	NO	1.06	A408_W01	A408_W04	PASS
A409	NO	0.10	A409_W01	A409_W03	FAIL
A410	YES	2.00	A410_W01	A410_W04	DTS
A501	NO	0.06	A501_W02	A501_W04	FAIL
A502	YES	1.12	A502_W01	A502_W04	DTS
A503	NO	0.00	A503_W01	A503_W02	FAIL
A504	NO	0.00	A504_W01	A504_W02	FAIL

A505	NO	0.05	A505_W01	A505_W04	FAIL
A506	YES	0.73	A506_W02	A506_W04	DTS
A507	YES	0.76	A507_W02	A507_W03	DTS
A508	NO	1.10	A508_W01	A508_W04	PASS
A509	NO	0.07	A509_W01	A509_W03	FAIL
A510	YES	1.93	A510_W01	A510_W04	DTS
A601	NO	0.06	A601_W02	A601_W04	FAIL
A602	YES	1.12	A602_W01	A602_W04	DTS
A603	NO	0.00	A603_W01	A603_W02	FAIL
A604	NO	0.00	A604_W01	A604_W02	FAIL
A605	NO	0.05	A605_W01	A605_W04	FAIL
A606	YES	0.73	A606_W02	A606_W04	DTS
A607	YES	0.76	A607_W02	A607_W03	DTS
A608	NO	0.14	A608_W01	A608_W04	FAIL
A609	NO	0.07	A609_W01	A609_W03	FAIL
A610	YES	1.93	A610_W01	A610_W04	DTS
A701	NO	0.06	A701_W02	A701_W04	FAIL
A702	YES	1.12	A702_W01	A702_W04	DTS
A703	NO	0.00	A703_W01	A703_W02	FAIL
A704	NO	0.00	A704_W01	A704_W02	FAIL
A705	NO	0.11	A705_W01	A705_W04	FAIL
A706	YES	0.81	A706_W02	A706_W04	DTS
A707	YES	0.76	A707_W02	A707_W03	DTS
A708	NO	0.14	A708_W01	A708_W04	FAIL
A709	NO	0.07	A709_W01	A709_W03	FAIL
A710	YES	1.93	A710_W01	A710_W04	DTS
A801	NO	0.03	A801_W01	A801_W03	FAIL
A802	YES	1.12	A802_W01	A802_W03	DTS
A803	NO	0.00	A803_W01	A803_W02	FAIL
A804	NO	0.00	A804_W01	A804_W02	FAIL
A805	YES	1.06	A805_W01	A805_W03	DTS
A806	YES	0.91	A806_W01	A806_W04	DTS
A807	NO	0.07	A807_W01	A807_W02	FAIL
B201	NO	0.04	B201_W02	B201_W03	FAIL
B202	NO	0.05	B202_W02	B202_W03	FAIL
B203	YES	1.88	B203_W01	B203_W02	DTS
B204	NO	0.72	B204_W01	B204_W04	PASS

B205	YES	0.99	B205_W01	B205_W03	DTS
B206	YES	0.77	B206_W02	B206_W04	DTS
B301	NO	0.04	B301_W02	B301_W03	FAIL
B302	NO	0.04	B302_W02	B302_W03	FAIL
B303	YES	1.88	B303_W01	B303_W02	DTS
B304	NO	0.29	B304_W02	B304_W03	FAIL
B305	NO	0.75	B305_W01	B305_W05	PASS
B306	YES	1.08	B306_W03	B306_W05	DTS
B307	YES	0.69	B307_W04	B307_W06	DTS
B401	NO	0.04	B401_W02	B401_W03	FAIL
B402	NO	0.04	B402_W02	B402_W03	FAIL
B403	YES	1.94	B403_W01	B403_W02	DTS
B404	NO	0.16	B404_W02	B404_W03	FAIL
B405	NO	0.75	B405_W01	B405_W05	PASS
B406	YES	1.08	B406_W03	B406_W05	DTS
B407	YES	1.37	B407_W01	B407_W05	DTS
B501	NO	0.05	B501_W02	B501_W03	FAIL
B502	NO	0.04	B502_W02	B502_W03	FAIL
B503	YES	1.84	B503_W01	B503_W02	DTS
B504	NO	0.18	B504_W02	B504_W03	FAIL
B505	NO	0.29	B505_W01	B505_W03	FAIL
B506	YES	0.52	B506_W03	B506_W05	DTS
B507	YES	1.46	B507_W01	B507_W05	DTS
B601	NO	0.05	B601_W02	B601_W03	FAIL
B602	NO	0.04	B602_W02	B602_W03	FAIL
B603	YES	1.84	B603_W01	B603_W02	DTS
B604	NO	0.18	B604_W02	B604_W03	FAIL
B605	NO	0.54	B605_W01	B605_W05	PASS
B606	YES	0.52	B606_W03	B606_W05	DTS
B607	YES	1.46	B607_W01	B607_W05	DTS
B701	NO	0.05	B701_W02	B701_W03	FAIL
B702	NO	0.04	B702_W02	B702_W03	FAIL
B703	YES	1.84	B703_W01	B703_W02	DTS
B704	NO	0.18	B704_W02	B704_W03	FAIL
B705	NO	0.70	B705_W03	B705_W05	PASS
B706	YES	0.52	B706_W03	B706_W05	DTS
B707	YES	1.46	B707_W01	B707_W05	DTS

C301	NO	1.99	C301_W03	C301_W04*	PASS
C302	NO	0.88	C302_W01	C302_W04	PASS
C303	NO	0.45	C303_W02	C303_W03	PASS
C304	YES	0.34	C304_W02	C304_W04	DTS
C305	YES	1.42	C305_W01	C305_W03	DTS
C306	YES	1.84	C306_W03	C306_W05	DTS
C307	YES	1.82	C307_W01	C307_W02	DTS
C308	YES	1.49	C308_W02	C308_W03	DTS
C309	YES	1.77	C309_W01	C309_W02	DTS
C310	YES	1.31	C310_W01	C310_W02	DTS
C311	YES	1.77	C311_W01	C311_W02	DTS
C401	YES	1.74	C401_W01	C401_W04	DTS
C402	NO	0.88	C402_W01	C402_W04	PASS
C403	NO	0.13	C403_W01	C403_W04	FAIL
C404	YES	0.34	C404_W02	C404_W04	DTS
C405	YES	1.42	C405_W01	C405_W03	DTS
C406	YES	2.02	C406_W02	C406_W05	DTS
C501	NO	1.82	C501_W01	C501_W05	PASS
C502	YES	0.92	C502_W01	C502_W04	DTS
C503	NO	0.86	C503_W01	C503_W05	PASS
C504	NO	0.13	C504_W01	C504_W03	FAIL
C505	YES	0.59	C505_W03	C505_W06	DTS
C506	NO	0.62	C506_W01	C506_W04	PASS
C601	NO	1.82	C601_W01	C601_W05	PASS
C602	YES	0.92	C602_W01	C602_W04	DTS
C603	NO	0.86	C603_W01	C603_W05	PASS
C604	NO	0.13	C604_W01	C604_W03	FAIL
C605	YES	0.59	C605_W03	C605_W06	DTS
C606	NO	0.62	C606_W01	C606_W04	PASS
C701	NO	0.99	C701_W01	C701_W05	PASS
C702	YES	0.92	C702_W01	C702_W04	DTS
C703	NO	0.86	C703_W01	C703_W05	PASS
C704	NO	0.13	C704_W01	C704_W03	FAIL
C705	YES	0.59	C705_W03	C705_W06	DTS
C706	NO	1.05	C706_W01	C706_W04	PASS
C801	NO	0.98	C801_W01	C801_W05	PASS
C802	YES	1.78	C802_W01	C802_W04	DTS

C803	NO	0.65	C803_W01	C803_W04	PASS
C804	NO	0.07	C804_W01	C804_W03	FAIL
C805	YES	0.87	C805_W03	C805_W06	DTS
C806	NO	1.18	C806_W01	C806_W04	PASS
C901	NO	0.98	C901_W01	C901_W05	PASS
C902	YES	1.78	C902_W01	C902_W04	DTS
C903	NO	0.65	C903_W01	C903_W04	PASS
C904	NO	0.07	C904_W01	C904_W03	FAIL
C905	YES	0.87	C905_W03	C905_W06	DTS
C906	NO	1.18	C906_W01	C906_W04	PASS
D301	YES	0.95	D301_W03	D301_W05	DTS
D302	YES	0.77	D302_W01	D302_W04	DTS
D303	NO	0.20	D303_W01	D303_W03	FAIL
D304	NO	0.66	D304_W03	D304_W04	PASS
D305	NO	2.02	D305_W03	D305_W05*	PASS
D401	YES	0.88	D401_W01	D401_W07	DTS
D402	YES	0.77	D402_W02	D402_W04	DTS
D403	NO	0.41	D403_W01	D403_W05	PASS
D404	NO	0.66	D404_W03	D404_W04	PASS
D405	YES	1.62	D405_W01	D405_W05	DTS
D501	YES	1.16	D501_W01	D501_W05	DTS
D502	YES	1.01	D502_W01	D502_W04	DTS
D503	NO	0.45	D503_W01	D503_W05	PASS
D504	NO	0.87	D504_W01	D504_W03	PASS
D505	YES	1.30	D505_W01	D505_W04	DTS
D506	NO	0.20	D506_W01	D506_W04	FAIL
D601	YES	1.16	D601_W01	D601_W05	DTS
D602	YES	1.01	D602_W01	D602_W04	DTS
D603	NO	0.45	D603_W01	D603_W05	PASS
D604	NO	0.87	D604_W01	D604_W03	PASS
D605	YES	1.30	D605_W01	D605_W04	DTS
D606	NO	0.20	D606_W01	D606_W04	FAIL
D701	YES	1.16	D701_W01	D701_W05	DTS
D702	YES	1.01	D702_W01	D702_W04	DTS
D703	NO	0.45	D703_W01	D703_W05	PASS
D704	NO	0.87	D704_W01	D704_W03	PASS
D705	YES	1.30	D705_W01	D705_W04	DTS

D706	NO	0.46	D706_W01	D706_W04	PASS
D801	YES	1.24	D801_W01	D801_W05	DTS
D802	YES	1.07	D802_W01	D802_W05	DTS
D803	NO	0.35	D803_W01	D803_W05	PASS
D804	NO	0.61	D804_W01	D804_W03	PASS
D805	YES	1.86	D805_W01	D805_W04	DTS
D806	NO	0.28	D806_W01	D806_W04	FAIL
D901	YES	1.24	D901_W01	D901_W05	DTS
D902	YES	1.07	D902_W01	D902_W05	DTS
D903	NO	0.35	D903_W01	D903_W05	PASS
D904	NO	0.61	D904_W01	D904_W03	PASS
D905	YES	1.86	D905_W01	D905_W04	DTS
D906	NO	0.28	D906_W01	D906_W04	FAIL

* These openings were included in the analysis as all habitable rooms are required to have natural ventilation.

Table 4: Natural Ventilation Performance Summary

Apartments	Number	Percentage
Satisfies ADG (Deemed to Satisfy)	87	44.8%
Significant Pressure Differential	42	21.6%
No Significant Pressure Differential	65	33.5%
Total Number of Naturally Cross Ventilated Units	129	66.5%

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APPENDIX A RESULTS OF THE MEAN EXTERNAL PRESSURE COEFFICIENTS

A.1 Tabulated Results Summary of the External Pressure Coefficients

Table A1
Summary of the External Pressure Coefficients
(referenced to an hourly mean velocity)

Individual Tap ID	Means				Std Dev (Max)		Peak Positive		Peak Negative	
	Maximum Coeff.	Dir	Minimum Coeff.	Dir	Coeff.	Dir	Coeff.	Dir	Coeff.	Dir
RJ01	-0.26	180	-0.56	292.5	+0.24	292.5	+0.73	180	-2.43	292.5
RJ02	-0.02	225	-0.52	45	+0.29	225	+1.61	225	-1.50	157.5
NI01	+0.57	67.5	-0.43	337.5	+0.26	0	+1.93	45	-1.66	0
NI02	+0.45	22.5	-0.66	67.5	+0.44	45	+1.66	45	-2.01	67.5
NI03	+0.48	0	-0.58	67.5	+0.22	22.5	+1.44	0	-1.27	45
NI04	+0.52	337.5	-0.63	45	+0.32	22.5	+1.78	337.5	-1.92	22.5
NI05	+0.50	112.5	-0.47	180	+0.24	90	+1.81	90	-1.62	180
NI06	-0.13	135	-0.47	45	+0.14	45	+0.45	157.5	-1.12	45
NI07	-0.14	315	-0.42	67.5	+0.16	247.5	+0.72	247.5	-1.01	67.5
WI01	+0.55	315	-0.74	22.5	+0.42	0	+1.94	315	-2.63	0
WI02	+0.51	292.5	-0.52	45	+0.33	270	+1.93	315	-1.86	0
WI03	+0.37	315	-0.53	45	+0.24	22.5	+1.66	315	-1.76	22.5
WI04	+0.14	315	-0.53	45	+0.21	22.5	+1.10	315	-1.54	22.5
WI05	+0.16	315	-0.51	45	+0.22	22.5	+1.07	315	-1.78	22.5
WI06	-0.07	315	-0.49	45	+0.17	22.5	+0.63	315	-1.35	22.5
WI07	-0.17	135	-0.45	45	+0.17	337.5	+0.66	315	-1.13	22.5
WI08	-0.17	315	-0.43	67.5	+0.16	247.5	+0.59	247.5	-1.26	247.5
WI09	-0.24	315	-0.44	67.5	+0.19	247.5	+0.91	247.5	-1.41	247.5
WI10	-0.16	315	-0.42	67.5	+0.19	247.5	+1.01	247.5	-1.16	247.5
WI11	-0.25	270	-0.42	67.5	+0.20	247.5	+1.21	270	-1.25	247.5
WI12	-0.26	270	-0.45	157.5	+0.22	270	+1.43	270	-1.35	225
WI13	-0.29	270	-0.48	157.5	+0.21	270	+1.27	270	-1.63	225
WI14	-0.31	292.5	-0.65	225	+0.25	225	+0.88	270	-2.09	202.5
WI15	+0.09	225	-0.66	180	+0.35	202.5	+1.20	225	-2.09	180
WI16	+0.37	202.5	-0.51	67.5	+0.30	180	+1.69	225	-1.72	180
SI01	+0.54	180	-0.54	67.5	+0.26	180	+1.95	180	-1.81	67.5
SI02	+0.53	157.5	-0.54	67.5	+0.25	180	+1.87	157.5	-1.83	90
SI03	+0.53	157.5	-0.53	67.5	+0.25	112.5	+1.88	157.5	-1.77	67.5
SI04	-0.12	315	-0.41	67.5	+0.15	247.5	+0.64	247.5	-1.00	67.5
SI05	-0.24	180	-0.45	45	+0.14	45	+0.32	202.5	-1.08	45
SI06	+0.51	112.5	-0.40	337.5	+0.24	112.5	+1.66	112.5	-1.14	180
SI07	+0.49	90	-0.44	337.5	+0.25	112.5	+1.72	90	-1.53	180
EI01	+0.51	112.5	-0.48	180	+0.24	112.5	+1.75	112.5	-1.67	180
EI02	+0.49	112.5	-0.49	180	+0.24	112.5	+1.73	90	-1.78	180
EI03	+0.48	90	-0.44	337.5	+0.25	112.5	+1.69	90	-1.55	180
EI04	+0.51	90	-0.42	337.5	+0.24	90	+1.83	90	-1.22	180
EI05	+0.51	90	-0.49	22.5	+0.27	45	+1.87	90	-1.57	22.5
EI06	+0.53	67.5	-0.43	337.5	+0.29	112.5	+1.88	90	-1.50	0
EI07	+0.54	67.5	-0.45	337.5	+0.27	0	+1.78	45	-1.74	0
EI08	+0.53	45	-0.45	337.5	+0.35	0	+1.91	45	-1.98	0
EI09	+0.50	45	-0.49	0	+0.36	0	+1.93	45	-2.36	337.5
SH01	+0.23	225	-0.58	157.5	+0.34	202.5	+1.67	225	-1.73	180
SH02	+0.50	157.5	-0.64	90	+0.33	112.5	+1.89	157.5	-2.00	67.5
EH01	+0.45	112.5	-0.58	180	+0.33	157.5	+1.74	112.5	-1.74	180
EH02	+0.45	112.5	-0.54	180	+0.30	157.5	+1.60	135	-1.58	180
NF01	+0.53	90	-0.48	180	+0.25	45	+1.93	90	-1.64	180
SF01	+0.43	90	-0.46	180	+0.24	112.5	+1.59	90	-1.49	180
EF01	+0.48	112.5	-0.44	202.5	+0.23	112.5	+1.63	112.5	-1.72	180
EF02	+0.51	90	-0.46	180	+0.25	45	+1.86	90	-1.54	180
EF03	+0.49	90	-0.48	180	+0.26	112.5	+1.80	90	-1.45	180
EF04	+0.51	90	-0.43	337.5	+0.23	90	+1.77	90	-1.47	180
EF05	+0.48	90	-0.47	0	+0.26	45	+1.73	90	-1.41	0
SE12	+0.18	225	-0.59	157.5	+0.34	202.5	+1.63	225	-1.77	180
SE14	+0.49	157.5	-0.64	90	+0.30	112.5	+1.95	157.5	-2.14	90
EE02	+0.40	112.5	-0.60	180	+0.34	157.5	+1.69	135	-1.98	180

Summary of Peak Values and Corresponding Wind Directions (data on this page only)

Peak Tap ID	Max Mean		Min Mean		Max St Dev		Max Peak		Min Peak	
	+0.57	67.5	-0.74	22.5	+0.44	45	+1.95	157.5	-2.63	0
	NI01		WI01		NI02		SE14		WI01	

Table A1
Summary of the External Pressure Coefficients
(referenced to an hourly mean velocity)

Individual Tap ID	Means				Std Dev (Max)		Peak Positive		Peak Negative	
	Maximum Coeff.	Dir	Minimum Coeff.	Dir	Coeff.	Dir	Coeff.	Dir	Coeff.	Dir
EE08	+0.50	112.5	-0.40	45	+0.26	90	+1.65	112.5	-1.09	67.5
ND01	+0.53	67.5	-0.43	337.5	+0.25	0	+1.87	45	-1.75	0
ND02	+0.37	22.5	-0.53	67.5	+0.36	45	+1.64	22.5	-1.73	45
ND03	+0.43	0	-0.50	67.5	+0.26	22.5	+1.82	0	-1.49	45
ND04	+0.45	337.5	-0.56	45	+0.33	22.5	+1.62	0	-1.91	22.5
ND05	+0.46	112.5	-0.41	337.5	+0.22	112.5	+1.48	112.5	-1.27	180
ND06	-0.06	135	-0.44	0	+0.14	90	+0.57	157.5	-1.06	67.5
ND07	-0.11	315	-0.42	67.5	+0.14	247.5	+0.56	247.5	-1.02	67.5
WD01	+0.51	315	-0.64	22.5	+0.34	0	+1.87	315	-1.79	22.5
WD02	+0.44	315	-0.54	45	+0.29	22.5	+1.86	315	-1.84	0
WD03	+0.20	315	-0.52	45	+0.22	22.5	+1.03	315	-1.41	22.5
WD04	-0.06	337.5	-0.49	45	+0.16	22.5	+0.51	315	-1.31	22.5
WD05	-0.04	315	-0.48	45	+0.16	22.5	+0.56	315	-1.31	22.5
WD06	-0.12	135	-0.46	67.5	+0.14	45	+0.61	157.5	-1.13	45
WD07	-0.03	135	-0.44	67.5	+0.16	90	+0.90	112.5	-1.07	67.5
WD08	-0.04	135	-0.44	67.5	+0.16	90	+0.87	112.5	-1.06	67.5
WD09	-0.11	135	-0.43	67.5	+0.14	112.5	+0.64	112.5	-1.09	67.5
WD10	-0.08	157.5	-0.43	67.5	+0.14	112.5	+0.64	180	-1.09	67.5
WD11	-0.21	180	-0.45	315	+0.16	292.5	+0.34	270	-1.25	315
WD12	-0.25	180	-0.45	0	+0.15	247.5	+0.32	292.5	-1.19	225
WD13	-0.28	180	-0.45	67.5	+0.16	225	+0.29	180	-1.43	225
WD14	-0.32	180	-0.62	225	+0.24	225	+0.28	180	-1.99	202.5
WD15	+0.05	225	-0.67	180	+0.33	202.5	+1.16	202.5	-2.25	180
WD16	+0.30	202.5	-0.49	135	+0.30	180	+1.61	202.5	-2.08	247.5
SD01	+0.44	180	-0.51	67.5	+0.24	180	+1.90	180	-1.43	247.5
SD02	+0.47	157.5	-0.55	67.5	+0.23	157.5	+1.75	157.5	-1.68	90
SD03	+0.46	157.5	-0.55	67.5	+0.24	90	+1.74	157.5	-1.91	67.5
SD04	-0.10	315	-0.41	67.5	+0.14	247.5	+0.53	247.5	-1.02	67.5
SD05	-0.17	135	-0.44	0	+0.13	67.5	+0.38	112.5	-1.06	67.5
SD06	+0.50	112.5	-0.37	337.5	+0.23	90	+1.63	112.5	-0.93	0
SD07	+0.51	90	-0.45	180	+0.26	112.5	+1.76	90	-1.30	337.5
ED01	+0.44	112.5	-0.39	202.5	+0.22	112.5	+1.47	112.5	-1.56	180
ED02	+0.45	112.5	-0.40	337.5	+0.22	112.5	+1.48	112.5	-1.25	180
ED03	+0.51	90	-0.45	180	+0.26	112.5	+1.75	90	-1.29	337.5
ED04	+0.52	90	-0.45	180	+0.25	135	+1.78	90	-1.26	337.5
ED05	+0.48	90	-0.43	337.5	+0.23	90	+1.75	90	-1.43	0
ED06	+0.52	67.5	-0.43	337.5	+0.23	90	+1.70	45	-1.62	0
ED07	+0.51	67.5	-0.45	337.5	+0.29	0	+1.83	45	-1.96	0
ED08	+0.52	45	-0.44	337.5	+0.33	0	+1.89	45	-1.93	0
ED10	+0.47	45	-0.43	0	+0.32	22.5	+1.81	45	-1.94	337.5
RD01	+0.48	45	-0.43	337.5	+0.33	0	+1.89	45	-1.97	0
RD02	+0.51	67.5	-0.44	337.5	+0.23	90	+1.78	90	-1.74	0
RD03	+0.53	90	-0.44	180	+0.26	112.5	+1.85	90	-1.28	337.5
RD04	+0.44	112.5	-0.61	180	+0.25	157.5	+1.50	112.5	-1.76	180
RD05	+0.37	112.5	-0.73	180	+0.27	157.5	+1.30	90	-2.09	180
NC01	+0.46	112.5	-0.39	337.5	+0.22	90	+1.52	112.5	-1.12	45
NC02	+0.45	112.5	-0.41	22.5	+0.22	112.5	+1.54	112.5	-1.06	45
SC12	+0.16	225	-0.50	135	+0.28	225	+1.58	225	-1.44	157.5
SC14	+0.47	157.5	-0.62	67.5	+0.28	112.5	+1.85	157.5	-2.14	90
SC15	+0.51	112.5	-0.38	22.5	+0.24	90	+1.66	112.5	-0.97	337.5
SC16	+0.50	112.5	-0.38	22.5	+0.24	90	+1.60	112.5	-0.99	45
SC17	+0.46	112.5	-0.48	45	+0.24	90	+1.63	135	-1.17	67.5
SC18	+0.37	157.5	-0.51	45	+0.24	90	+1.69	180	-1.71	67.5
SC19	+0.40	135	-0.51	45	+0.28	90	+1.52	157.5	-1.55	90
EC02	+0.37	112.5	-0.51	202.5	+0.27	157.5	+1.55	135	-1.88	180

Summary of Peak Values and Corresponding Wind Directions (data on this page only)

Peak Tap ID	Max Mean		Min Mean		Max St Dev		Max Peak		Min Peak	
	+0.53	67.5	-0.73	180	+0.36	45	+1.90	180	-2.25	180
	ND01		RD05		ND02		SD01		WD15	

Table A1
Summary of the External Pressure Coefficients
(referenced to an hourly mean velocity)

Individual Tap ID	Means				Std Dev (Max)		Peak Positive		Peak Negative	
	Maximum Coeff.	Dir	Minimum Coeff.	Dir	Coeff.	Dir	Coeff.	Dir	Coeff.	Dir
EC04	+0.43	112.5	-0.41	337.5	+0.22	112.5	+1.48	112.5	-1.16	180
EC09	+0.52	112.5	-0.42	45	+0.27	90	+1.70	112.5	-1.14	45
NB01	+0.35	90	-0.53	180	+0.20	90	+1.55	90	-1.42	180
NB02	-0.35	225	-0.42	0	+0.16	22.5	+0.29	22.5	-1.17	45
NB03	+0.45	67.5	-0.44	337.5	+0.21	90	+1.58	67.5	-1.37	0
NB04	+0.38	67.5	-0.46	180	+0.20	90	+1.54	90	-1.41	337.5
NB05	+0.41	67.5	-0.45	180	+0.21	90	+1.58	90	-1.42	337.5
NB06	+0.37	22.5	-0.36	90	+0.29	45	+1.65	22.5	-1.50	67.5
NB07	+0.37	0	-0.49	67.5	+0.28	22.5	+1.59	0	-1.59	45
NB08	+0.35	0	-0.51	67.5	+0.26	22.5	+1.61	0	-1.65	45
NB09	+0.39	337.5	-0.50	67.5	+0.24	22.5	+1.54	0	-1.48	45
NB10	-0.07	135	-0.45	0	+0.14	90	+0.56	157.5	-1.08	45
NB11	-0.10	315	-0.42	67.5	+0.17	247.5	+0.91	247.5	-1.04	67.5
WB02	+0.49	315	-0.69	22.5	+0.37	0	+1.99	315	-2.18	22.5
WB04	+0.41	315	-0.55	45	+0.26	22.5	+1.81	315	-1.59	22.5
WB06	+0.25	315	-0.49	45	+0.19	22.5	+1.20	315	-1.37	22.5
WB08	-0.01	315	-0.45	67.5	+0.15	45	+0.62	315	-1.23	45
WB10	-0.09	315	-0.46	67.5	+0.14	67.5	+0.50	315	-1.12	45
WB11	-0.06	315	-0.44	67.5	+0.14	67.5	+0.51	315	-1.13	67.5
WB13	-0.08	292.5	-0.42	67.5	+0.20	315	+0.97	315	-1.05	67.5
WB14	-0.08	135	-0.41	67.5	+0.14	90	+0.59	157.5	-1.05	67.5
WB15	-0.11	135	-0.44	67.5	+0.14	112.5	+0.60	157.5	-1.08	67.5
WB16	-0.13	315	-0.42	67.5	+0.15	157.5	+0.62	135	-1.06	67.5
WB17	+0.52	112.5	-0.37	337.5	+0.24	90	+1.65	112.5	-0.94	337.5
WB18	-0.23	180	-0.52	315	+0.15	292.5	+0.46	270	-1.36	315
WB19	-0.24	180	-0.43	67.5	+0.15	292.5	+0.58	270	-1.16	112.5
WB20	+0.50	112.5	-0.39	45	+0.24	90	+1.61	112.5	-1.03	45
WB21	-0.25	180	-0.44	67.5	+0.16	157.5	+0.39	270	-1.28	112.5
WB22	-0.31	180	-0.65	225	+0.23	225	+0.34	292.5	-1.98	225
WB23	+0.48	112.5	-0.42	45	+0.23	112.5	+1.61	112.5	-1.13	45
WB24	+0.08	225	-0.63	157.5	+0.34	202.5	+1.22	225	-2.22	180
WB25	+0.40	112.5	-0.43	45	+0.25	180	+1.51	135	-1.25	67.5
WB26	+0.19	225	-0.50	135	+0.30	202.5	+1.32	225	-1.90	247.5
SB01	+0.40	180	-0.52	67.5	+0.24	247.5	+1.77	180	-1.48	247.5
SB02	+0.48	157.5	-0.50	67.5	+0.24	247.5	+1.81	180	-1.58	247.5
SB03	+0.46	157.5	-0.47	67.5	+0.24	157.5	+1.81	157.5	-1.38	90
SB04	-0.10	315	-0.40	67.5	+0.17	247.5	+0.91	247.5	-1.00	67.5
SB05	+0.41	157.5	-0.63	67.5	+0.29	112.5	+1.74	157.5	-2.21	67.5
SB06	-0.13	112.5	-0.45	45	+0.14	90	+0.45	112.5	-1.11	45
SB07	+0.53	112.5	-0.36	337.5	+0.23	90	+1.67	112.5	-0.93	337.5
SB08	+0.45	67.5	-0.44	337.5	+0.21	0	+1.55	67.5	-1.41	0
EB01	+0.37	135	-0.69	180	+0.38	157.5	+1.63	135	-2.52	202.5
EB02	+0.30	112.5	-0.51	180	+0.20	67.5	+1.53	90	-1.48	180
EB03	+0.35	90	-0.54	180	+0.20	90	+1.58	90	-1.42	180
EB04	+0.45	112.5	-0.39	337.5	+0.21	112.5	+1.52	112.5	-1.05	180
EB05	+0.34	67.5	-0.55	180	+0.20	67.5	+1.60	90	-1.56	180
EB06	+0.38	90	-0.48	180	+0.20	67.5	+1.52	67.5	-1.34	180
EB07	+0.37	67.5	-0.47	180	+0.20	90	+1.55	67.5	-1.34	180
EB08	+0.41	67.5	-0.45	180	+0.20	90	+1.57	90	-1.35	337.5
EB09	+0.41	67.5	-0.44	180	+0.20	90	+1.57	90	-1.35	337.5
EB10	+0.42	67.5	-0.45	337.5	+0.21	90	+1.58	90	-1.42	337.5
EB11	+0.43	67.5	-0.42	337.5	+0.20	90	+1.49	90	-1.32	0
EB12	+0.45	67.5	-0.44	337.5	+0.21	90	+1.59	67.5	-1.39	0
EB13	+0.43	67.5	-0.47	337.5	+0.21	0	+1.59	67.5	-1.46	0
EB14	+0.44	67.5	-0.45	337.5	+0.21	90	+1.55	67.5	-1.41	0

Summary of Peak Values and Corresponding Wind Directions (data on this page only)

Peak Tap ID	Max Mean		Min Mean		Max St Dev		Max Peak		Min Peak	
	+0.53	112.5	-0.69	22.5	+0.38	157.5	+1.99	315	-2.52	202.5
	SB07		WB02		EB01		WB02		EB01	

Table A1
Summary of the External Pressure Coefficients
(referenced to an hourly mean velocity)

Individual Tap ID	Means				Std Dev (Max)		Peak Positive		Peak Negative	
	Maximum Coeff.	Dir	Minimum Coeff.	Dir	Coeff.	Dir	Coeff.	Dir	Coeff.	Dir
EB15	+0.43	67.5	-0.45	337.5	+0.25	0	+1.65	45	-1.56	0
EB16	+0.41	45	-0.45	337.5	+0.26	0	+1.69	45	-1.73	0
EB17	+0.41	45	-0.49	337.5	+0.33	0	+1.65	45	-2.05	0
RH01	-0.26	292.5	-0.75	247.5	+0.28	247.5	+0.40	292.5	-2.37	247.5
RH02	-0.35	202.5	-0.63	135	+0.22	157.5	+0.35	45	-1.98	157.5
WE07	+0.48	247.5	-0.41	157.5	+0.23	247.5	+1.79	247.5	-1.30	180
WE08	+0.47	270	-0.42	0	+0.23	247.5	+1.69	247.5	-1.27	337.5
EE09	-0.08	135	-0.46	67.5	+0.16	202.5	+0.66	180	-1.18	337.5
EE10	+0.09	157.5	-0.45	67.5	+0.18	202.5	+1.08	180	-1.09	0
WC01	+0.47	247.5	-0.41	157.5	+0.22	247.5	+1.76	247.5	-1.24	337.5
WC02	+0.45	270	-0.41	0	+0.22	247.5	+1.69	247.5	-1.25	337.5
EC10	-0.01	135	-0.45	67.5	+0.15	202.5	+0.67	135	-1.15	337.5
EC11	+0.14	180	-0.45	67.5	+0.19	202.5	+1.13	180	-1.07	337.5
NB12	+0.47	315	-0.41	247.5	+0.22	315	+1.73	315	-1.29	247.5
NB13	+0.49	315	-0.50	247.5	+0.26	292.5	+1.87	315	-1.57	247.5
NB14	+0.43	315	-0.64	247.5	+0.35	270	+1.86	315	-1.98	247.5
WB01	+0.40	292.5	-0.48	0	+0.35	270	+1.92	315	-1.74	270
WB03	+0.44	292.5	-0.63	337.5	+0.34	315	+1.55	315	-2.00	337.5
WB05	+0.45	292.5	-0.46	337.5	+0.28	315	+1.59	315	-1.68	337.5
WB07	+0.43	270	-0.40	0	+0.22	315	+1.53	247.5	-1.35	337.5
WB09	+0.43	270	-0.40	0	+0.22	247.5	+1.57	247.5	-1.29	337.5
WB12	+0.44	270	-0.40	157.5	+0.22	247.5	+1.74	247.5	-1.24	337.5
EB18	-0.06	22.5	-0.46	67.5	+0.23	45	+0.89	45	-1.28	67.5
NA01	+0.41	337.5	-0.40	67.5	+0.21	0	+1.51	0	-1.52	67.5
NA02	+0.41	337.5	-0.39	67.5	+0.21	0	+1.50	0	-1.70	67.5
NA03	+0.46	337.5	-0.39	225	+0.21	0	+1.54	337.5	-1.49	67.5
NA04	+0.45	337.5	-0.39	225	+0.21	0	+1.54	337.5	-1.59	67.5
NA05	+0.46	337.5	-0.39	225	+0.21	315	+1.62	337.5	-1.43	67.5
NA06	+0.41	315	-0.44	247.5	+0.21	315	+1.60	315	-1.39	247.5
NA07	+0.43	315	-0.45	247.5	+0.26	270	+1.69	315	-1.44	247.5
NA08	+0.39	315	-0.57	247.5	+0.26	292.5	+1.88	315	-1.67	247.5
NA09	+0.34	292.5	-0.50	0	+0.30	315	+1.60	315	-1.84	337.5
WA01	+0.38	292.5	-0.52	337.5	+0.29	315	+1.48	315	-1.77	337.5
WA02	+0.38	292.5	-0.47	0	+0.25	315	+1.45	315	-1.63	337.5
WA03	+0.37	292.5	-0.45	0	+0.23	337.5	+1.37	292.5	-1.54	337.5
WA04	+0.37	292.5	-0.42	0	+0.23	337.5	+1.38	270	-1.43	337.5
WA05	+0.34	270	-0.42	0	+0.22	247.5	+1.42	247.5	-1.37	337.5
WA06	+0.49	247.5	-0.40	157.5	+0.23	247.5	+1.83	247.5	-1.29	337.5
WA07	+0.48	247.5	-0.41	0	+0.22	247.5	+1.77	247.5	-1.41	337.5
SA05	+0.18	180	-0.44	67.5	+0.20	202.5	+1.27	180	-1.04	337.5
SA06	+0.30	180	-0.44	67.5	+0.25	202.5	+1.55	112.5	-1.09	247.5
SA07	+0.32	180	-0.45	67.5	+0.27	202.5	+1.62	180	-1.10	247.5
SA08	+0.09	202.5	-0.44	67.5	+0.23	225	+1.39	202.5	-1.31	247.5
SA09	-0.22	292.5	-0.65	202.5	+0.22	202.5	+0.91	292.5	-1.87	202.5
EA06	+0.02	157.5	-0.45	67.5	+0.18	202.5	+0.70	135	-1.24	202.5
EA07	+0.14	180	-0.44	67.5	+0.19	202.5	+1.11	180	-1.06	337.5
EA08	-0.20	292.5	-0.68	202.5	+0.21	202.5	+0.88	292.5	-1.85	202.5
EA09	-0.25	315	-0.55	202.5	+0.19	202.5	+0.89	292.5	-1.60	202.5
EA10	+0.41	337.5	-0.40	67.5	+0.21	0	+1.51	0	-1.58	67.5
WE09	+0.46	247.5	-0.42	0	+0.23	247.5	+1.69	247.5	-1.34	180
WE10	+0.47	247.5	-0.42	0	+0.23	247.5	+1.69	247.5	-1.41	180
WE11	+0.51	247.5	-0.41	157.5	+0.24	247.5	+1.76	247.5	-1.43	180
WE12	+0.49	247.5	-0.41	157.5	+0.24	247.5	+1.76	247.5	-1.45	180
WE13	+0.44	225	-0.46	180	+0.33	202.5	+1.77	247.5	-1.61	180
WE14	+0.33	225	-0.35	112.5	+0.22	202.5	+1.47	202.5	-1.07	0

Summary of Peak Values and Corresponding Wind Directions (data on this page only)

Peak Tap ID	Max Mean		Min Mean		Max St Dev		Max Peak		Min Peak	
	+0.51	247.5	-0.75	247.5	+0.35	270	+1.92	315	-2.37	247.5
	WE11		RH01		NB14		WB01		RH01	

Table A1
Summary of the External Pressure Coefficients
(referenced to an hourly mean velocity)

Individual Tap ID	Means				Std Dev (Max)		Peak Positive		Peak Negative	
	Maximum Coeff.	Dir	Minimum Coeff.	Dir	Coeff.	Dir	Coeff.	Dir	Coeff.	Dir
SE01	+0.42	202.5	-0.41	315	+0.30	225	+1.76	202.5	-1.47	247.5
SE02	+0.46	180	-0.47	247.5	+0.35	225	+1.78	202.5	-1.70	225
SE03	+0.50	180	-0.48	247.5	+0.31	225	+1.82	180	-1.90	247.5
SE04	+0.46	157.5	-0.47	247.5	+0.30	112.5	+1.75	157.5	-1.77	247.5
SE05	+0.40	135	-0.46	247.5	+0.31	90	+1.70	157.5	-1.64	247.5
SE06	+0.49	112.5	-0.43	202.5	+0.36	90	+1.94	112.5	-1.38	180
EE01	+0.47	112.5	-0.44	247.5	+0.34	90	+1.84	90	-1.47	247.5
EE03	+0.47	112.5	-0.44	67.5	+0.35	90	+1.85	112.5	-1.48	180
EE04	-0.05	135	-0.47	67.5	+0.21	90	+0.72	135	-1.88	90
EE05	-0.13	135	-0.47	67.5	+0.16	202.5	+0.42	135	-1.26	90
EE06	-0.14	157.5	-0.46	67.5	+0.17	337.5	+0.44	180	-1.43	337.5
EE07	-0.08	135	-0.46	67.5	+0.17	202.5	+0.52	180	-1.26	202.5
WC03	+0.45	247.5	-0.42	0	+0.22	247.5	+1.68	247.5	-1.26	180
WC04	+0.47	247.5	-0.41	157.5	+0.23	247.5	+1.65	247.5	-1.30	180
WC05	+0.49	247.5	-0.41	157.5	+0.23	247.5	+1.70	247.5	-1.35	180
WC06	+0.47	247.5	-0.41	157.5	+0.23	247.5	+1.66	247.5	-1.39	180
WC07	+0.41	225	-0.45	180	+0.32	202.5	+1.69	247.5	-1.67	180
WC08	+0.32	225	-0.37	315	+0.22	247.5	+1.49	202.5	-1.12	157.5
SC01	+0.37	202.5	-0.42	292.5	+0.36	225	+1.56	225	-1.87	247.5
SC02	+0.44	180	-0.49	247.5	+0.35	225	+1.75	180	-1.79	247.5
SC03	+0.47	180	-0.50	247.5	+0.34	225	+1.78	180	-1.98	247.5
SC04	+0.43	157.5	-0.47	247.5	+0.26	112.5	+1.67	157.5	-1.87	247.5
SC05	+0.35	135	-0.45	247.5	+0.28	90	+1.58	157.5	-1.62	247.5
SC06	+0.46	112.5	-0.42	202.5	+0.34	90	+1.85	90	-1.36	180
EC01	+0.37	112.5	-0.42	247.5	+0.27	90	+1.61	90	-1.37	247.5
EC03	+0.42	112.5	-0.44	67.5	+0.33	90	+1.74	90	-1.43	180
EC05	-0.01	135	-0.47	67.5	+0.19	90	+0.78	135	-1.40	90
EC06	-0.08	135	-0.46	67.5	+0.17	337.5	+0.79	315	-1.27	202.5
EC07	-0.06	157.5	-0.46	67.5	+0.19	337.5	+0.86	315	-1.47	337.5
EC08	-0.00	157.5	-0.45	67.5	+0.17	315	+0.76	315	-1.23	202.5
WA08	+0.48	247.5	-0.41	157.5	+0.23	247.5	+1.73	247.5	-1.44	337.5
WA09	+0.49	247.5	-0.41	0	+0.23	247.5	+1.76	247.5	-1.57	337.5
WA10	+0.50	247.5	-0.41	157.5	+0.24	247.5	+1.83	247.5	-1.47	180
WA11	+0.50	247.5	-0.41	157.5	+0.24	247.5	+1.83	247.5	-1.38	180
WA12	+0.42	225	-0.48	180	+0.33	202.5	+1.70	247.5	-1.95	180
WA13	+0.26	202.5	-0.43	315	+0.25	225	+1.39	202.5	-1.39	247.5
SA01	+0.33	202.5	-0.47	292.5	+0.35	225	+1.50	202.5	-1.77	247.5
SA02	+0.39	180	-0.54	247.5	+0.39	225	+1.74	180	-2.58	247.5
SA03	+0.43	180	-0.49	247.5	+0.30	225	+1.77	180	-1.89	247.5
SA04	+0.40	157.5	-0.47	247.5	+0.23	202.5	+1.57	157.5	-1.87	247.5
EA01	+0.35	112.5	-0.45	202.5	+0.28	90	+1.55	112.5	-1.34	180
EA02	+0.40	112.5	-0.43	67.5	+0.30	90	+1.73	90	-1.30	247.5
EA03	-0.06	315	-0.47	90	+0.22	112.5	+0.74	337.5	-1.72	90
EA04	-0.01	157.5	-0.45	67.5	+0.21	315	+1.14	315	-1.26	202.5
EA05	+0.02	157.5	-0.45	67.5	+0.23	315	+1.30	315	-1.26	202.5
RG01	-0.20	45	-0.69	202.5	+0.23	202.5	+0.62	270	-2.09	202.5
RG02	-0.22	45	-0.63	0	+0.25	22.5	+0.74	45	-1.90	0
RG03	-0.25	180	-0.50	67.5	+0.22	0	+0.77	337.5	-1.56	0
RG04	-0.29	270	-0.59	157.5	+0.20	0	+0.76	270	-1.81	202.5
NF02	+0.41	22.5	-0.46	67.5	+0.29	45	+1.72	22.5	-1.45	45
NF03	+0.40	0	-0.45	67.5	+0.24	0	+1.68	0	-1.57	67.5
NF04	+0.43	0	-0.43	67.5	+0.24	0	+1.69	0	-1.47	67.5
SH04	+0.09	135	-0.47	67.5	+0.20	157.5	+1.20	135	-1.12	247.5
SH03	+0.40	157.5	-0.48	67.5	+0.28	180	+1.74	112.5	-1.15	337.5
EH03	-0.27	270	-0.76	157.5	+0.25	157.5	+0.50	270	-2.14	157.5

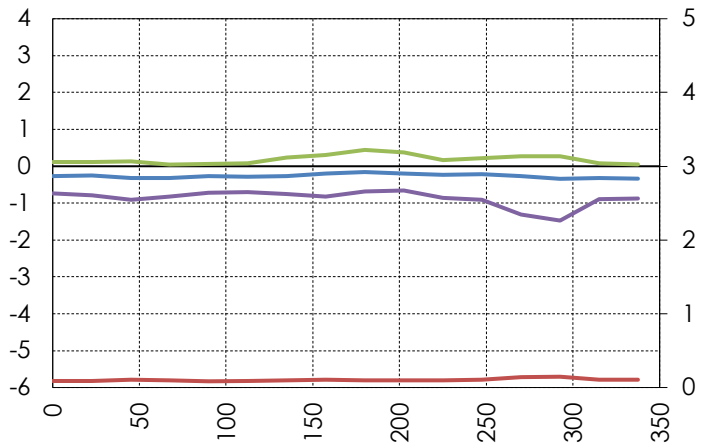
Summary of Peak Values and Corresponding Wind Directions (data on this page only)

Peak Tap ID	Max Mean		Min Mean		Max St Dev		Max Peak		Min Peak	
	+0.50	247.5	-0.76	157.5	+0.39	225	+1.94	112.5	-2.58	247.5
	WA10		EH03		SA02		SE06		SA02	

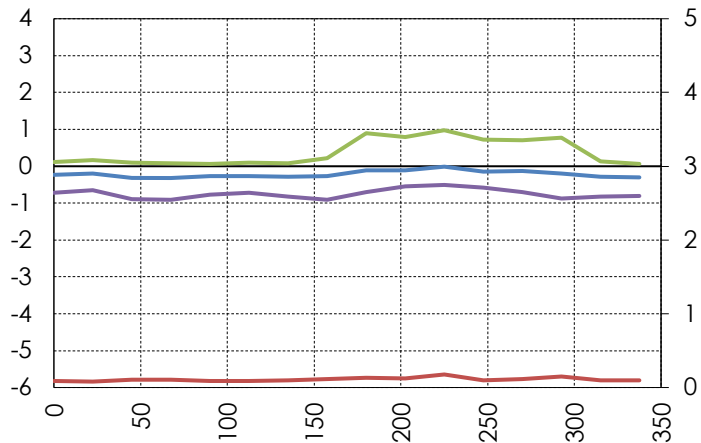
Table A1

A.2 Plots of the External Pressure Coefficients

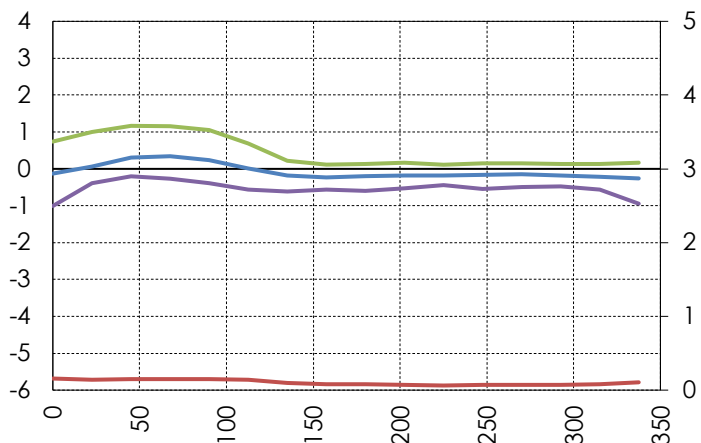
Individual Tap ID: RJ01 Port ID: 0



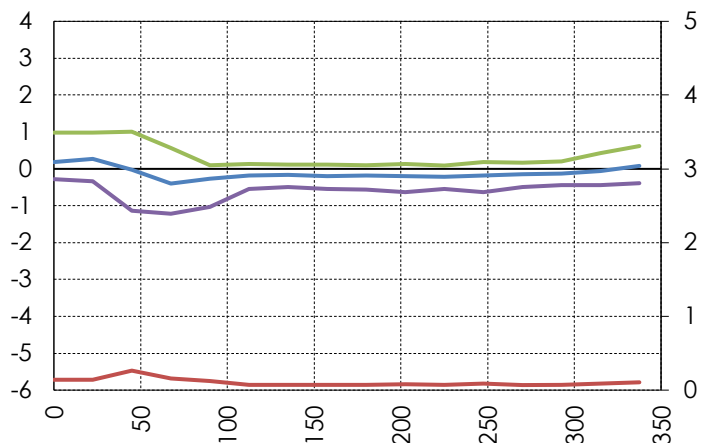
Individual Tap ID: RJ02 Port ID: 1



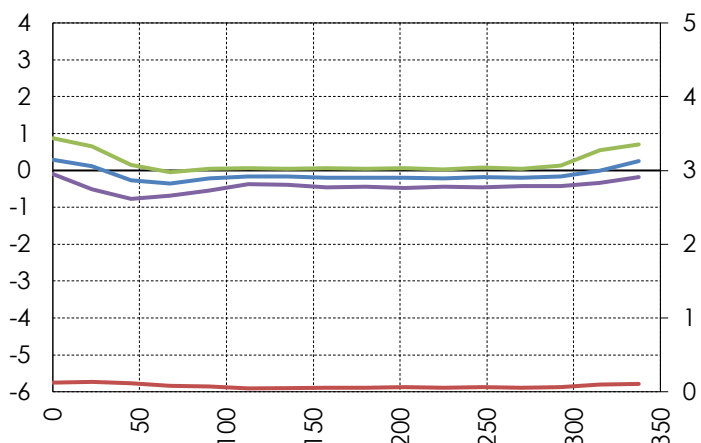
Individual Tap ID: NI01 Port ID: 2



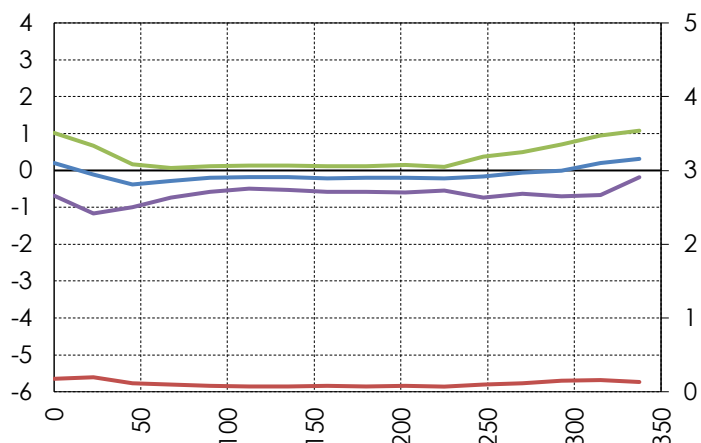
Individual Tap ID: NI02 Port ID: 3



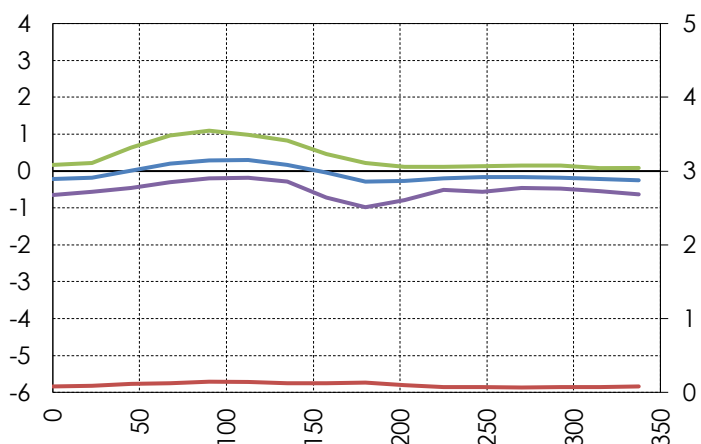
Individual Tap ID: NI03 Port ID: 4



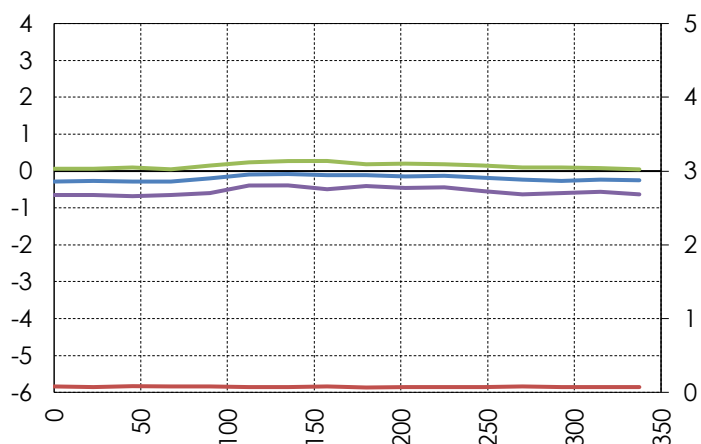
Individual Tap ID: NI04 Port ID: 5



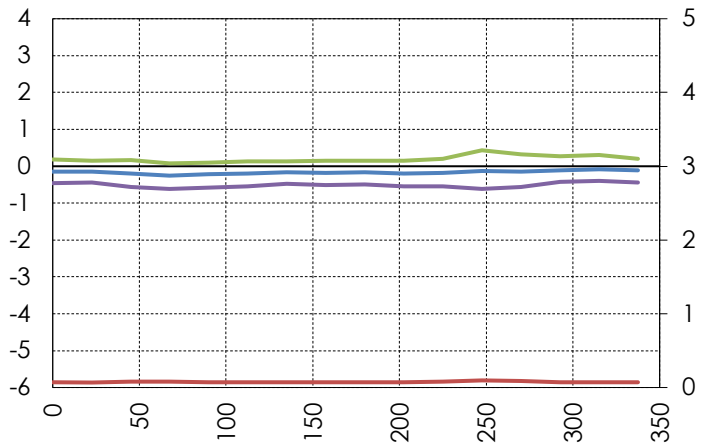
Individual Tap ID: NI05 Port ID: 6



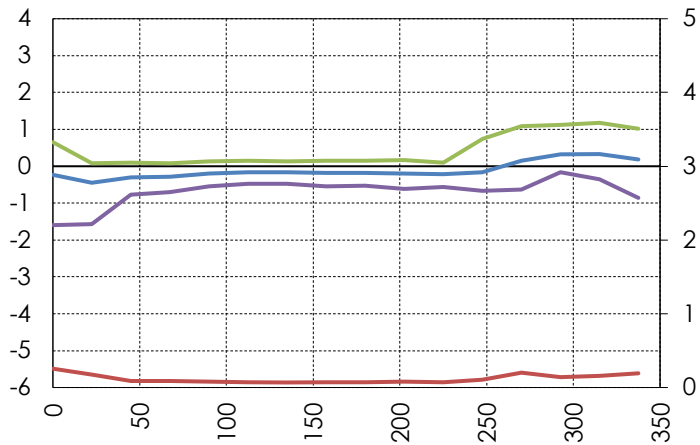
Individual Tap ID: NI06 Port ID: 7



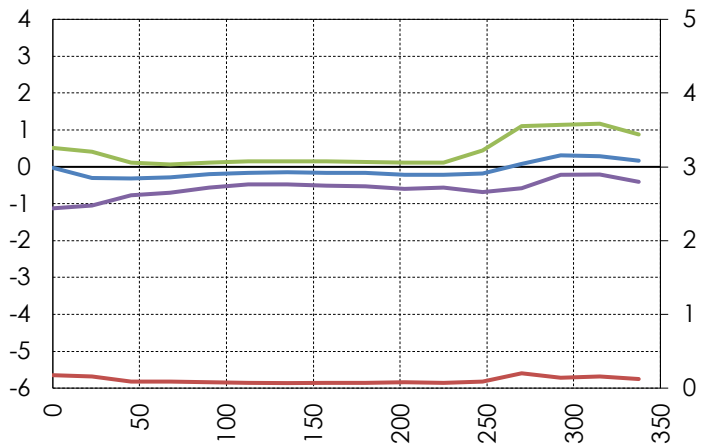
Individual Tap ID: NI07 Port ID: 8



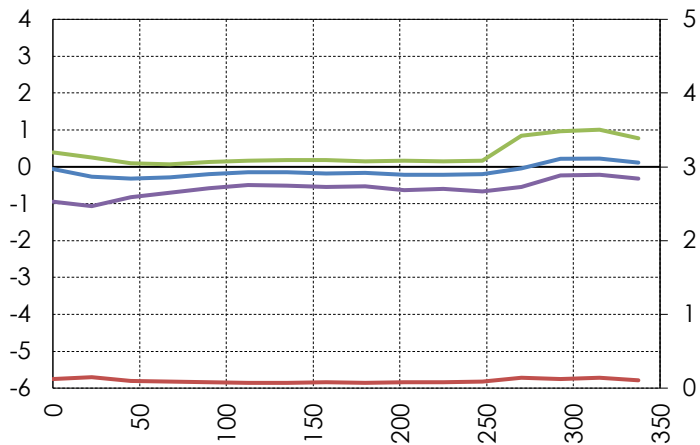
Individual Tap ID: WI01 Port ID: 9



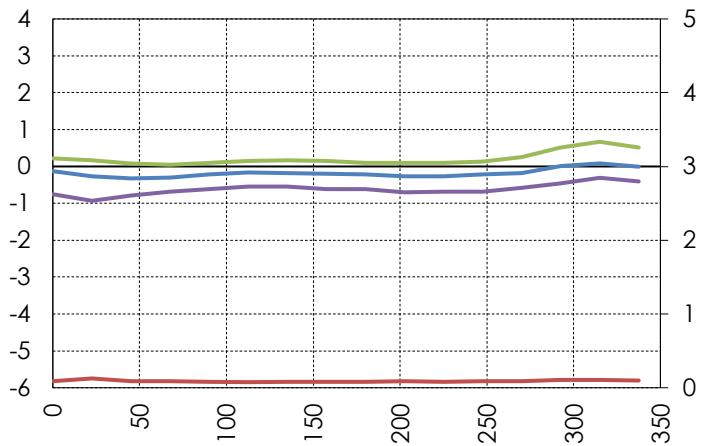
Individual Tap ID: WI02 Port ID: 10



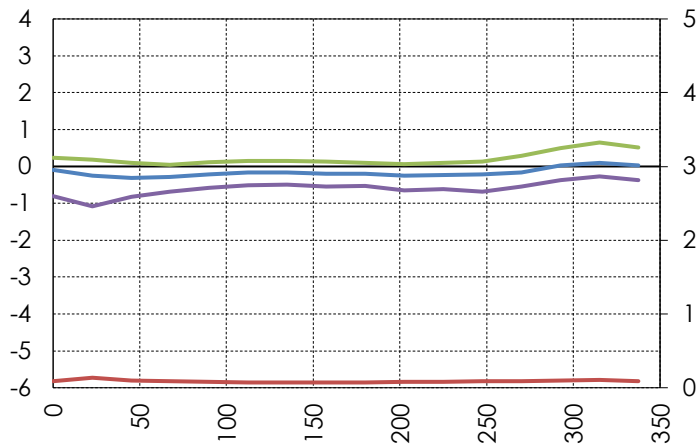
Individual Tap ID: WI03 Port ID: 11



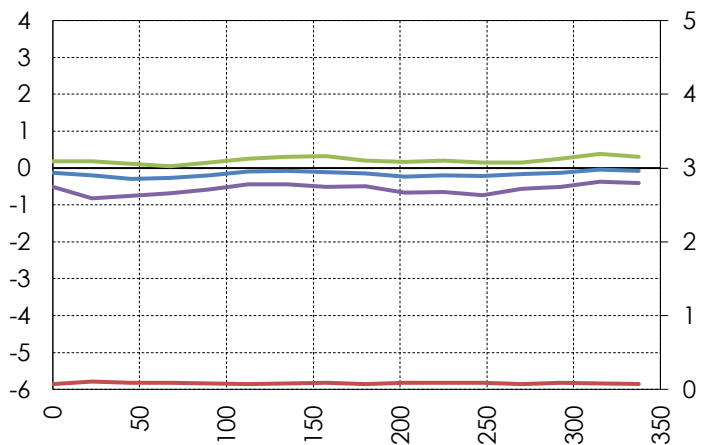
Individual Tap ID: WI04 Port ID: 12



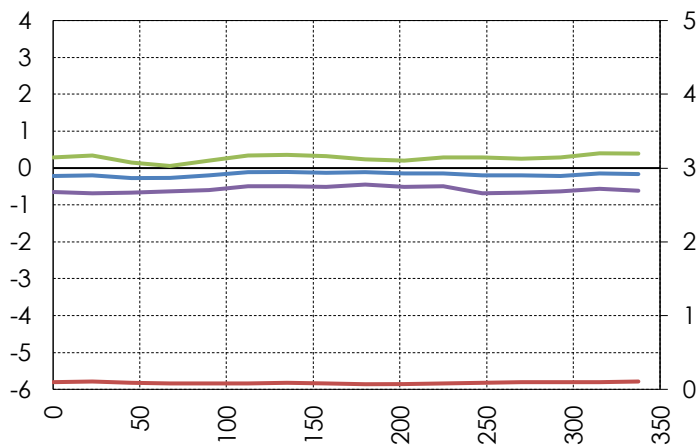
Individual Tap ID: WI05 Port ID: 14



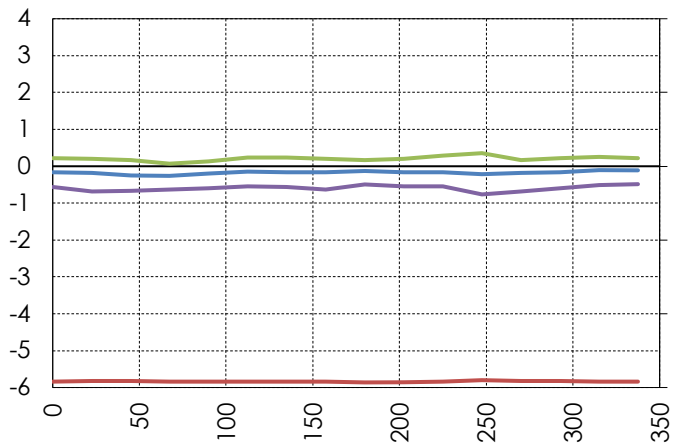
Individual Tap ID: WI06 Port ID: 15



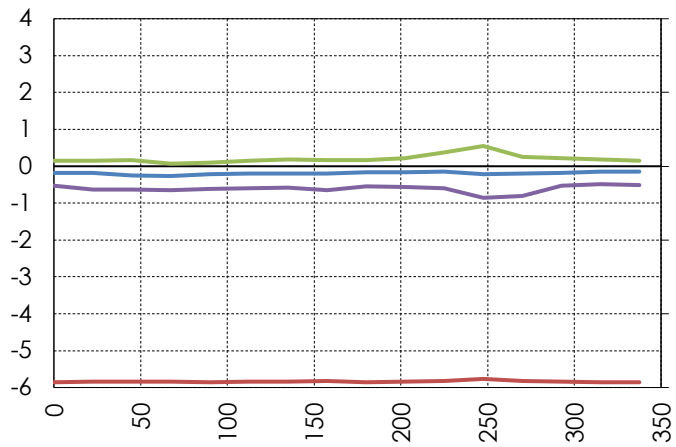
Individual Tap ID: WI07 Port ID: 16



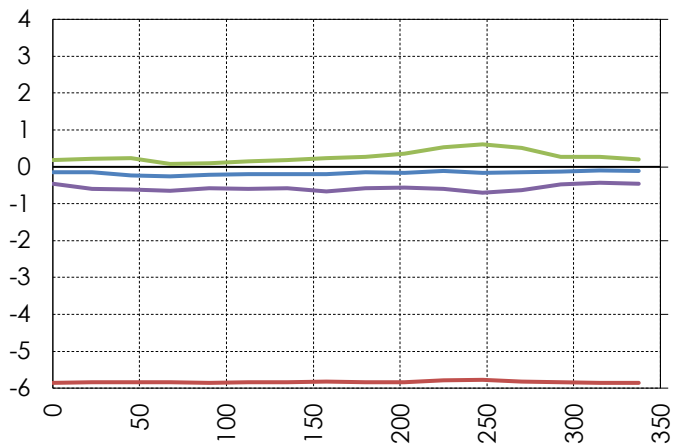
Individual Tap ID: WI08 Port ID: 17



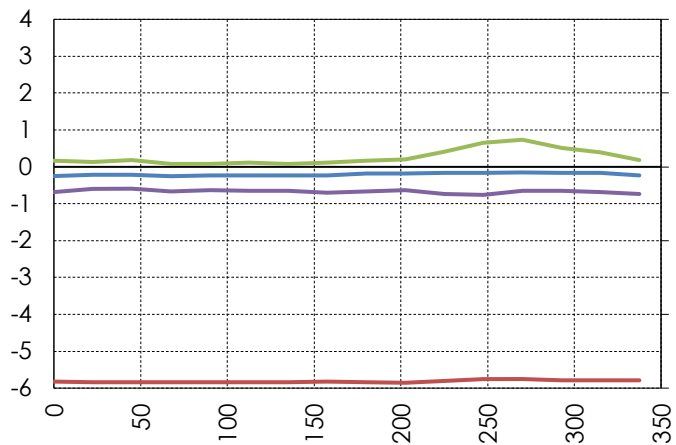
Individual Tap ID: WI09 Port ID: 18



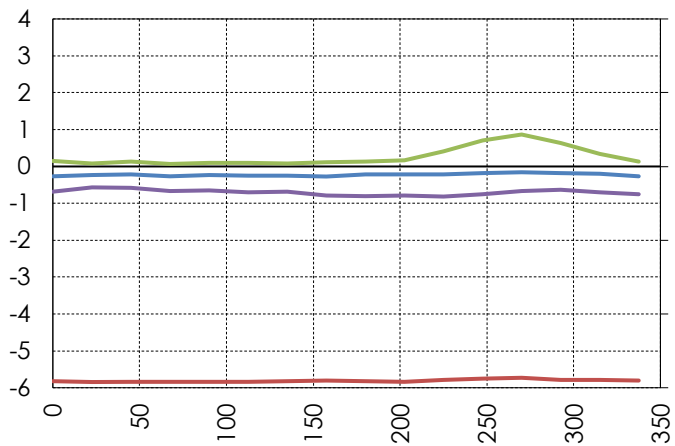
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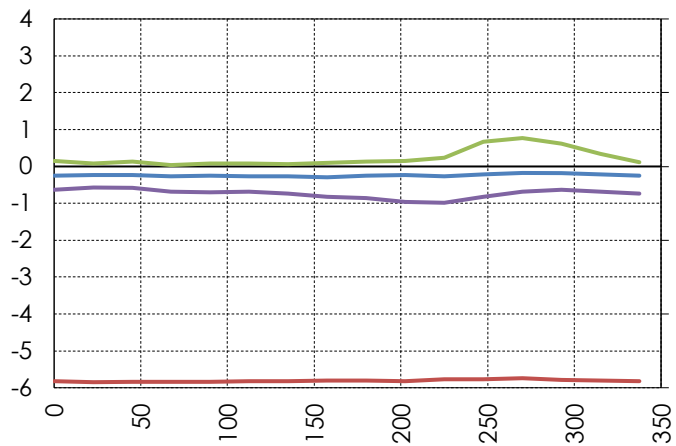
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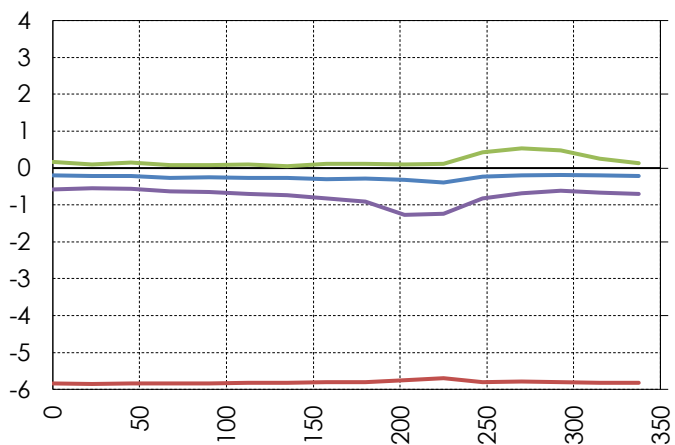
Individual Tap ID: WI12 Port ID: 21



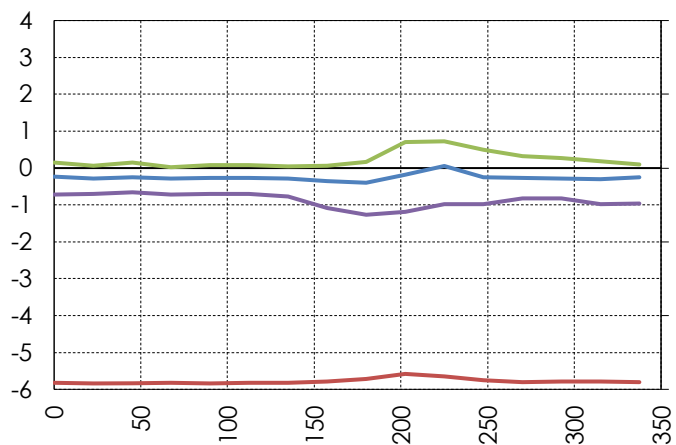
Individual Tap ID: WI13 Port ID: 22



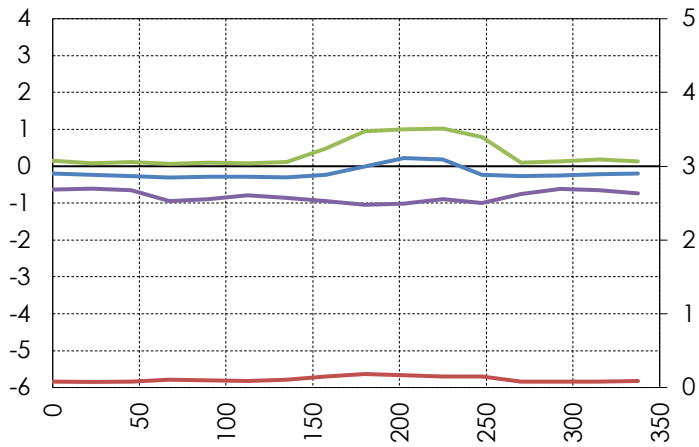
Individual Tap ID: WI14 Port ID: 23



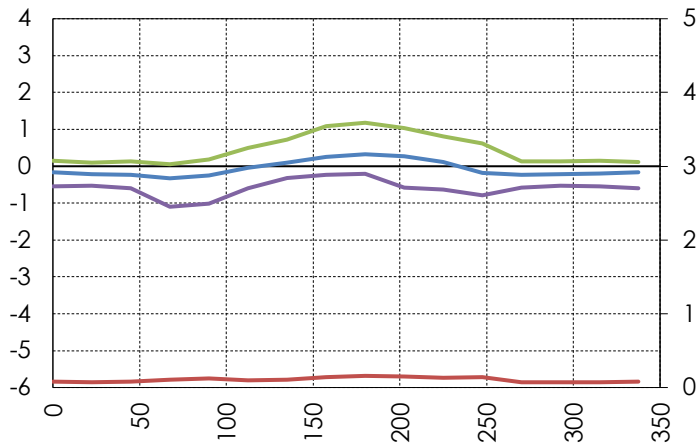
Individual Tap ID: WI15 Port ID: 24



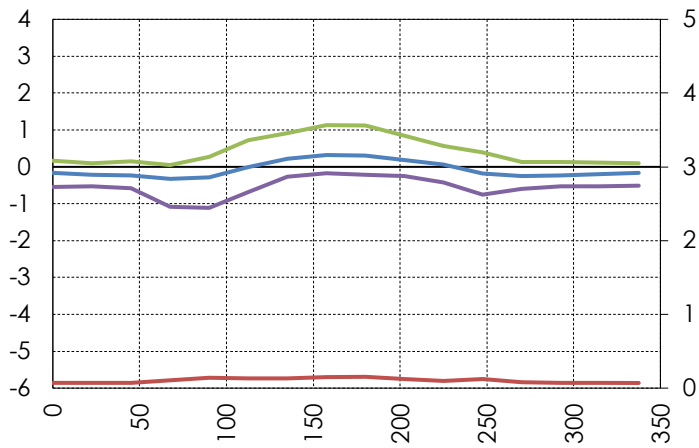
Individual Tap ID: WI16 Port ID: 25



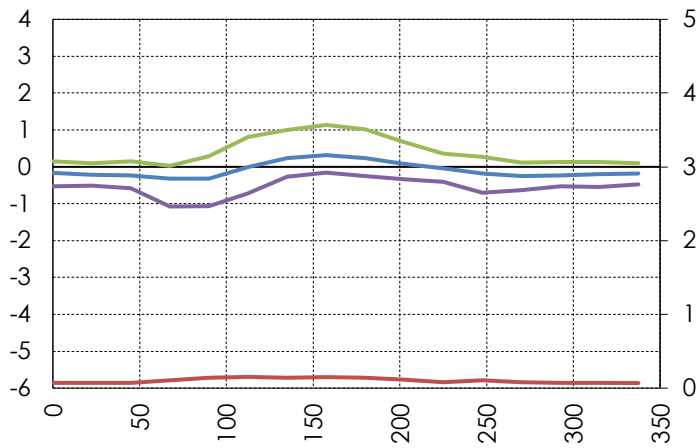
Individual Tap ID: SI01 Port ID: 26



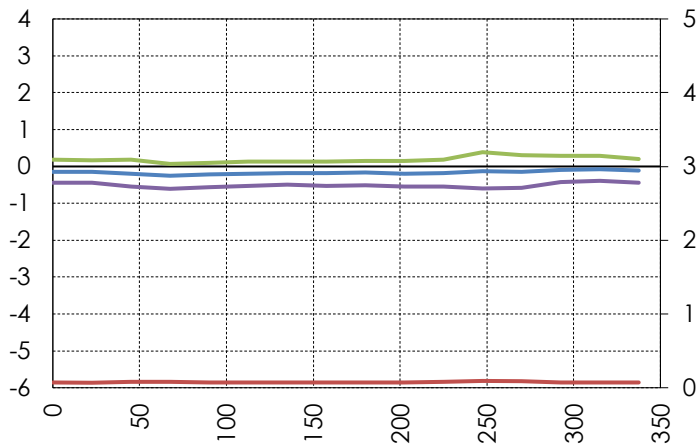
Individual Tap ID: SI02 Port ID: 27



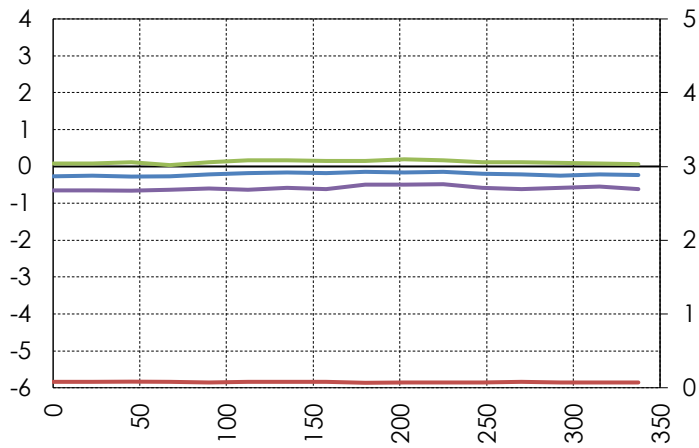
Individual Tap ID: SI03 Port ID: 28



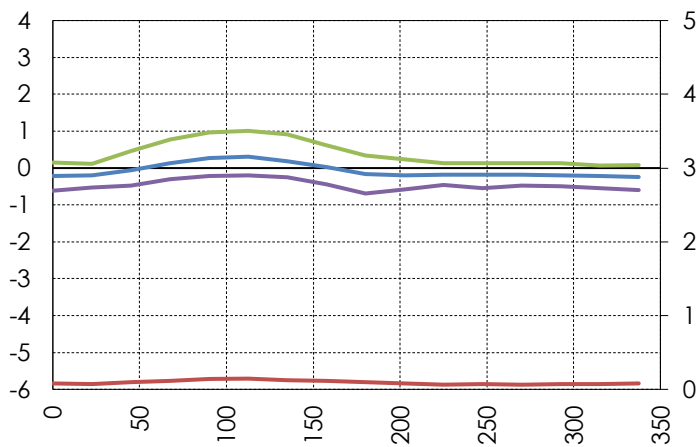
Individual Tap ID: SI04 Port ID: 29



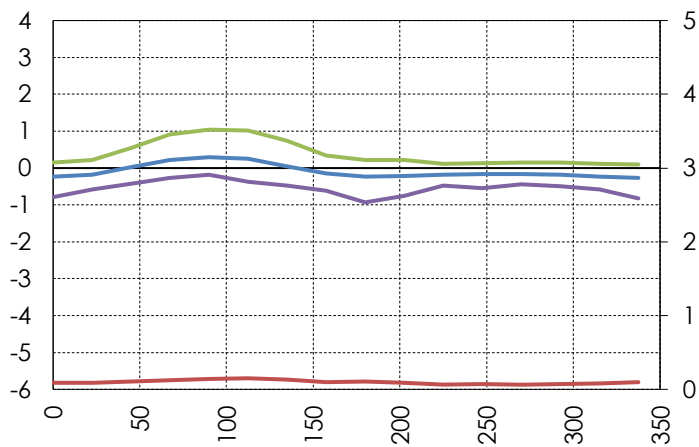
Individual Tap ID: SI05 Port ID: 30



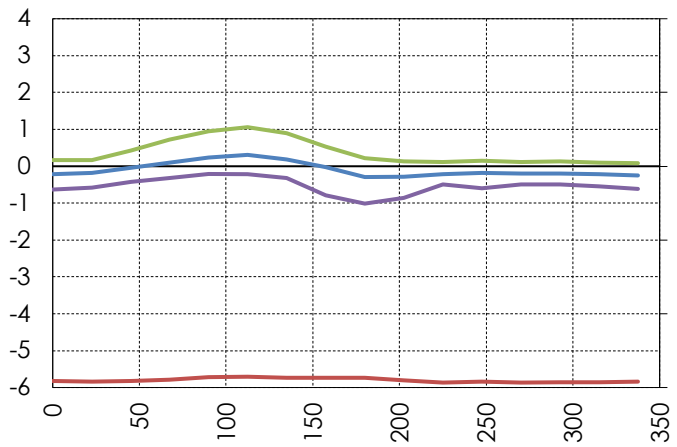
Individual Tap ID: SI06 Port ID: 31



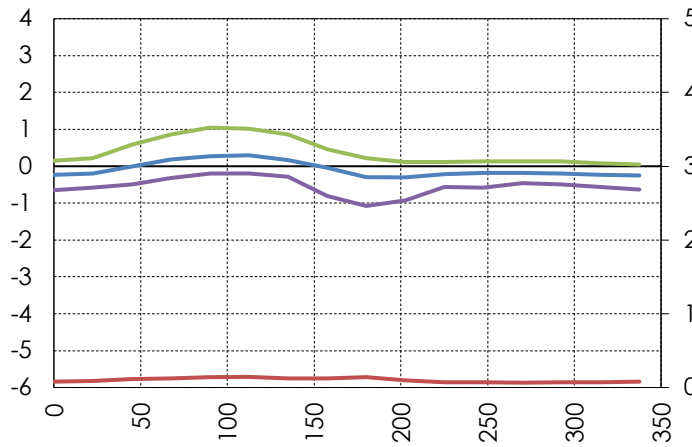
Individual Tap ID: SI07 Port ID: 32



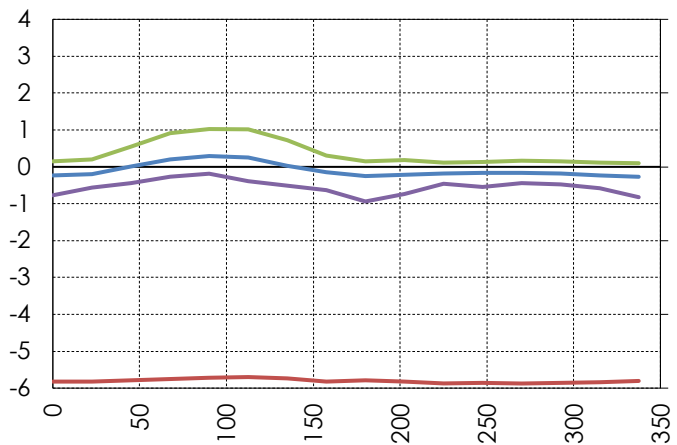
Individual Tap ID: EI01 Port ID: 33



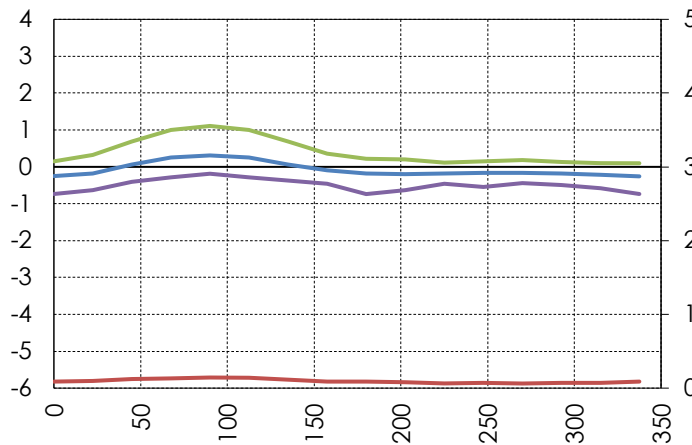
Individual Tap ID: EI02 Port ID: 34



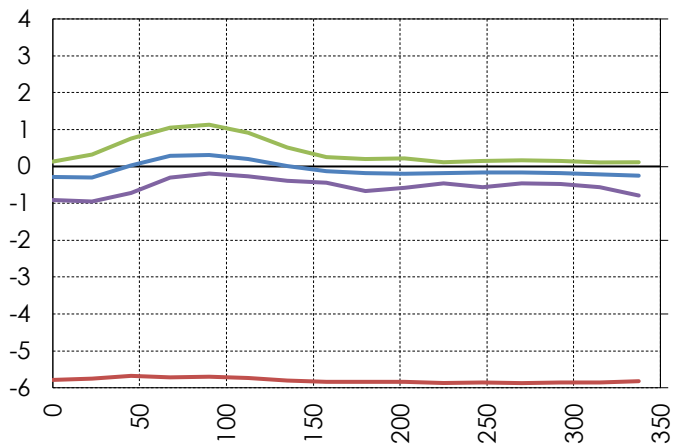
Individual Tap ID: EI03 Port ID: 35



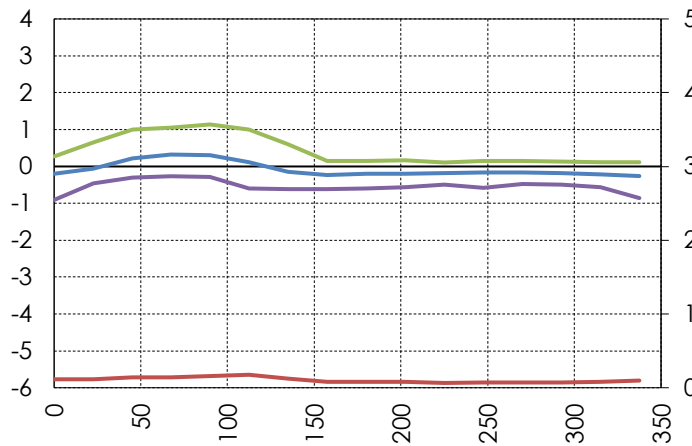
Individual Tap ID: EI04 Port ID: 36



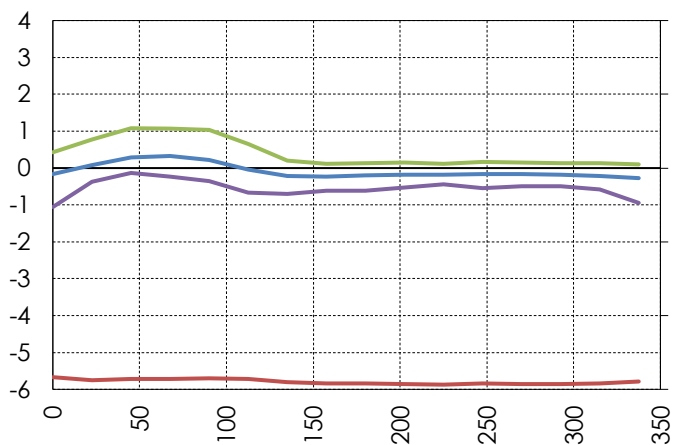
Individual Tap ID: EI05 Port ID: 37



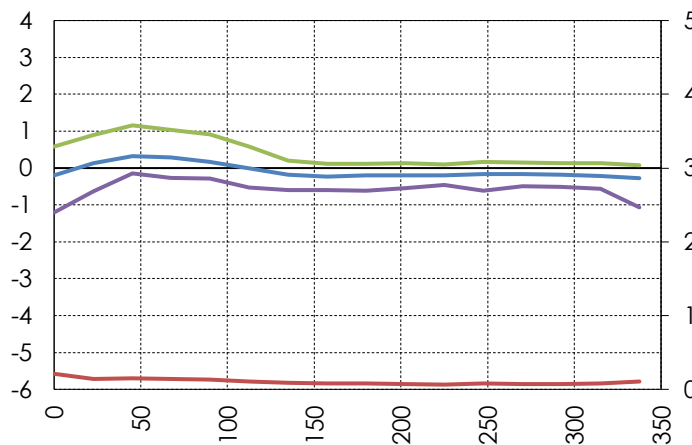
Individual Tap ID: EI06 Port ID: 38



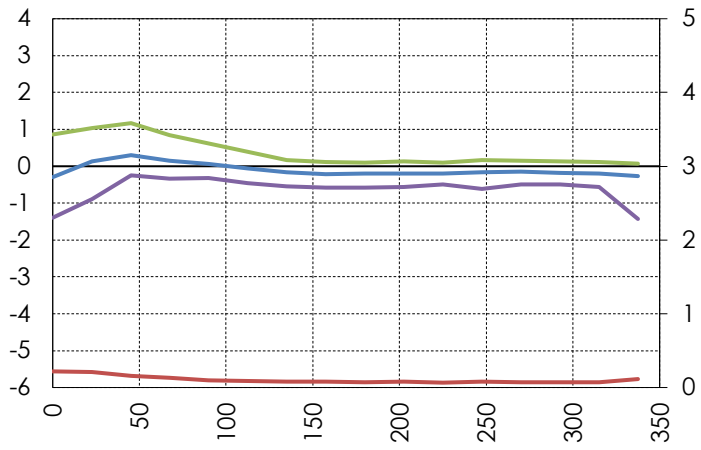
Individual Tap ID: EI07 Port ID: 39



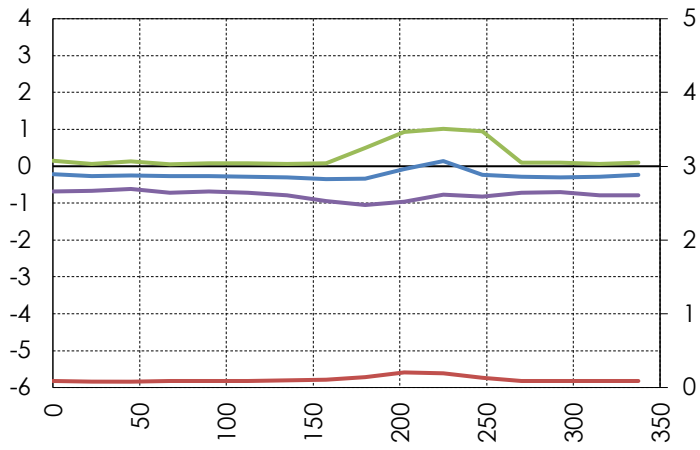
Individual Tap ID: EI08 Port ID: 40



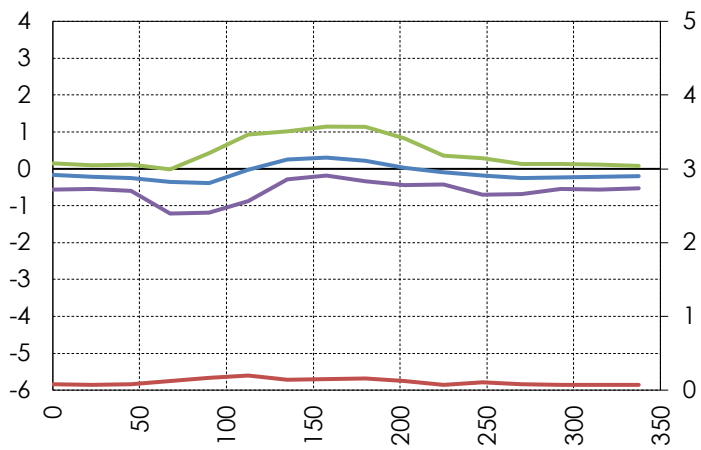
Individual Tap ID: EI09 Port ID: 41



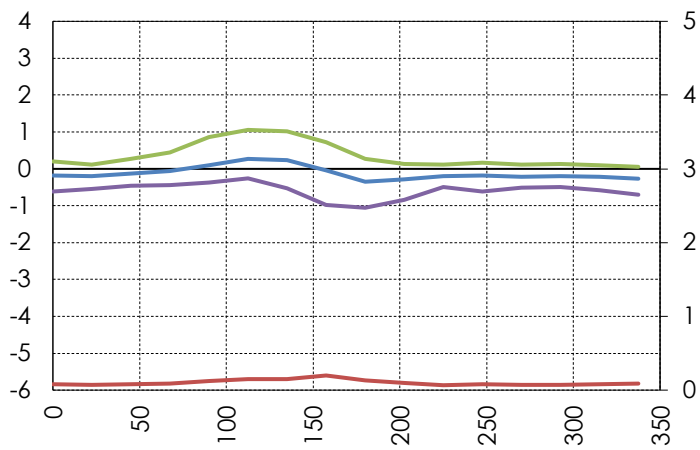
Individual Tap ID: SH01 Port ID: 42



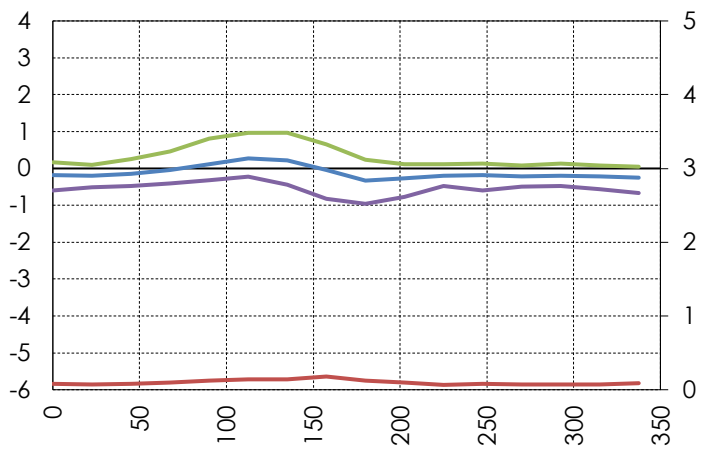
Individual Tap ID: SH02 Port ID: 43



Individual Tap ID: EH01 Port ID: 44



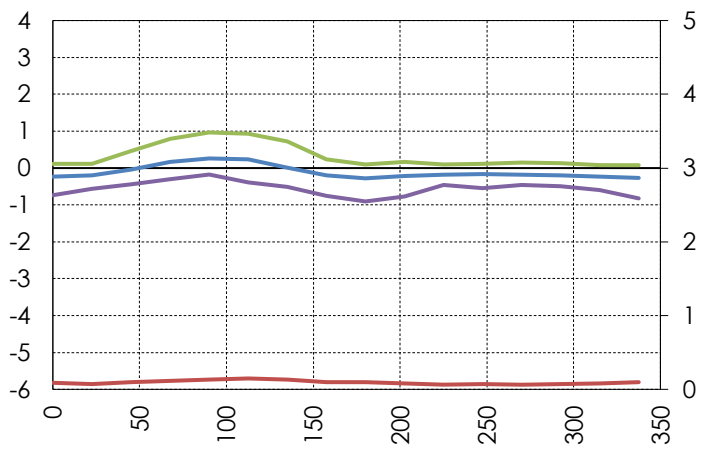
Individual Tap ID: EH02 Port ID: 45



Individual Tap ID: NF01 Port ID: 46



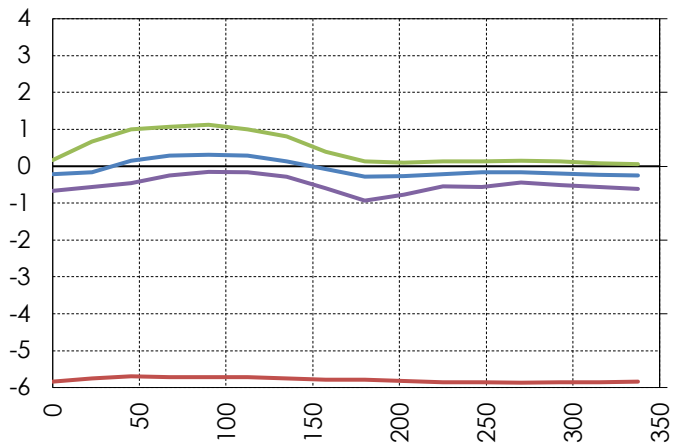
Individual Tap ID: SF01 Port ID: 47



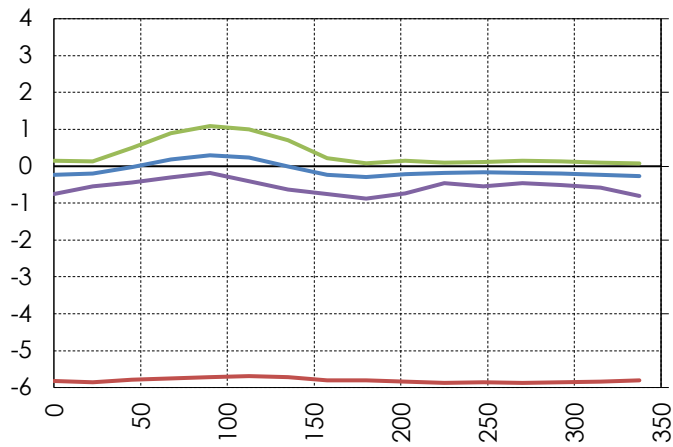
Individual Tap ID: EF01 Port ID: 48



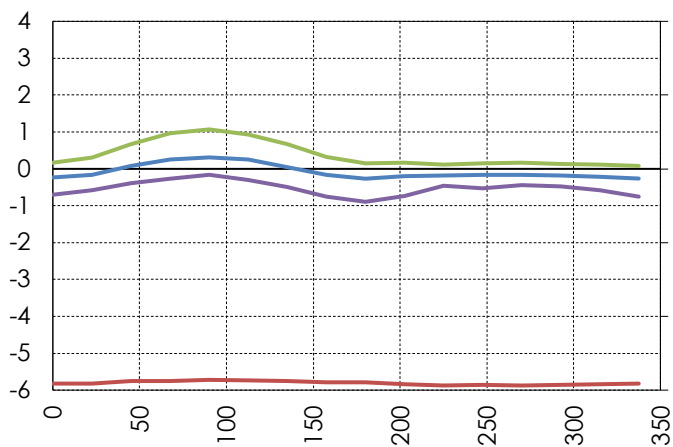
Individual Tap ID: EF02 Port ID: 49



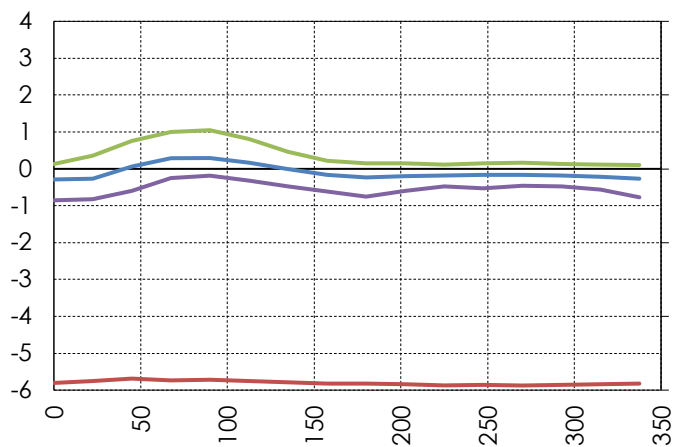
Individual Tap ID: EF03 Port ID: 50



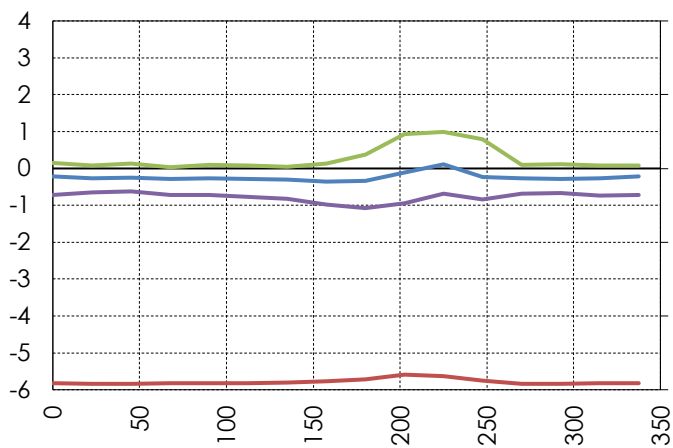
Individual Tap ID: EF04 Port ID: 51



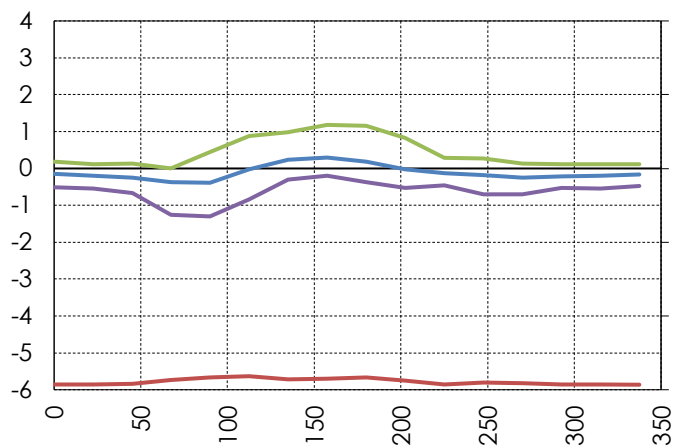
Individual Tap ID: EF05 Port ID: 52



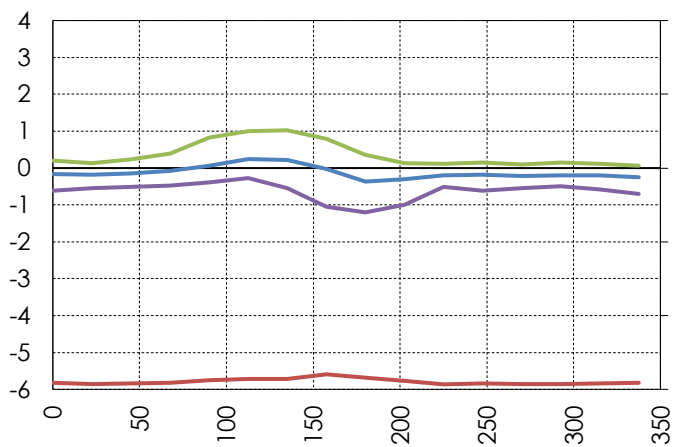
Individual Tap ID: SE12 Port ID: 53



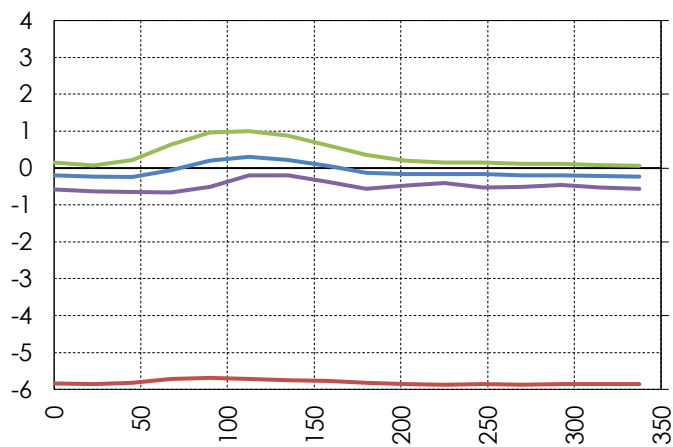
Individual Tap ID: SE14 Port ID: 54



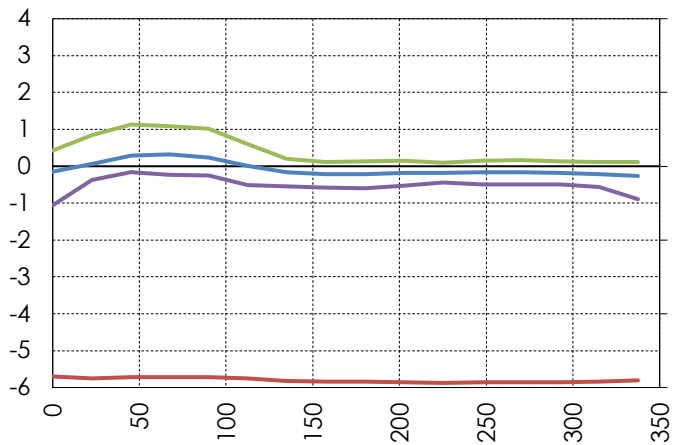
Individual Tap ID: EE02 Port ID: 55



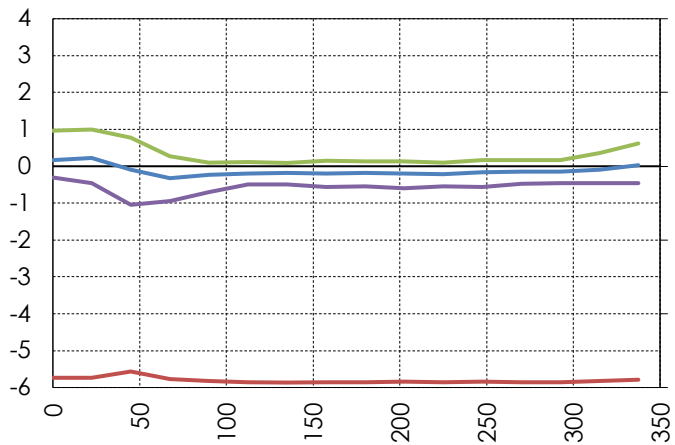
Individual Tap ID: EE08 Port ID: 56



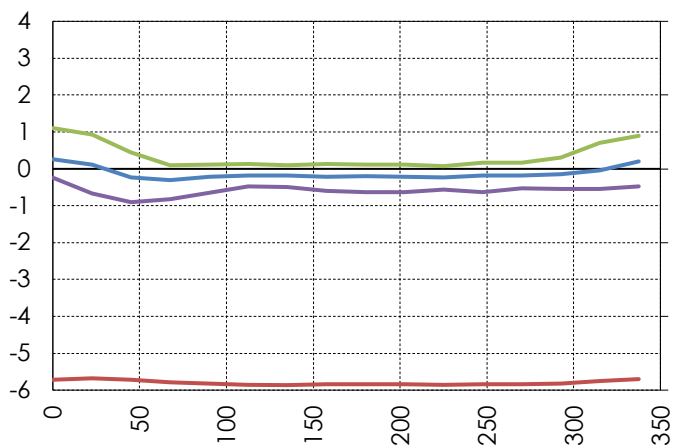
Individual Tap ID: ND01 Port ID: 64



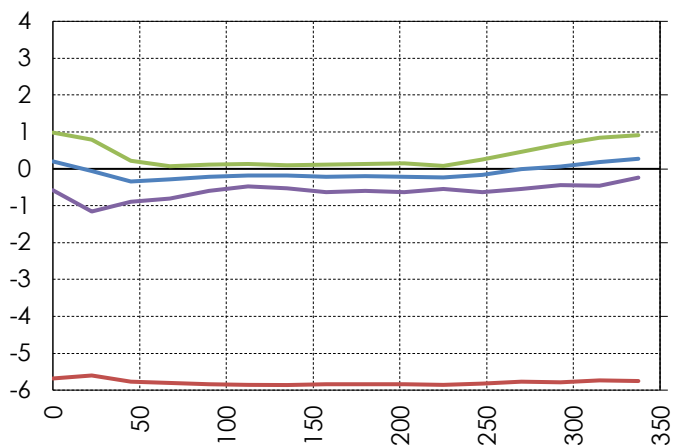
Individual Tap ID: ND02 Port ID: 65



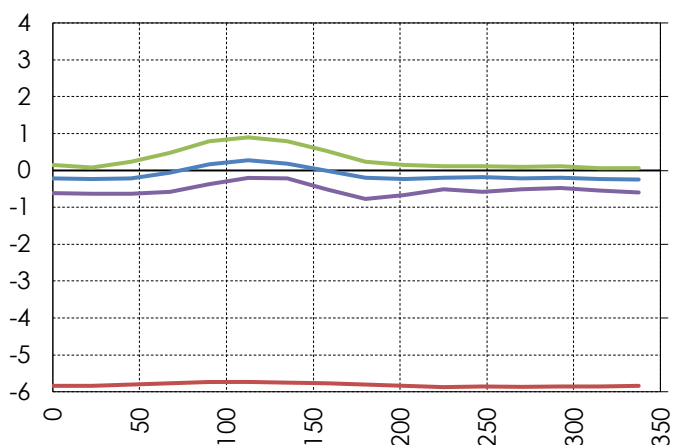
Individual Tap ID: ND03 Port ID: 66



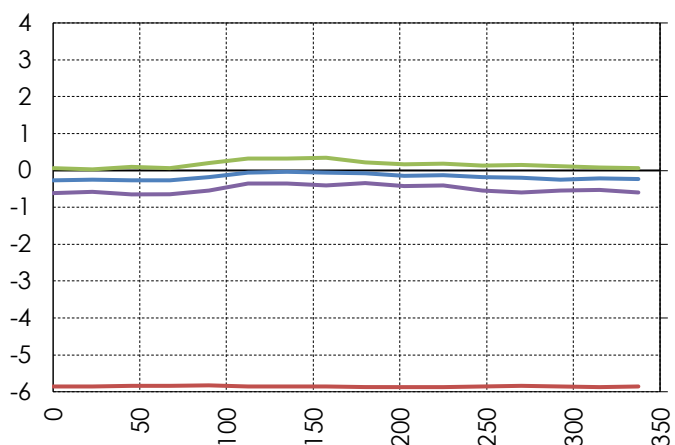
Individual Tap ID: ND04 Port ID: 67



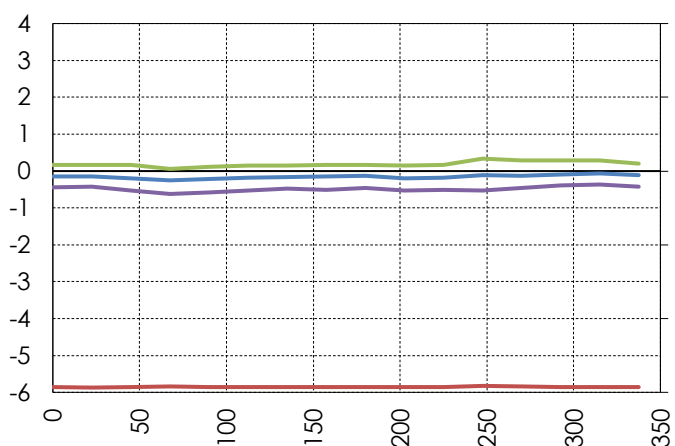
Individual Tap ID: ND05 Port ID: 68



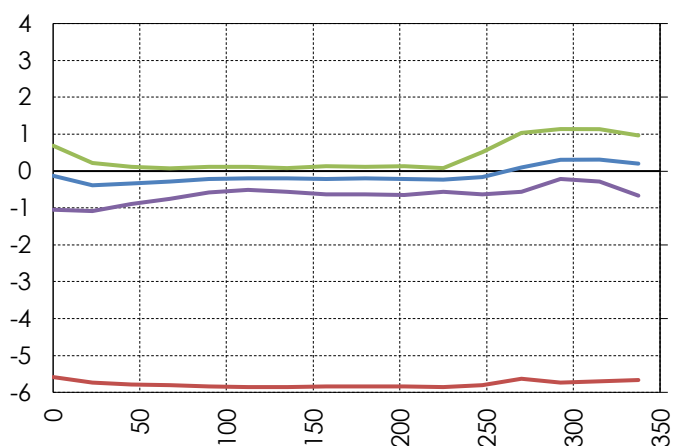
Individual Tap ID: ND06 Port ID: 69



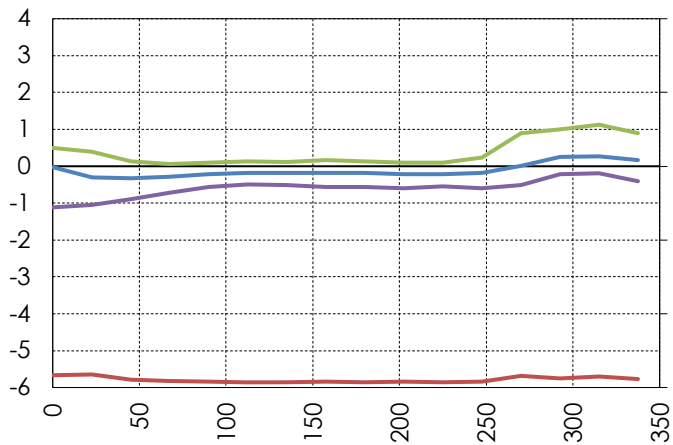
Individual Tap ID: ND07 Port ID: 70



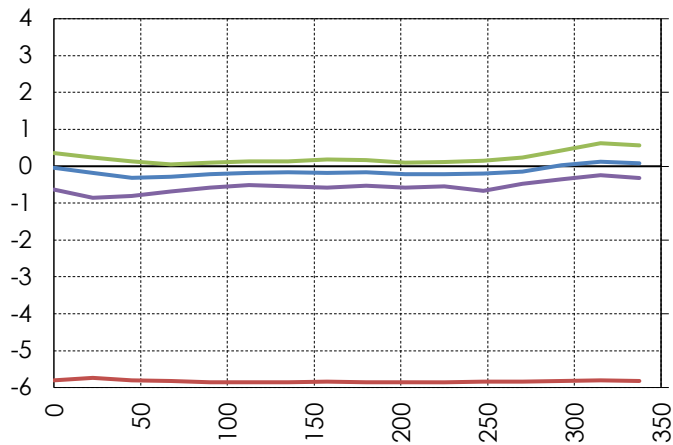
Individual Tap ID: WD01 Port ID: 71



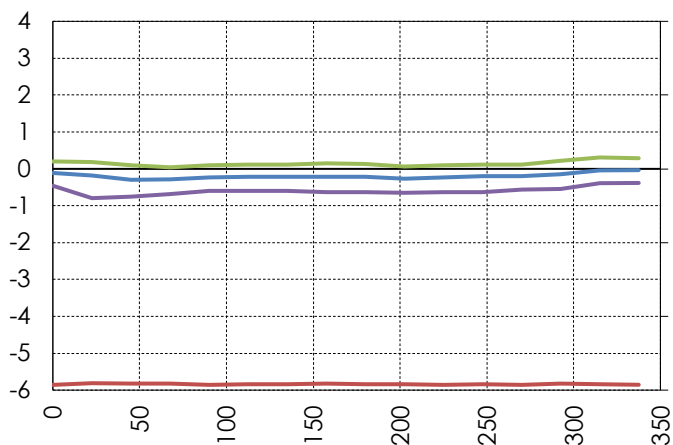
Individual Tap ID: WD02 Port ID: 72



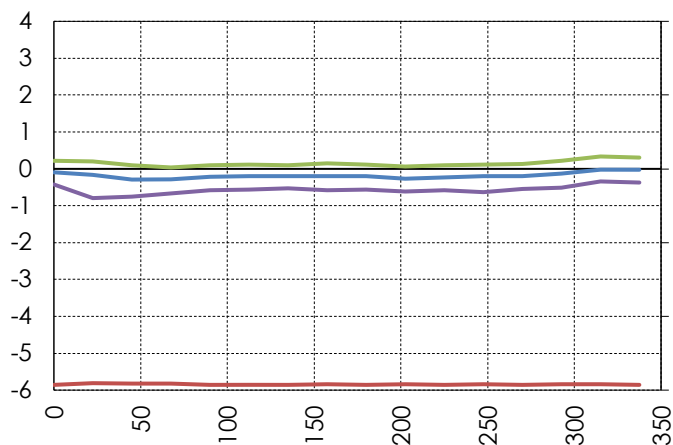
Individual Tap ID: WD03 Port ID: 73



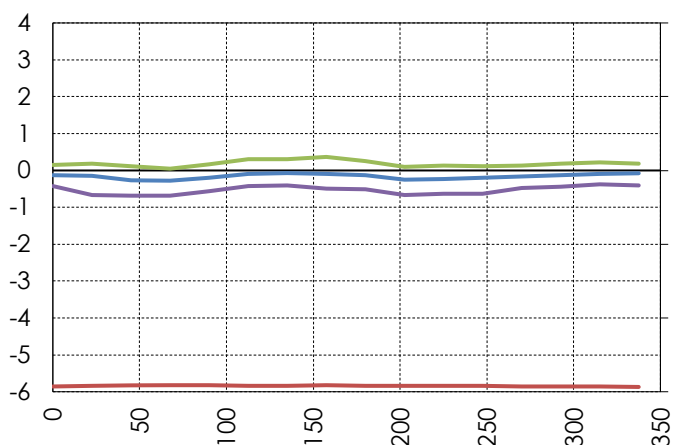
Individual Tap ID: WD04 Port ID: 74



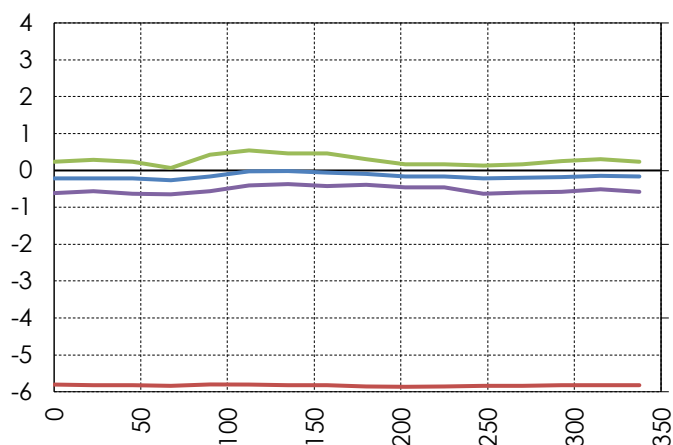
Individual Tap ID: WD05 Port ID: 75



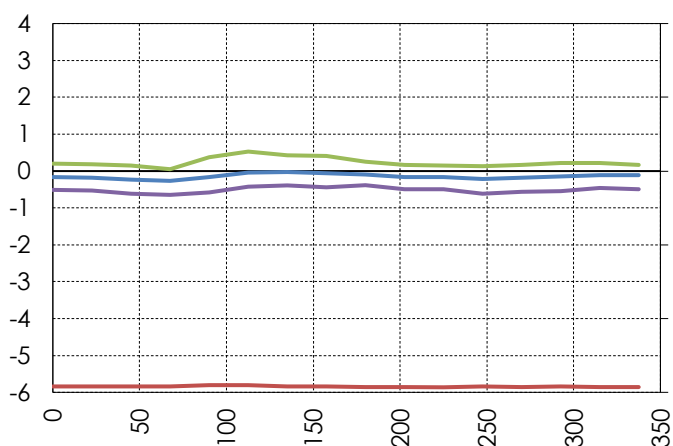
Individual Tap ID: WD06 Port ID: 76



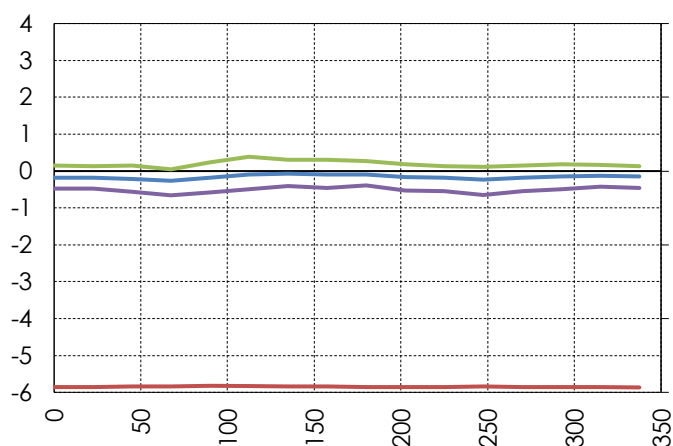
Individual Tap ID: WD07 Port ID: 77



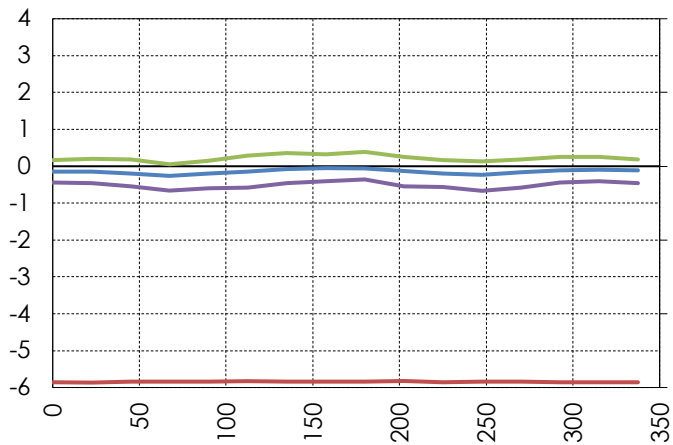
Individual Tap ID: WD08 Port ID: 78



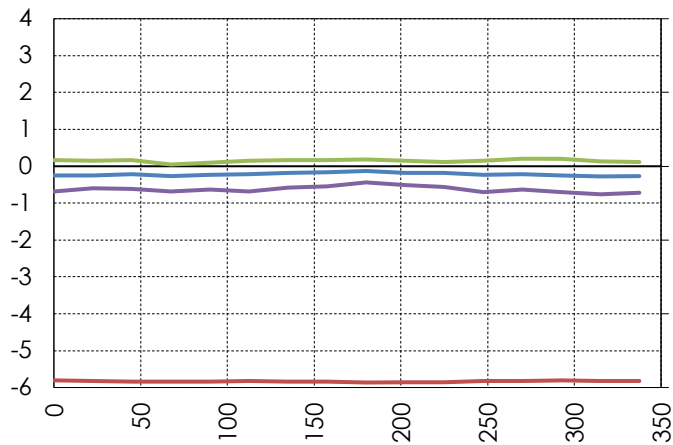
Individual Tap ID: WD09 Port ID: 79



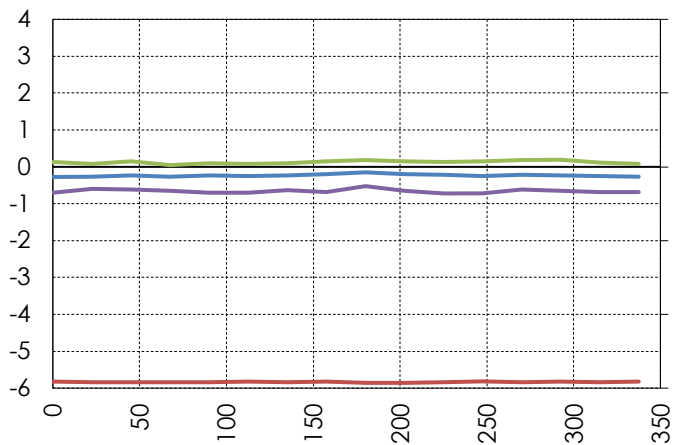
Individual Tap ID: WD10 Port ID: 80



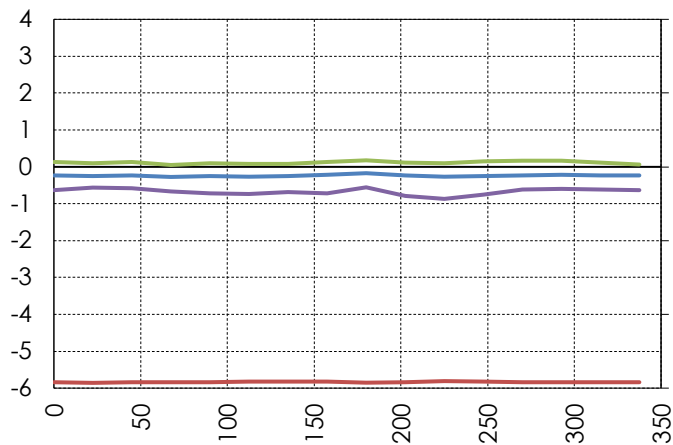
Individual Tap ID: WD11 Port ID: 81



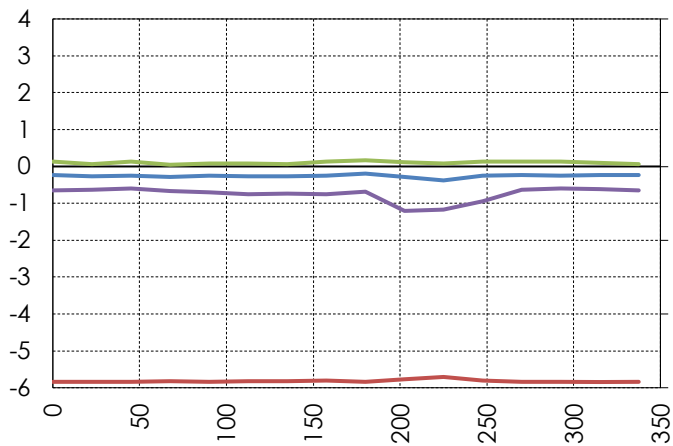
Individual Tap ID: WD12 Port ID: 82



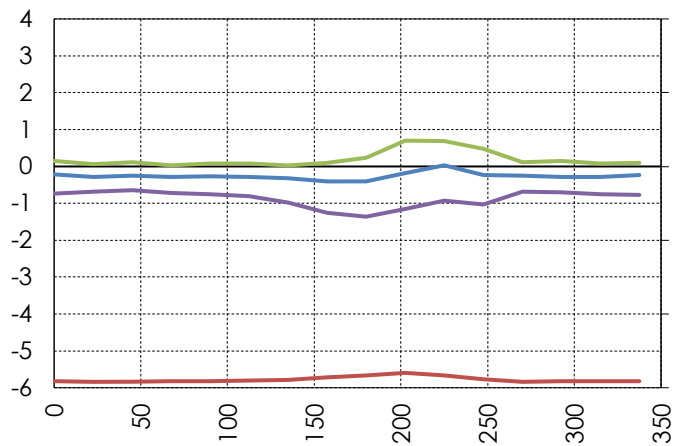
Individual Tap ID: WD13 Port ID: 83



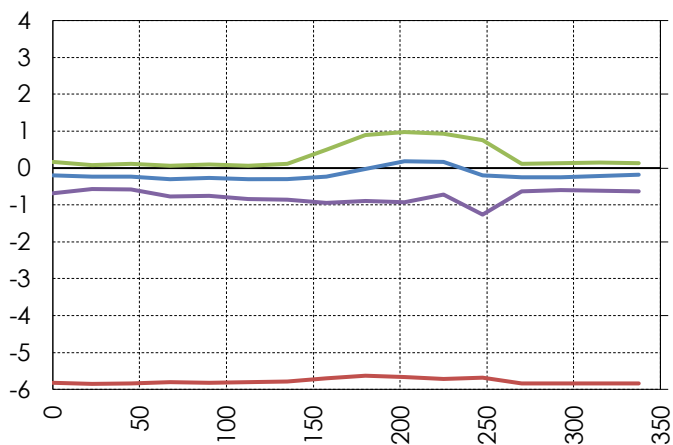
Individual Tap ID: WD14 Port ID: 84



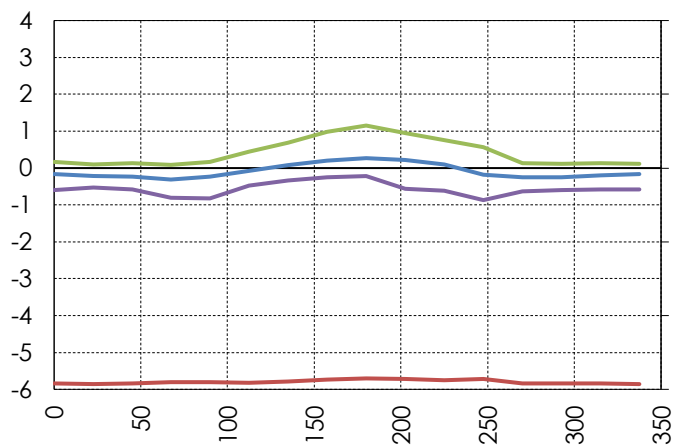
Individual Tap ID: WD15 Port ID: 85



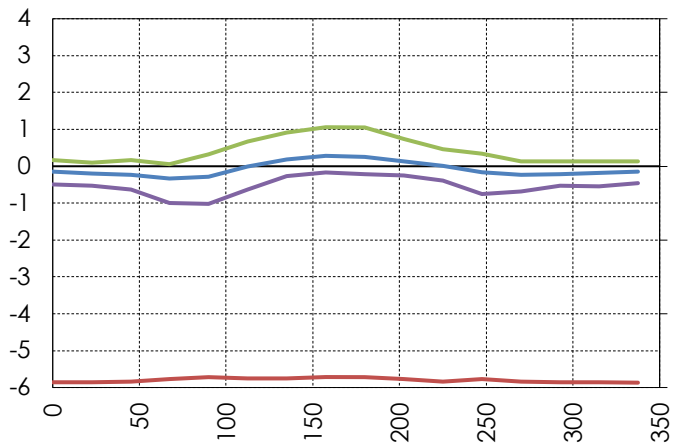
Individual Tap ID: WD16 Port ID: 86



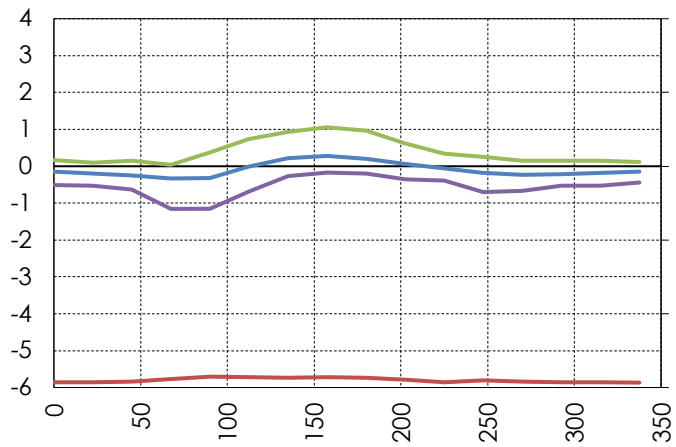
Individual Tap ID: SD01 Port ID: 87



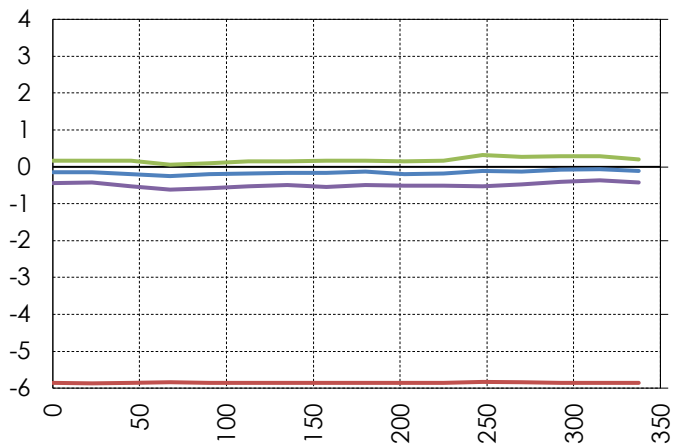
Individual Tap ID: SD02 Port ID: 88



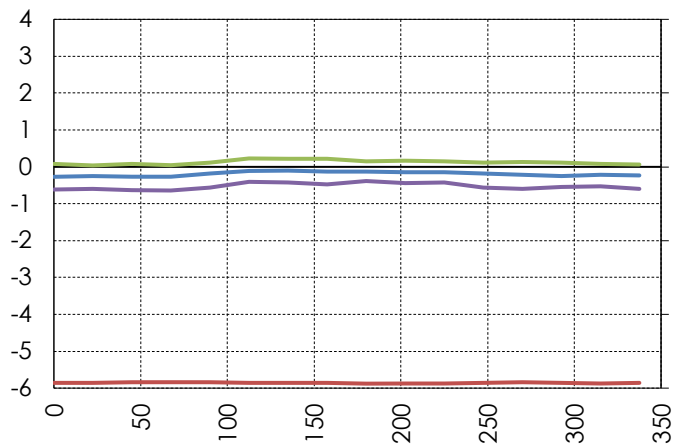
Individual Tap ID: SD03 Port ID: 89



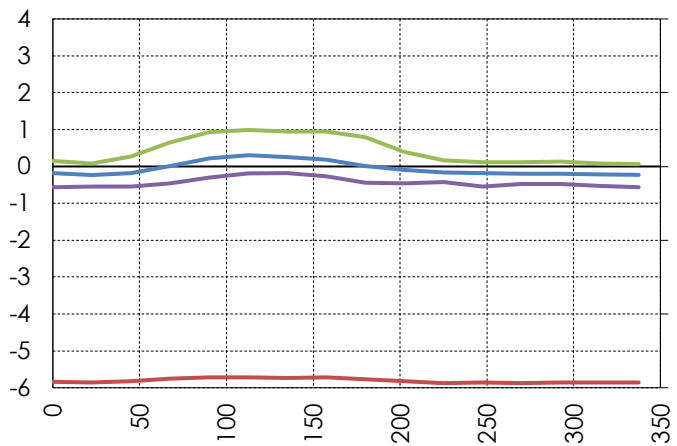
Individual Tap ID: SD04 Port ID: 90



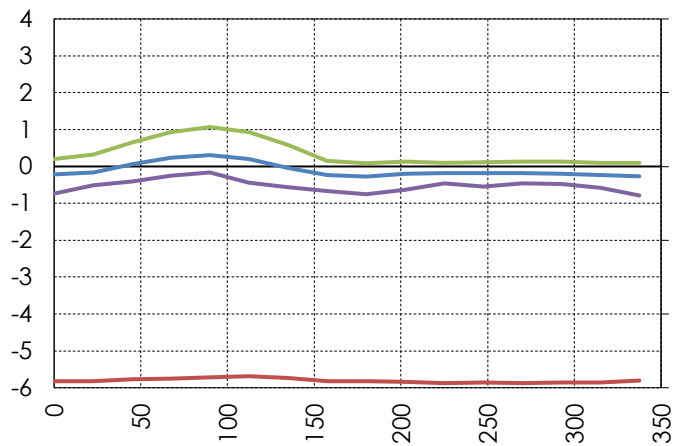
Individual Tap ID: SD05 Port ID: 91



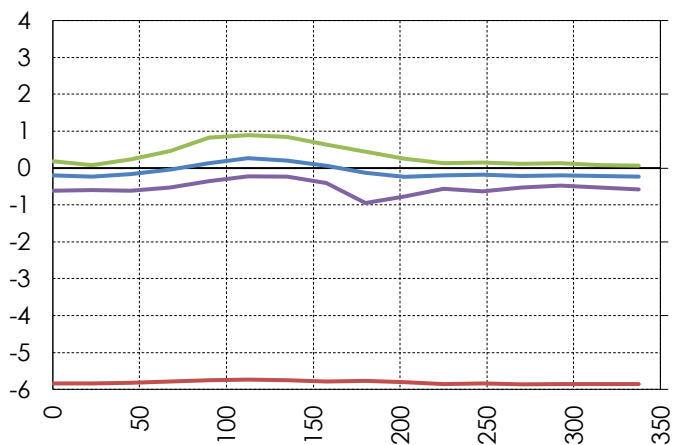
Individual Tap ID: SD06 Port ID: 92



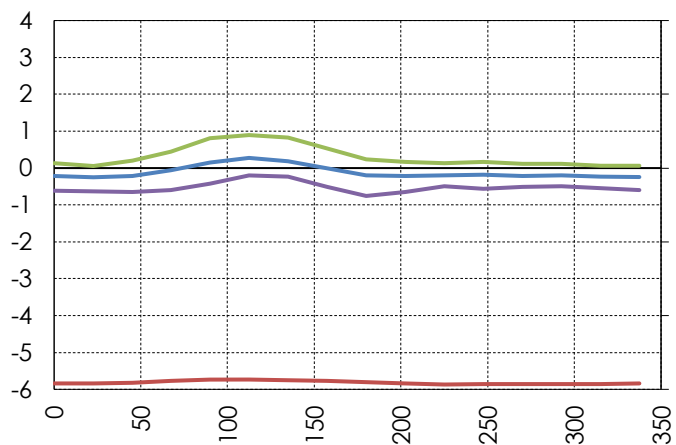
Individual Tap ID: SD07 Port ID: 93



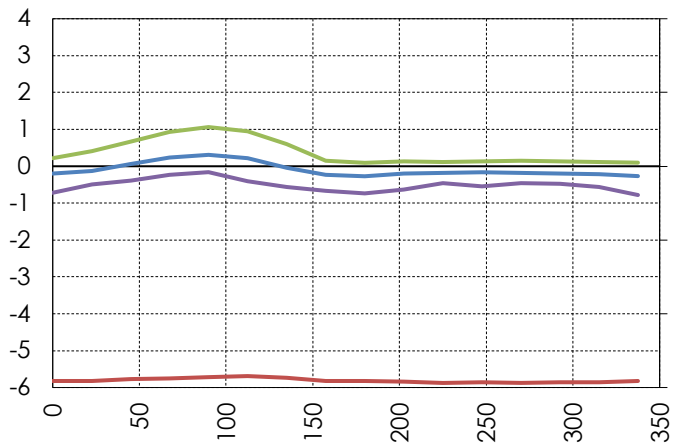
Individual Tap ID: ED01 Port ID: 94



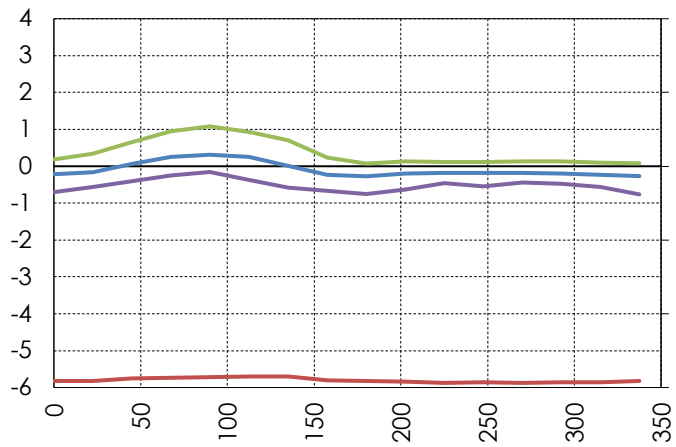
Individual Tap ID: ED02 Port ID: 95



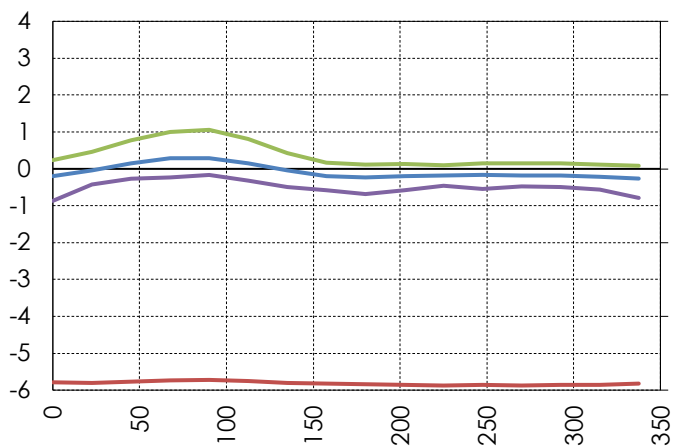
Individual Tap ID: ED03 Port ID: 96



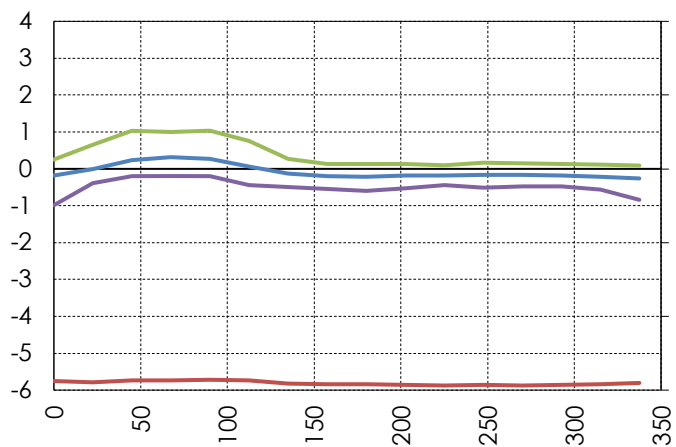
Individual Tap ID: ED04 Port ID: 97



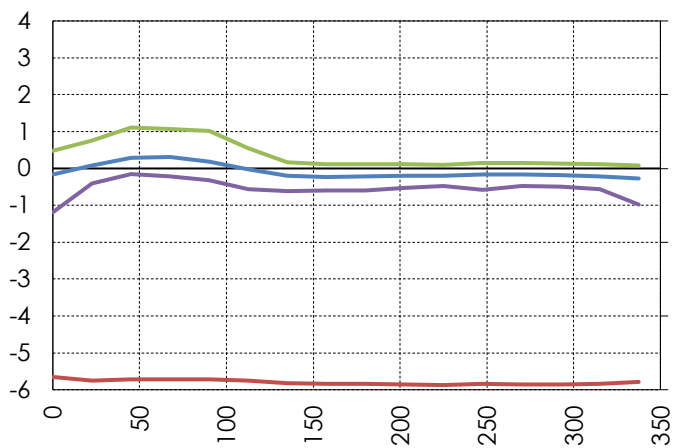
Individual Tap ID: ED05 Port ID: 98



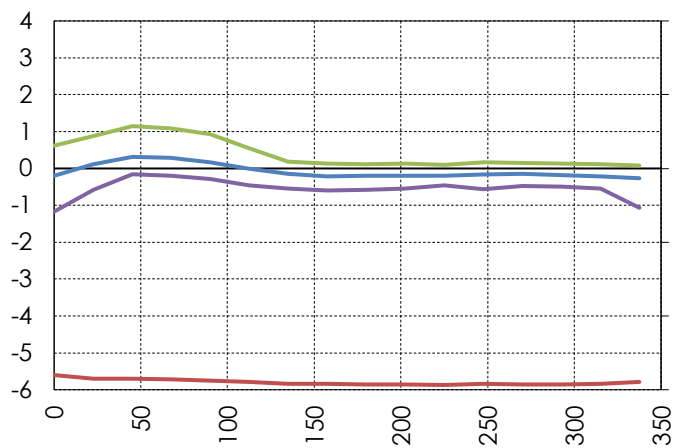
Individual Tap ID: ED06 Port ID: 99



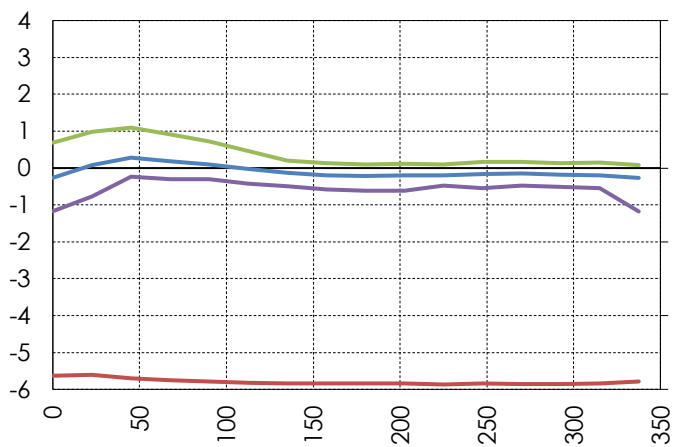
Individual Tap ID: ED07 Port ID: 100



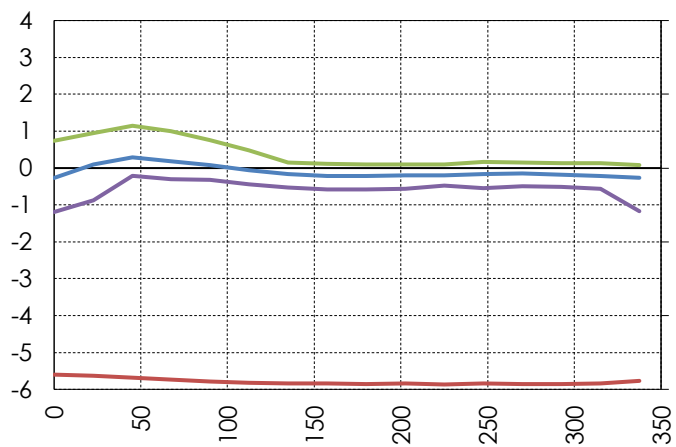
Individual Tap ID: ED08 Port ID: 101



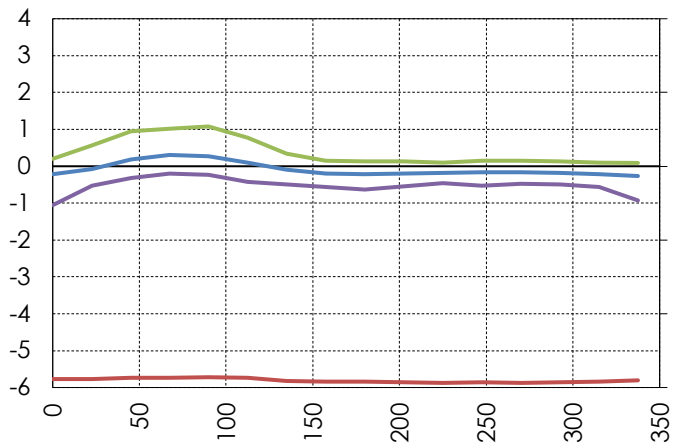
Individual Tap ID: ED10 Port ID: 102



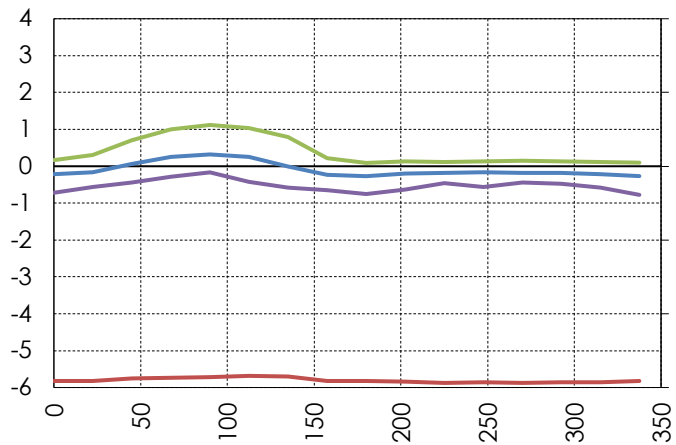
Individual Tap ID: RD01 Port ID: 103



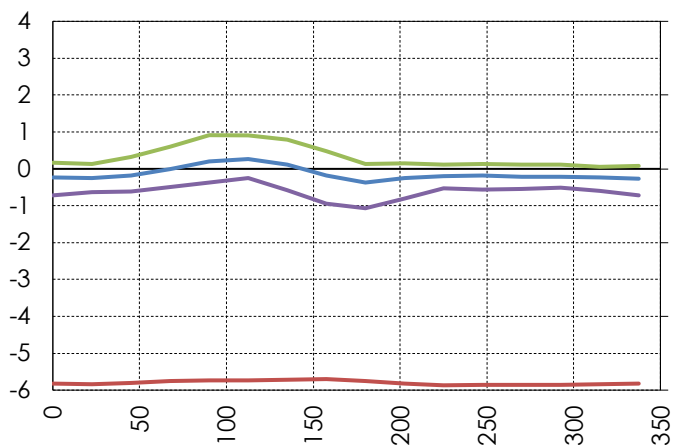
Individual Tap ID: RD02 Port ID: 104



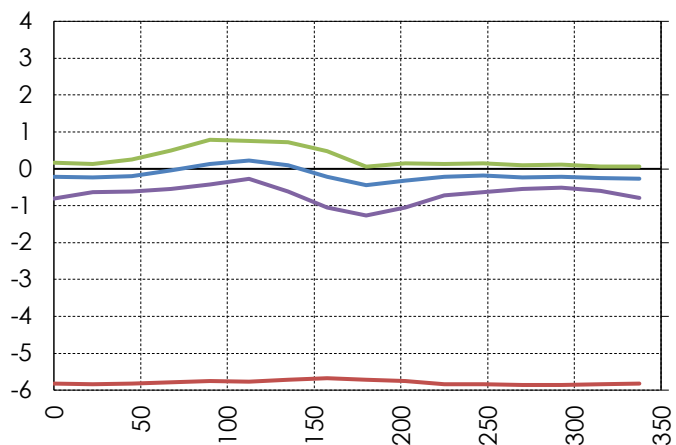
Individual Tap ID: RD03 Port ID: 105



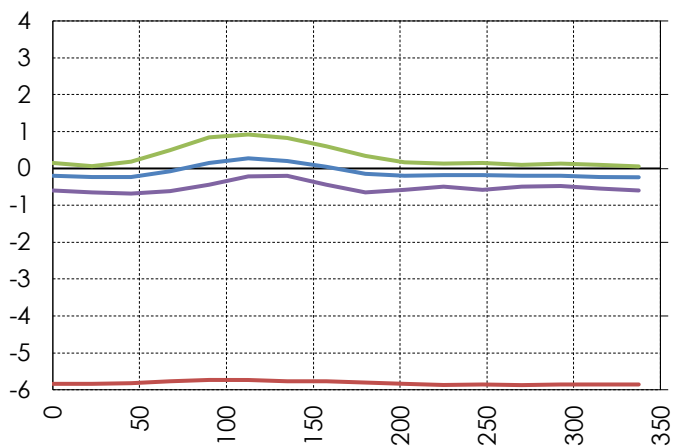
Individual Tap ID: RD04 Port ID: 106



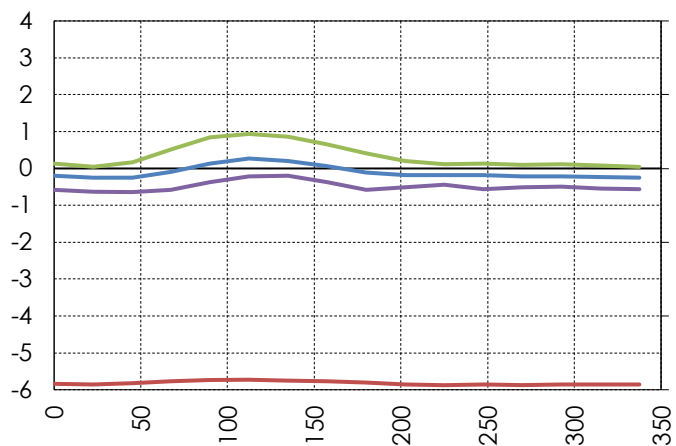
Individual Tap ID: RD05 Port ID: 107



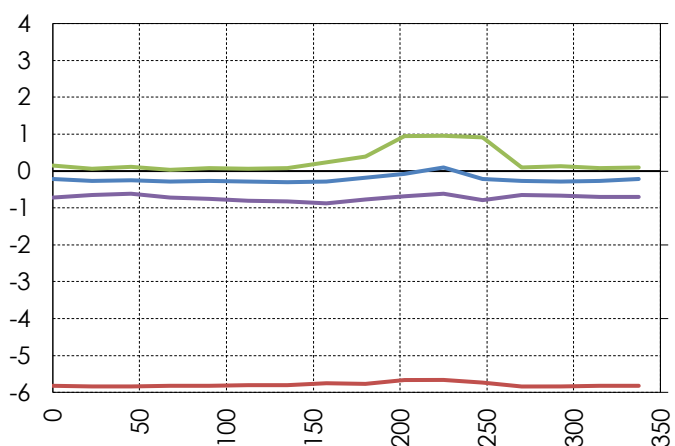
Individual Tap ID: NC01 Port ID: 108



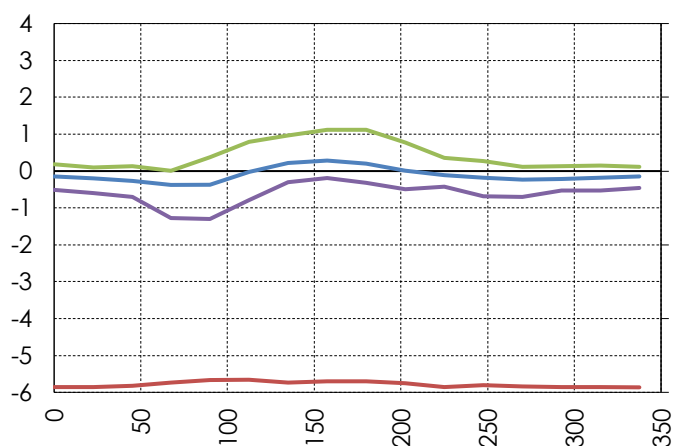
Individual Tap ID: NC02 Port ID: 109



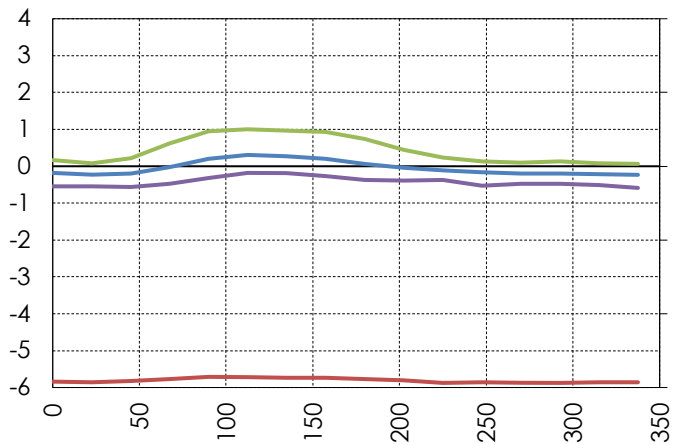
Individual Tap ID: SC12 Port ID: 110



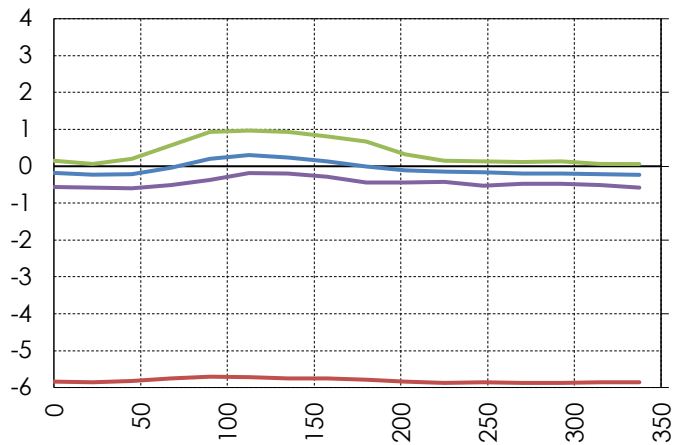
Individual Tap ID: SC14 Port ID: 111



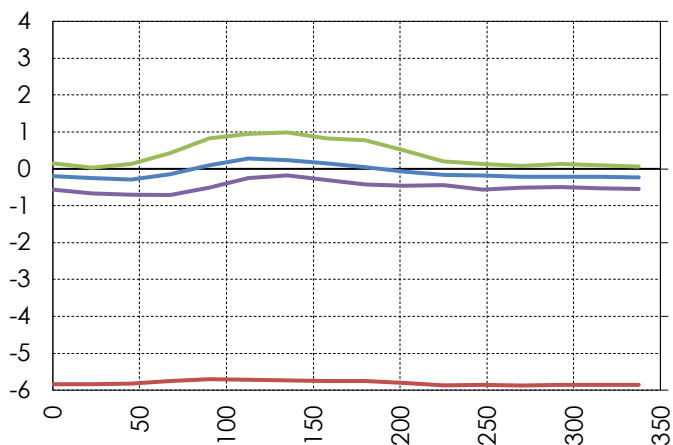
Individual Tap ID: SC15 Port ID: 112



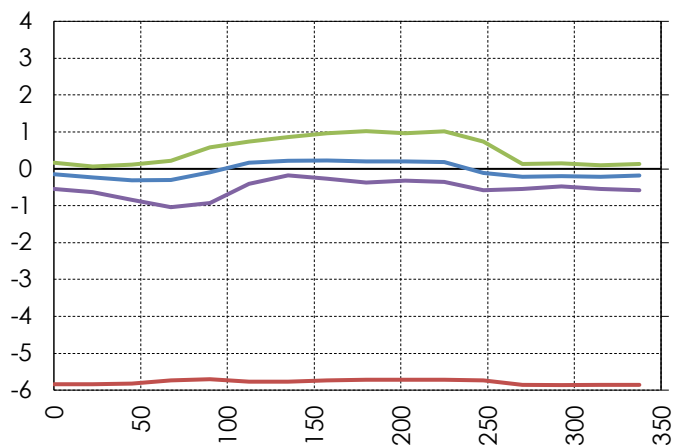
Individual Tap ID: SC16 Port ID: 113



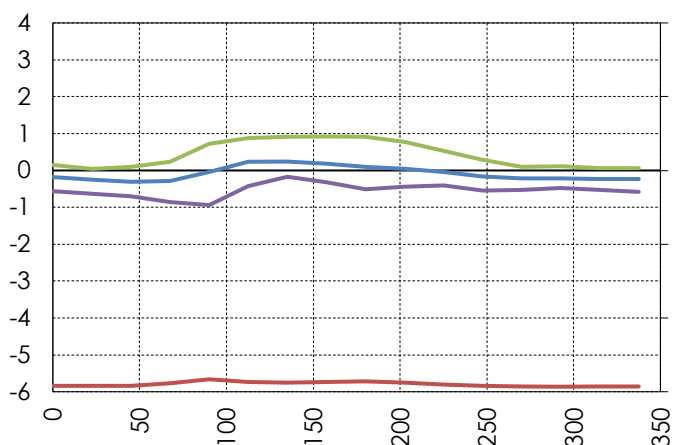
Individual Tap ID: SC17 Port ID: 114



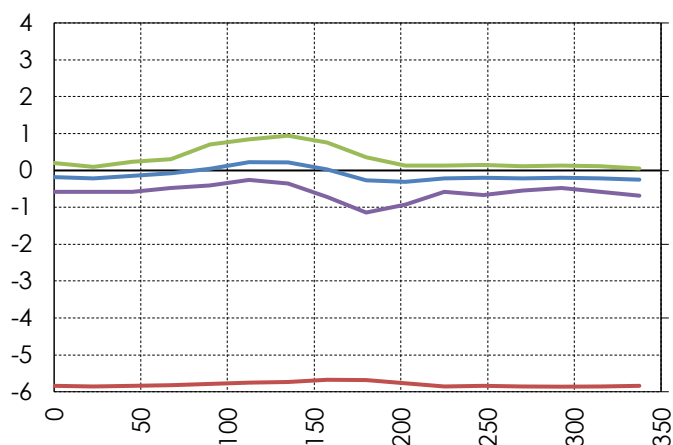
Individual Tap ID: SC18 Port ID: 115



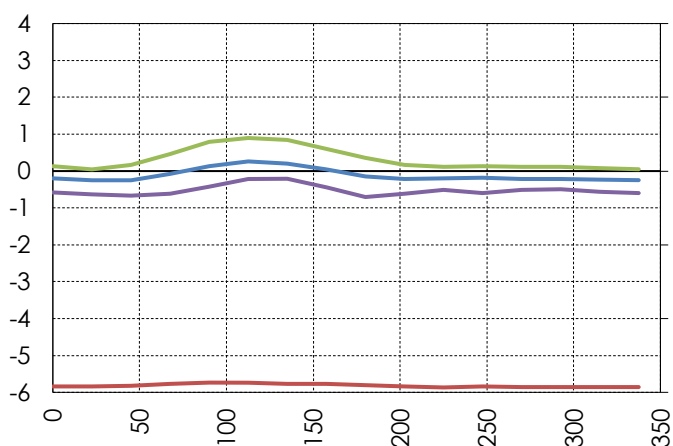
Individual Tap ID: SC19 Port ID: 116



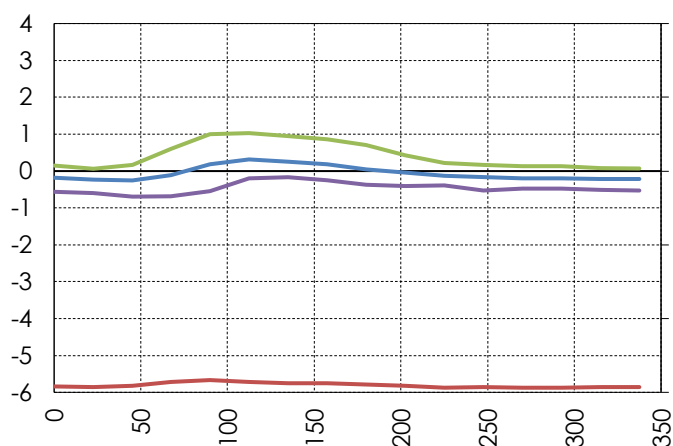
Individual Tap ID: EC02 Port ID: 117



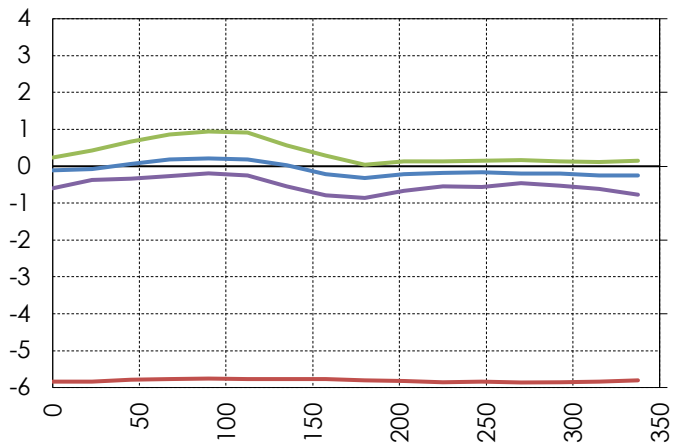
Individual Tap ID: EC04 Port ID: 118



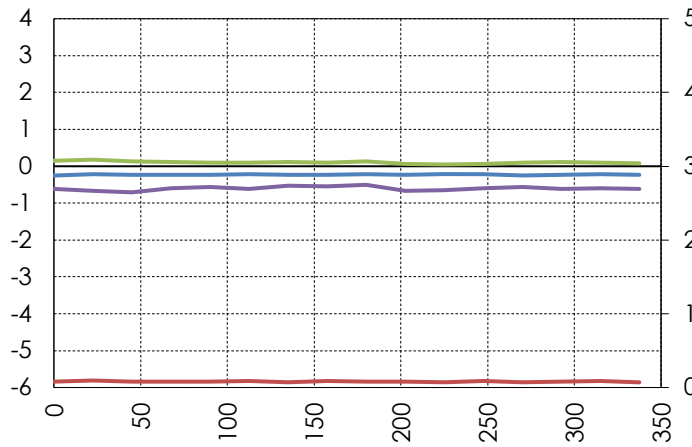
Individual Tap ID: EC09 Port ID: 119



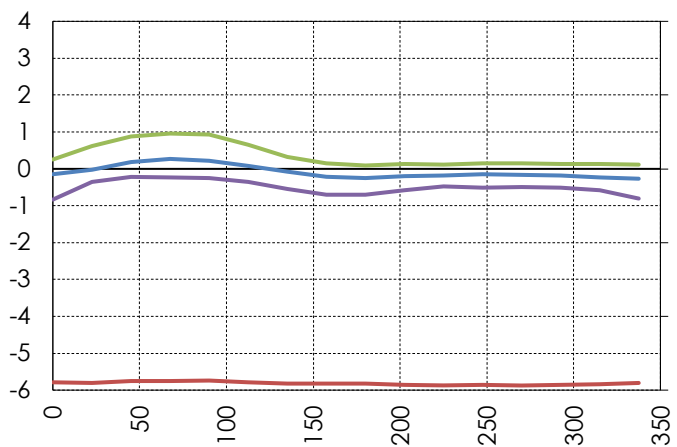
Individual Tap ID: NB01 Port ID: 128



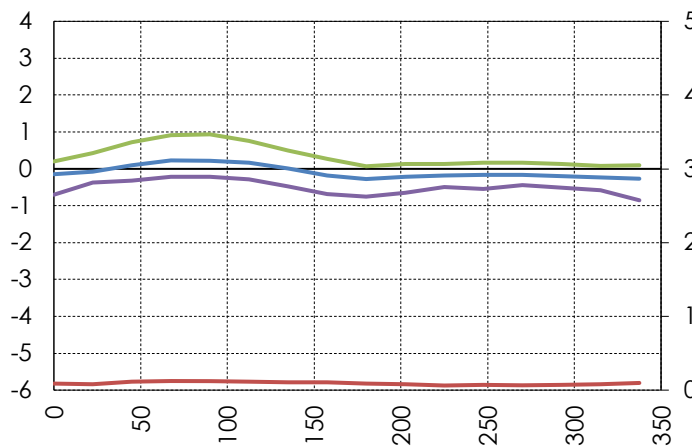
Individual Tap ID: NB02 Port ID: 129



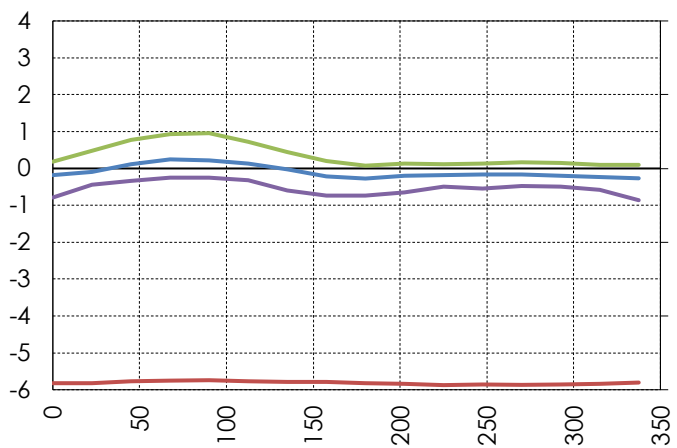
Individual Tap ID: NB03 Port ID: 130



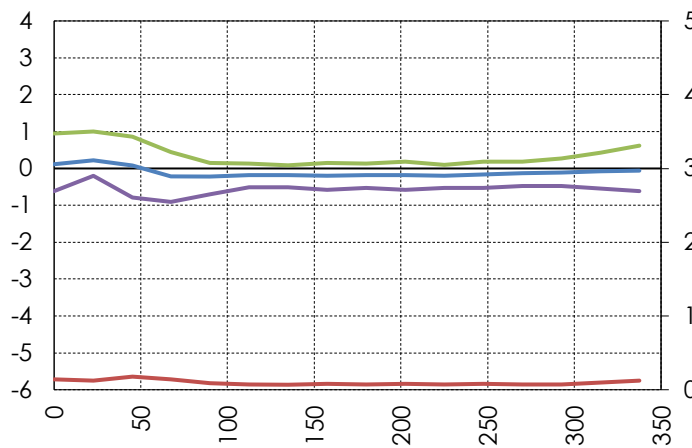
Individual Tap ID: NB04 Port ID: 131



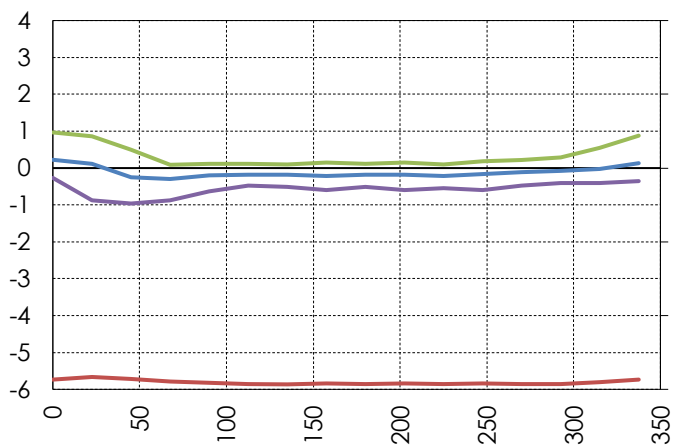
Individual Tap ID: NB05 Port ID: 132



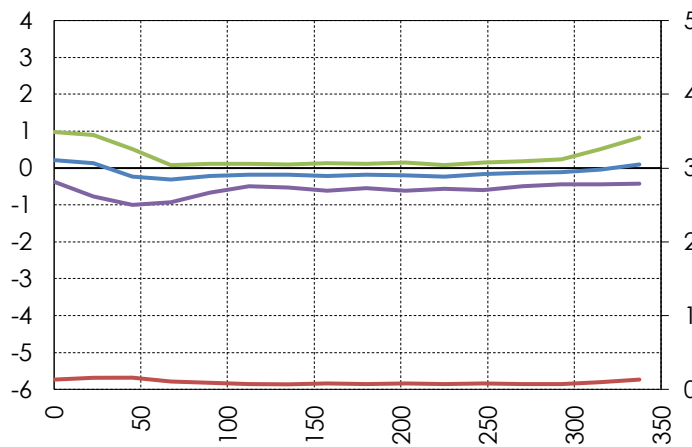
Individual Tap ID: NB06 Port ID: 133



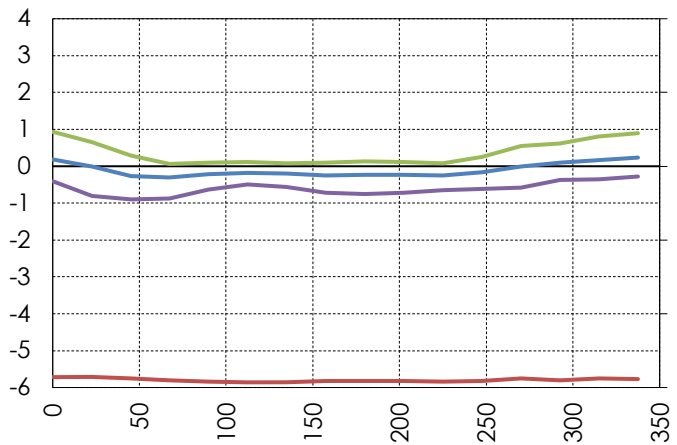
Individual Tap ID: NB07 Port ID: 134



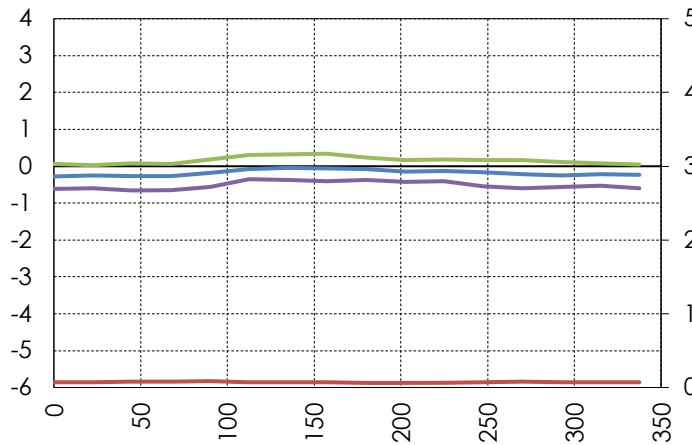
Individual Tap ID: NB08 Port ID: 135



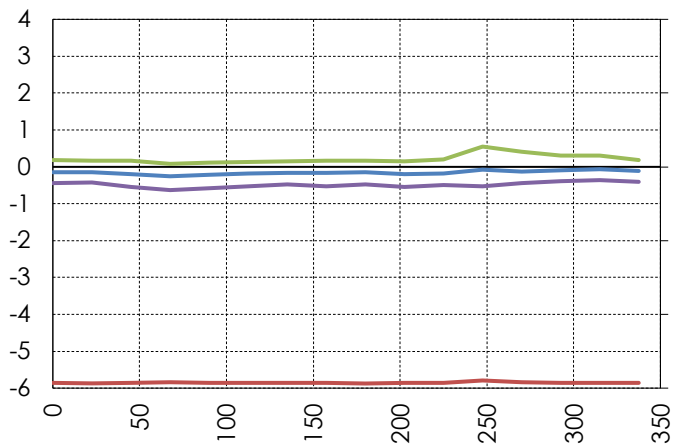
Individual Tap ID: NB09 Port ID: 136



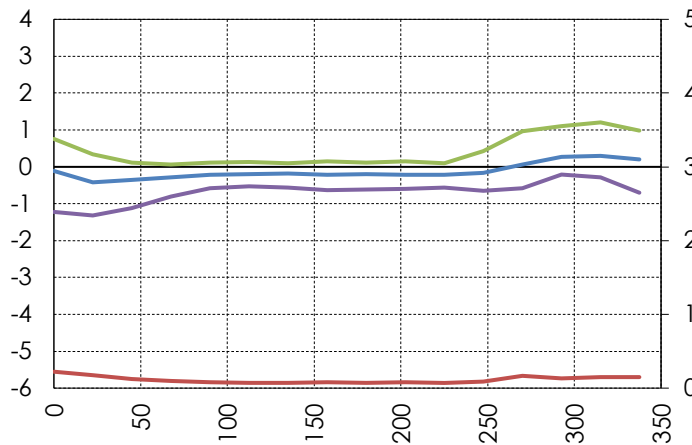
Individual Tap ID: NB10 Port ID: 137



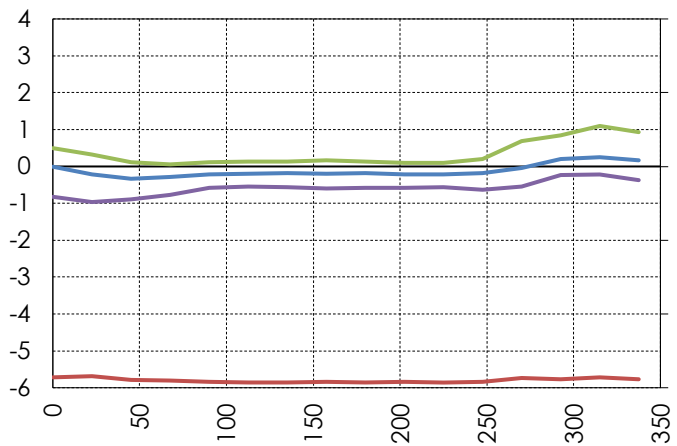
Individual Tap ID: NB11 Port ID: 138



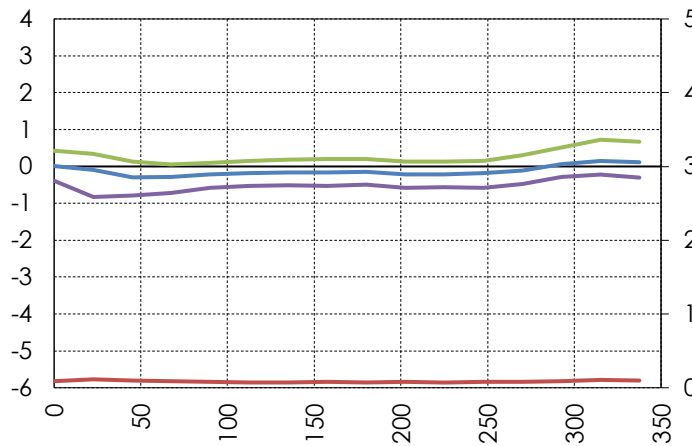
Individual Tap ID: WB02 Port ID: 139



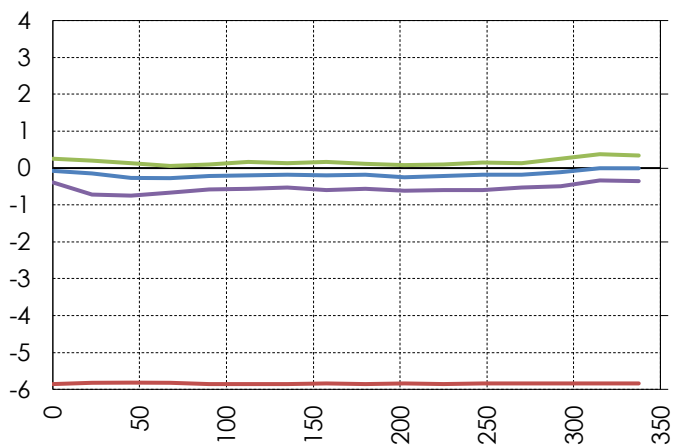
Individual Tap ID: WB04 Port ID: 140



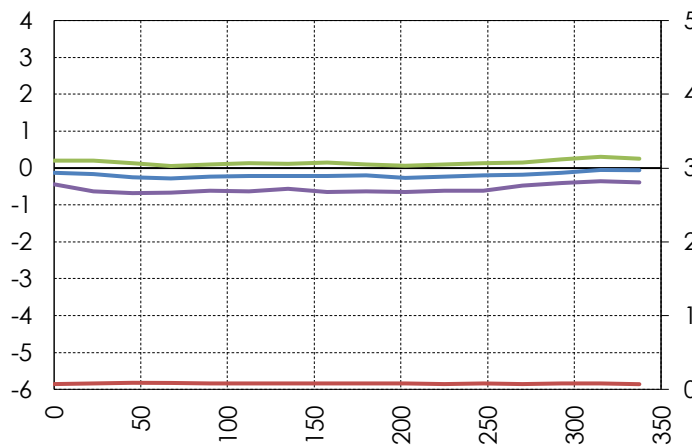
Individual Tap ID: WB06 Port ID: 141



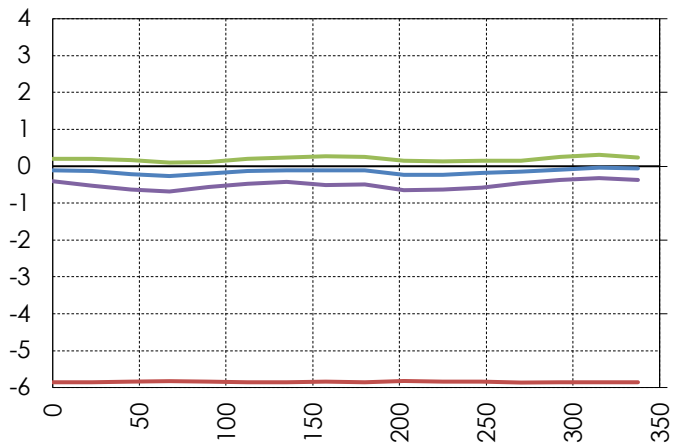
Individual Tap ID: WB08 Port ID: 142



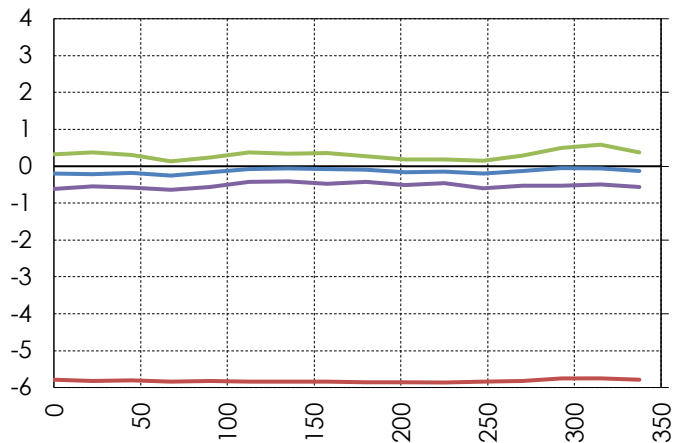
Individual Tap ID: WB10 Port ID: 143



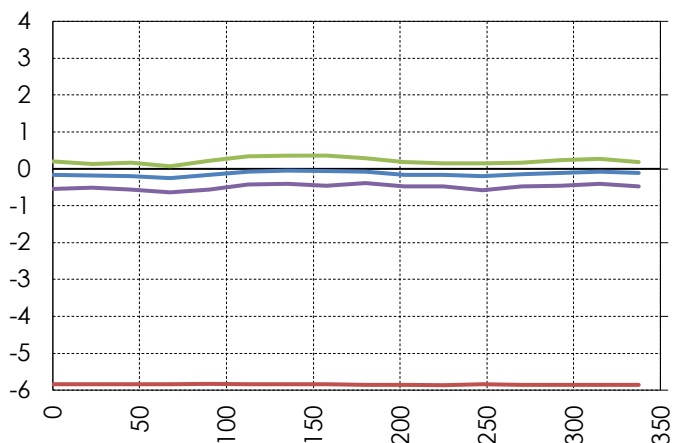
Individual Tap ID: WB11 Port ID: 144



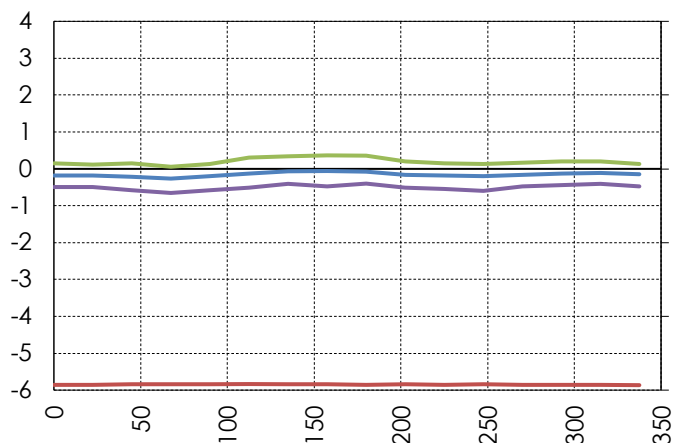
Individual Tap ID: WB13 Port ID: 145



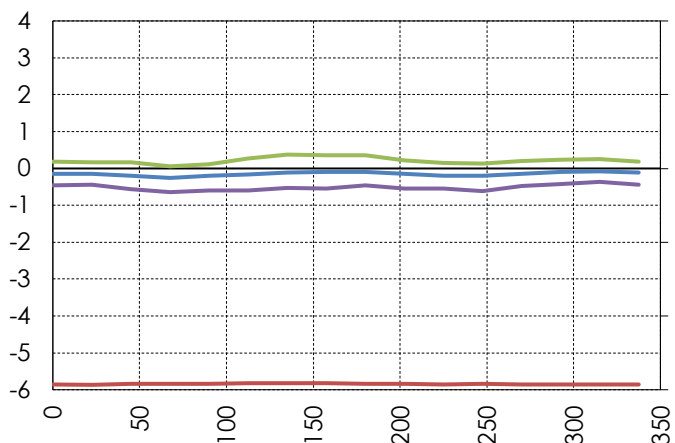
Individual Tap ID: WB14 Port ID: 146



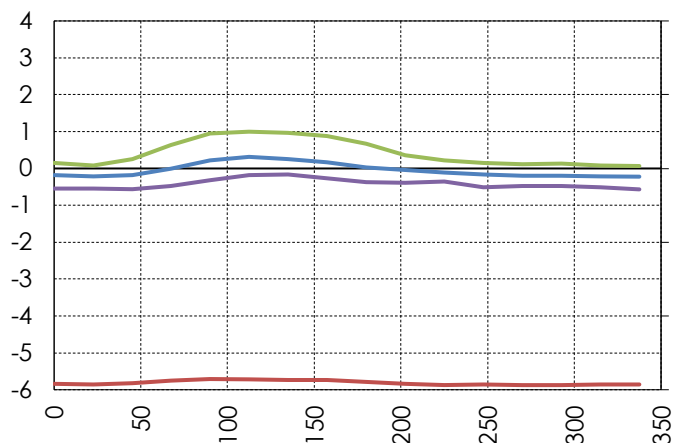
Individual Tap ID: WB15 Port ID: 147



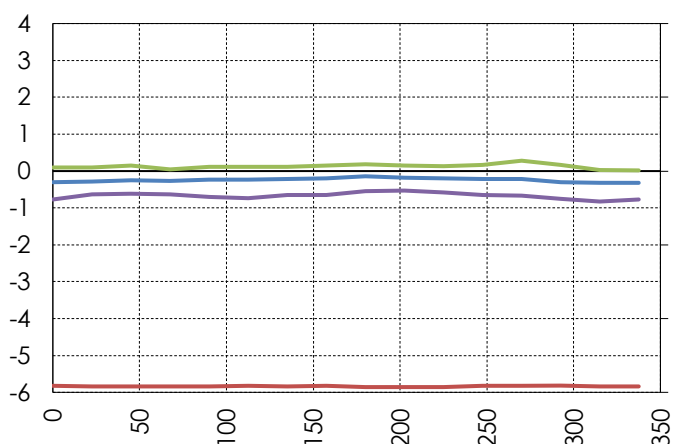
Individual Tap ID: WB16 Port ID: 148



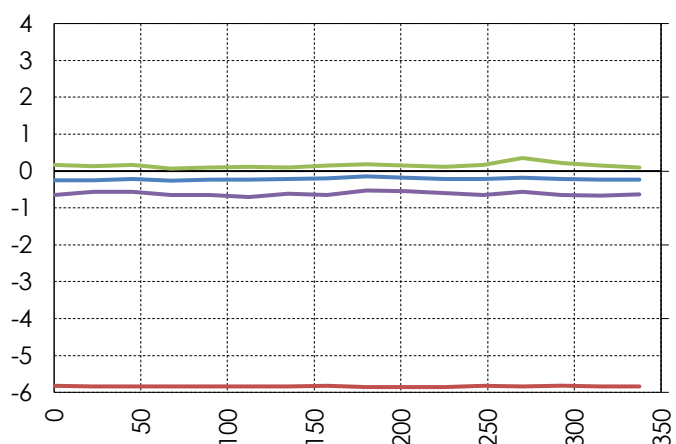
Individual Tap ID: WB17 Port ID: 149



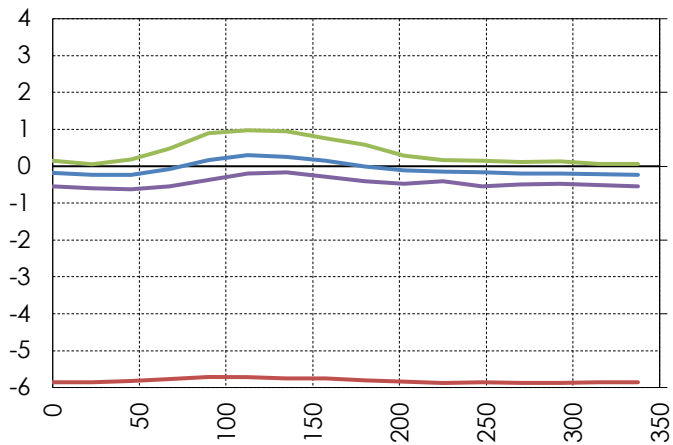
Individual Tap ID: WB18 Port ID: 150



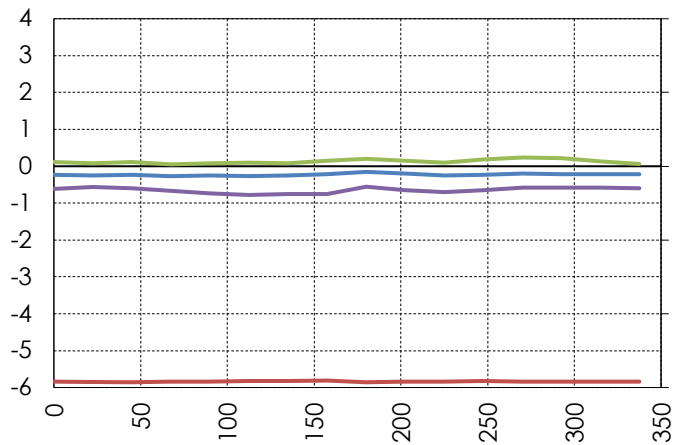
Individual Tap ID: WB19 Port ID: 151



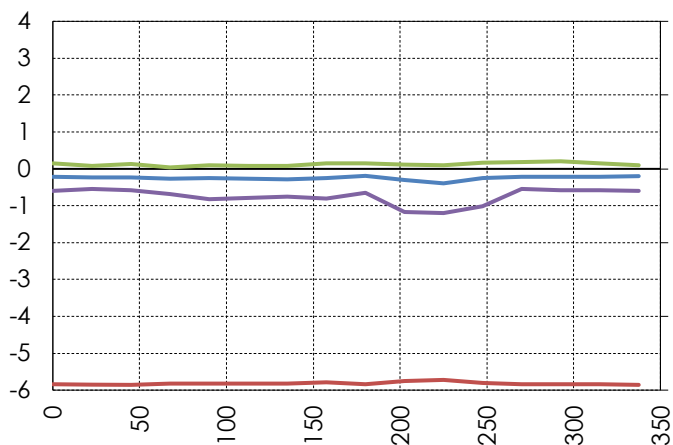
Individual Tap ID: WB20 Port ID: 152



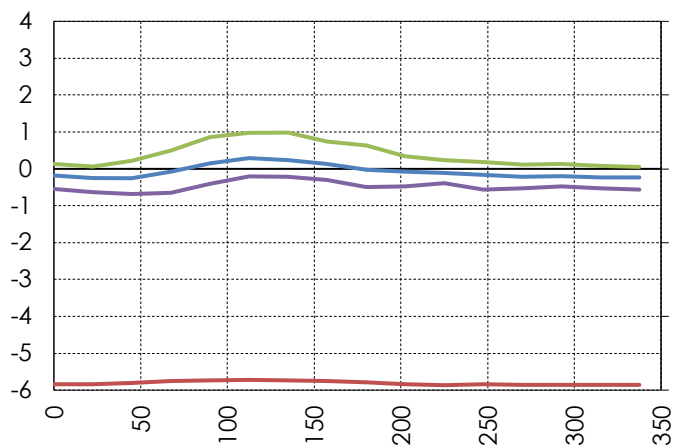
Individual Tap ID: WB21 Port ID: 153



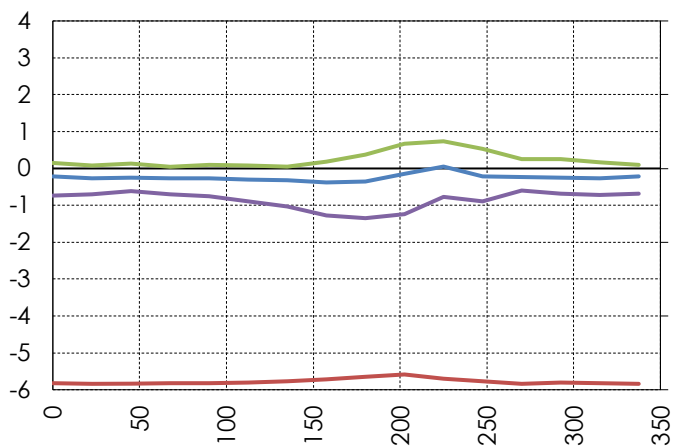
Individual Tap ID: WB22 Port ID: 154



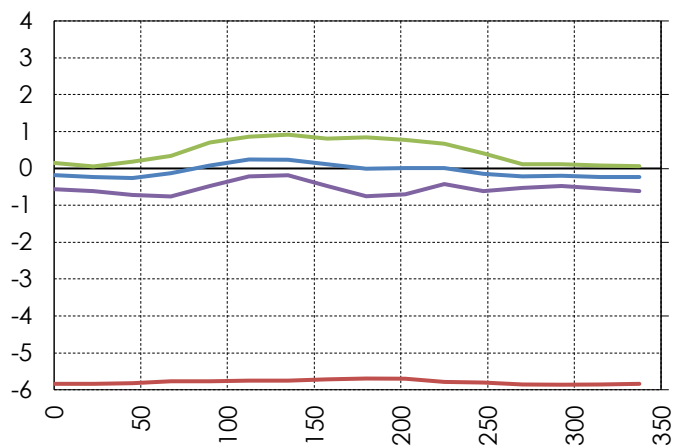
Individual Tap ID: WB23 Port ID: 155



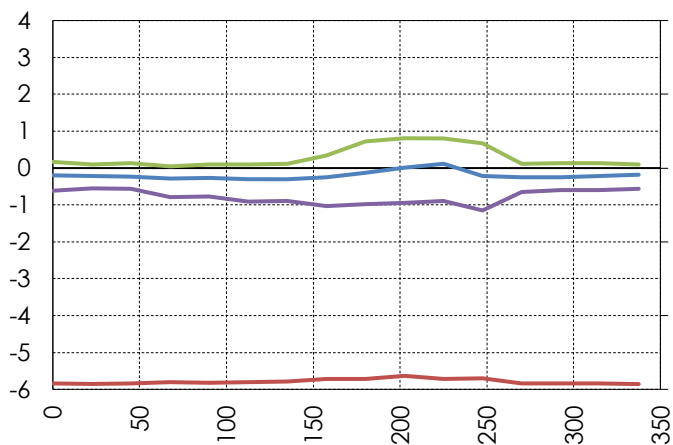
Individual Tap ID: WB24 Port ID: 156



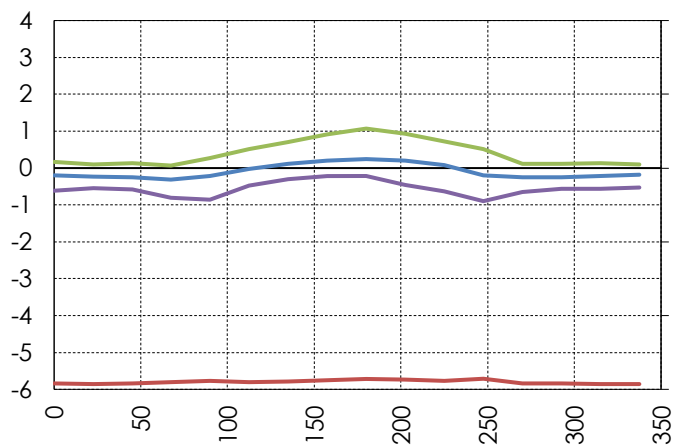
Individual Tap ID: WB25 Port ID: 157



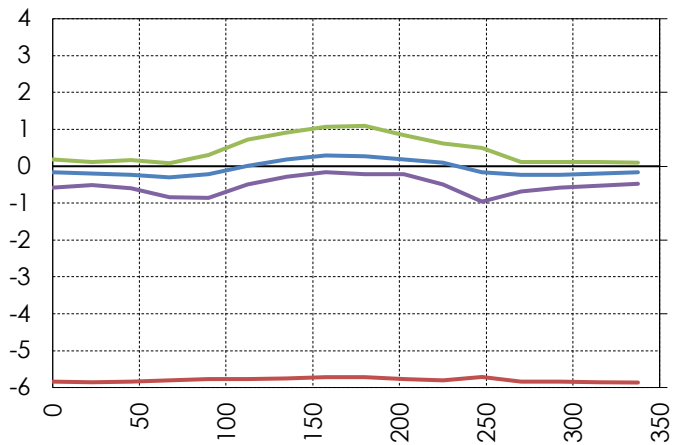
Individual Tap ID: WB26 Port ID: 158



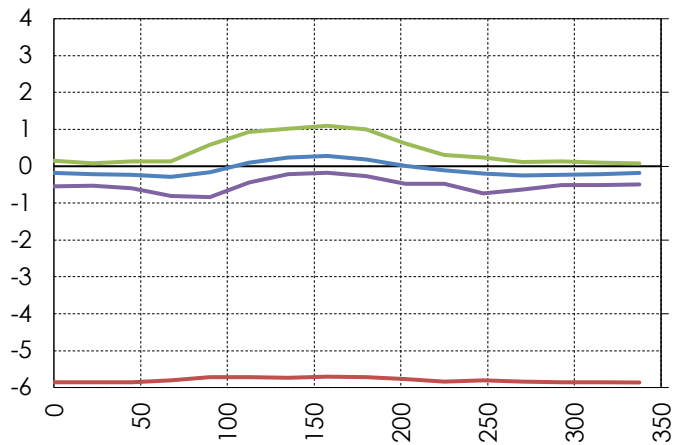
Individual Tap ID: SB01 Port ID: 159



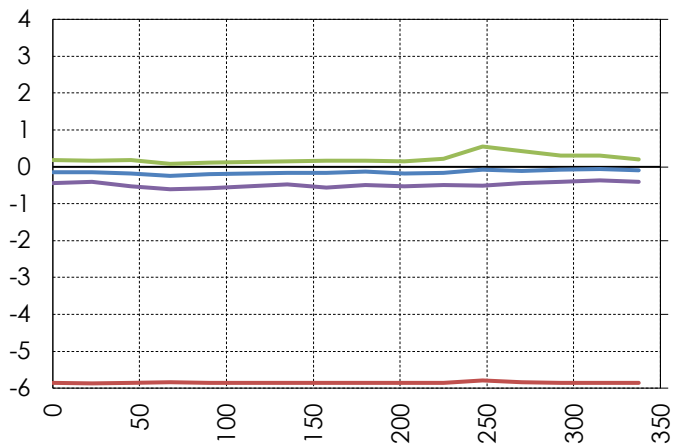
Individual Tap ID: SB02 Port ID: 160



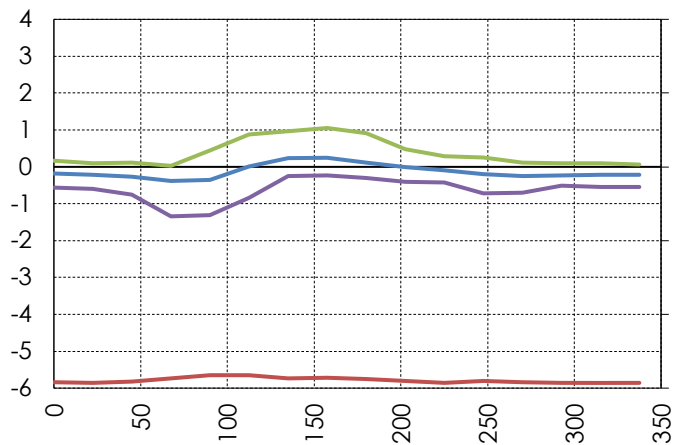
Individual Tap ID: SB03 Port ID: 161



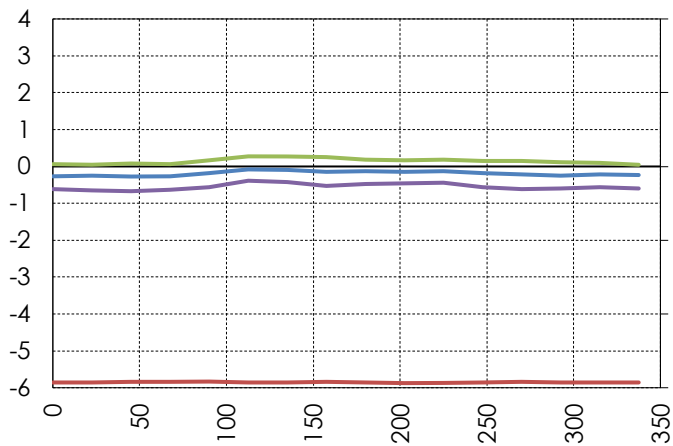
Individual Tap ID: SB04 Port ID: 162



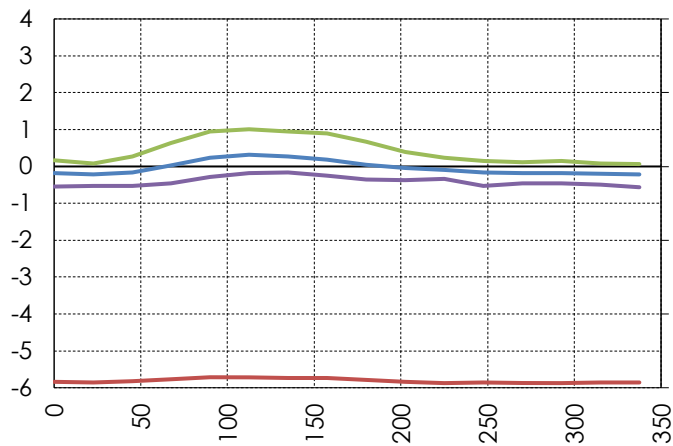
Individual Tap ID: SB05 Port ID: 163



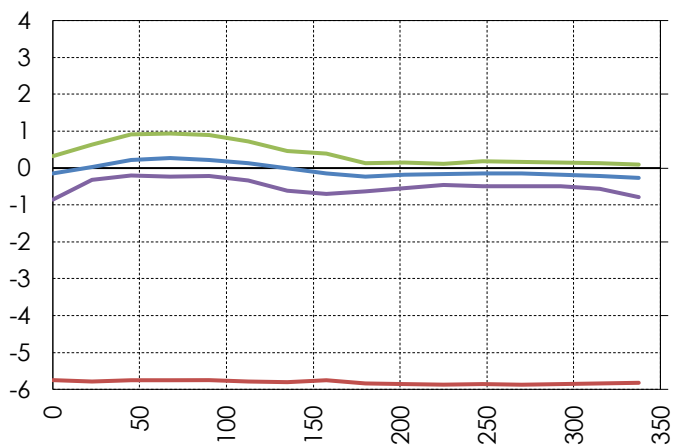
Individual Tap ID: SB06 Port ID: 164



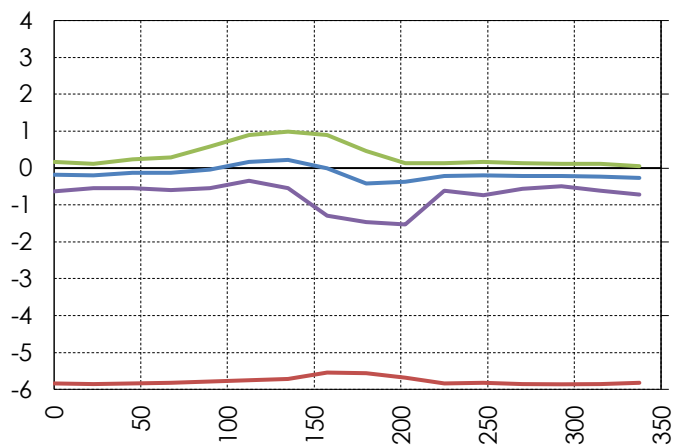
Individual Tap ID: SB07 Port ID: 165



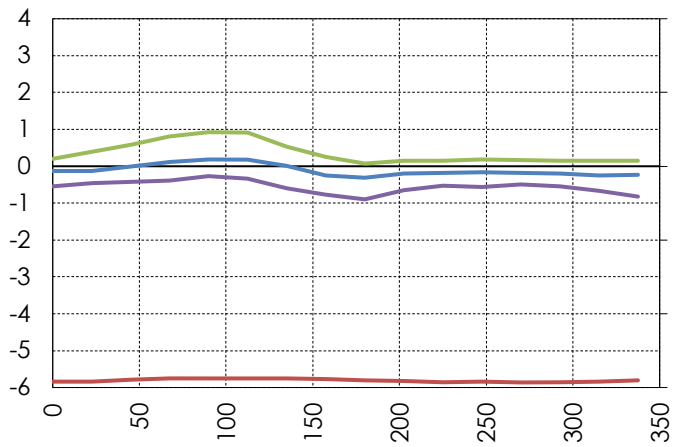
Individual Tap ID: SB08 Port ID: 166



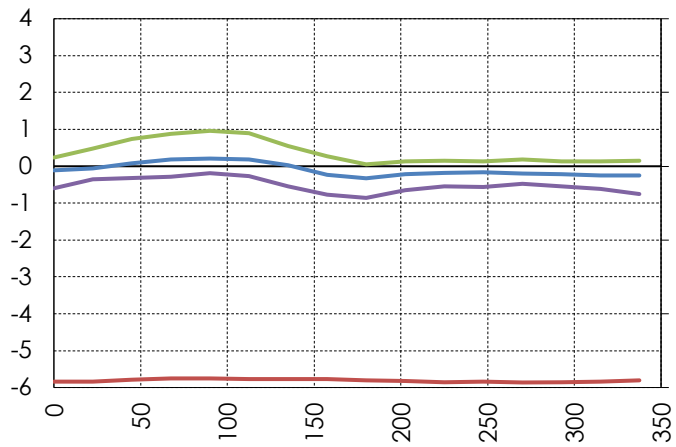
Individual Tap ID: EB01 Port ID: 167



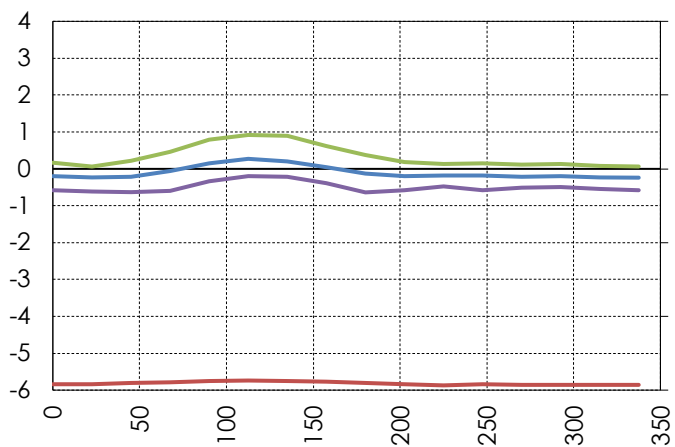
Individual Tap ID: EB02 Port ID: 168



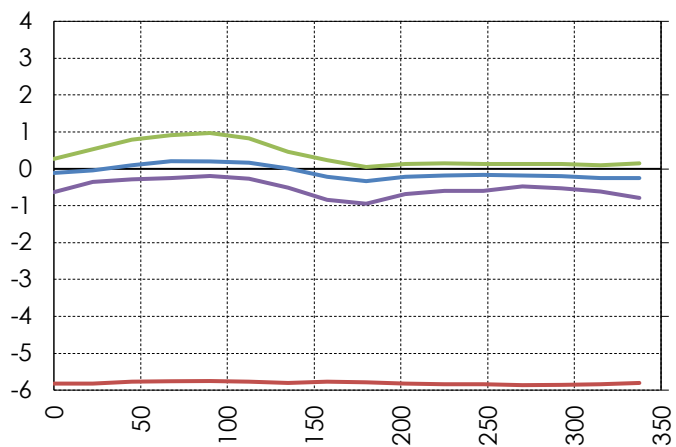
Individual Tap ID: EB03 Port ID: 169



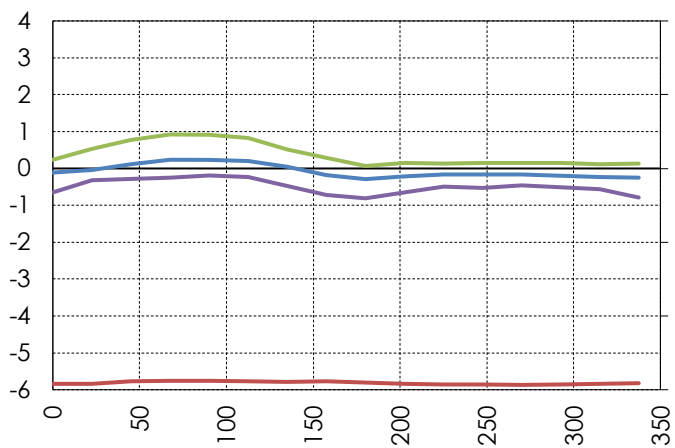
Individual Tap ID: EB04 Port ID: 171



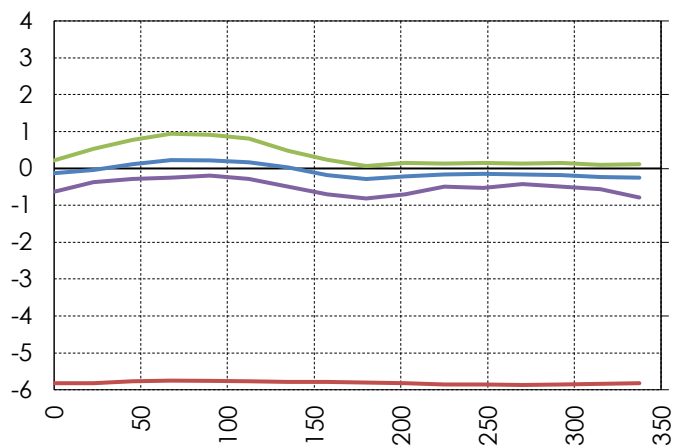
Individual Tap ID: EB05 Port ID: 172



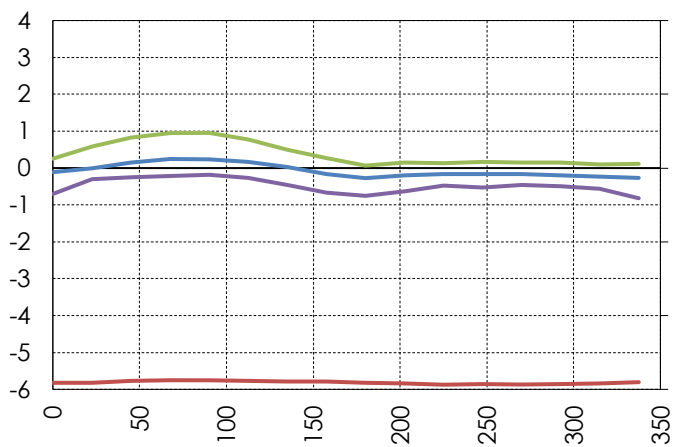
Individual Tap ID: EB06 Port ID: 173



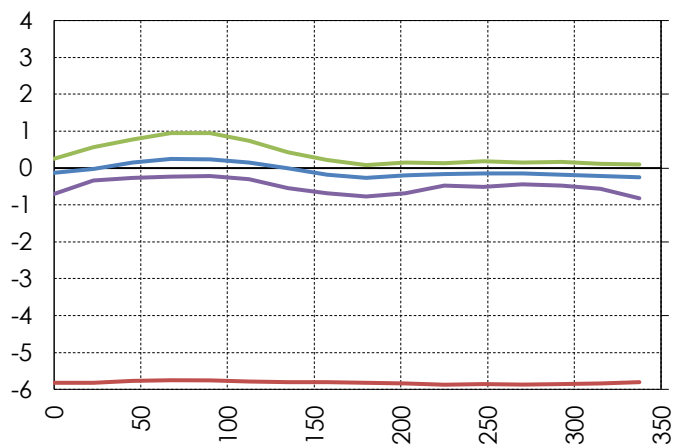
Individual Tap ID: EB07 Port ID: 174



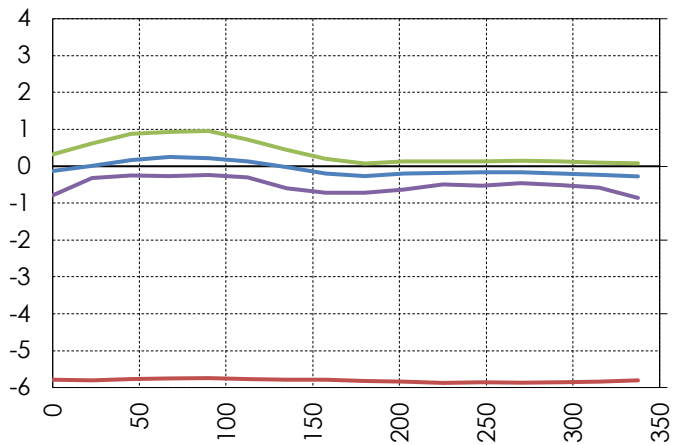
Individual Tap ID: EB08 Port ID: 175



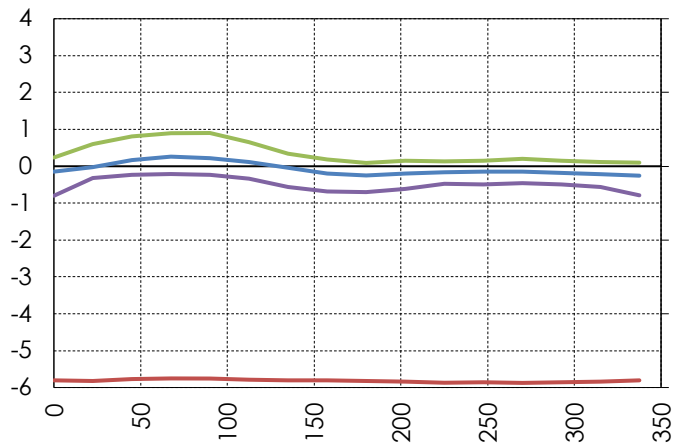
Individual Tap ID: EB09 Port ID: 176



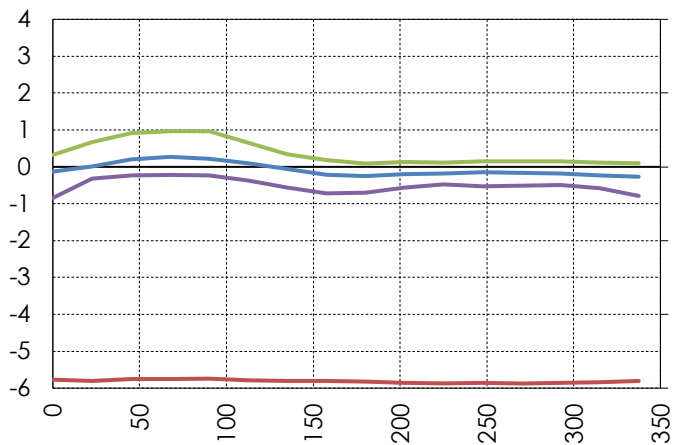
Individual Tap ID: EB10 Port ID: 177



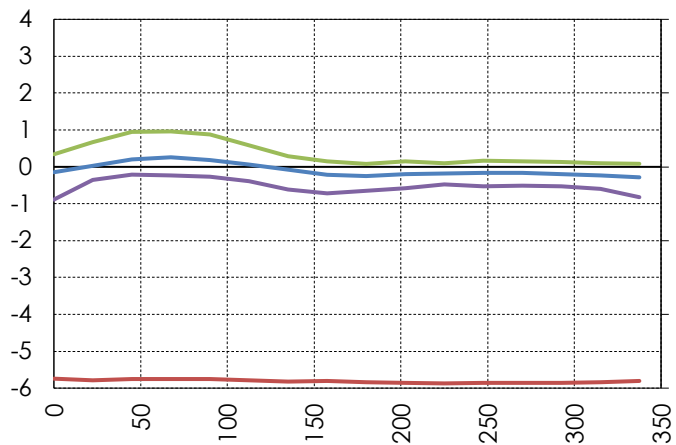
Individual Tap ID: EB11 Port ID: 178



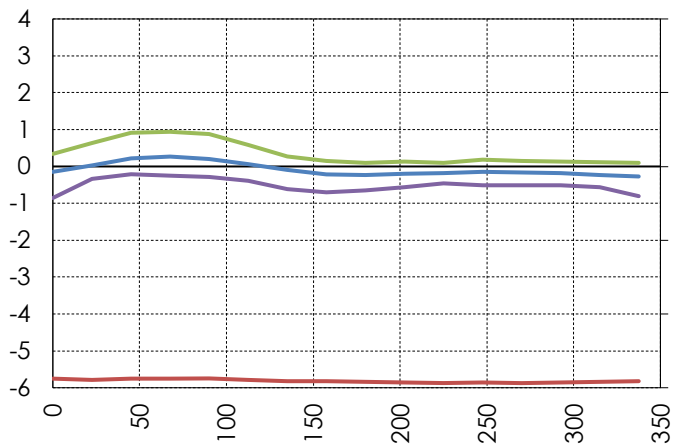
Individual Tap ID: EB12 Port ID: 179



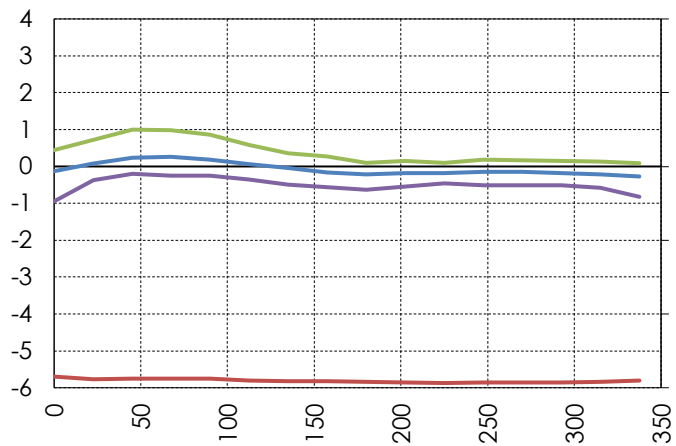
Individual Tap ID: EB13 Port ID: 180



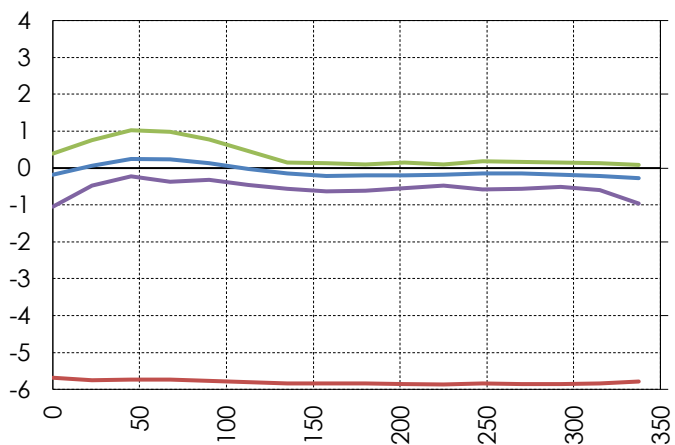
Individual Tap ID: EB14 Port ID: 181



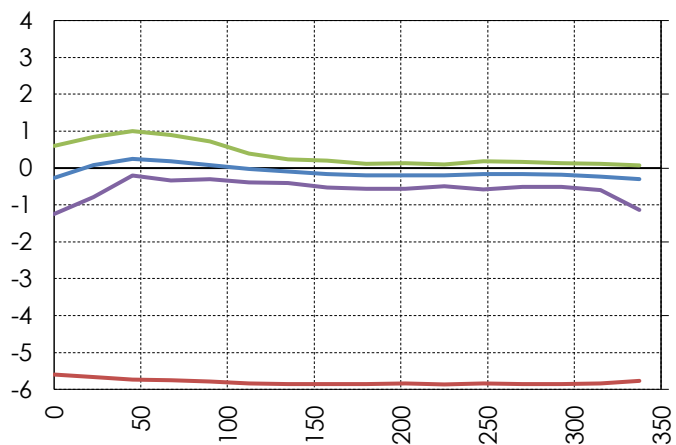
Individual Tap ID: EB15 Port ID: 182



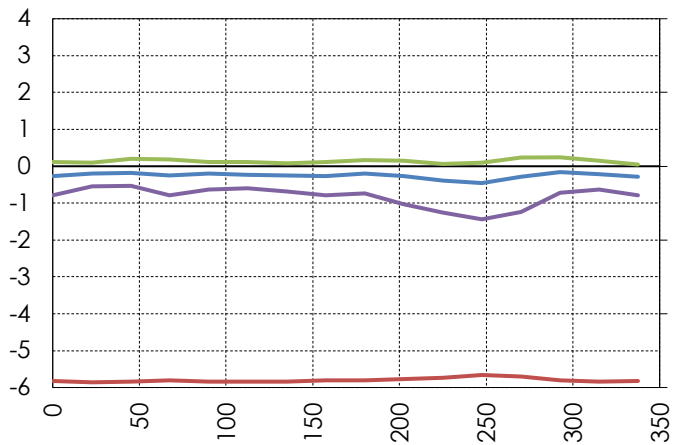
Individual Tap ID: EB16 Port ID: 183



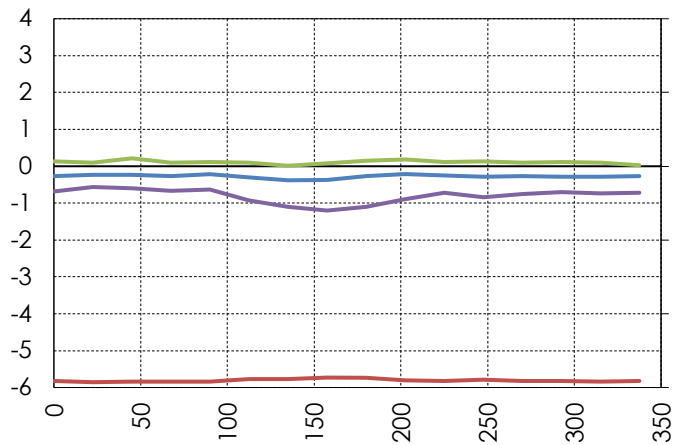
Individual Tap ID: EB17 Port ID: 184



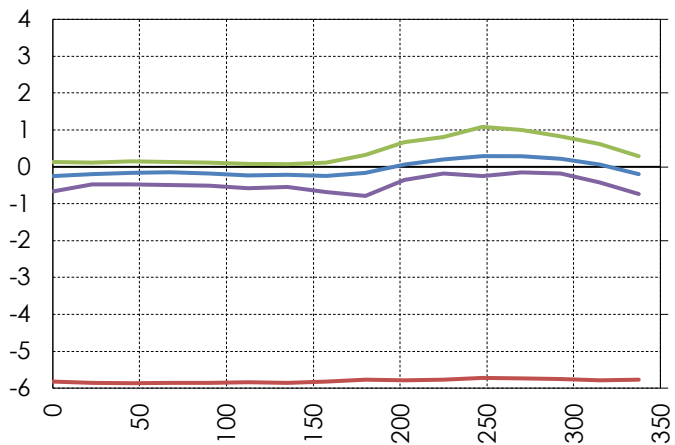
Individual Tap ID: RH01 Port ID: 256



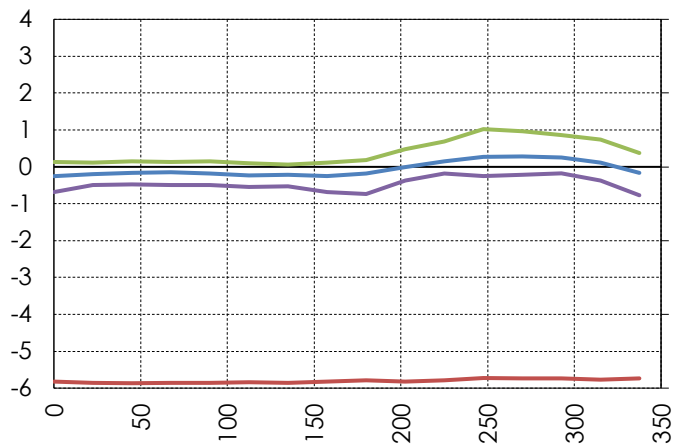
Individual Tap ID: RH02 Port ID: 257



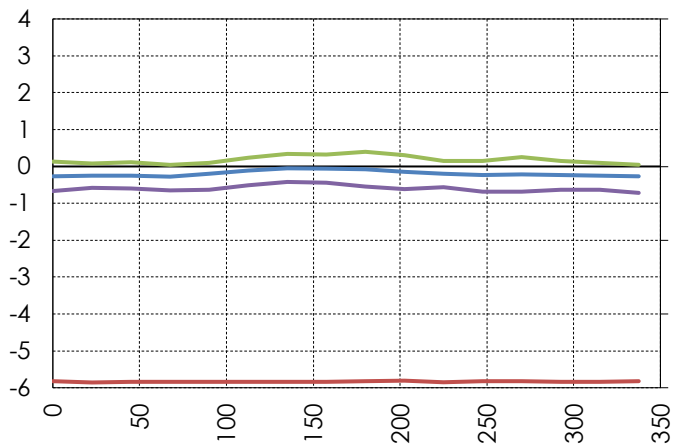
Individual Tap ID: WE07 Port ID: 258



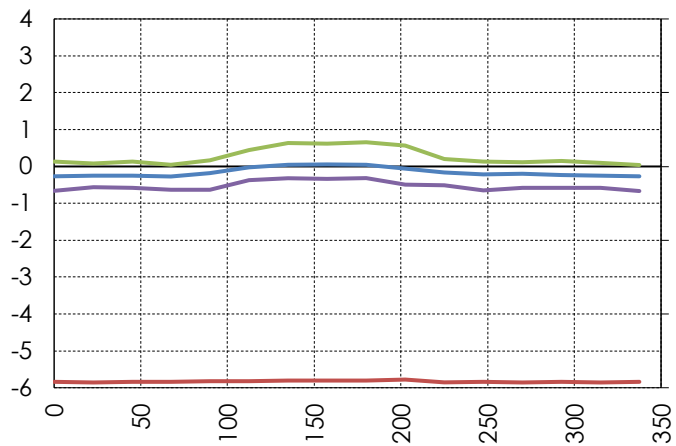
Individual Tap ID: WE08 Port ID: 259



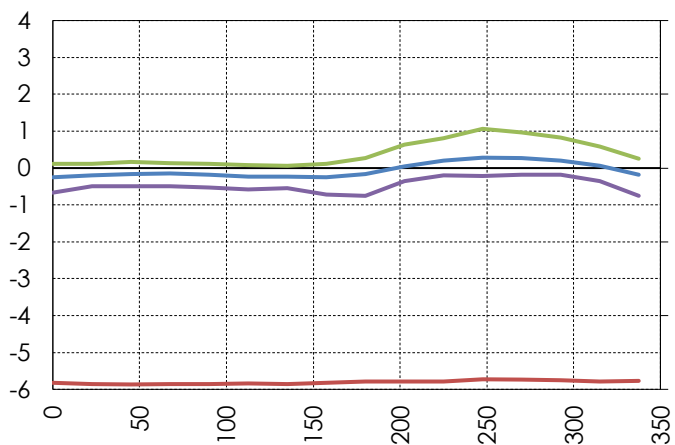
Individual Tap ID: EE09 Port ID: 260



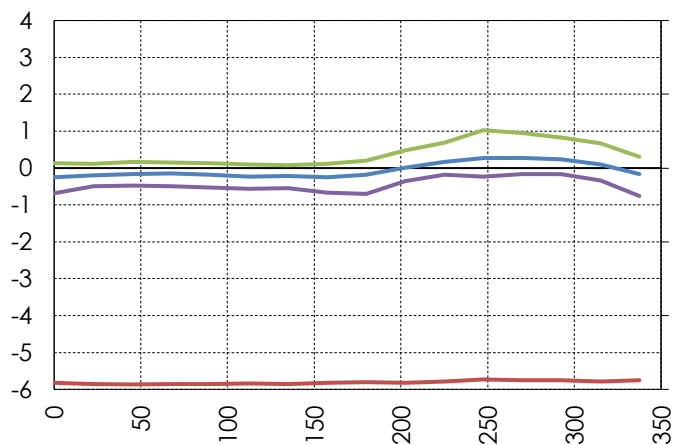
Individual Tap ID: EE10 Port ID: 261



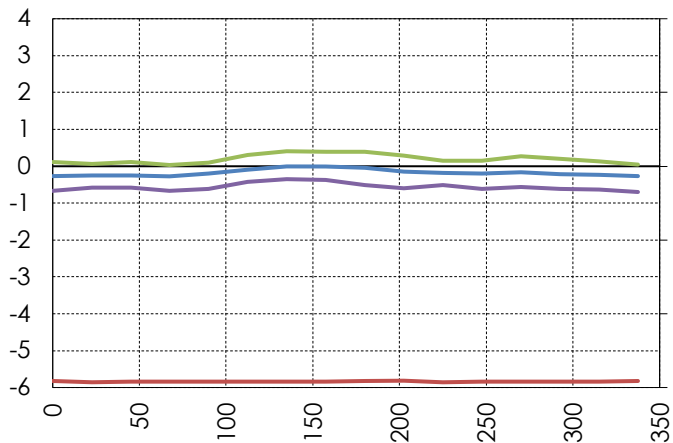
Individual Tap ID: WC01 Port ID: 262



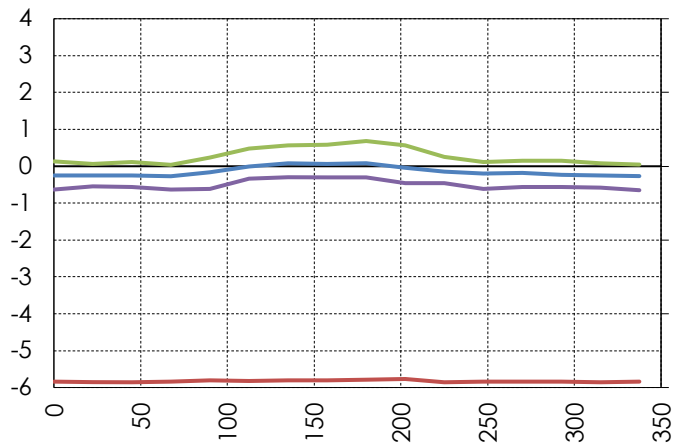
Individual Tap ID: WC02 Port ID: 263



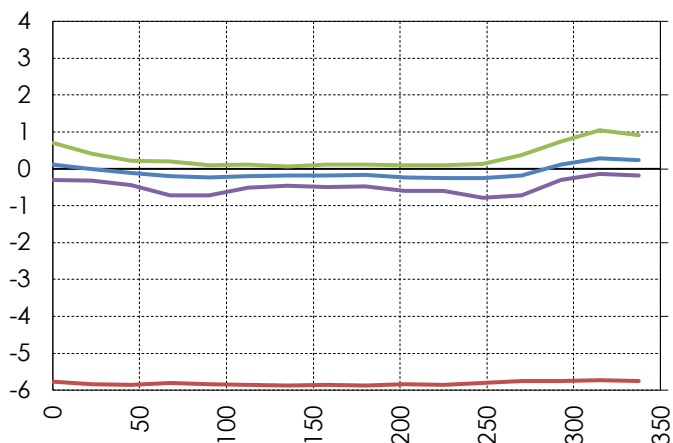
Individual Tap ID: EC10 Port ID: 264



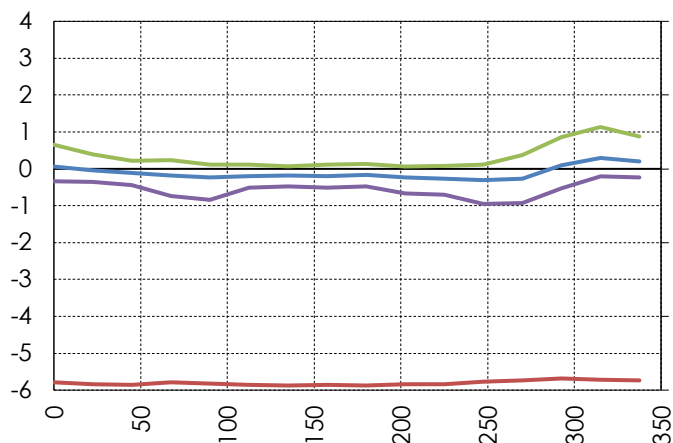
Individual Tap ID: EC11 Port ID: 265



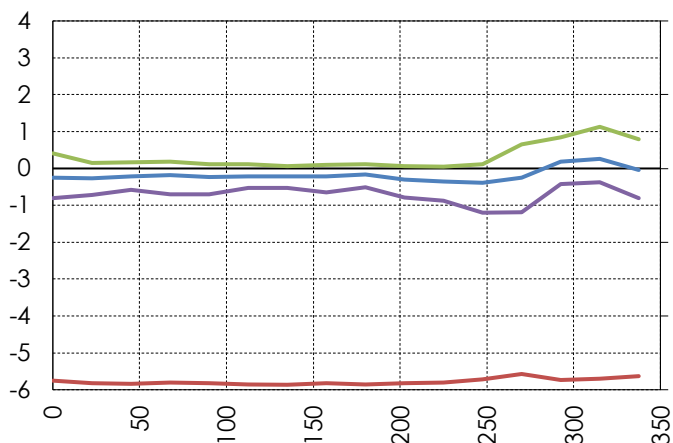
Individual Tap ID: NB12 Port ID: 266



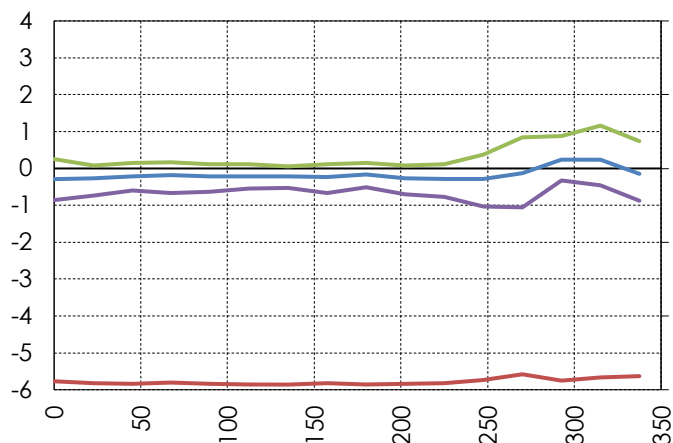
Individual Tap ID: NB13 Port ID: 267



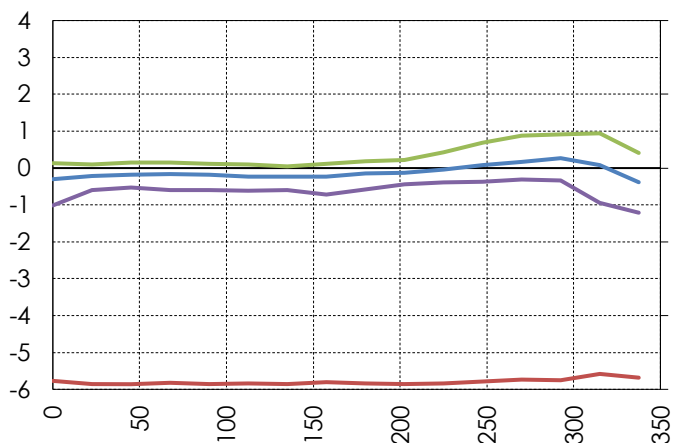
Individual Tap ID: NB14 Port ID: 268



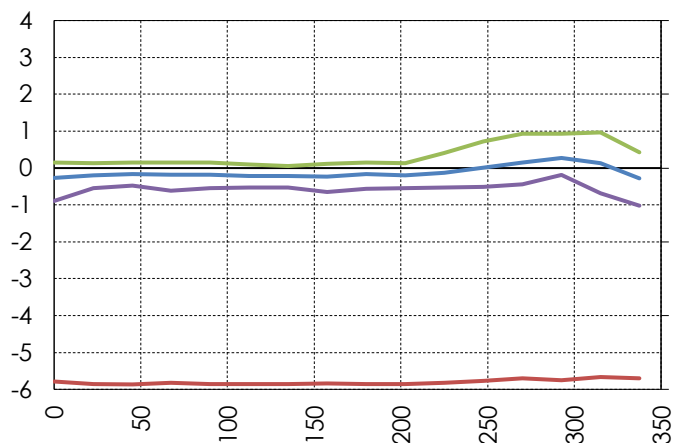
Individual Tap ID: WB01 Port ID: 269



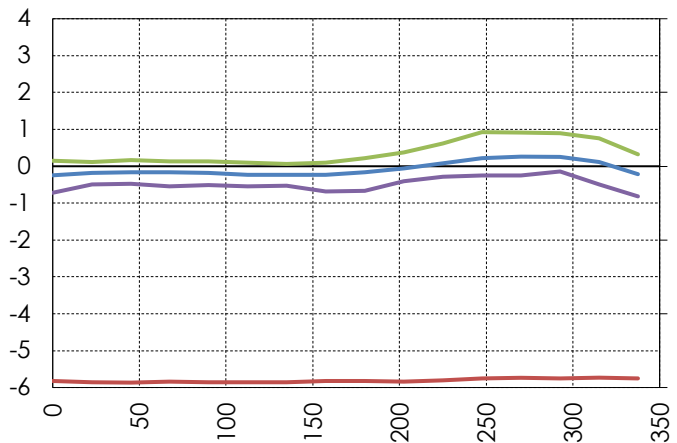
Individual Tap ID: WB03 Port ID: 270



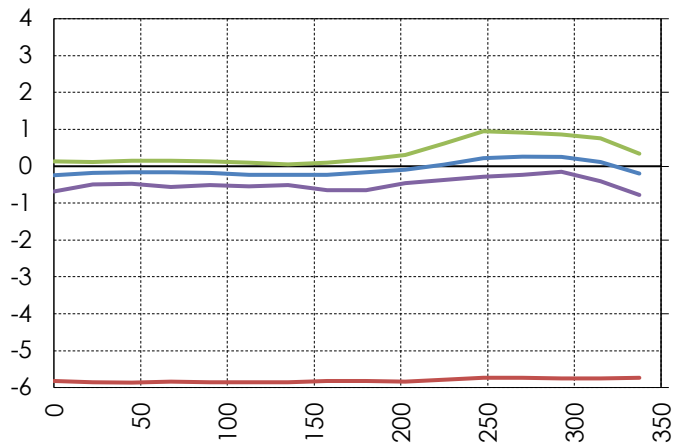
Individual Tap ID: WB05 Port ID: 271



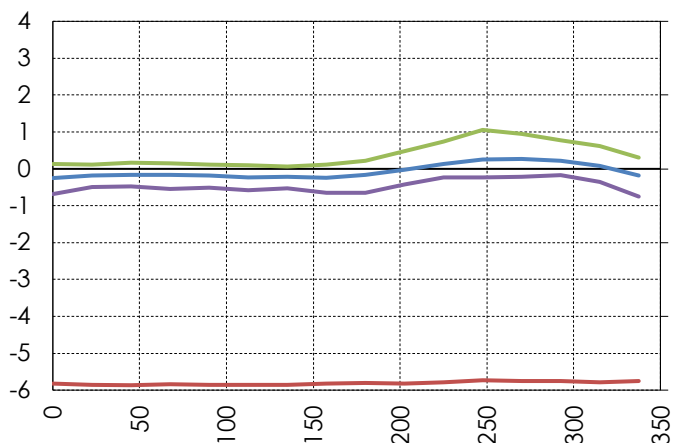
Individual Tap ID: WB07 Port ID: 272



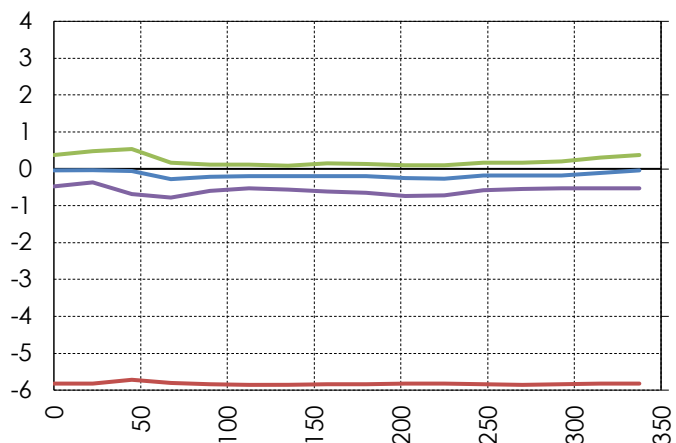
Individual Tap ID: WB09 Port ID: 273



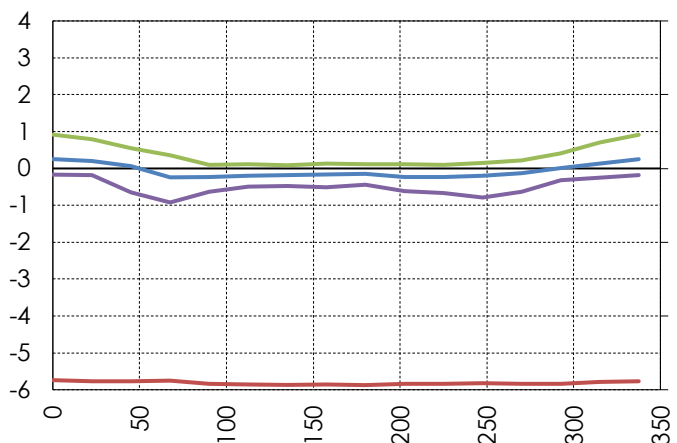
Individual Tap ID: WB12 Port ID: 274



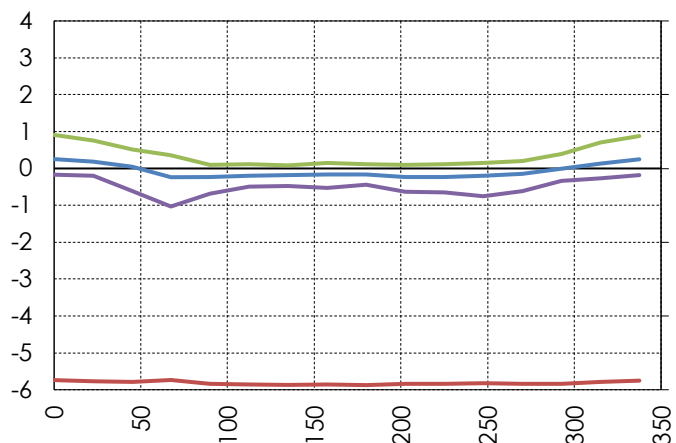
Individual Tap ID: EB18 Port ID: 275



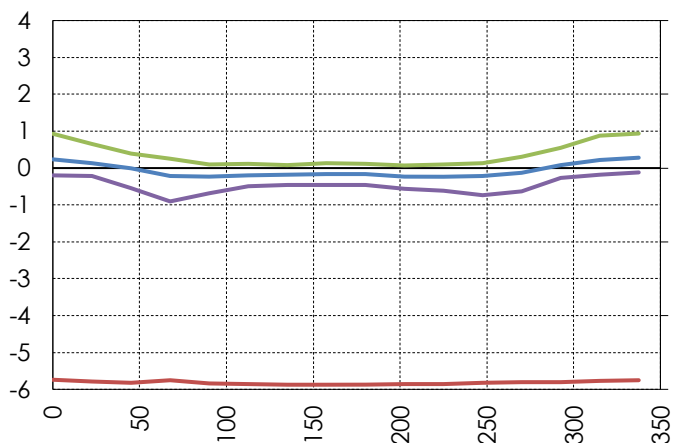
Individual Tap ID: NA01 Port ID: 276



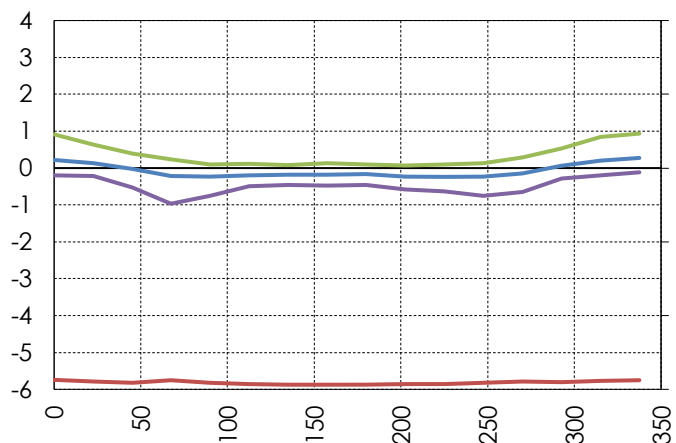
Individual Tap ID: NA02 Port ID: 277



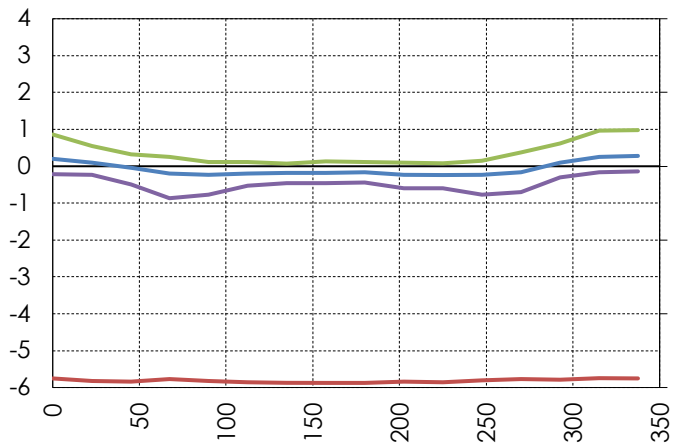
Individual Tap ID: NA03 Port ID: 278



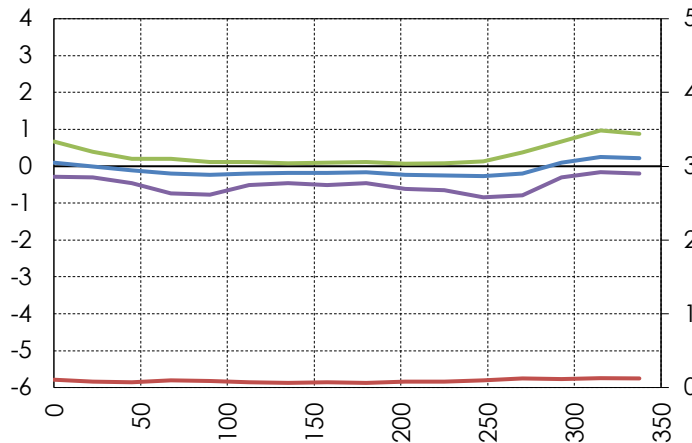
Individual Tap ID: NA04 Port ID: 279



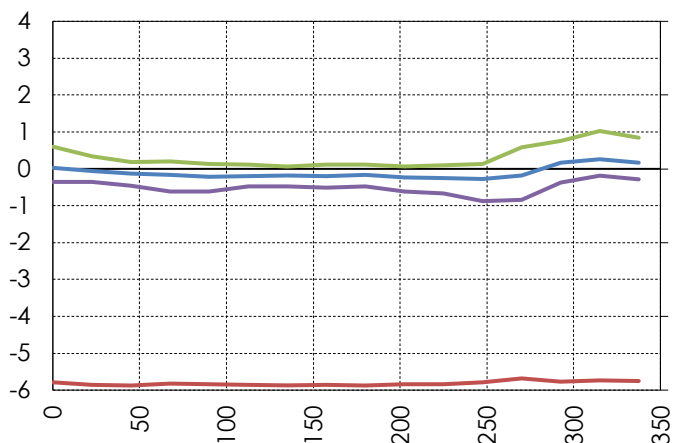
Individual Tap ID: NA05 Port ID: 280



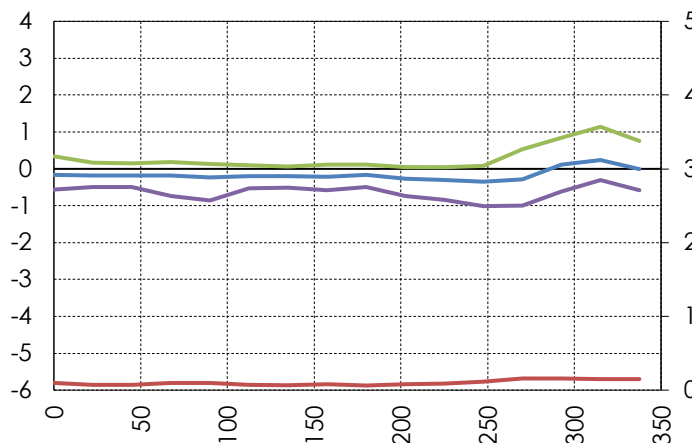
Individual Tap ID: NA06 Port ID: 281



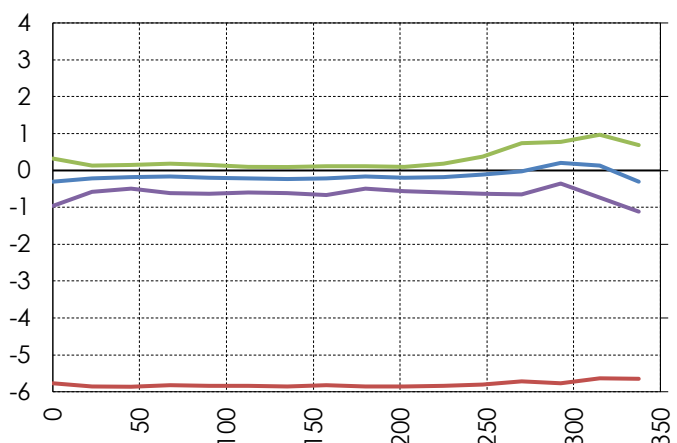
Individual Tap ID: NA07 Port ID: 282



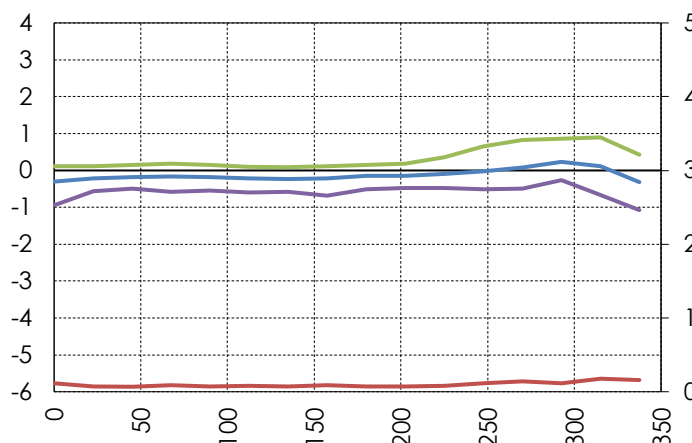
Individual Tap ID: NA08 Port ID: 283



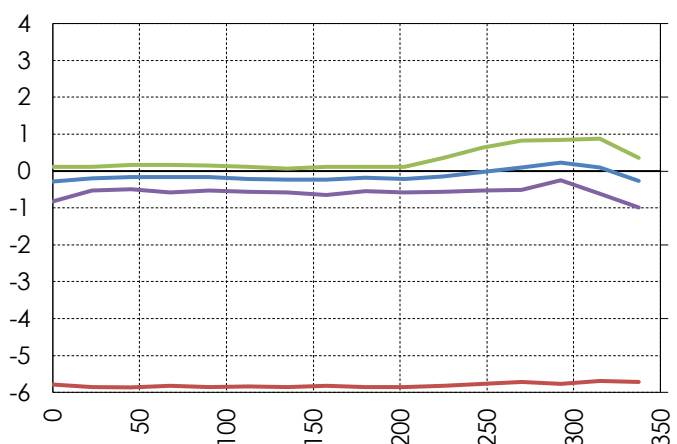
Individual Tap ID: NA09 Port ID: 284



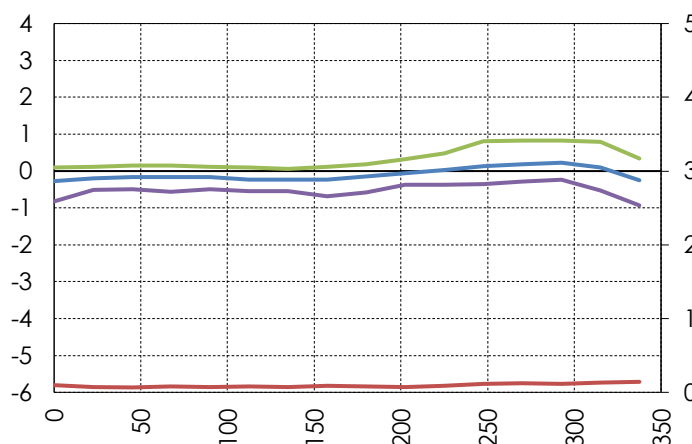
Individual Tap ID: WA01 Port ID: 285



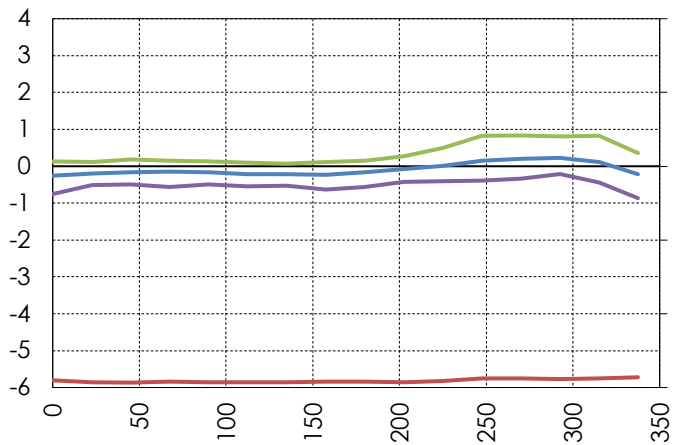
Individual Tap ID: WA02 Port ID: 286



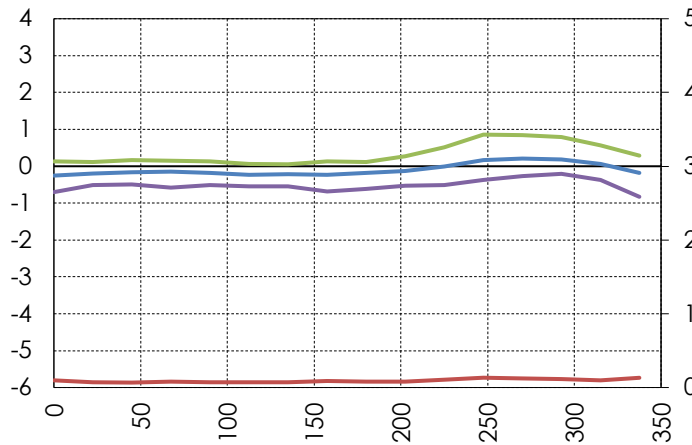
Individual Tap ID: WA03 Port ID: 287



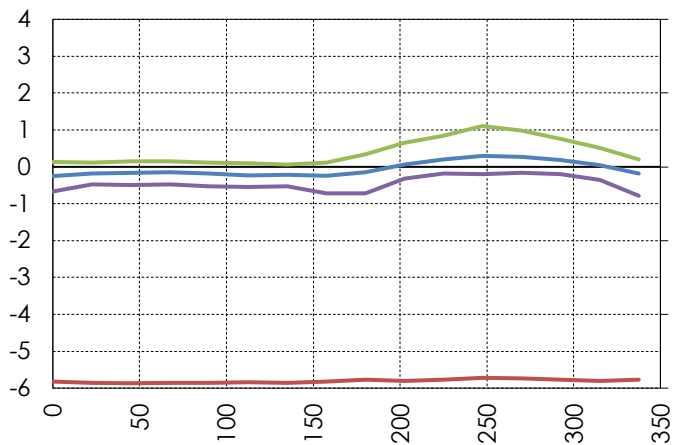
Individual Tap ID: WA04 Port ID: 288



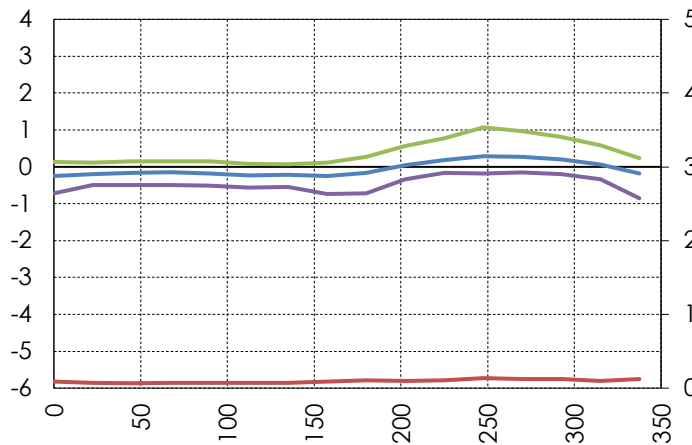
Individual Tap ID: WA05 Port ID: 289



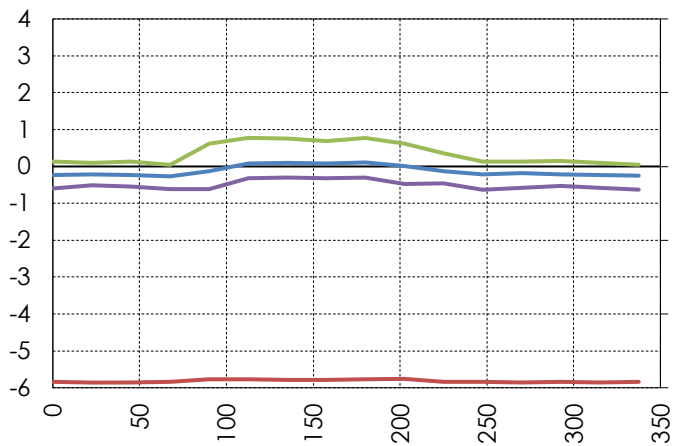
Individual Tap ID: WA06 Port ID: 290



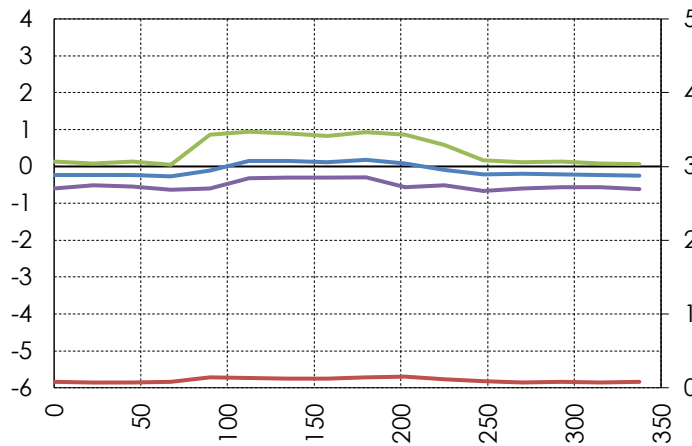
Individual Tap ID: WA07 Port ID: 291



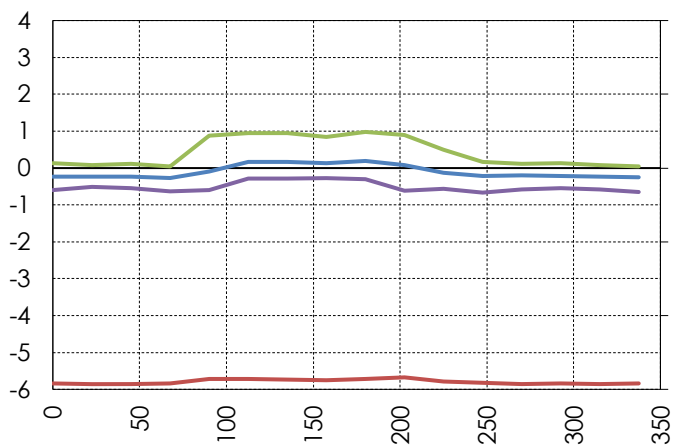
Individual Tap ID: SA05 Port ID: 292



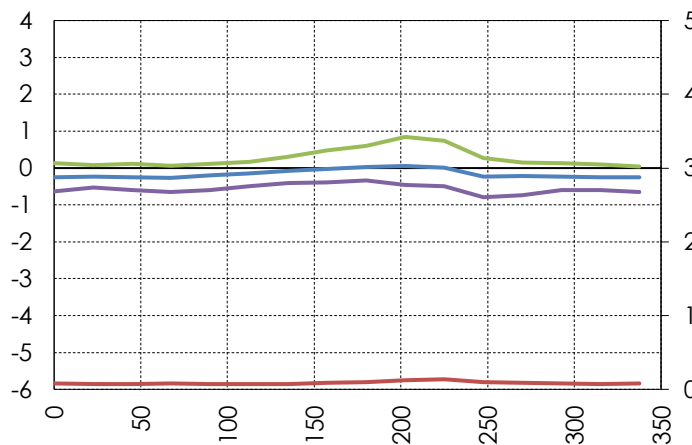
Individual Tap ID: SA06 Port ID: 293



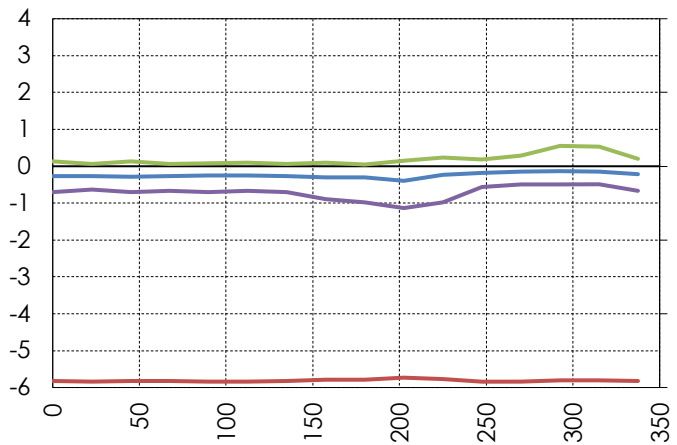
Individual Tap ID: SA07 Port ID: 294



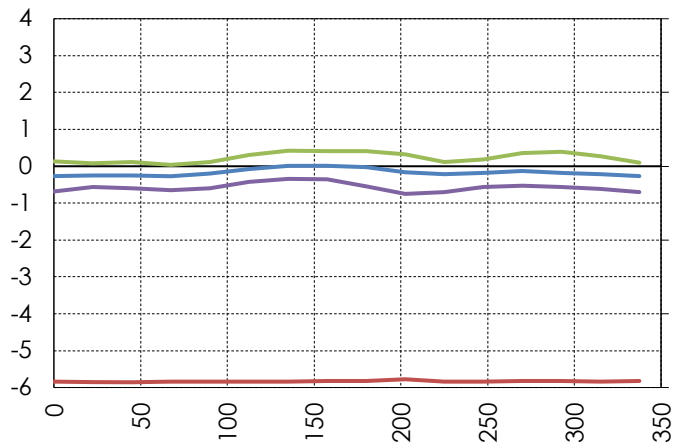
Individual Tap ID: SA08 Port ID: 295



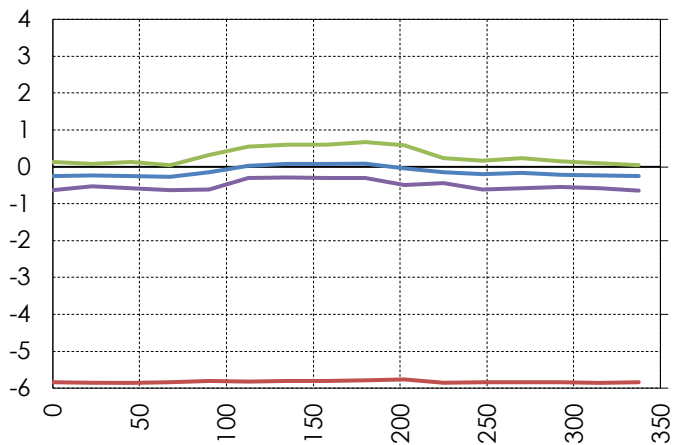
Individual Tap ID: SA09 Port ID: 296



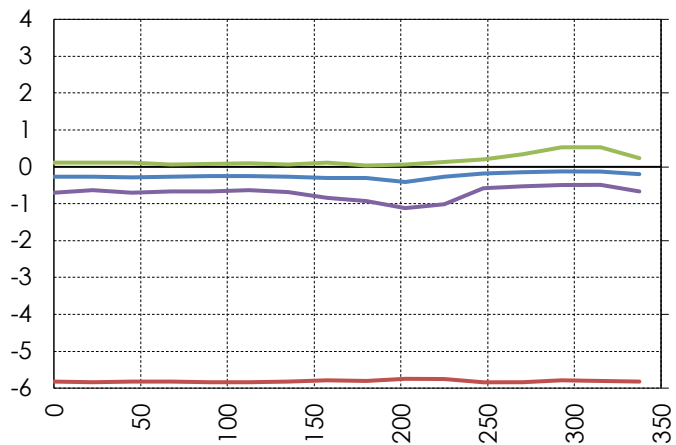
Individual Tap ID: EA06 Port ID: 297



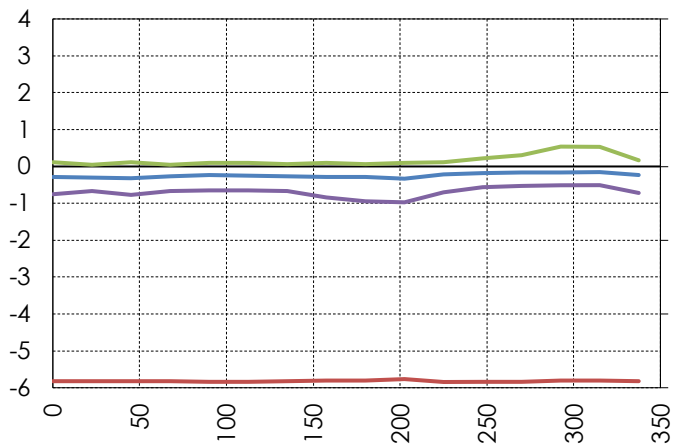
Individual Tap ID: EA07 Port ID: 298



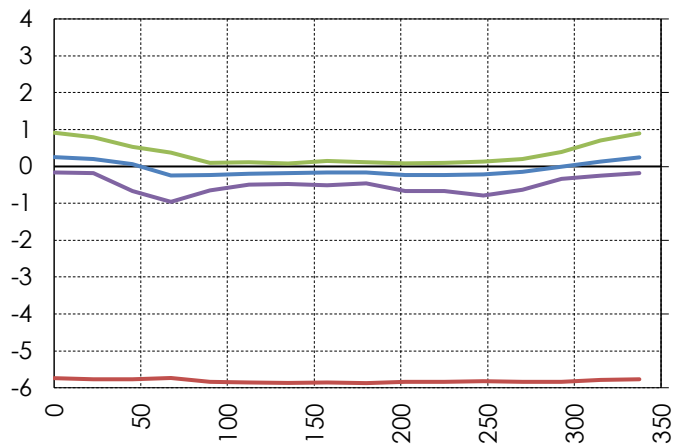
Individual Tap ID: EA08 Port ID: 299



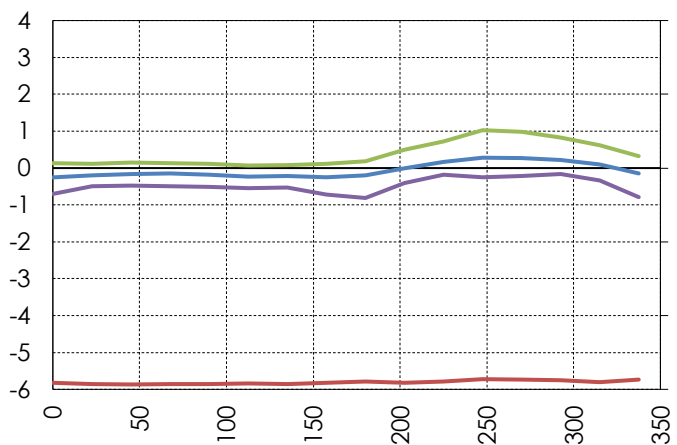
Individual Tap ID: EA09 Port ID: 300



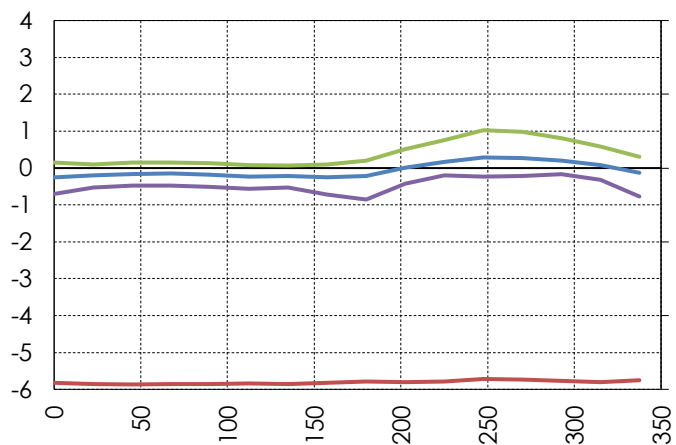
Individual Tap ID: EA10 Port ID: 301



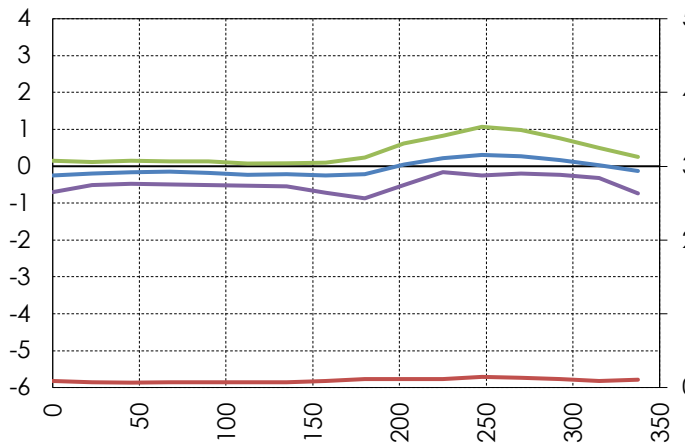
Individual Tap ID: WE09 Port ID: 320



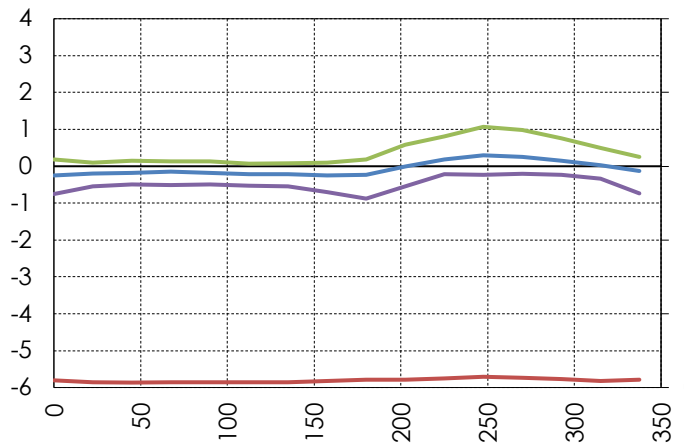
Individual Tap ID: WE10 Port ID: 321



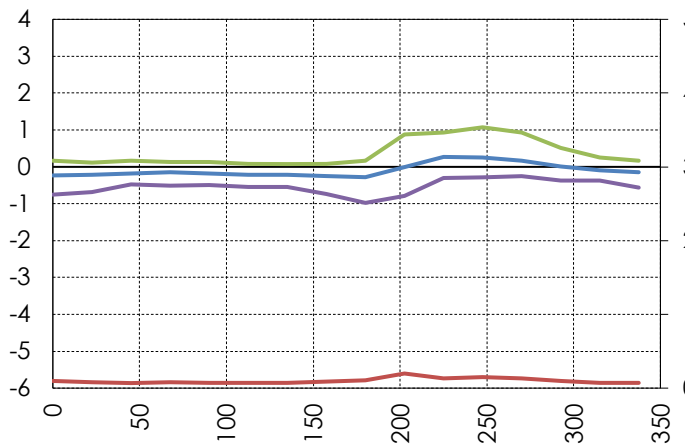
Individual Tap ID: WE11 Port ID: 322



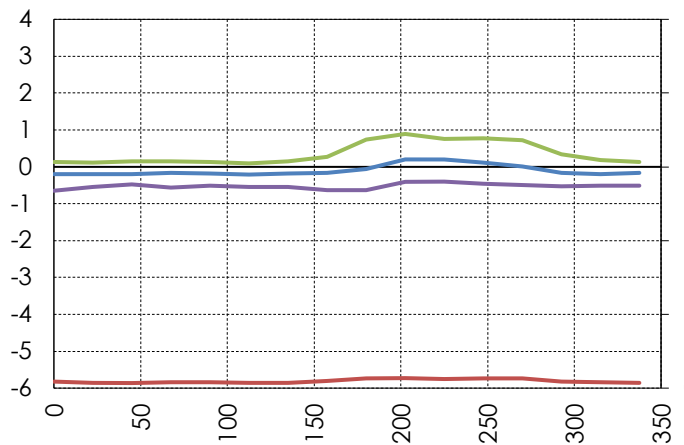
Individual Tap ID: WE12 Port ID: 323



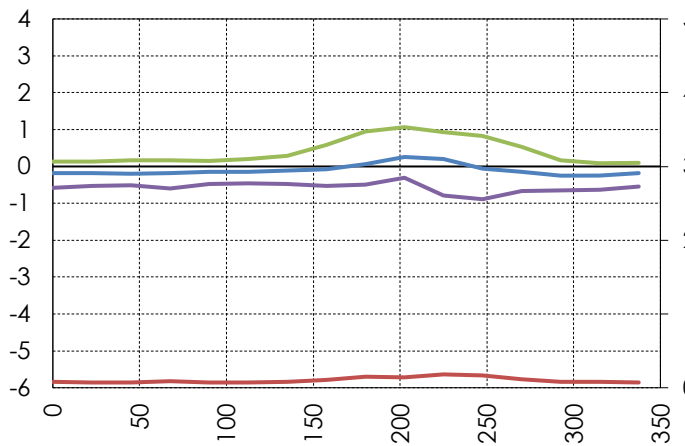
Individual Tap ID: WE13 Port ID: 324



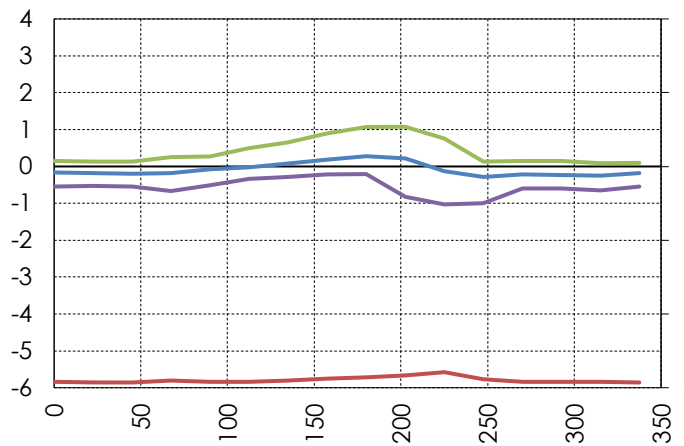
Individual Tap ID: WE14 Port ID: 325



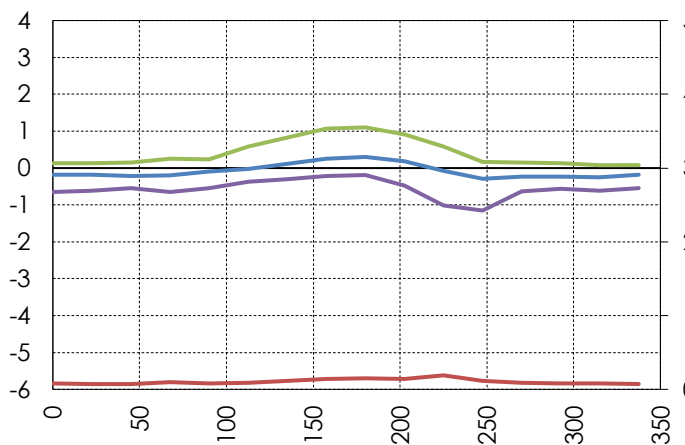
Individual Tap ID: SE01 Port ID: 326



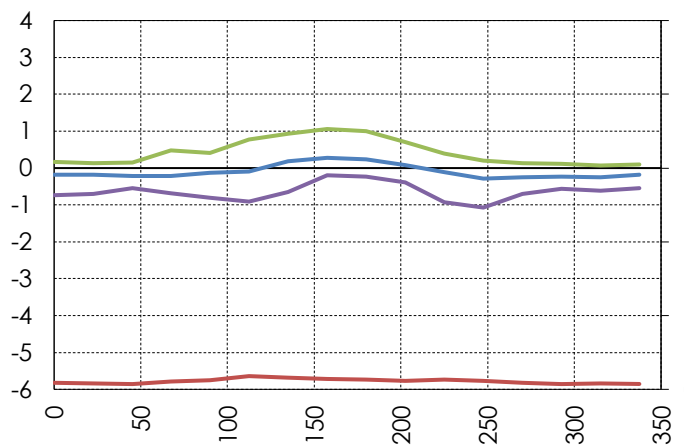
Individual Tap ID: SE02 Port ID: 327



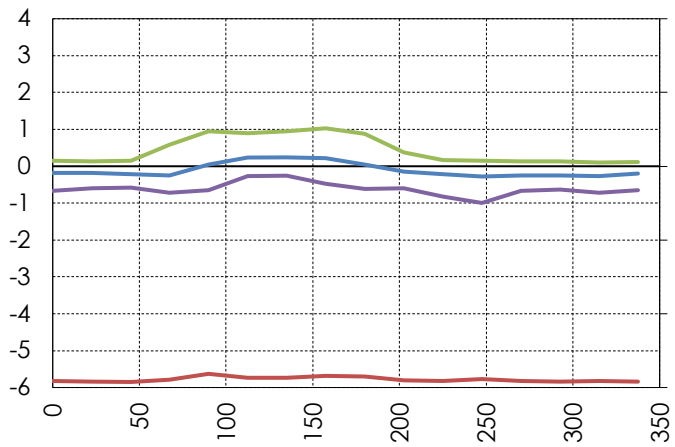
Individual Tap ID: SE03 Port ID: 328



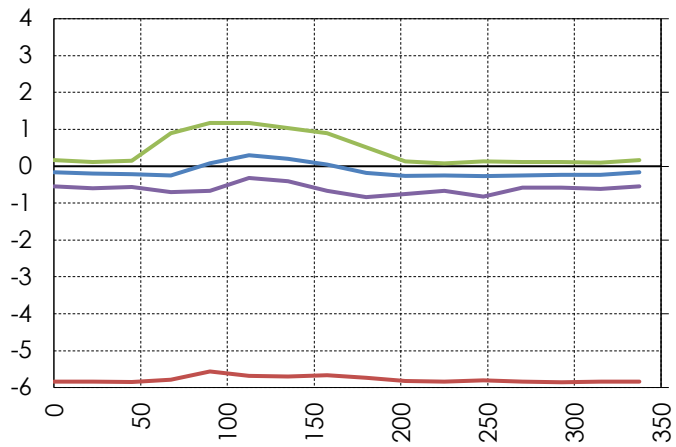
Individual Tap ID: SE04 Port ID: 329



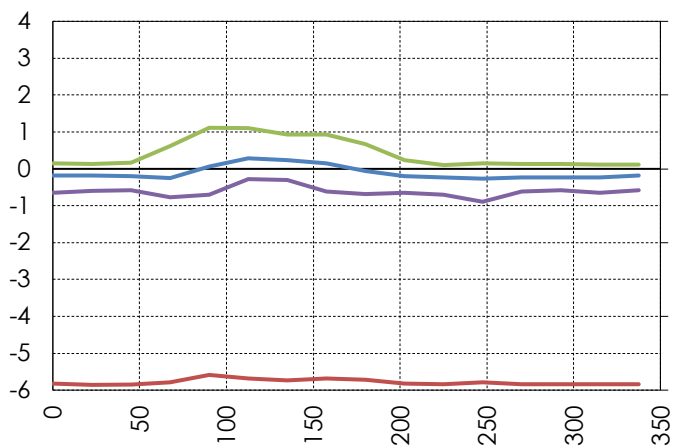
Individual Tap ID: SE05 Port ID: 330



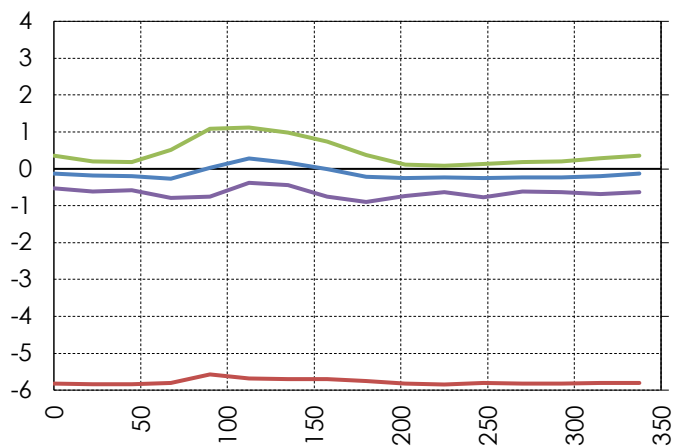
Individual Tap ID: SE06 Port ID: 331



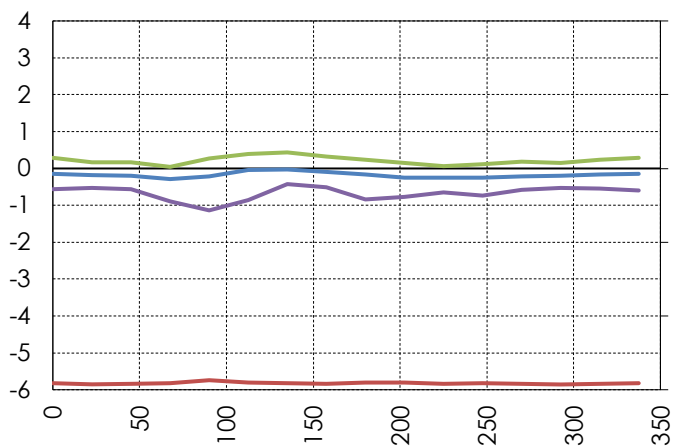
Individual Tap ID: EE01 Port ID: 332



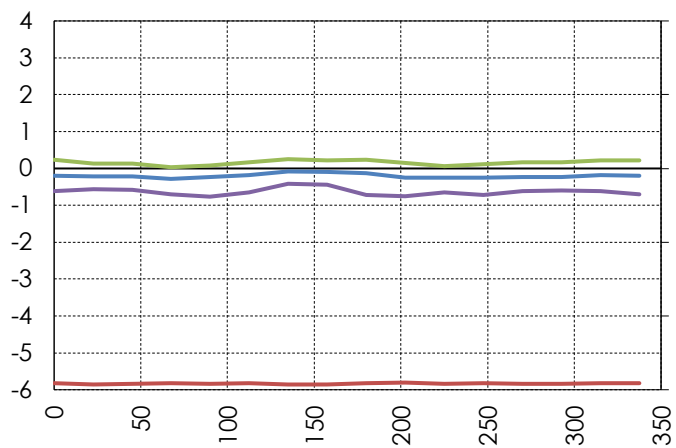
Individual Tap ID: EE03 Port ID: 333



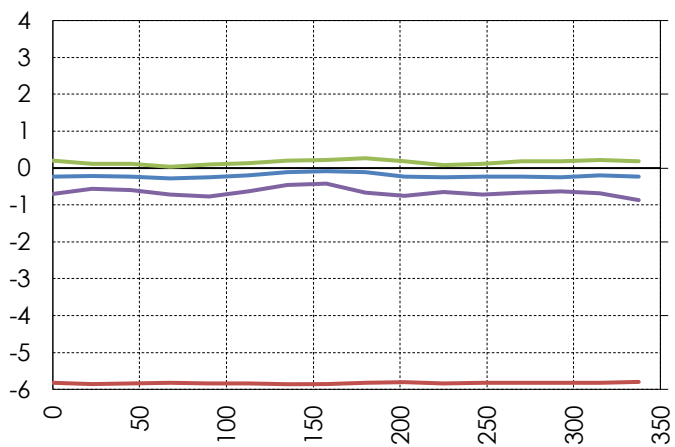
Individual Tap ID: EE04 Port ID: 334



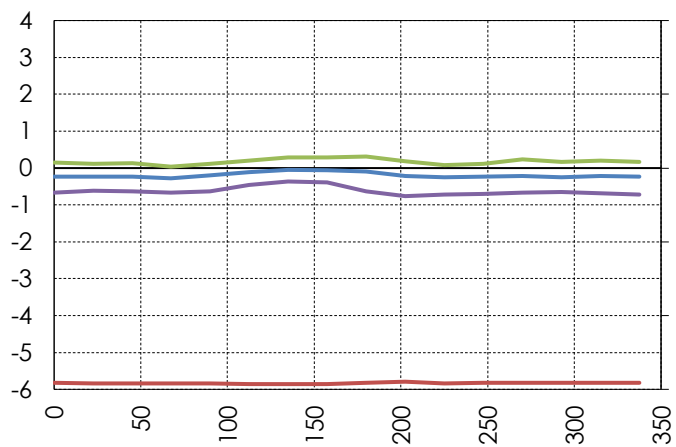
Individual Tap ID: EE05 Port ID: 335



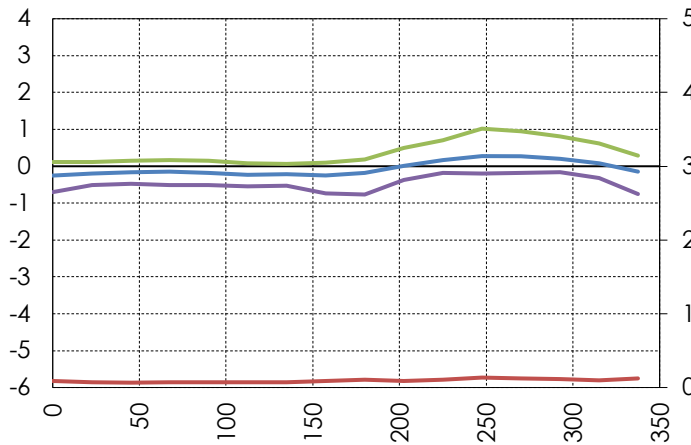
Individual Tap ID: EE06 Port ID: 336



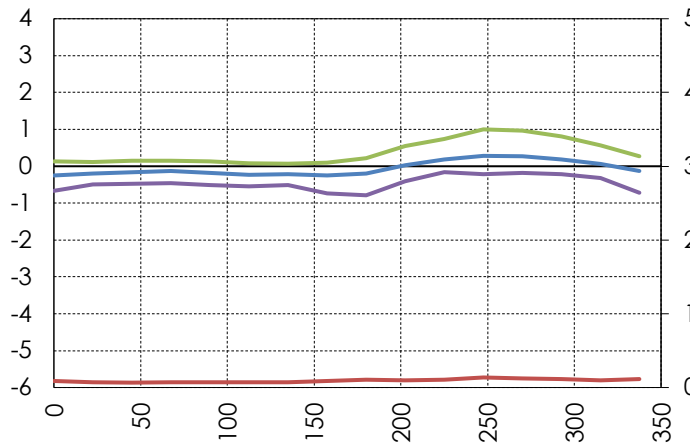
Individual Tap ID: EE07 Port ID: 337



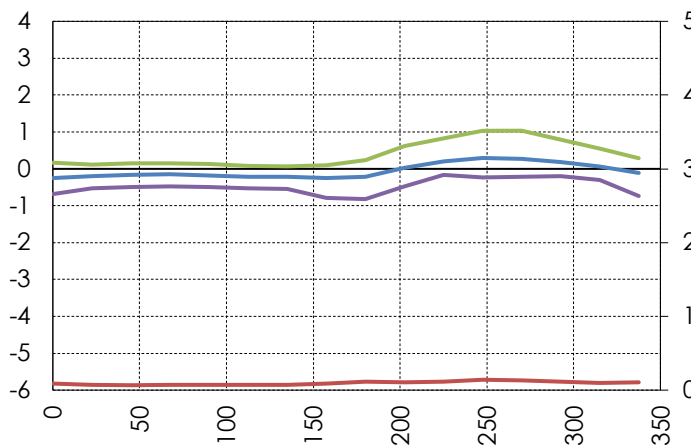
Individual Tap ID: WC03 Port ID: 338



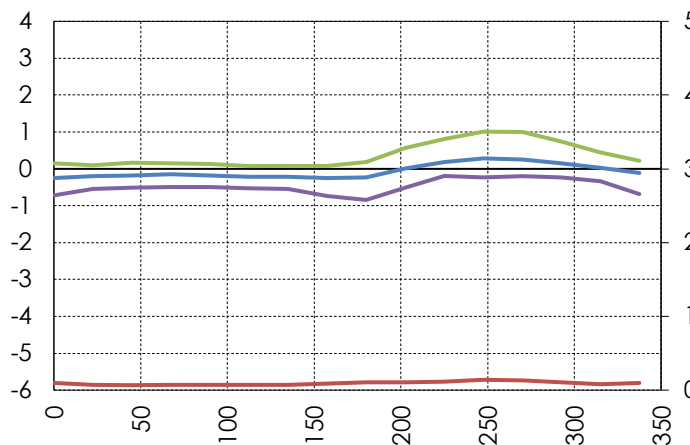
Individual Tap ID: WC04 Port ID: 339



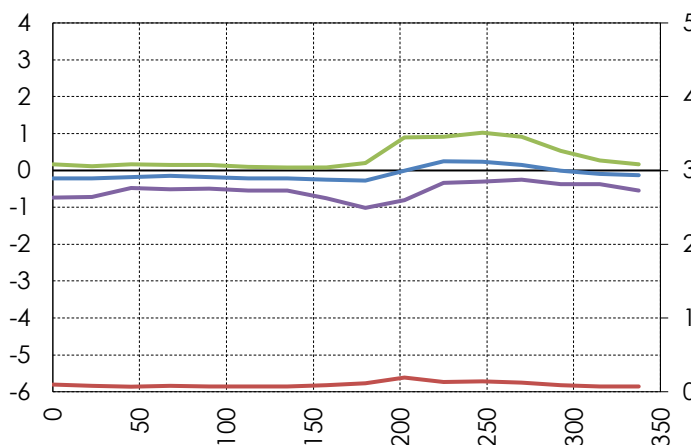
Individual Tap ID: WC05 Port ID: 340



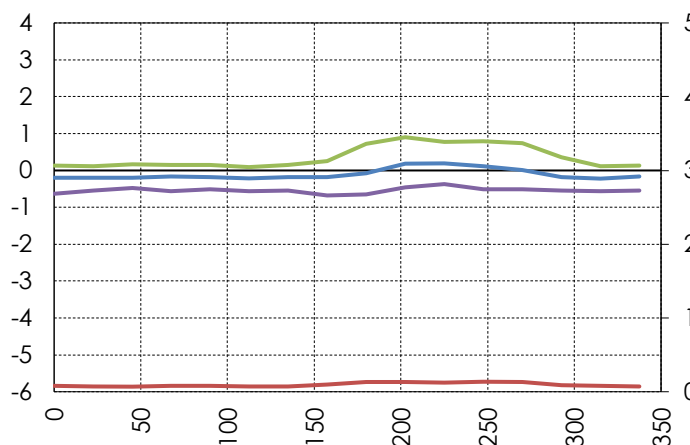
Individual Tap ID: WC06 Port ID: 341



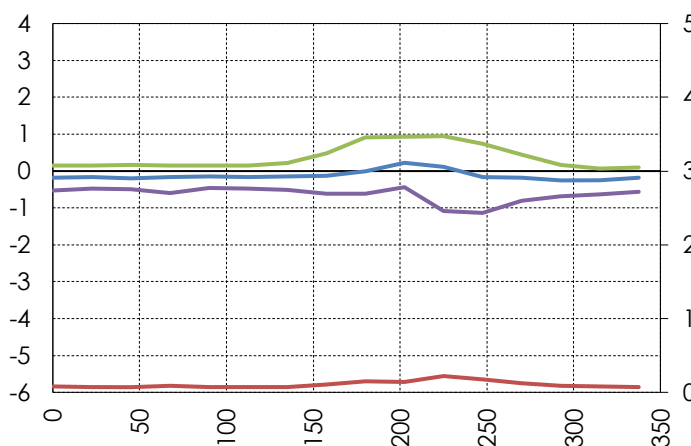
Individual Tap ID: WC07 Port ID: 342



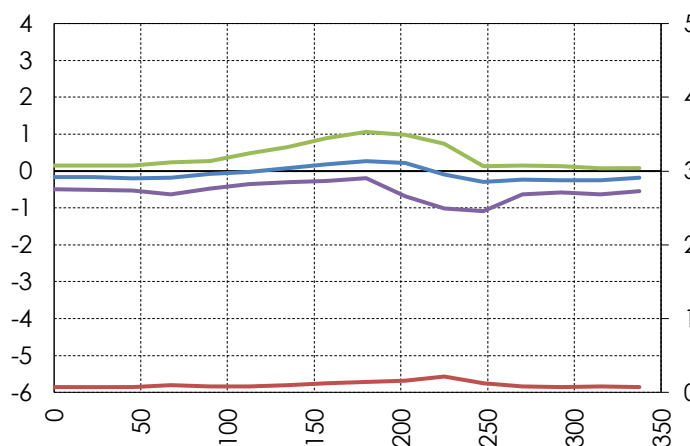
Individual Tap ID: WC08 Port ID: 343



Individual Tap ID: SC01 Port ID: 344



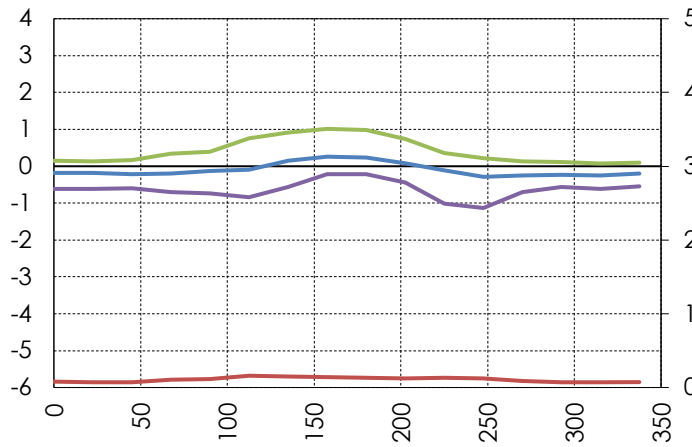
Individual Tap ID: SC02 Port ID: 345



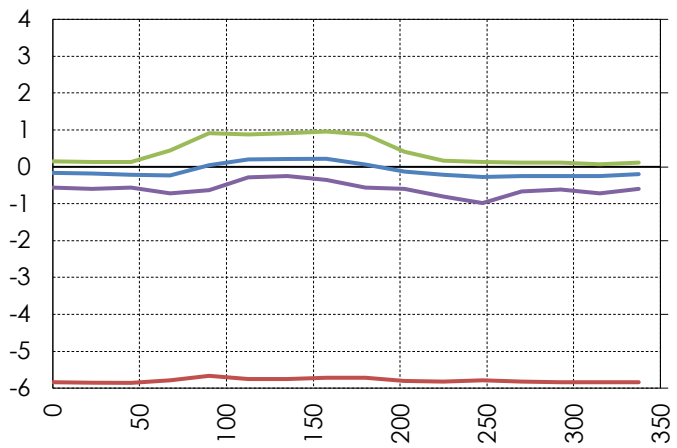
Individual Tap ID: SC03 Port ID: 346



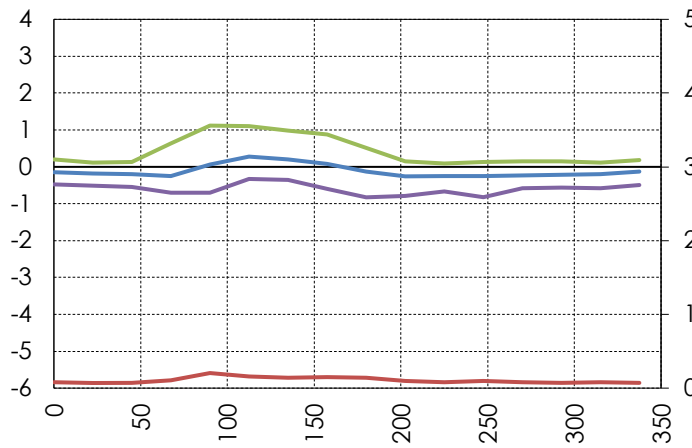
Individual Tap ID: SC04 Port ID: 347



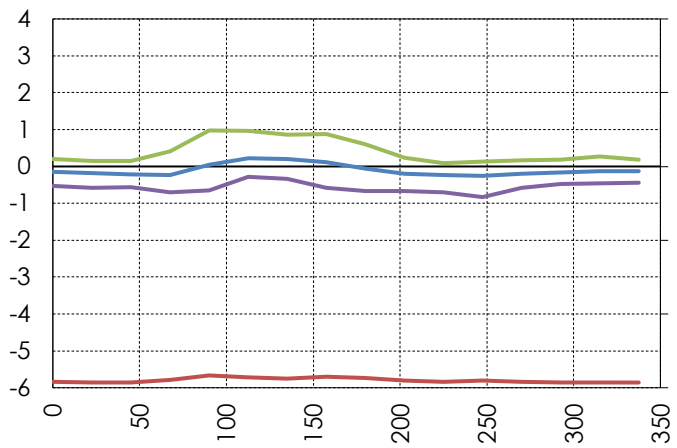
Individual Tap ID: SC05 Port ID: 348



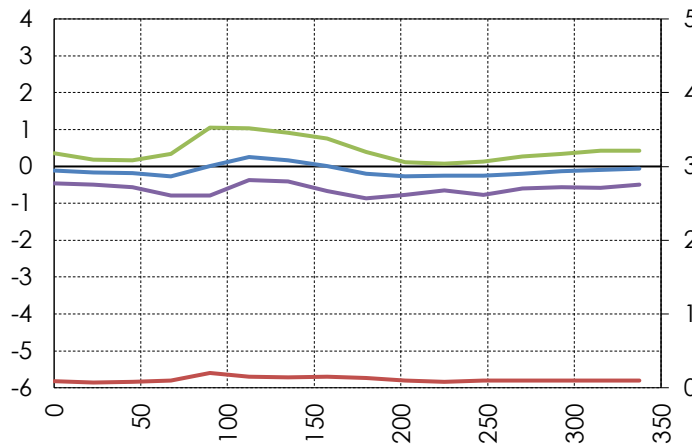
Individual Tap ID: SC06 Port ID: 349



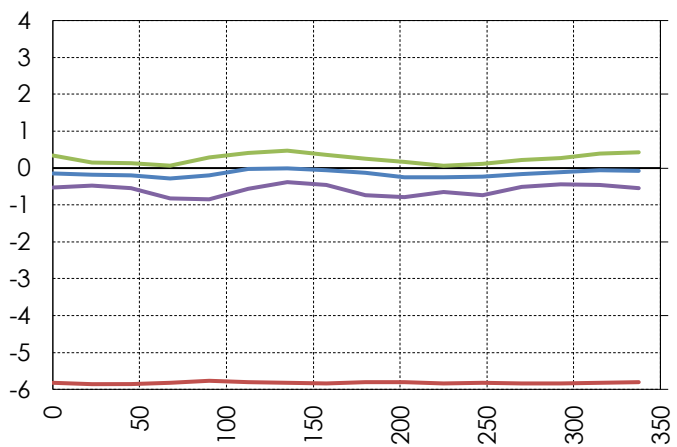
Individual Tap ID: EC01 Port ID: 350



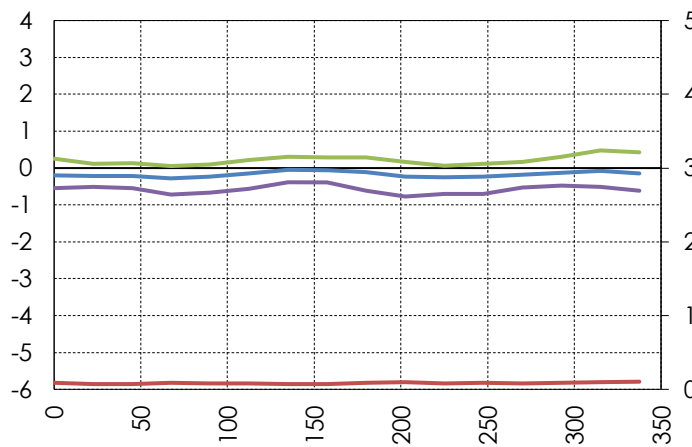
Individual Tap ID: EC03 Port ID: 351



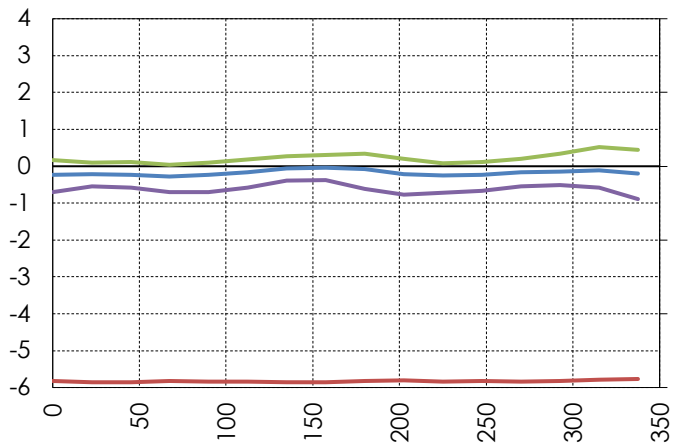
Individual Tap ID: EC05 Port ID: 352



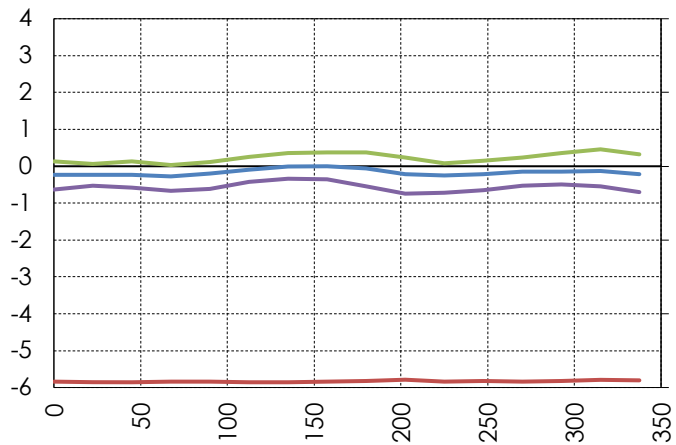
Individual Tap ID: EC06 Port ID: 353



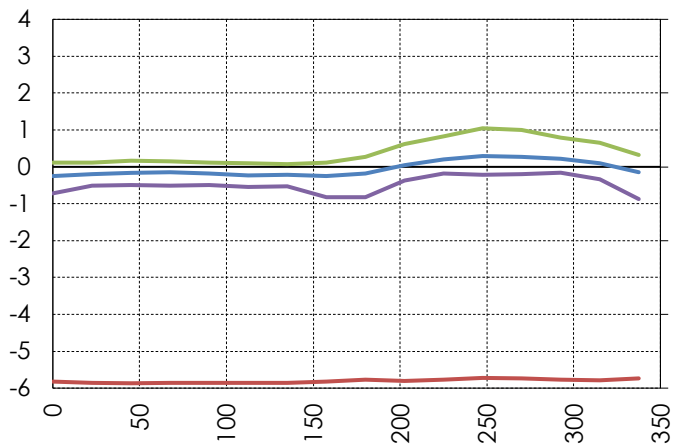
Individual Tap ID: EC07 Port ID: 354



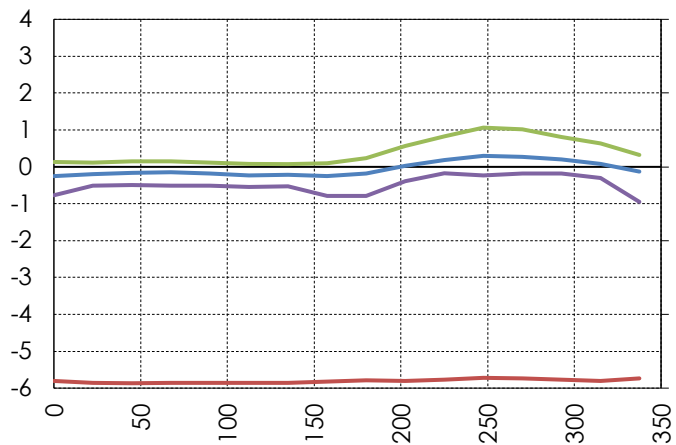
Individual Tap ID: EC08 Port ID: 355



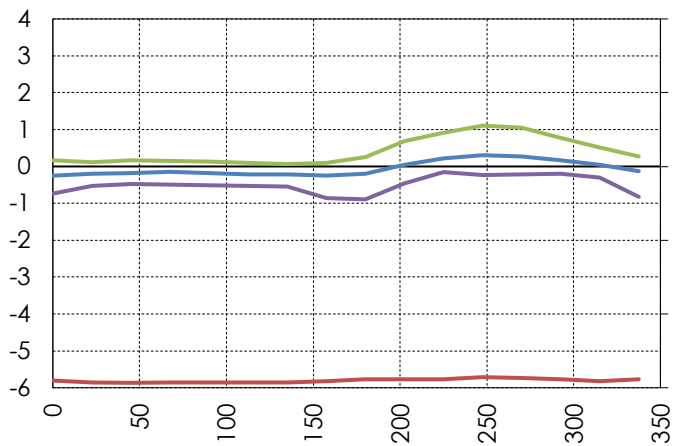
Individual Tap ID: WA08 Port ID: 356



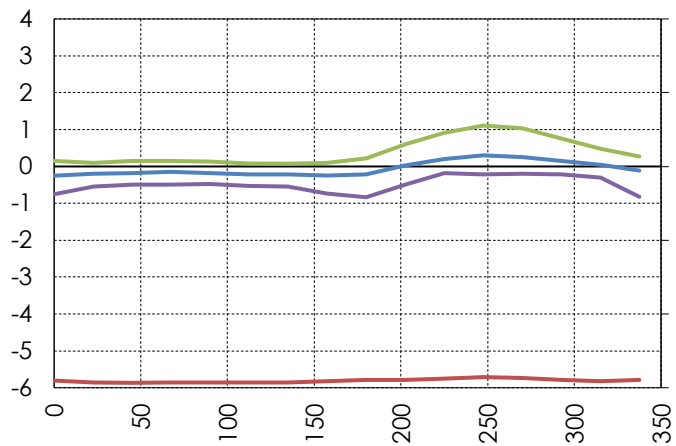
Individual Tap ID: WA09 Port ID: 357



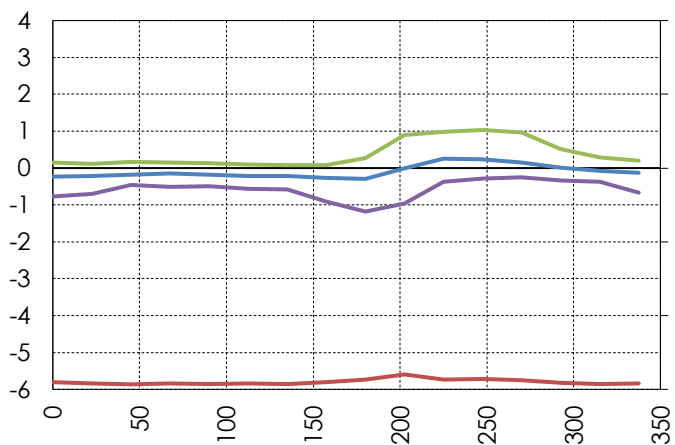
Individual Tap ID: WA10 Port ID: 358



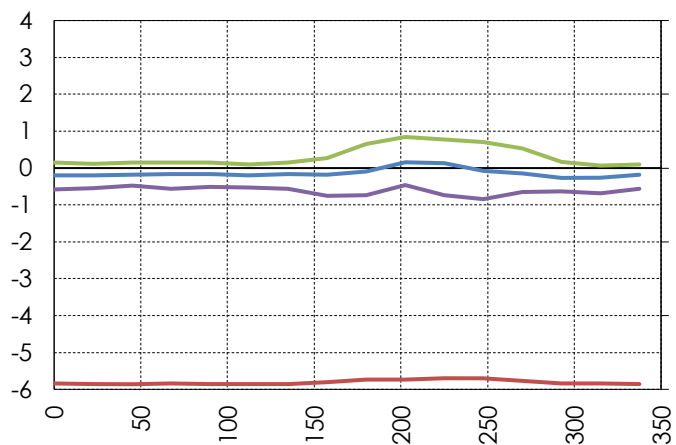
Individual Tap ID: WA11 Port ID: 359



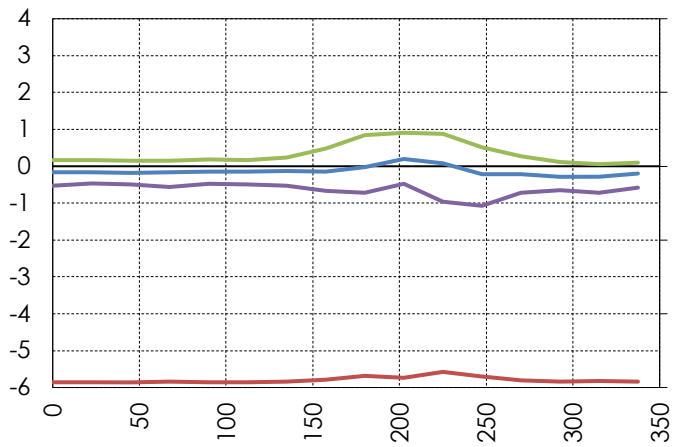
Individual Tap ID: WA12 Port ID: 360



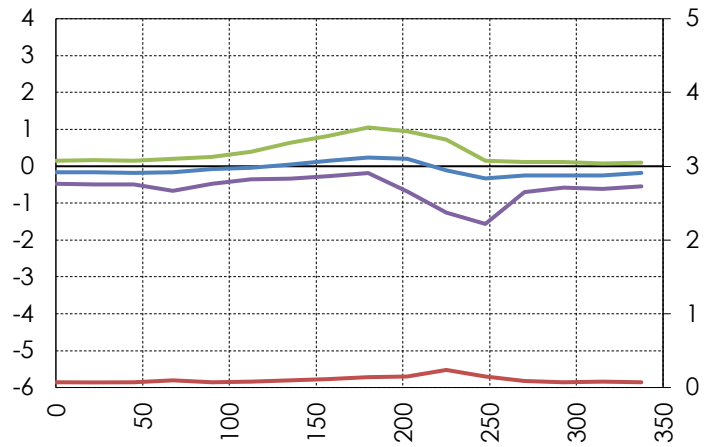
Individual Tap ID: WA13 Port ID: 361



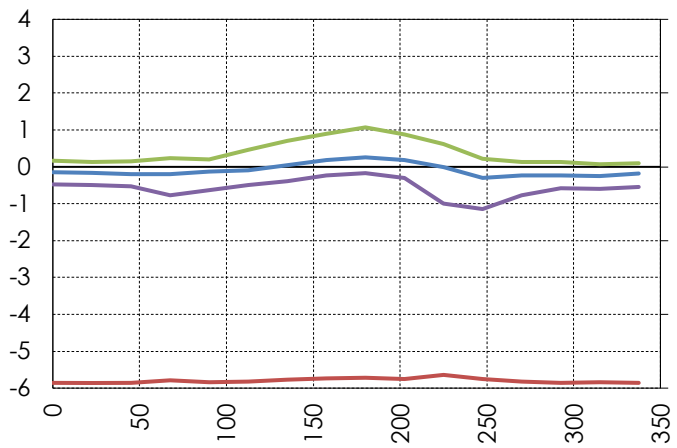
Individual Tap ID: SA01 Port ID: 362



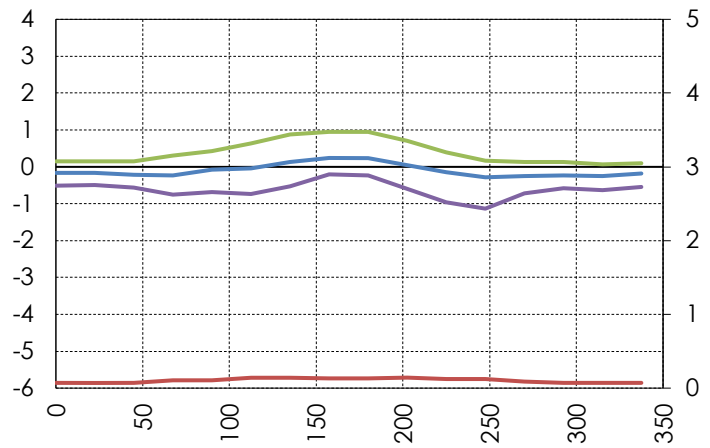
Individual Tap ID: SA02 Port ID: 363



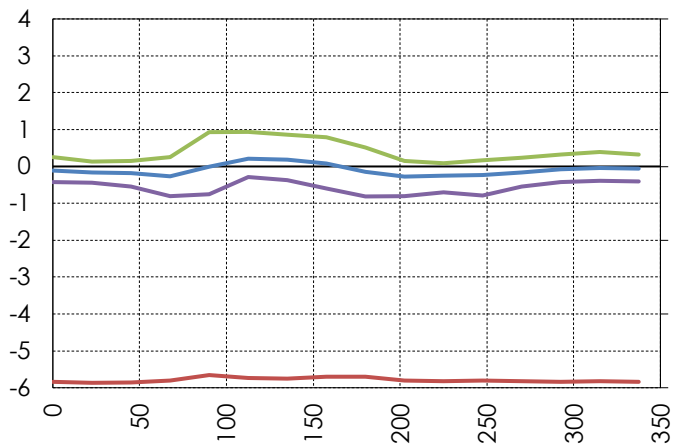
Individual Tap ID: SA03 Port ID: 364



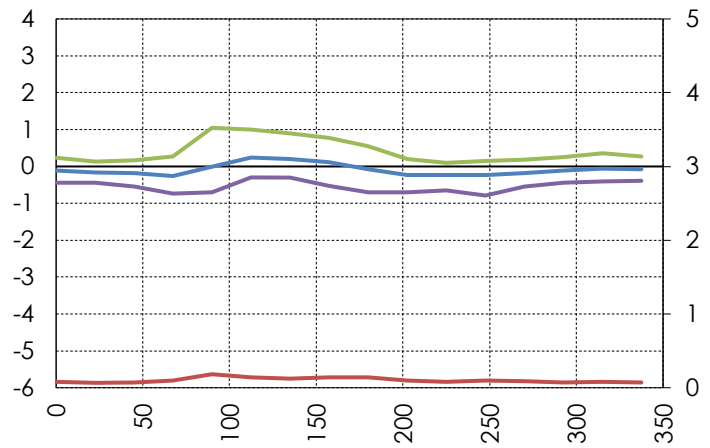
Individual Tap ID: SA04 Port ID: 365



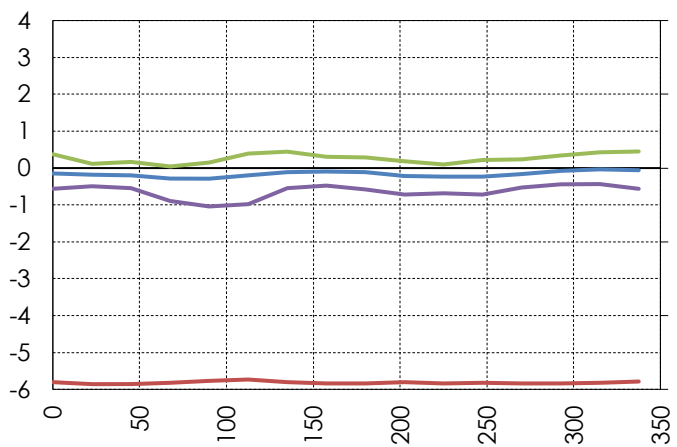
Individual Tap ID: EA01 Port ID: 366



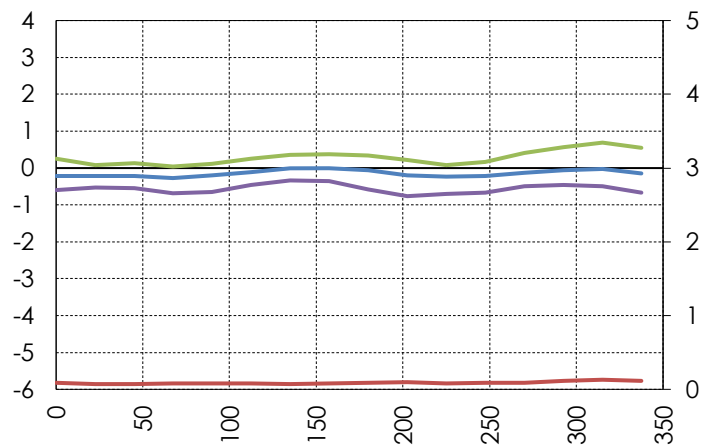
Individual Tap ID: EA02 Port ID: 367



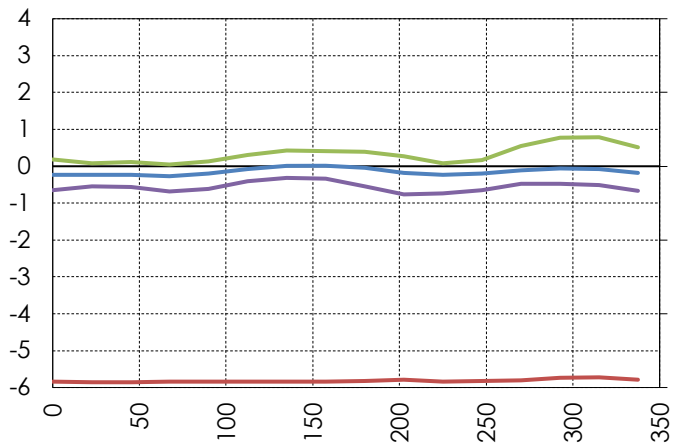
Individual Tap ID: EA03 Port ID: 368



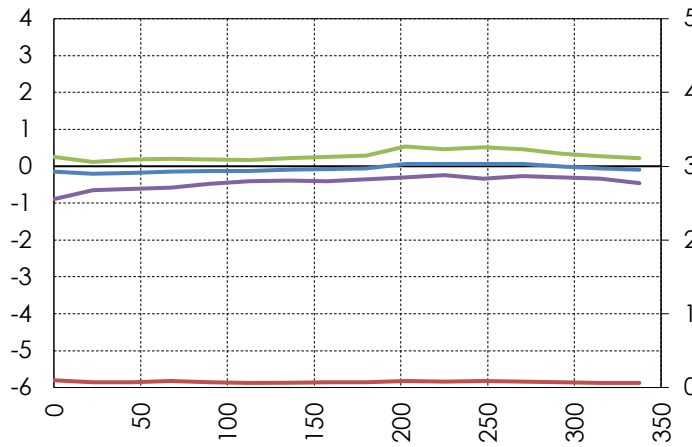
Individual Tap ID: EA04 Port ID: 369



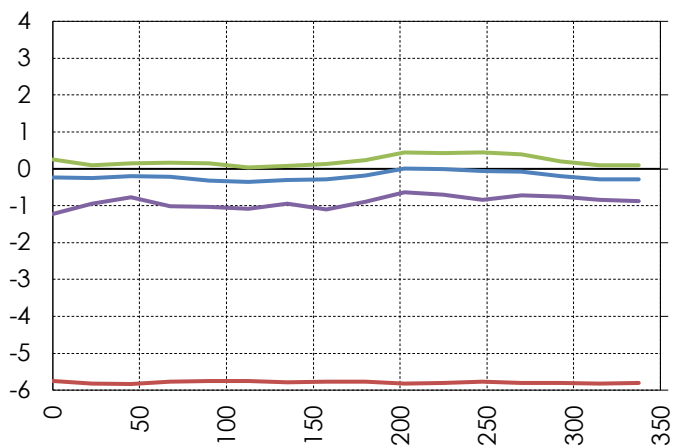
Individual Tap ID: EA05 Port ID: 370



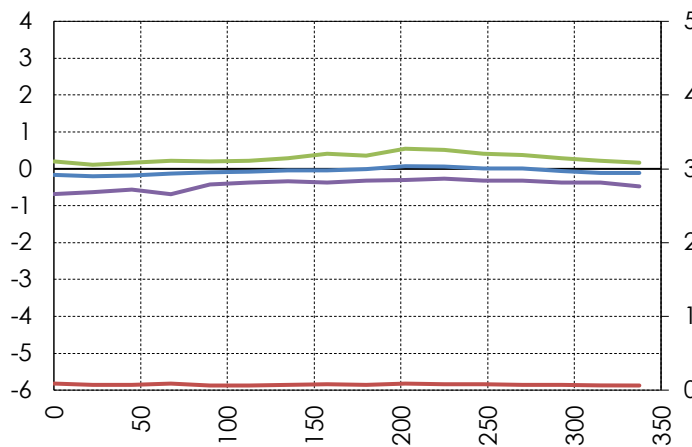
Individual Tap ID: P01s Port ID: 384



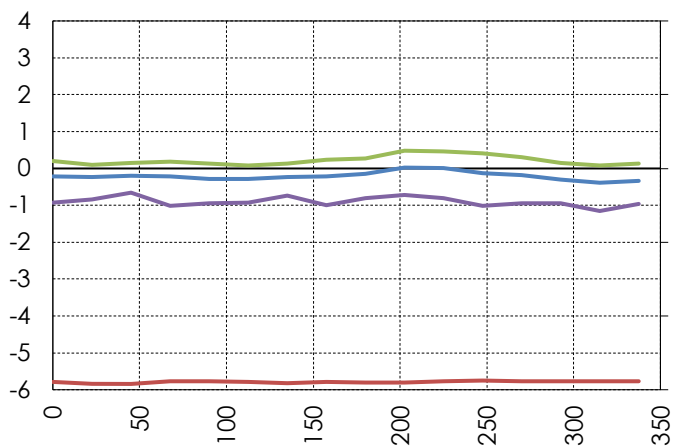
Individual Tap ID: P01t Port ID: 385



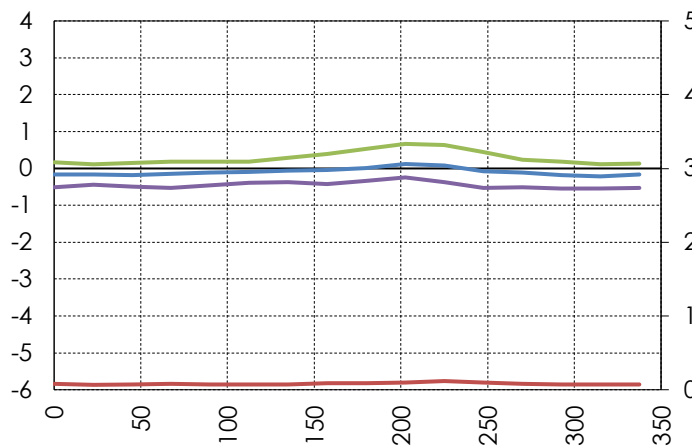
Individual Tap ID: P02s Port ID: 386



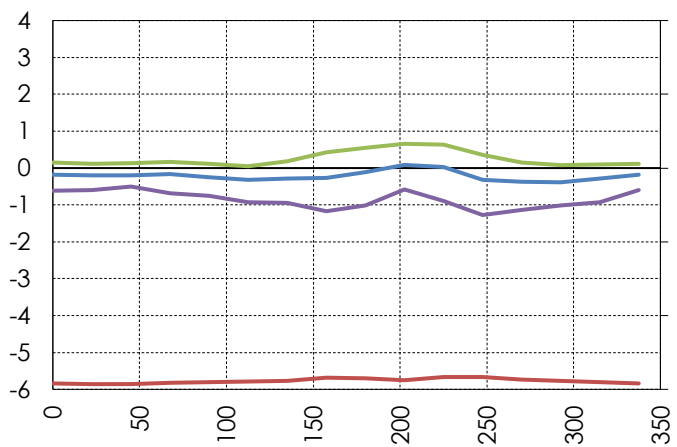
Individual Tap ID: P02t Port ID: 387



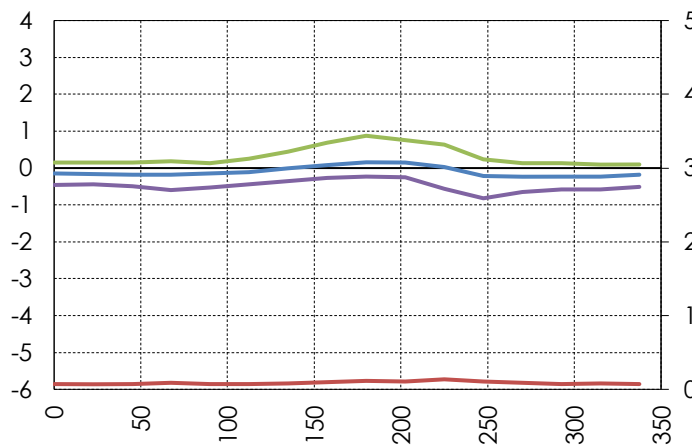
Individual Tap ID: P03s Port ID: 388



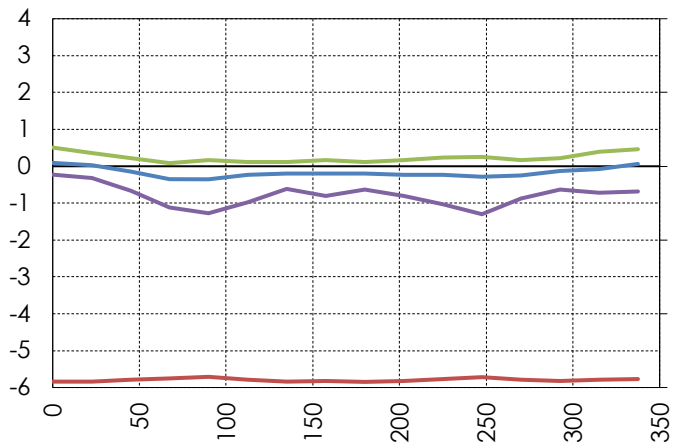
Individual Tap ID: P03t Port ID: 389



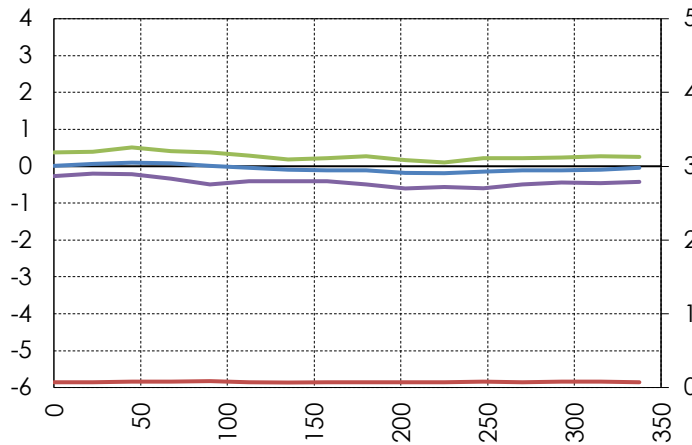
Individual Tap ID: P04s Port ID: 390



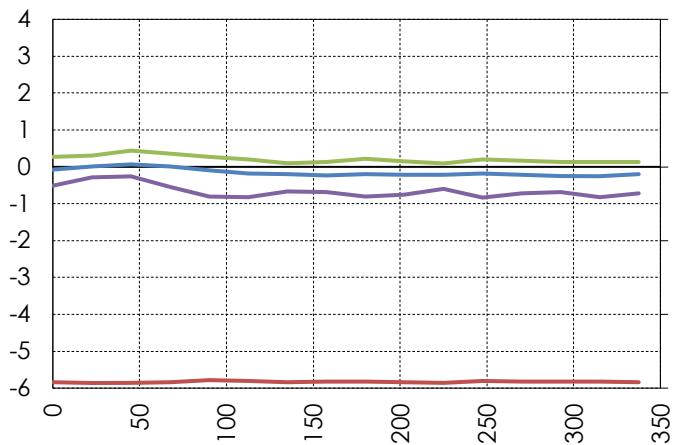
Individual Tap ID: P36t Port ID: 461



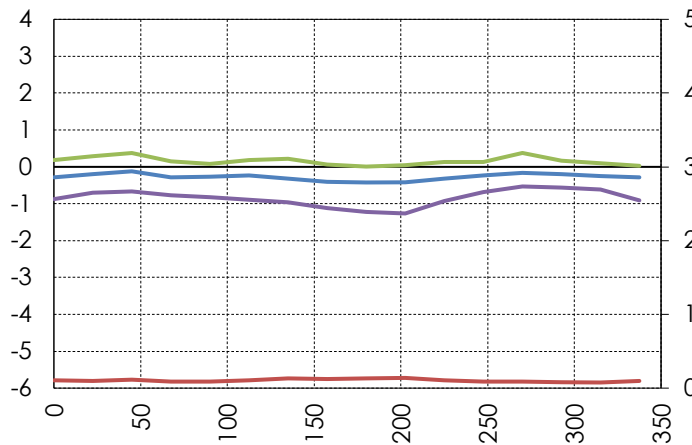
Individual Tap ID: P37s Port ID: 462



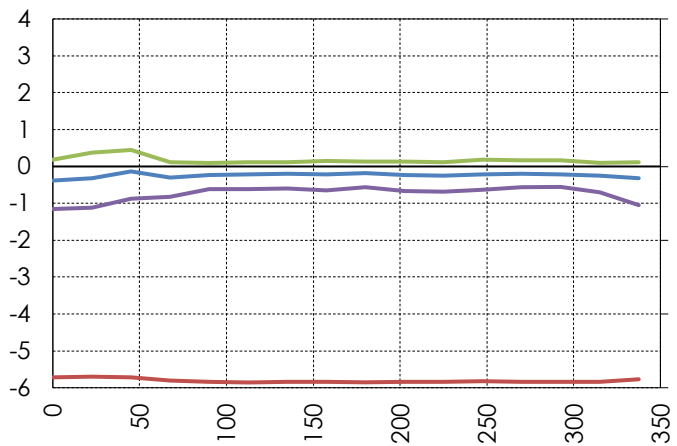
Individual Tap ID: P37t Port ID: 463



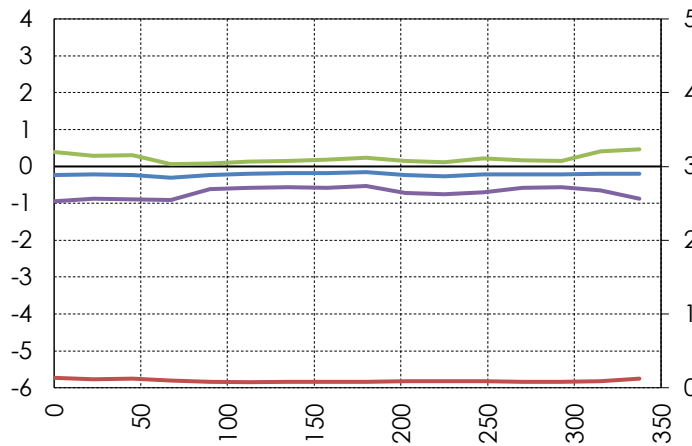
Individual Tap ID: RG01 Port ID: 704



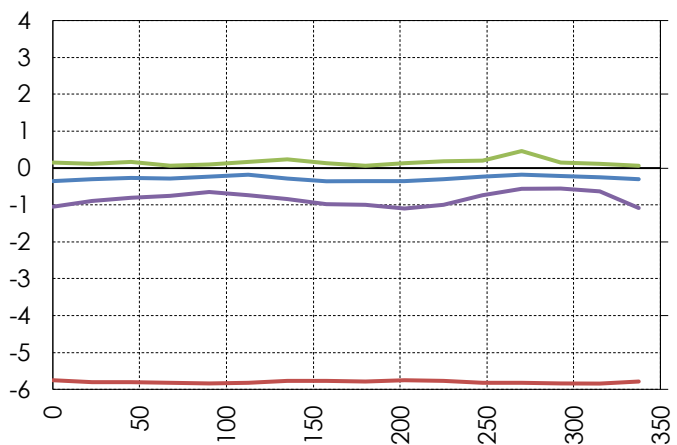
Individual Tap ID: RG02 Port ID: 705



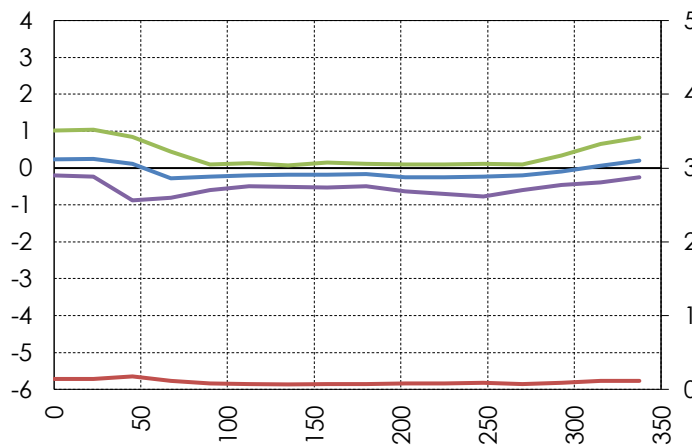
Individual Tap ID: RG03 Port ID: 706



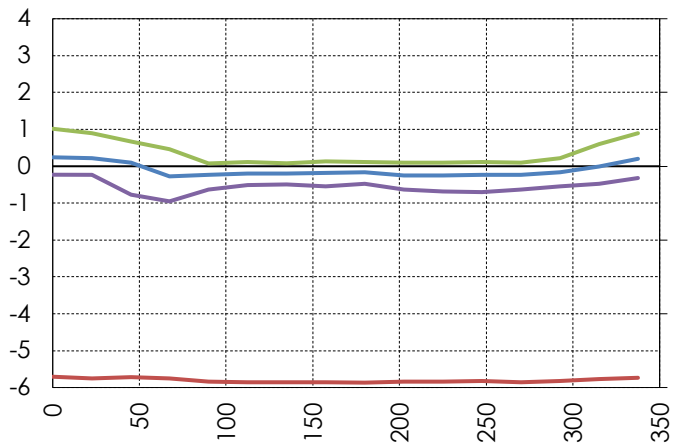
Individual Tap ID: RG04 Port ID: 708



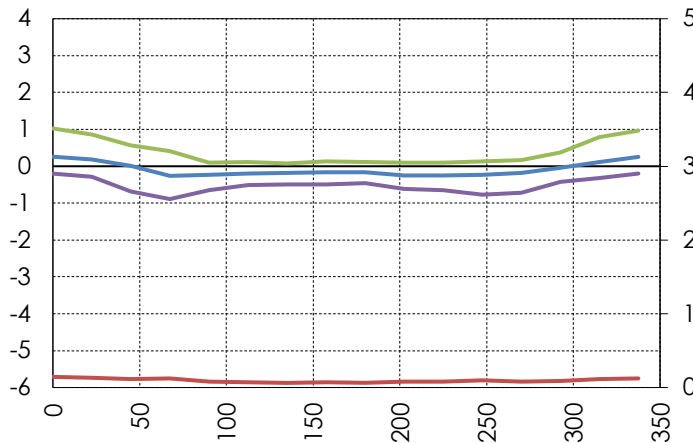
Individual Tap ID: NF02 Port ID: 709



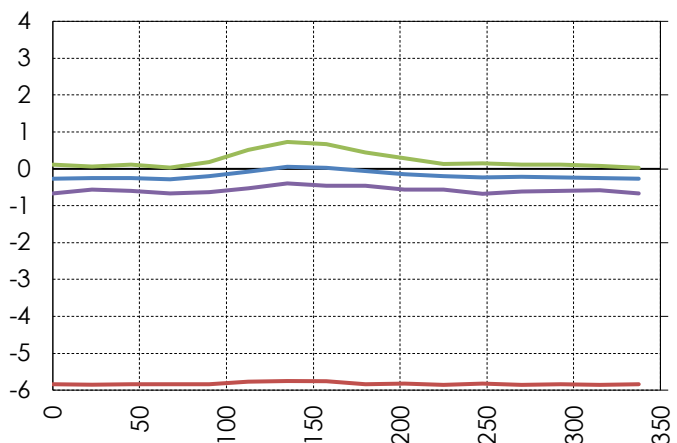
Individual Tap ID: NF03 Port ID: 710



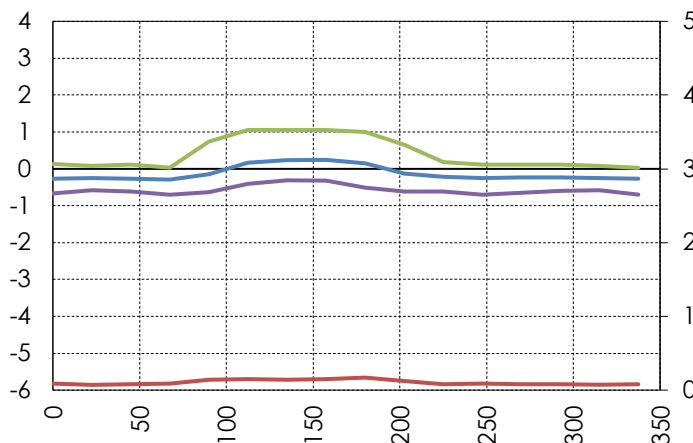
Individual Tap ID: NF04 Port ID: 711



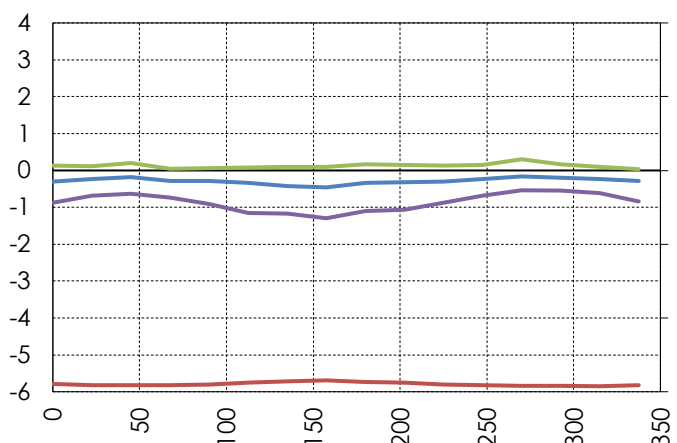
Individual Tap ID: SH04 Port ID: 712



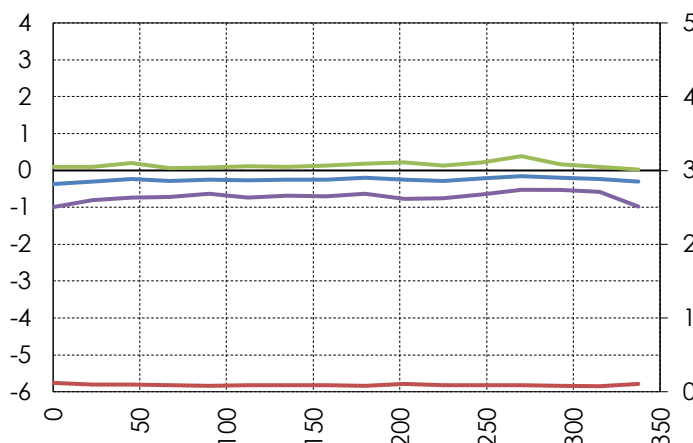
Individual Tap ID: SH03 Port ID: 713



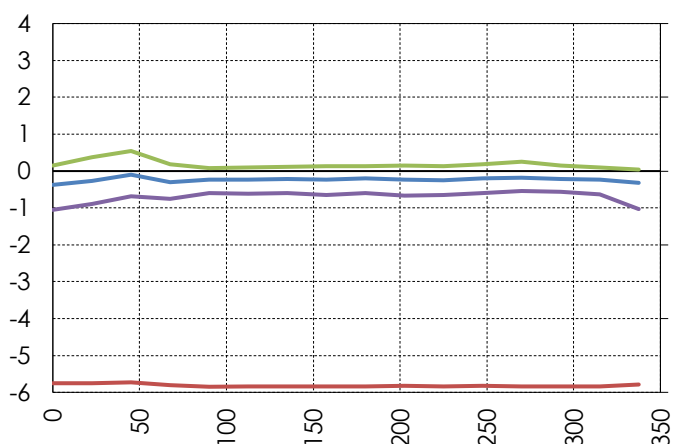
Individual Tap ID: EH03 Port ID: 714



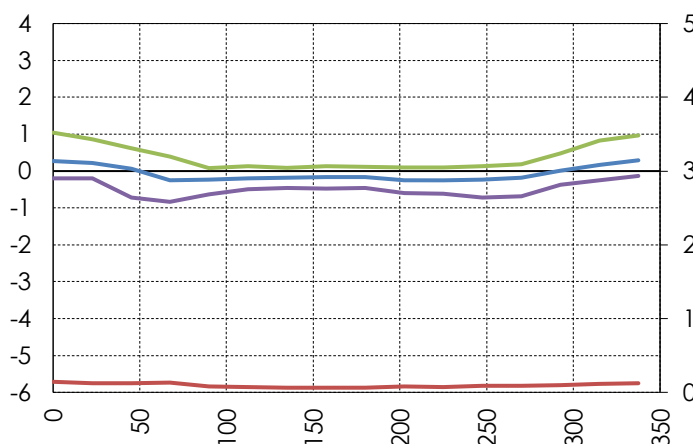
Individual Tap ID: EH04 Port ID: 715



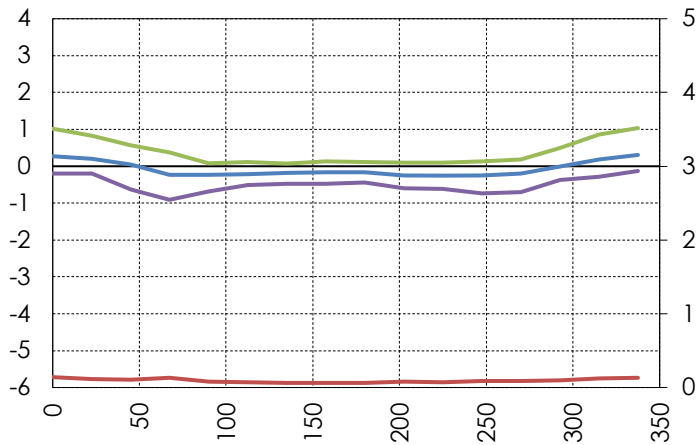
Individual Tap ID: EH05 Port ID: 716



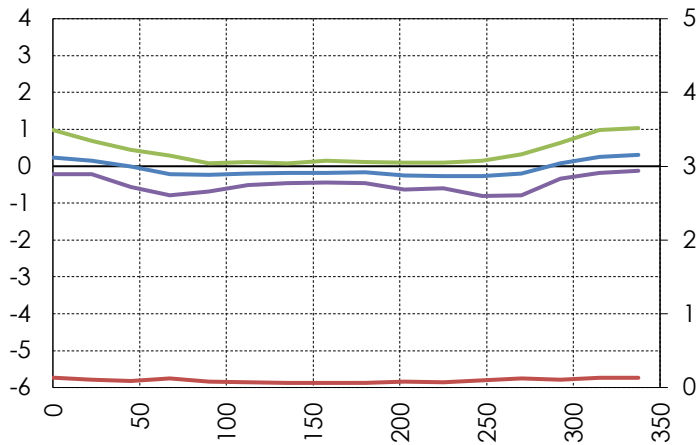
Individual Tap ID: NF05 Port ID: 720



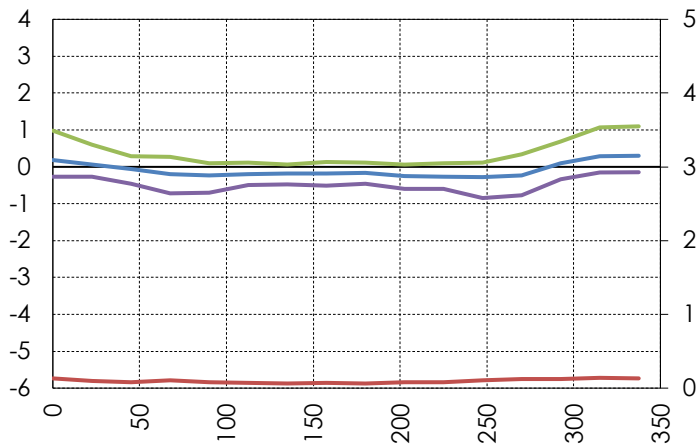
Individual Tap ID: NF06 Port ID: 721



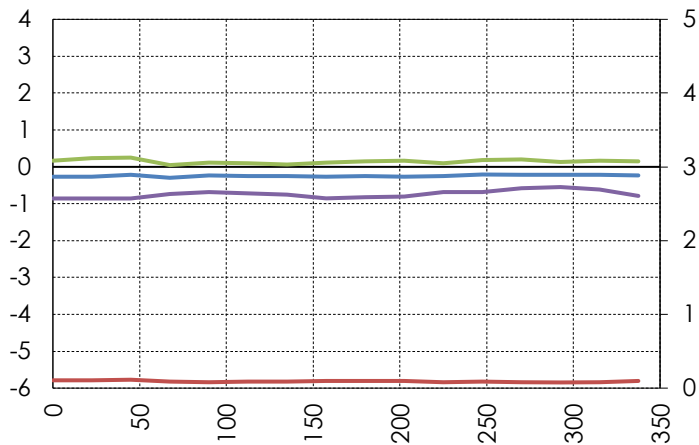
Individual Tap ID: NF07 Port ID: 722



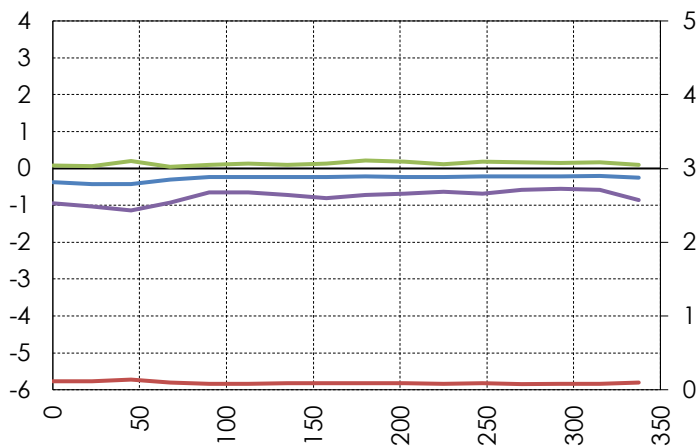
Individual Tap ID: NF08 Port ID: 723



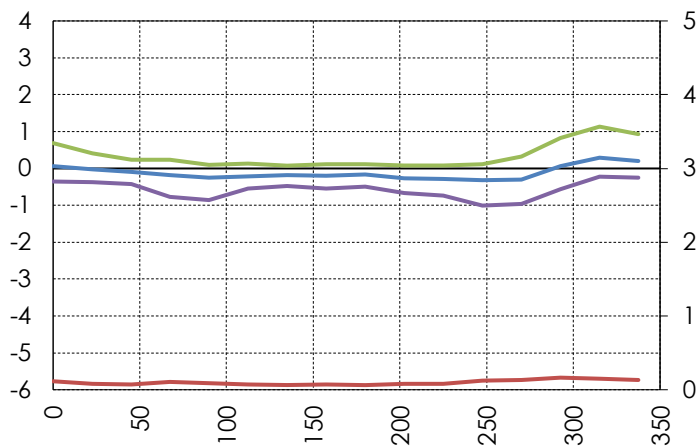
Individual Tap ID: EF06 Port ID: 724



Individual Tap ID: EF07 Port ID: 725



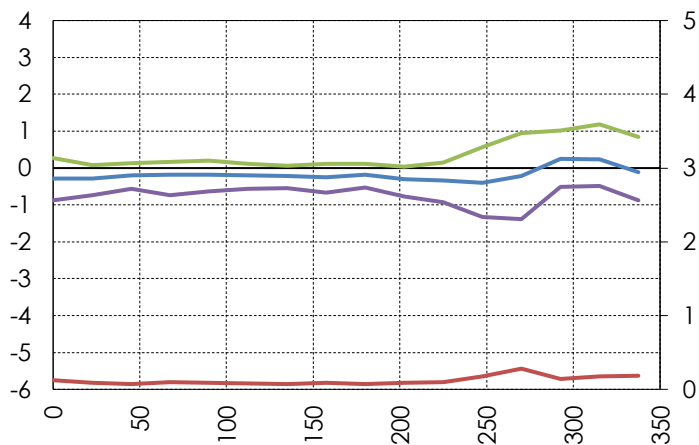
Individual Tap ID: NE01 Port ID: 726



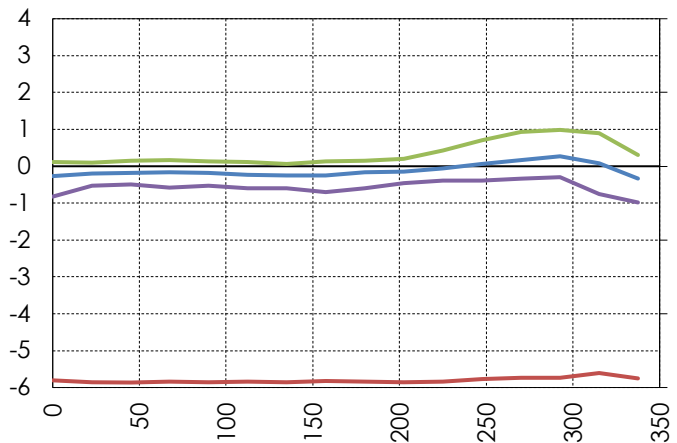
Individual Tap ID: NE02 Port ID: 727



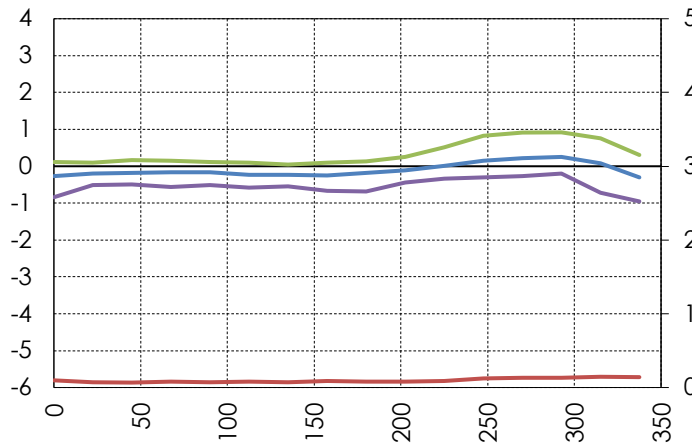
Individual Tap ID: WE01 Port ID: 728



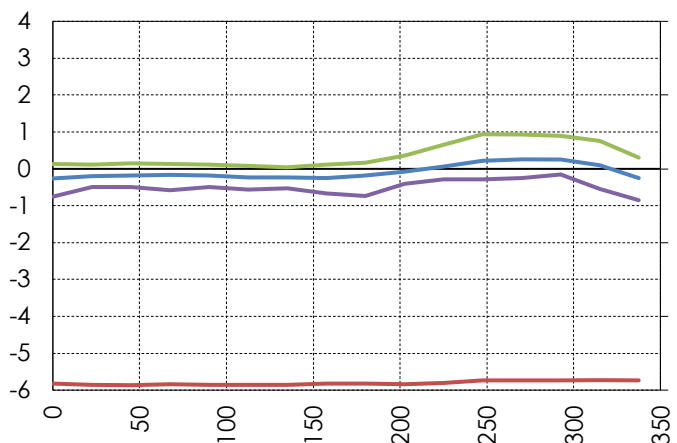
Individual Tap ID: WE02 Port ID: 729



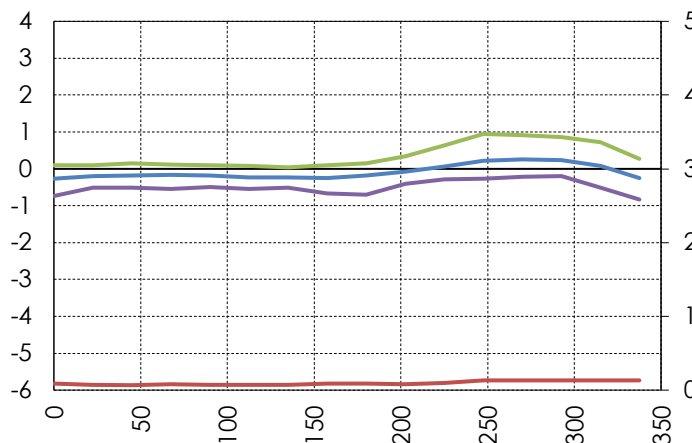
Individual Tap ID: WE03 Port ID: 730



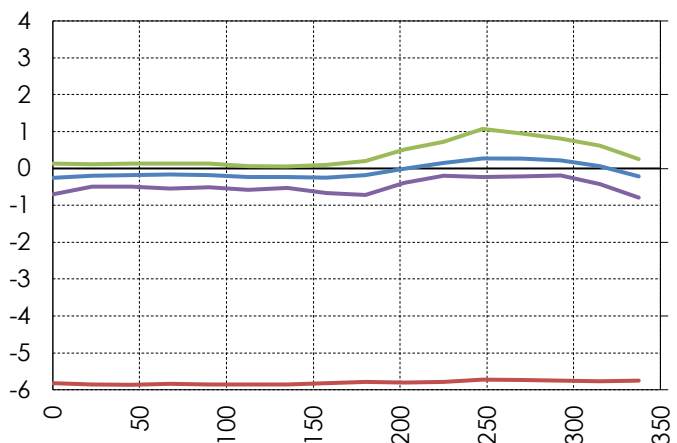
Individual Tap ID: WE04 Port ID: 731



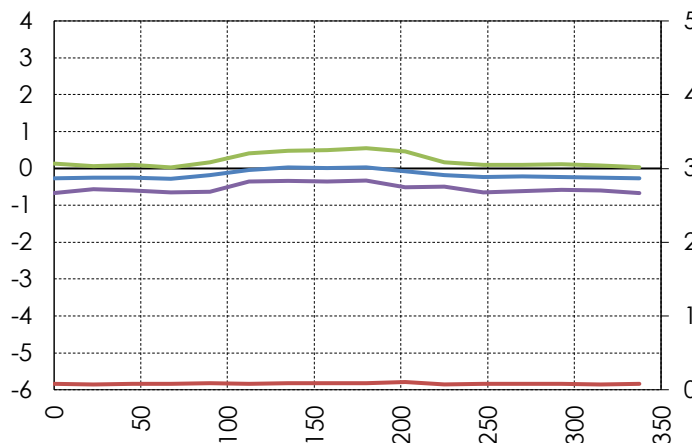
Individual Tap ID: WE05 Port ID: 732



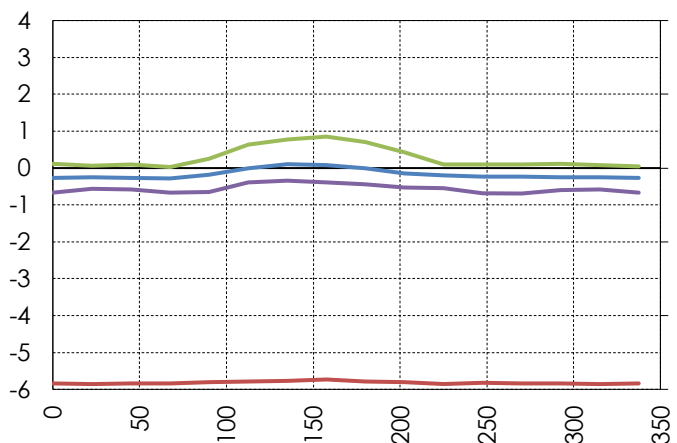
Individual Tap ID: WE06 Port ID: 733



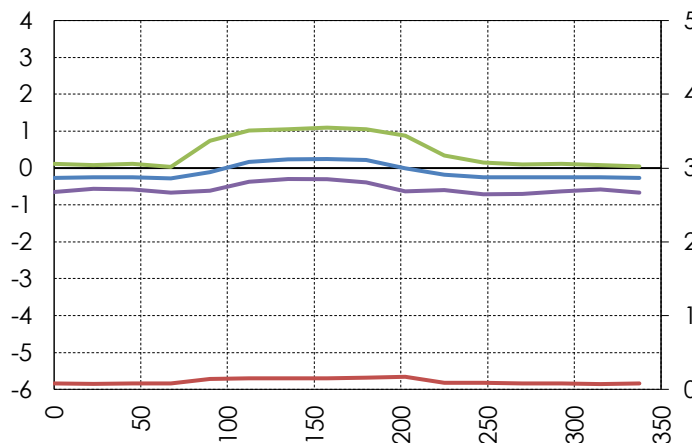
Individual Tap ID: SE07 Port ID: 734



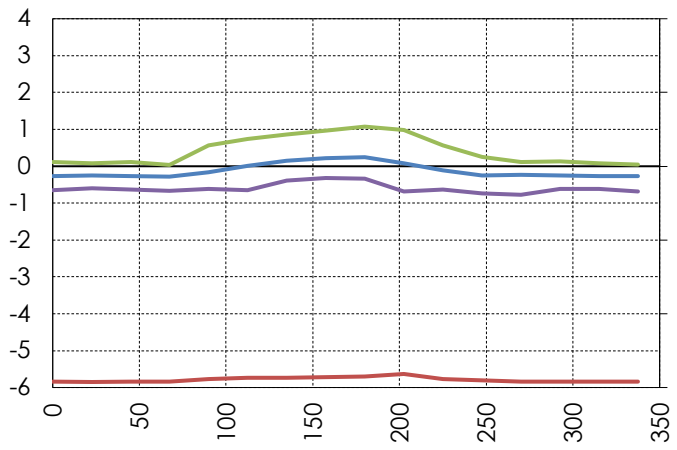
Individual Tap ID: SE08 Port ID: 735



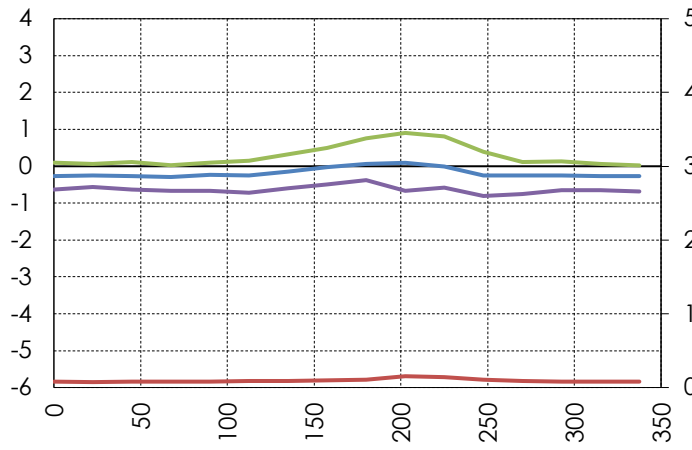
Individual Tap ID: SE09 Port ID: 736



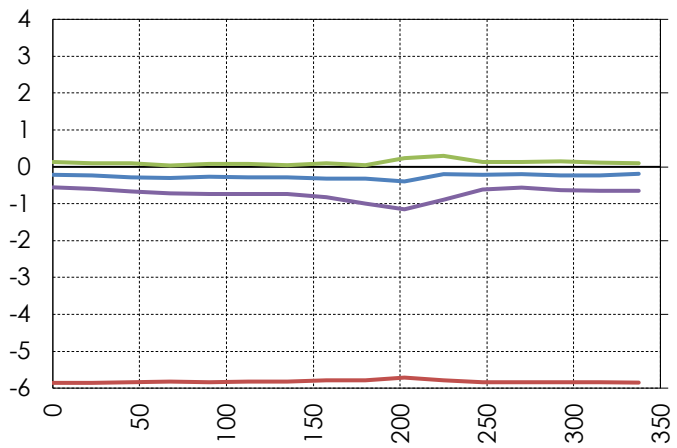
Individual Tap ID: SE10 Port ID: 737



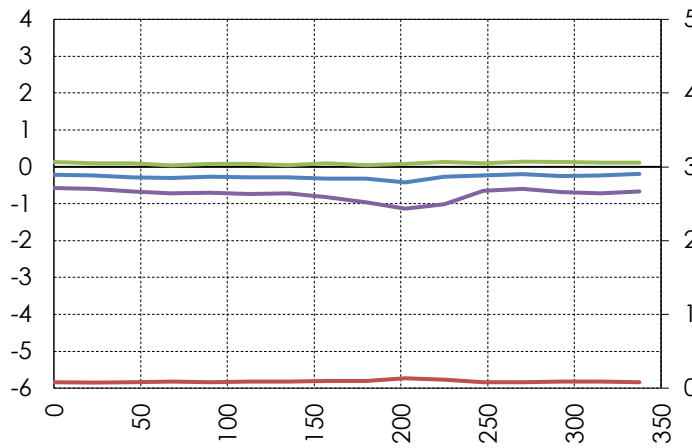
Individual Tap ID: SE11 Port ID: 738



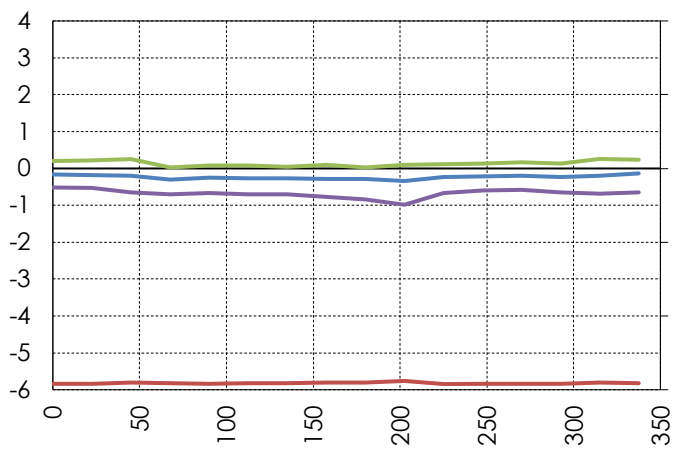
Individual Tap ID: SE13 Port ID: 739



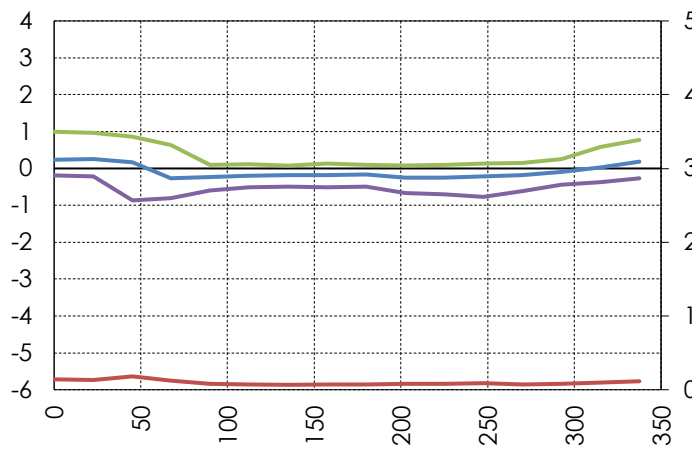
Individual Tap ID: EE11 Port ID: 740



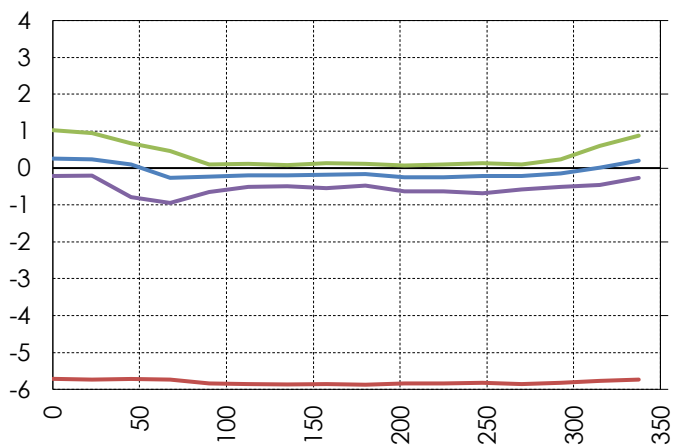
Individual Tap ID: EE12 Port ID: 741



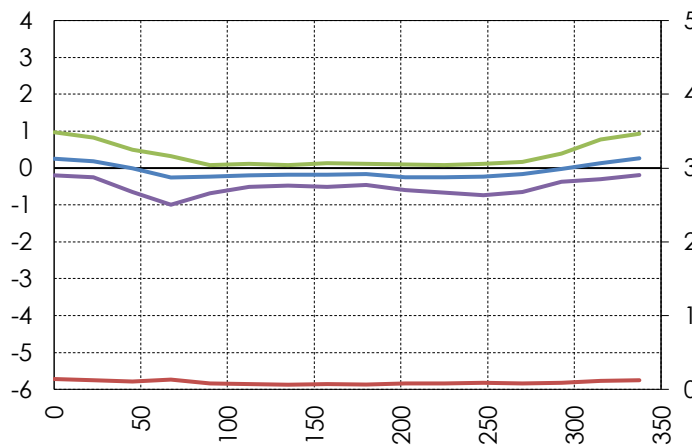
Individual Tap ID: ND08 Port ID: 742



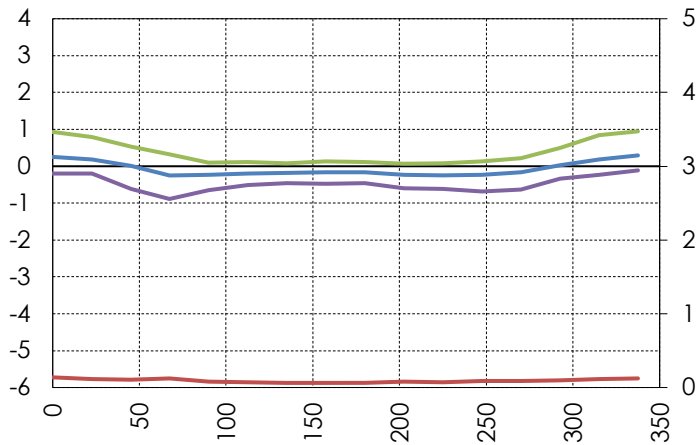
Individual Tap ID: ND09 Port ID: 743



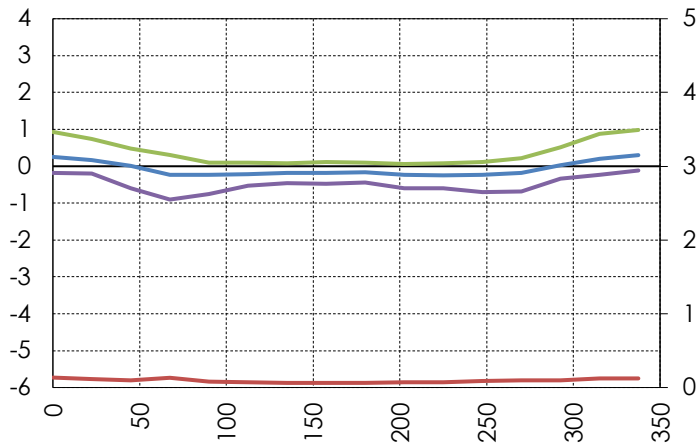
Individual Tap ID: ND10 Port ID: 744



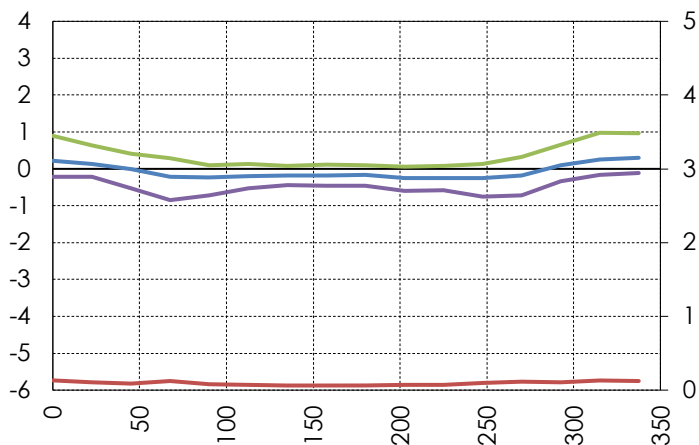
Individual Tap ID: ND11 Port ID: 745



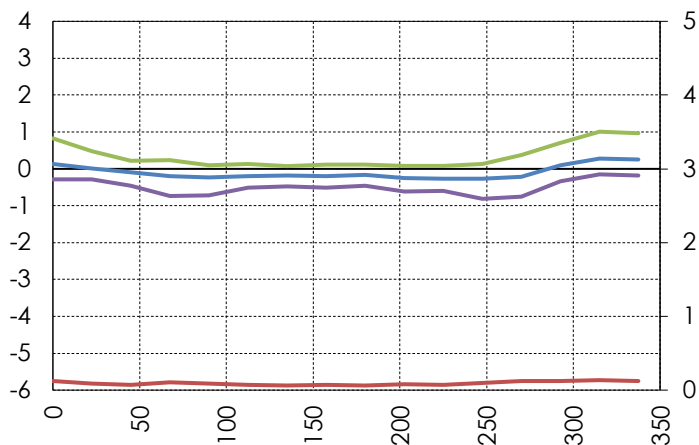
Individual Tap ID: ND12 Port ID: 746



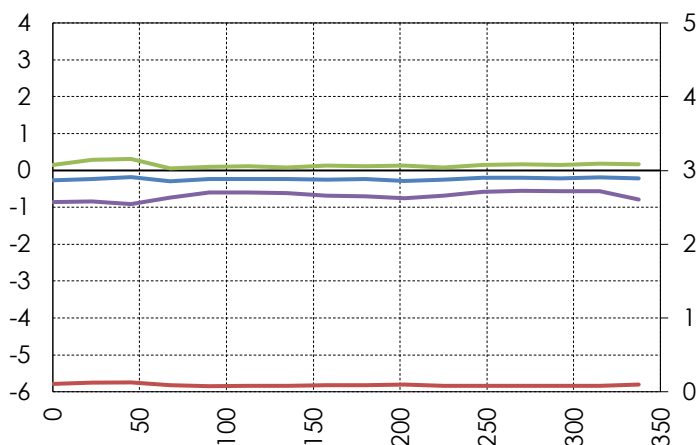
Individual Tap ID: ND13 Port ID: 747



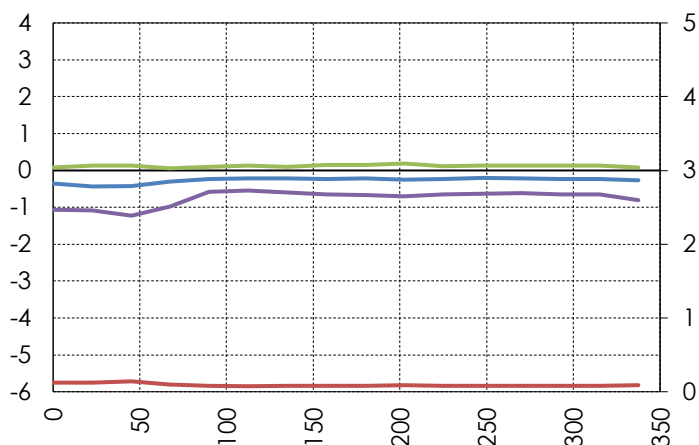
Individual Tap ID: ND14 Port ID: 748



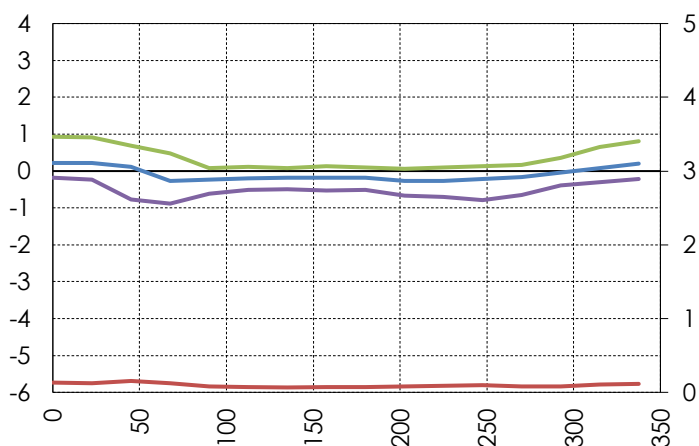
Individual Tap ID: ED09 Port ID: 749



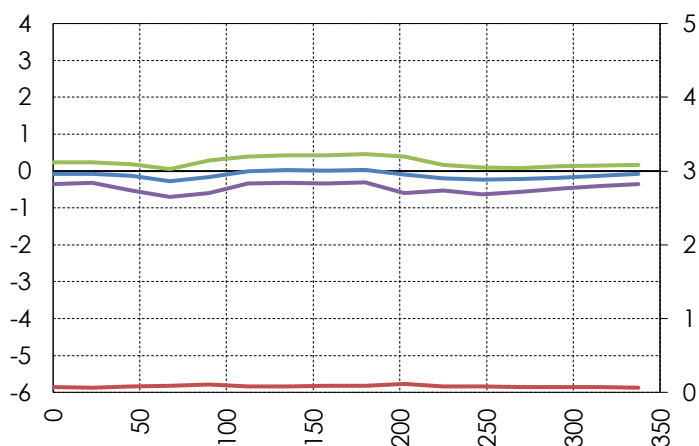
Individual Tap ID: ED11 Port ID: 750



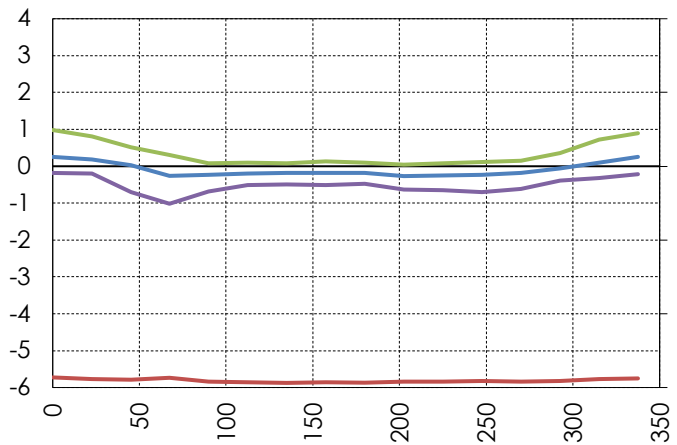
Individual Tap ID: NC03 Port ID: 751



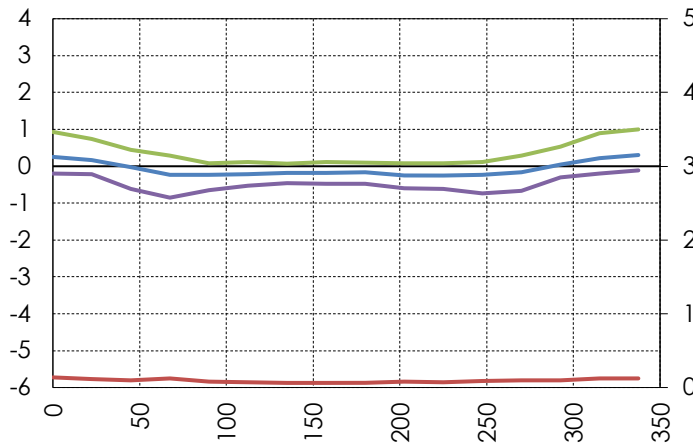
Individual Tap ID: NC04 Port ID: 752



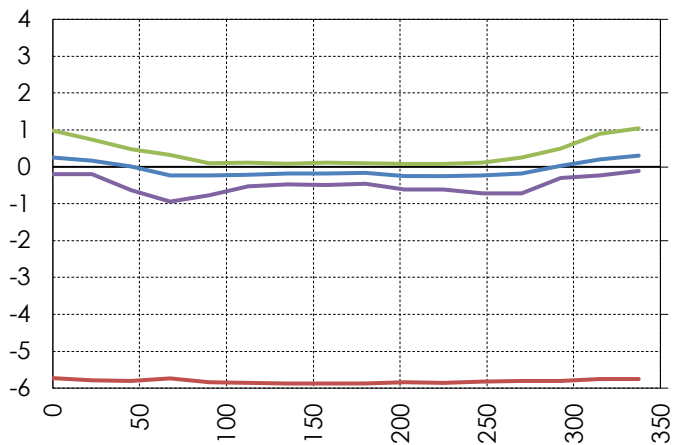
Individual Tap ID: NC05 Port ID: 753



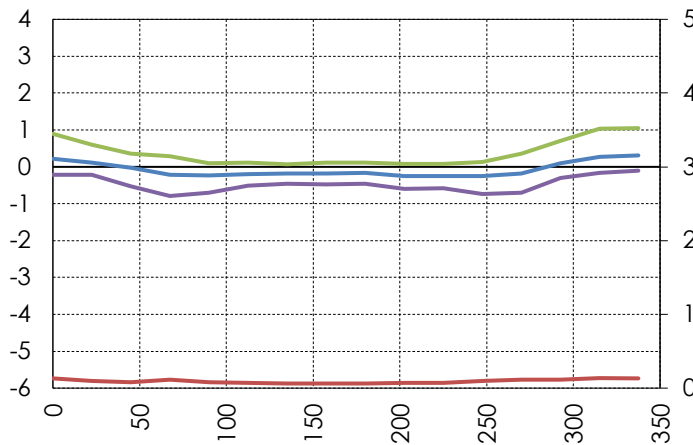
Individual Tap ID: NC06 Port ID: 754



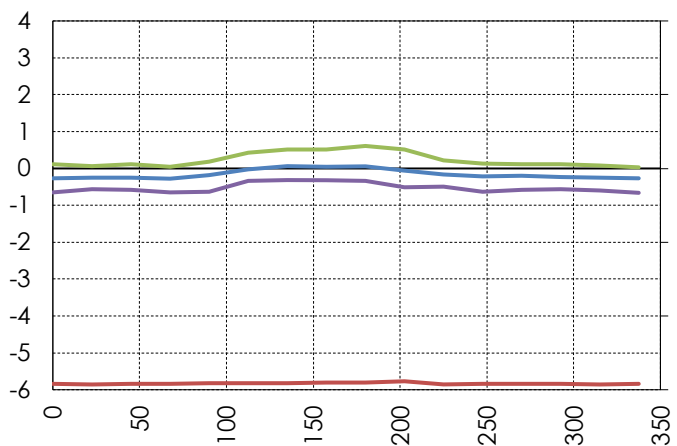
Individual Tap ID: NC07 Port ID: 755



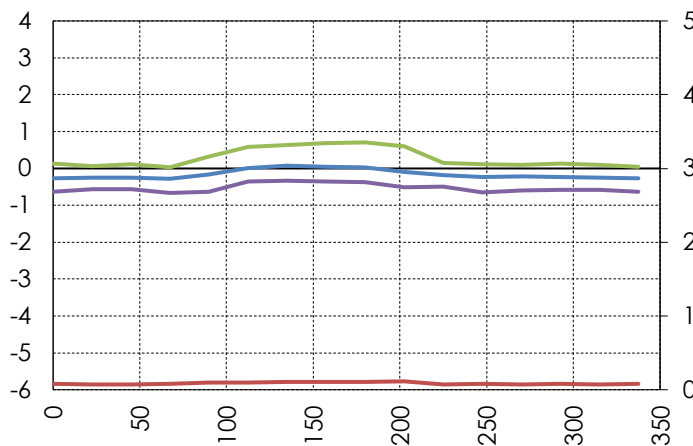
Individual Tap ID: NC08 Port ID: 756



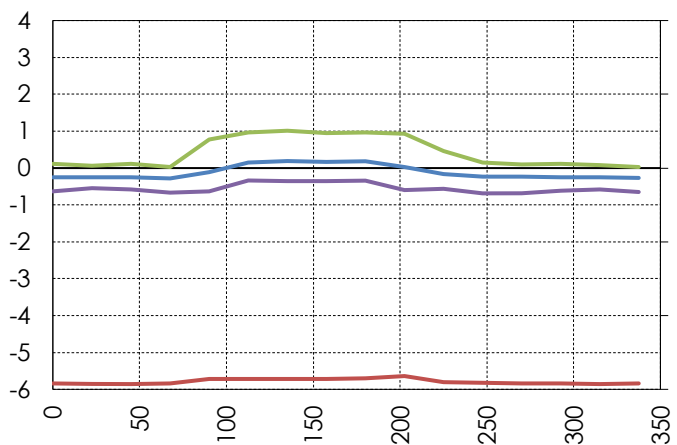
Individual Tap ID: SC07 Port ID: 757



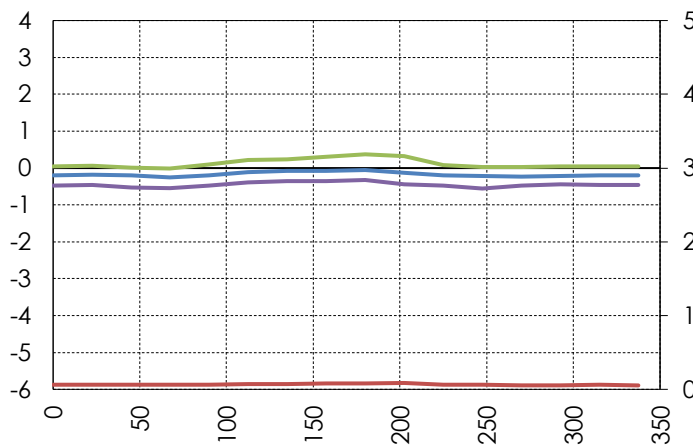
Individual Tap ID: SC08 Port ID: 758



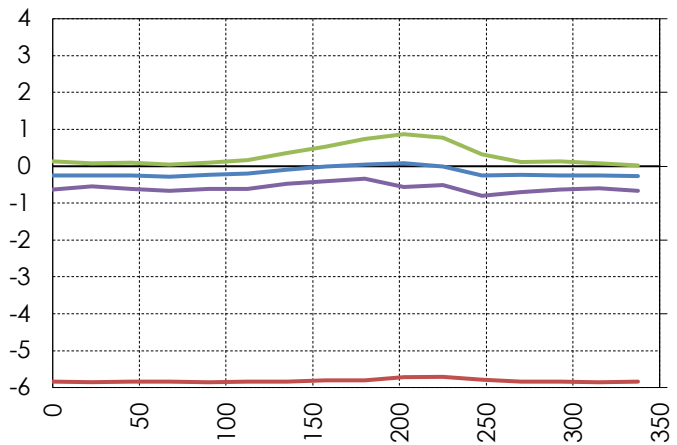
Individual Tap ID: SC09 Port ID: 759



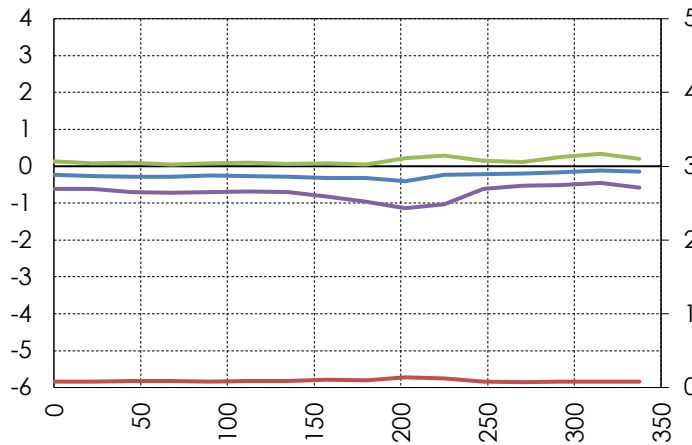
Individual Tap ID: SC10 Port ID: 760



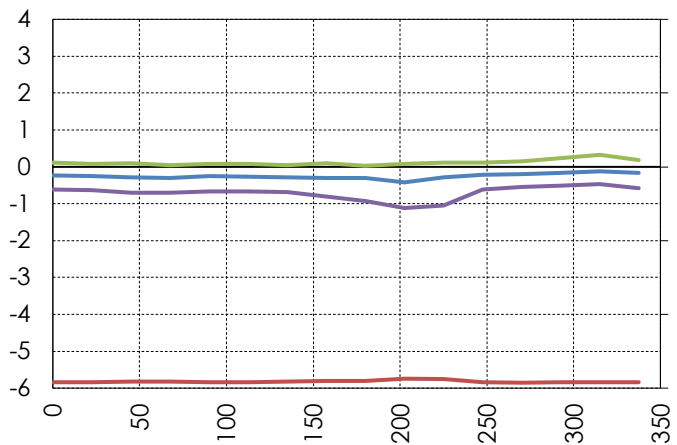
Individual Tap ID: SC11 Port ID: 761



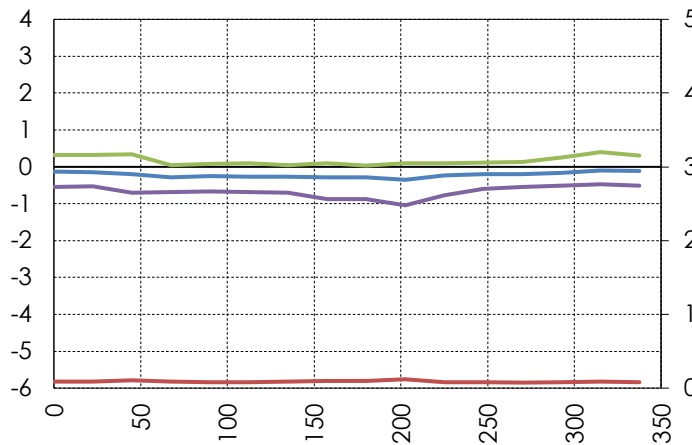
Individual Tap ID: SC13 Port ID: 762



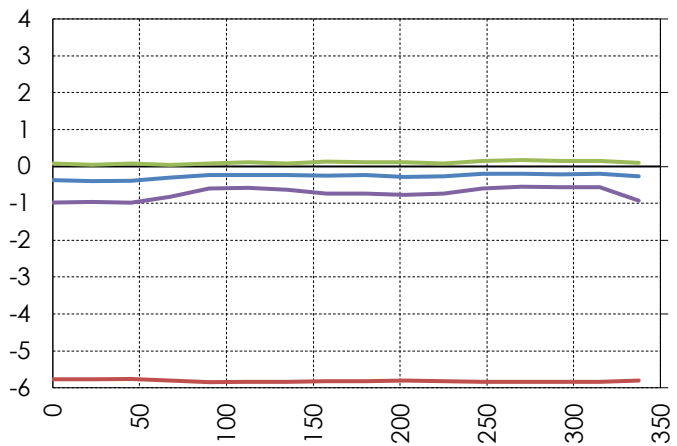
Individual Tap ID: EC12 Port ID: 763



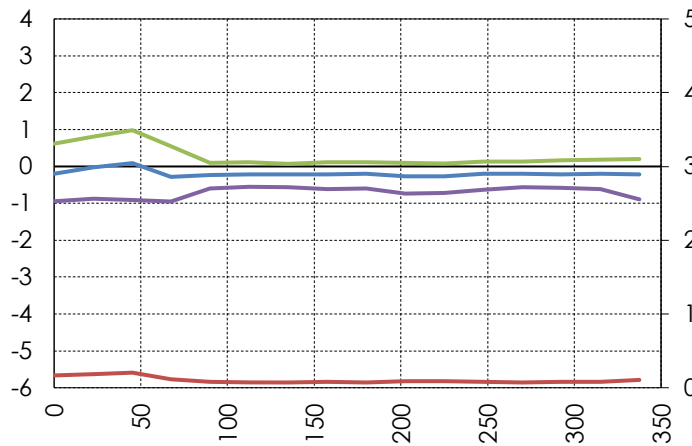
Individual Tap ID: EC13 Port ID: 764



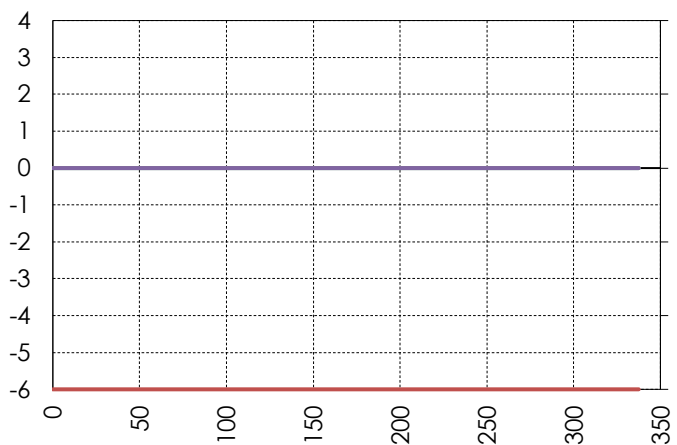
Individual Tap ID: EC14 Port ID: 765



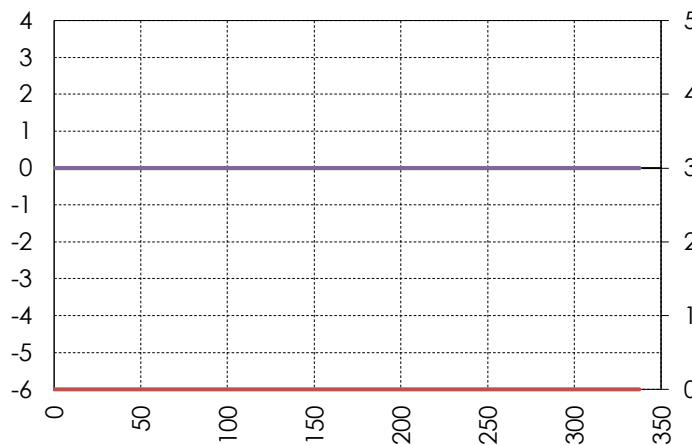
Individual Tap ID: EC15 Port ID: 766



Individual Tap ID: EC16 Port ID: 767



Individual Tap ID: EC17 Port ID: 768



APPENDIX B TABULATED RESULTS OF THE ANNUAL MEDIAN ABSOLUTE MEAN PRESSURES BETWEEN OPENINGS FOR EACH UNIT (FOR WARM CLIMATE)

Apartment	Opening 1	Opening 2	ADG DTS	ΔP (Pa)
A201	A201_W01	A201_W03	NO	0.06
A201	A201_W01	A201_W04	NO	0.06
A201	A201_W02	A201_W03	NO	0.06
A201	A201_W02	A201_W04	NO	0.06
A201	A201_W03	A201_W04	NO	0.00
A202	A202_W01	A202_W03	YES	0.77
A202	A202_W01	A202_W04	YES	0.76
A202	A202_W02	A202_W04	YES	0.49
A203	A203_W01	A203_W02	NO	0.05
A204	A204_W01	A204_W02	NO	0.00
A205	A205_W01	A205_W02	NO	0.00
A205	A205_W01	A205_W03	NO	0.00
A205	A205_W02	A205_W03	NO	0.00
A206	A206_W02	A206_W05	YES	0.63
A206	A206_W04	A206_W05	YES	0.61
A207	A207_W02	A207_W03	YES	0.99
A207	A207_W02	A207_W04	YES	0.99
A208	A208_W01	A208_W03	NO	0.16
A208	A208_W01	A208_W04	NO	0.14
A208	A208_W02	A208_W04	NO	0.14
A209	A209_W01	A209_W04	YES	1.96
A209	A209_W01	A209_W05	YES	1.96
A209	A209_W02	A209_W04	YES	1.96
A209	A209_W02	A209_W05	YES	1.96
A209	A209_W03	A209_W04	YES	2.09
A209	A209_W03	A209_W05	YES	2.09
A301	A301_W01	A301_W02	NO	0.00
A302	A302_W01	A302_W04	YES	1.00
A302	A302_W01	A302_W05	YES	0.80
A303	A303_W01	A303_W02	NO	0.00
A304	A304_W01	A304_W02	NO	0.00

Apartment	Opening 1	Opening 2	ADG DTS	ΔP (Pa)
A305	A305_W01	A305_W03	NO	0.00
A306	A306_W02	A306_W05	YES	0.63
A306	A306_W04	A306_W05	YES	0.61
A307	A307_W02	A307_W03	YES	1.16
A307	A307_W02	A307_W04	YES	1.16
A307	A307_W03	A307_W05	YES	0.83
A308	A308_W01	A308_W02	NO	0.00
A308	A308_W01	A308_W03	NO	0.00
A308	A308_W01	A308_W04	NO	1.06
A308	A308_W02	A308_W03	NO	0.00
A308	A308_W02	A308_W04	NO	1.06
A309	A309_W01	A309_W02	NO	0.00
A309	A309_W01	A309_W03	NO	0.10
A309	A309_W02	A309_W03	NO	0.10
A310	A310_W01	A310_W04	YES	2.03
A310	A310_W02	A310_W04	YES	2.03
A310	A310_W03	A310_W04	YES	2.09
A401	A401_W01	A401_W02	NO	0.00
A401	A401_W02	A401_W03	NO	0.02
A401	A401_W02	A401_W04	NO	0.02
A402	A402_W01	A402_W04	YES	1.00
A402	A402_W01	A402_W05	YES	0.80
A403	A403_W01	A403_W02	NO	0.00
A404	A404_W01	A404_W02	NO	0.00
A405	A405_W01	A405_W02	NO	0.00
A405	A405_W01	A405_W03	NO	0.00
A405	A405_W02	A405_W03	NO	0.00
A406	A406_W01	A406_W05	YES	1.01
A407	A407_W02	A407_W03	YES	1.16
A407	A407_W02	A407_W04	YES	1.16
A408	A408_W01	A408_W02	NO	0.00
A408	A408_W01	A408_W03	NO	0.00
A408	A408_W01	A408_W04	NO	1.06
A409	A409_W01	A409_W02	NO	0.00
A409	A409_W01	A409_W03	NO	0.10

Apartment	Opening 1	Opening 2	ADG DTS	ΔP (Pa)
A409	A409_W02	A409_W03	NO	0.10
A410	A410_W01	A410_W04	YES	2.00
A410	A410_W02	A410_W04	YES	2.00
A410	A410_W03	A410_W04	YES	2.06
A501	A501_W02	A501_W03	NO	0.03
A501	A501_W02	A501_W04	NO	0.06
A502	A502_W01	A502_W04	YES	1.12
A502	A502_W01	A502_W05	YES	1.17
A503	A503_W01	A503_W02	NO	0.00
A504	A504_W01	A504_W02	NO	0.00
A505	A505_W01	A505_W03	NO	0.00
A505	A505_W01	A505_W04	NO	0.05
A506	A506_W01	A506_W04	YES	0.83
A506	A506_W01	A506_W05	YES	0.83
A506	A506_W02	A506_W04	YES	0.73
A506	A506_W02	A506_W05	YES	0.73
A507	A507_W02	A507_W03	YES	0.76
A507	A507_W02	A507_W04	YES	0.76
A508	A508_W01	A508_W02	NO	0.00
A508	A508_W01	A508_W03	NO	0.00
A508	A508_W01	A508_W04	NO	1.10
A509	A509_W01	A509_W02	NO	0.00
A509	A509_W01	A509_W03	NO	0.07
A509	A509_W02	A509_W03	NO	0.07
A510	A510_W01	A510_W04	YES	1.93
A510	A510_W02	A510_W04	YES	1.93
A510	A510_W03	A510_W04	YES	2.04
A601	A601_W02	A601_W03	NO	0.03
A601	A601_W02	A601_W04	NO	0.06
A602	A602_W01	A602_W04	YES	1.12
A602	A602_W01	A602_W05	YES	1.17
A603	A603_W01	A603_W02	NO	0.00
A604	A604_W01	A604_W02	NO	0.00
A605	A605_W01	A605_W03	NO	0.00
A605	A605_W01	A605_W04	NO	0.05

Apartment	Opening 1	Opening 2	ADG DTS	ΔP (Pa)
A606	A606_W01	A606_W04	YES	0.83
A606	A606_W01	A606_W05	YES	0.83
A606	A606_W02	A606_W04	YES	0.73
A606	A606_W02	A606_W05	YES	0.73
A607	A607_W02	A607_W03	YES	0.76
A607	A607_W02	A607_W04	YES	0.76
A608	A608_W01	A608_W02	NO	0.00
A608	A608_W01	A608_W03	NO	0.00
A608	A608_W01	A608_W04	NO	0.14
A609	A609_W01	A609_W02	NO	0.00
A609	A609_W01	A609_W03	NO	0.07
A609	A609_W02	A609_W03	NO	0.07
A610	A610_W01	A610_W04	YES	1.93
A610	A610_W02	A610_W04	YES	1.93
A610	A610_W03	A610_W04	YES	2.04
A701	A701_W01	A701_W02	NO	0.00
A701	A701_W02	A701_W03	NO	0.03
A701	A701_W02	A701_W04	NO	0.06
A702	A702_W01	A702_W04	YES	1.12
A702	A702_W01	A702_W05	YES	1.17
A703	A703_W01	A703_W02	NO	0.00
A704	A704_W01	A704_W02	NO	0.00
A705	A705_W01	A705_W02	NO	0.00
A705	A705_W01	A705_W03	NO	0.00
A705	A705_W01	A705_W04	NO	0.11
A706	A706_W01	A706_W04	YES	1.02
A706	A706_W01	A706_W05	YES	1.29
A706	A706_W02	A706_W04	YES	0.81
A706	A706_W02	A706_W05	YES	1.08
A707	A707_W02	A707_W03	YES	0.76
A707	A707_W02	A707_W04	YES	0.76
A708	A708_W01	A708_W02	NO	0.00
A708	A708_W01	A708_W03	NO	0.00
A708	A708_W01	A708_W04	NO	0.14
A708	A708_W02	A708_W03	NO	0.00

Apartment	Opening 1	Opening 2	ADG DTS	ΔP (Pa)
A709	A709_W01	A709_W02	NO	0.00
A709	A709_W01	A709_W03	NO	0.07
A709	A709_W02	A709_W03	NO	0.07
A710	A710_W01	A710_W04	YES	1.93
A710	A710_W02	A710_W04	YES	1.93
A710	A710_W03	A710_W04	YES	2.04
A801	A801_W01	A801_W03	NO	0.03
A801	A801_W02	A801_W03	NO	0.00
A802	A802_W01	A802_W03	YES	1.12
A802	A802_W01	A802_W04	YES	1.17
A803	A803_W01	A803_W02	NO	0.00
A804	A804_W01	A804_W02	NO	0.00
A805	A805_W01	A805_W03	YES	1.06
A805	A805_W01	A805_W04	YES	1.06
A806	A806_W01	A806_W03	YES	0.98
A806	A806_W01	A806_W04	YES	0.91
A806	A806_W02	A806_W04	YES	0.91
A807	A807_W01	A807_W02	NO	0.07
B201	B201_W02	B201_W03	NO	0.04
B202	B202_W01	B202_W02	NO	0.00
B202	B202_W02	B202_W03	NO	0.05
B203	B203_W01	B203_W02	YES	1.88
B203	B203_W01	B203_W03	YES	1.88
B204	B204_W01	B204_W02	NO	0.22
B204	B204_W01	B204_W04	NO	0.72
B204	B204_W01	B204_W05	NO	0.72
B204	B204_W02	B204_W04	NO	0.52
B204	B204_W02	B204_W05	NO	0.52
B204	B204_W03	B204_W05	NO	0.52
B205	B205_W01	B205_W03	YES	0.99
B205	B205_W01	B205_W04	YES	1.30
B205	B205_W02	B205_W04	YES	1.42
B206	B206_W02	B206_W04	YES	0.77
B206	B206_W03	B206_W05	YES	1.35
B206	B206_W03	B206_W06	YES	1.35

Apartment	Opening 1	Opening 2	ADG DTS	ΔP (Pa)
B206	B206_W04	B206_W05	YES	1.39
B206	B206_W04	B206_W06	YES	1.39
B301	B301_W01	B301_W02	NO	0.00
B301	B301_W02	B301_W03	NO	0.04
B302	B302_W01	B302_W02	NO	0.00
B302	B302_W02	B302_W03	NO	0.04
B303	B303_W01	B303_W02	YES	1.88
B304	B304_W01	B304_W02	NO	0.00
B304	B304_W02	B304_W03	NO	0.29
B305	B305_W01	B305_W02	NO	0.00
B305	B305_W01	B305_W03	NO	0.24
B305	B305_W01	B305_W04	NO	0.24
B305	B305_W01	B305_W05	NO	0.75
B305	B305_W02	B305_W04	NO	0.24
B305	B305_W02	B305_W05	NO	0.75
B305	B305_W03	B305_W04	NO	0.00
B305	B305_W03	B305_W05	NO	0.64
B306	B306_W03	B306_W05	YES	1.08
B306	B306_W03	B306_W06	YES	1.08
B306	B306_W04	B306_W05	YES	1.38
B306	B306_W04	B306_W06	YES	1.38
B307	B307_W01	B307_W05	YES	1.37
B307	B307_W01	B307_W06	YES	1.37
B307	B307_W02	B307_W05	YES	1.37
B307	B307_W02	B307_W06	YES	1.37
B307	B307_W04	B307_W06	YES	0.69
B401	B401_W02	B401_W03	NO	0.04
B402	B402_W02	B402_W03	NO	0.04
B403	B403_W01	B403_W02	YES	1.94
B404	B404_W02	B404_W03	NO	0.16
B405	B405_W01	B405_W04	NO	0.24
B405	B405_W01	B405_W05	NO	0.75
B406	B406_W03	B406_W05	YES	1.08
B406	B406_W03	B406_W06	YES	1.08
B406	B406_W04	B406_W05	YES	1.38

Apartment	Opening 1	Opening 2	ADG DTS	ΔP (Pa)
B406	B406_W04	B406_W06	YES	1.38
B407	B407_W01	B407_W05	YES	1.37
B407	B407_W01	B407_W06	YES	1.37
B407	B407_W02	B407_W05	YES	1.37
B407	B407_W02	B407_W06	YES	1.37
B501	B501_W01	B501_W02	NO	0.00
B501	B501_W02	B501_W03	NO	0.05
B502	B502_W02	B502_W03	NO	0.04
B503	B503_W01	B503_W02	YES	1.84
B504	B504_W02	B504_W03	NO	0.18
B505	B505_W01	B505_W03	NO	0.29
B505	B505_W01	B505_W04	NO	0.29
B506	B506_W03	B506_W05	YES	0.52
B506	B506_W03	B506_W06	YES	0.52
B506	B506_W04	B506_W05	YES	0.92
B506	B506_W04	B506_W06	YES	0.92
B507	B507_W01	B507_W05	YES	1.46
B507	B507_W01	B507_W06	YES	1.55
B507	B507_W02	B507_W05	YES	1.46
B507	B507_W02	B507_W06	YES	1.55
B601	B601_W01	B601_W02	NO	0.00
B601	B601_W02	B601_W03	NO	0.05
B602	B602_W01	B602_W02	NO	0.00
B602	B602_W02	B602_W03	NO	0.04
B603	B603_W01	B603_W02	YES	1.84
B604	B604_W01	B604_W02	NO	0.00
B604	B604_W02	B604_W03	NO	0.18
B605	B605_W01	B605_W03	NO	0.29
B605	B605_W01	B605_W04	NO	0.29
B605	B605_W01	B605_W05	NO	0.54
B606	B606_W03	B606_W05	YES	0.52
B606	B606_W03	B606_W06	YES	0.52
B606	B606_W04	B606_W05	YES	0.92
B606	B606_W04	B606_W06	YES	0.92
B607	B607_W01	B607_W05	YES	1.46

Apartment	Opening 1	Opening 2	ADG DTS	ΔP (Pa)
B607	B607_W01	B607_W06	YES	1.55
B607	B607_W02	B607_W05	YES	1.46
B607	B607_W02	B607_W06	YES	1.55
B701	B701_W01	B701_W02	NO	0.00
B701	B701_W02	B701_W03	NO	0.05
B702	B702_W01	B702_W02	NO	0.00
B702	B702_W02	B702_W03	NO	0.04
B703	B703_W01	B703_W02	YES	1.84
B704	B704_W01	B704_W02	NO	0.00
B704	B704_W02	B704_W03	NO	0.18
B705	B705_W01	B705_W02	NO	0.00
B705	B705_W01	B705_W03	NO	0.29
B705	B705_W01	B705_W04	NO	0.29
B705	B705_W01	B705_W05	NO	0.54
B705	B705_W02	B705_W04	NO	0.29
B705	B705_W02	B705_W05	NO	0.54
B705	B705_W03	B705_W04	NO	0.00
B705	B705_W03	B705_W05	NO	0.70
B706	B706_W03	B706_W05	YES	0.52
B706	B706_W03	B706_W06	YES	0.52
B706	B706_W04	B706_W05	YES	0.92
B706	B706_W04	B706_W06	YES	0.92
B707	B707_W01	B707_W05	YES	1.46
B707	B707_W01	B707_W06	YES	1.55
B707	B707_W02	B707_W05	YES	1.46
B707	B707_W02	B707_W06	YES	1.55
C301	C301_W02	C301_W04*	NO	1.74
C301	C301_W02	C301_W05*	NO	1.74
C301	C301_W03	C301_W04*	NO	1.99
C301	C301_W03	C301_W05*	NO	1.99
C302	C302_W01	C302_W03	NO	0.50
C302	C302_W01	C302_W04	NO	0.88
C303	C303_W01	C303_W04	NO	0.13
C303	C303_W02	C303_W03	NO	0.45
C303	C303_W02	C303_W04	NO	0.13

Apartment	Opening 1	Opening 2	ADG DTS	ΔP (Pa)
C303	C303_W03	C303_W04	NO	0.32
C304	C304_W01	C304_W04	YES	0.40
C304	C304_W02	C304_W04	YES	0.34
C305	C305_W01	C305_W03	YES	1.42
C305	C305_W01	C305_W04	YES	1.42
C306	C306_W02	C306_W05	YES	2.02
C306	C306_W03	C306_W05	YES	1.84
C306	C306_W04	C306_W05	YES	2.08
C307	C307_W01	C307_W02	YES	1.82
C307	C307_W01	C307_W03	YES	1.82
C308	C308_W01	C308_W02	YES	1.59
C308	C308_W01	C308_W04	YES	1.59
C308	C308_W02	C308_W03	YES	1.49
C308	C308_W03	C308_W04	YES	1.49
C309	C309_W01	C309_W02	YES	1.77
C309	C309_W01	C309_W04	YES	1.77
C309	C309_W02	C309_W03	YES	2.17
C309	C309_W03	C309_W04	YES	2.17
C310	C310_W01	C310_W02	YES	1.31
C310	C310_W01	C310_W04	YES	1.31
C310	C310_W02	C310_W03	YES	1.43
C310	C310_W03	C310_W04	YES	1.43
C311	C311_W01	C311_W02	YES	1.77
C311	C311_W01	C311_W04	YES	1.77
C311	C311_W02	C311_W03	YES	1.98
C311	C311_W03	C311_W04	YES	1.98
C401	C401_W01	C401_W04	YES	1.74
C401	C401_W01	C401_W05	YES	1.74
C401	C401_W02	C401_W04	YES	1.74
C401	C401_W02	C401_W05	YES	1.74
C401	C401_W03	C401_W04	YES	1.99
C401	C401_W03	C401_W05	YES	1.99
C402	C402_W01	C402_W02	NO	0.00
C402	C402_W01	C402_W03	NO	0.50
C402	C402_W01	C402_W04	NO	0.88

Apartment	Opening 1	Opening 2	ADG DTS	ΔP (Pa)
C403	C403_W01	C403_W04	NO	0.13
C403	C403_W02	C403_W04	NO	0.13
C404	C404_W01	C404_W04	YES	0.40
C404	C404_W02	C404_W04	YES	0.34
C405	C405_W01	C405_W03	YES	1.42
C405	C405_W01	C405_W04	YES	1.42
C406	C406_W02	C406_W05	YES	2.02
C406	C406_W04	C406_W05	YES	2.08
C501	C501_W01	C501_W04	NO	1.40
C501	C501_W01	C501_W05	NO	1.82
C501	C501_W02	C501_W05	NO	0.25
C502	C502_W01	C502_W04	YES	0.92
C502	C502_W02	C502_W04	YES	1.16
C502	C502_W03	C502_W04	YES	1.16
C503	C503_W01	C503_W03	NO	0.13
C503	C503_W01	C503_W04	NO	0.44
C503	C503_W01	C503_W05	NO	0.86
C503	C503_W02	C503_W03	NO	0.00
C503	C503_W02	C503_W04	NO	0.42
C503	C503_W02	C503_W05	NO	0.81
C504	C504_W01	C504_W03	NO	0.13
C505	C505_W01	C505_W04	YES	1.25
C505	C505_W01	C505_W05	YES	2.12
C505	C505_W01	C505_W06	YES	2.32
C505	C505_W02	C505_W05	YES	2.16
C505	C505_W02	C505_W06	YES	2.49
C505	C505_W03	C505_W06	YES	0.59
C506	C506_W01	C506_W04	NO	0.62
C506	C506_W01	C506_W05	NO	0.40
C506	C506_W01	C506_W06	NO	0.40
C506	C506_W02	C506_W04	NO	0.19
C506	C506_W02	C506_W05	NO	0.27
C506	C506_W02	C506_W06	NO	0.27
C506	C506_W03	C506_W05	NO	0.41
C506	C506_W03	C506_W06	NO	0.41

Apartment	Opening 1	Opening 2	ADG DTS	ΔP (Pa)
C601	C601_W01	C601_W04	NO	1.40
C601	C601_W01	C601_W05	NO	1.82
C601	C601_W02	C601_W05	NO	0.25
C602	C602_W01	C602_W04	YES	0.92
C602	C602_W02	C602_W04	YES	1.16
C602	C602_W03	C602_W04	YES	1.16
C603	C603_W01	C603_W03	NO	0.13
C603	C603_W01	C603_W04	NO	0.44
C603	C603_W01	C603_W05	NO	0.86
C603	C603_W02	C603_W03	NO	0.00
C603	C603_W02	C603_W04	NO	0.42
C603	C603_W02	C603_W05	NO	0.81
C604	C604_W01	C604_W03	NO	0.13
C605	C605_W01	C605_W04	YES	1.25
C605	C605_W01	C605_W05	YES	2.12
C605	C605_W01	C605_W06	YES	2.32
C605	C605_W02	C605_W05	YES	2.16
C605	C605_W02	C605_W06	YES	2.49
C605	C605_W03	C605_W06	YES	0.59
C606	C606_W01	C606_W04	NO	0.62
C606	C606_W01	C606_W05	NO	0.40
C606	C606_W01	C606_W06	NO	0.40
C606	C606_W02	C606_W04	NO	0.19
C606	C606_W02	C606_W05	NO	0.27
C606	C606_W02	C606_W06	NO	0.27
C606	C606_W03	C606_W05	NO	0.41
C606	C606_W03	C606_W06	NO	0.41
C701	C701_W01	C701_W04	NO	0.84
C701	C701_W01	C701_W05	NO	0.99
C701	C701_W02	C701_W05	NO	0.29
C702	C702_W01	C702_W04	YES	0.92
C702	C702_W02	C702_W04	YES	1.16
C702	C702_W03	C702_W04	YES	1.16
C703	C703_W01	C703_W03	NO	0.13
C703	C703_W01	C703_W04	NO	0.44

Apartment	Opening 1	Opening 2	ADG DTS	ΔP (Pa)
C703	C703_W01	C703_W05	NO	0.86
C703	C703_W02	C703_W03	NO	0.00
C703	C703_W02	C703_W04	NO	0.42
C703	C703_W02	C703_W05	NO	0.81
C704	C704_W01	C704_W03	NO	0.13
C705	C705_W01	C705_W04	YES	1.25
C705	C705_W01	C705_W05	YES	2.12
C705	C705_W01	C705_W06	YES	2.32
C705	C705_W02	C705_W05	YES	2.16
C705	C705_W02	C705_W06	YES	2.49
C705	C705_W03	C705_W06	YES	0.59
C706	C706_W01	C706_W04	NO	1.05
C706	C706_W01	C706_W05	NO	0.63
C706	C706_W01	C706_W06	NO	0.63
C706	C706_W02	C706_W04	NO	0.19
C706	C706_W02	C706_W05	NO	0.31
C706	C706_W02	C706_W06	NO	0.31
C706	C706_W03	C706_W05	NO	0.25
C706	C706_W03	C706_W06	NO	0.25
C801	C801_W01	C801_W04	NO	0.64
C801	C801_W01	C801_W05	NO	0.98
C801	C801_W02	C801_W05	NO	0.46
C802	C802_W01	C802_W04	YES	1.78
C802	C802_W02	C802_W04	YES	2.06
C802	C802_W03	C802_W04	YES	2.06
C803	C803_W01	C803_W03	NO	0.25
C803	C803_W01	C803_W04	NO	0.65
C803	C803_W01	C803_W05	NO	0.39
C803	C803_W02	C803_W03	NO	0.00
C803	C803_W02	C803_W04	NO	0.47
C803	C803_W02	C803_W05	NO	0.37
C804	C804_W01	C804_W03	NO	0.07
C805	C805_W01	C805_W04	YES	1.22
C805	C805_W01	C805_W05	YES	2.01
C805	C805_W01	C805_W06	YES	2.20

Apartment	Opening 1	Opening 2	ADG DTS	ΔP (Pa)
C805	C805_W02	C805_W05	YES	1.82
C805	C805_W02	C805_W06	YES	1.93
C805	C805_W03	C805_W06	YES	0.87
C806	C806_W01	C806_W04	NO	1.18
C806	C806_W01	C806_W05	NO	1.18
C806	C806_W01	C806_W06	NO	0.78
C806	C806_W02	C806_W04	NO	0.19
C806	C806_W02	C806_W05	NO	0.19
C806	C806_W02	C806_W06	NO	0.31
C806	C806_W03	C806_W05	NO	0.21
C806	C806_W03	C806_W06	NO	0.25
C901	C901_W01	C901_W04	NO	0.64
C901	C901_W01	C901_W05	NO	0.98
C901	C901_W02	C901_W05	NO	0.46
C902	C902_W01	C902_W04	YES	1.78
C902	C902_W02	C902_W04	YES	2.06
C902	C902_W03	C902_W04	YES	2.06
C903	C903_W01	C903_W03	NO	0.25
C903	C903_W01	C903_W04	NO	0.65
C903	C903_W01	C903_W05	NO	0.39
C903	C903_W02	C903_W03	NO	0.00
C903	C903_W02	C903_W04	NO	0.47
C903	C903_W02	C903_W05	NO	0.37
C904	C904_W01	C904_W03	NO	0.07
C905	C905_W01	C905_W04	YES	1.22
C905	C905_W01	C905_W05	YES	2.01
C905	C905_W01	C905_W06	YES	2.20
C905	C905_W02	C905_W05	YES	1.82
C905	C905_W02	C905_W06	YES	1.93
C905	C905_W03	C905_W06	YES	0.87
C906	C906_W01	C906_W04	NO	1.18
C906	C906_W01	C906_W05	NO	1.18
C906	C906_W01	C906_W06	NO	0.78
C906	C906_W02	C906_W04	NO	0.19
C906	C906_W02	C906_W05	NO	0.19

Apartment	Opening 1	Opening 2	ADG DTS	ΔP (Pa)
C906	C906_W02	C906_W06	NO	0.31
C906	C906_W03	C906_W05	NO	0.21
C906	C906_W03	C906_W06	NO	0.25
D301	D301_W01	D301_W05	YES	0.97
D301	D301_W02	D301_W05	YES	0.97
D301	D301_W03	D301_W05	YES	0.95
D302	D302_W01	D302_W04	YES	0.77
D302	D302_W01	D302_W05	YES	0.97
D302	D302_W02	D302_W04	YES	0.77
D302	D302_W02	D302_W05	YES	0.97
D303	D303_W01	D303_W03	NO	0.20
D303	D303_W01	D303_W04	NO	0.20
D303	D303_W02	D303_W04	NO	0.20
D304	D304_W01	D304_W04	NO	0.56
D304	D304_W02	D304_W04	NO	0.56
D304	D304_W03	D304_W04	NO	0.66
D305	D305_W01	D305_W05*	NO	1.62
D305	D305_W01	D305_W06*	NO	1.62
D305	D305_W03	D305_W05*	NO	2.02
D305	D305_W03	D305_W06*	NO	2.02
D401	D401_W01	D401_W05	YES	1.01
D401	D401_W01	D401_W06	YES	0.96
D401	D401_W01	D401_W07	YES	0.88
D401	D401_W03	D401_W06	YES	1.09
D401	D401_W03	D401_W07	YES	0.96
D402	D402_W01	D402_W05	YES	0.97
D402	D402_W02	D402_W04	YES	0.77
D402	D402_W02	D402_W05	YES	0.97
D403	D403_W01	D403_W04	NO	0.20
D403	D403_W01	D403_W05	NO	0.41
D403	D403_W02	D403_W04	NO	0.20
D403	D403_W02	D403_W05	NO	0.41
D404	D404_W01	D404_W02	NO	0.00
D404	D404_W01	D404_W04	NO	0.56
D404	D404_W02	D404_W03	NO	0.15

Apartment	Opening 1	Opening 2	ADG DTS	ΔP (Pa)
D404	D404_W02	D404_W04	NO	0.56
D404	D404_W03	D404_W04	NO	0.66
D405	D405_W01	D405_W05	YES	1.62
D405	D405_W01	D405_W06	YES	1.62
D405	D405_W02	D405_W05	YES	1.62
D405	D405_W02	D405_W06	YES	1.62
D405	D405_W03	D405_W05	YES	2.02
D405	D405_W03	D405_W06	YES	2.02
D501	D501_W01	D501_W05	YES	1.16
D502	D502_W01	D502_W04	YES	1.01
D502	D502_W01	D502_W05	YES	1.09
D502	D502_W02	D502_W05	YES	1.09
D503	D503_W01	D503_W03	NO	0.19
D503	D503_W01	D503_W04	NO	0.19
D503	D503_W01	D503_W05	NO	0.45
D503	D503_W02	D503_W04	NO	0.19
D503	D503_W02	D503_W05	NO	0.45
D504	D504_W01	D504_W02	NO	0.47
D504	D504_W01	D504_W03	NO	0.87
D504	D504_W01	D504_W04	NO	0.87
D505	D505_W01	D505_W04	YES	1.30
D505	D505_W02	D505_W04	YES	1.30
D505	D505_W03	D505_W04	YES	1.75
D506	D506_W01	D506_W04	NO	0.20
D601	D601_W01	D601_W05	YES	1.16
D602	D602_W01	D602_W04	YES	1.01
D602	D602_W01	D602_W05	YES	1.09
D602	D602_W02	D602_W05	YES	1.09
D603	D603_W01	D603_W03	NO	0.19
D603	D603_W01	D603_W04	NO	0.19
D603	D603_W01	D603_W05	NO	0.45
D603	D603_W02	D603_W04	NO	0.19
D603	D603_W02	D603_W05	NO	0.45
D604	D604_W01	D604_W02	NO	0.47
D604	D604_W01	D604_W03	NO	0.87

Apartment	Opening 1	Opening 2	ADG DTS	ΔP (Pa)
D604	D604_W01	D604_W04	NO	0.87
D605	D605_W01	D605_W04	YES	1.30
D605	D605_W02	D605_W04	YES	1.30
D605	D605_W03	D605_W04	YES	1.75
D606	D606_W01	D606_W04	NO	0.20
D701	D701_W01	D701_W05	YES	1.16
D702	D702_W01	D702_W04	YES	1.01
D702	D702_W01	D702_W05	YES	1.09
D702	D702_W02	D702_W05	YES	1.09
D703	D703_W01	D703_W03	NO	0.19
D703	D703_W01	D703_W04	NO	0.19
D703	D703_W01	D703_W05	NO	0.45
D703	D703_W02	D703_W04	NO	0.19
D703	D703_W02	D703_W05	NO	0.45
D704	D704_W01	D704_W02	NO	0.47
D704	D704_W01	D704_W03	NO	0.87
D704	D704_W01	D704_W04	NO	0.87
D705	D705_W01	D705_W04	YES	1.30
D705	D705_W02	D705_W04	YES	1.30
D705	D705_W03	D705_W04	YES	1.75
D706	D706_W01	D706_W04	NO	0.46
D801	D801_W01	D801_W05	YES	1.24
D802	D802_W01	D802_W04	YES	1.11
D802	D802_W01	D802_W05	YES	1.07
D802	D802_W02	D802_W05	YES	1.07
D803	D803_W01	D803_W03	NO	0.09
D803	D803_W01	D803_W04	NO	0.09
D803	D803_W01	D803_W05	NO	0.35
D803	D803_W02	D803_W04	NO	0.09
D803	D803_W02	D803_W05	NO	0.35
D804	D804_W01	D804_W02	NO	0.39
D804	D804_W01	D804_W03	NO	0.61
D804	D804_W01	D804_W04	NO	0.61
D805	D805_W01	D805_W04	YES	1.86
D805	D805_W02	D805_W04	YES	1.86

Apartment	Opening 1	Opening 2	ADG DTS	ΔP (Pa)
D805	D805_W03	D805_W04	YES	2.22
D806	D806_W01	D806_W04	NO	0.28
D901	D901_W01	D901_W05	YES	1.24
D902	D902_W01	D902_W04	YES	1.11
D902	D902_W01	D902_W05	YES	1.07
D902	D902_W02	D902_W05	YES	1.07
D903	D903_W01	D903_W03	NO	0.09
D903	D903_W01	D903_W04	NO	0.09
D903	D903_W01	D903_W05	NO	0.35
D903	D903_W02	D903_W04	NO	0.09
D903	D903_W02	D903_W05	NO	0.35
D904	D904_W01	D904_W02	NO	0.39
D904	D904_W01	D904_W03	NO	0.61
D904	D904_W01	D904_W04	NO	0.61
D905	D905_W01	D905_W04	YES	1.86
D905	D905_W02	D905_W04	YES	1.86
D905	D905_W03	D905_W04	YES	2.22
D906	D906_W01	D906_W04	NO	0.28

* These openings were included in the analysis as all habitable rooms are required to have natural ventilation.

APPENDIX C LAYOUT OF PRESSURE SENSORS AND OPENING LOCATIONS

C.1 Layout of Pressure Sensors

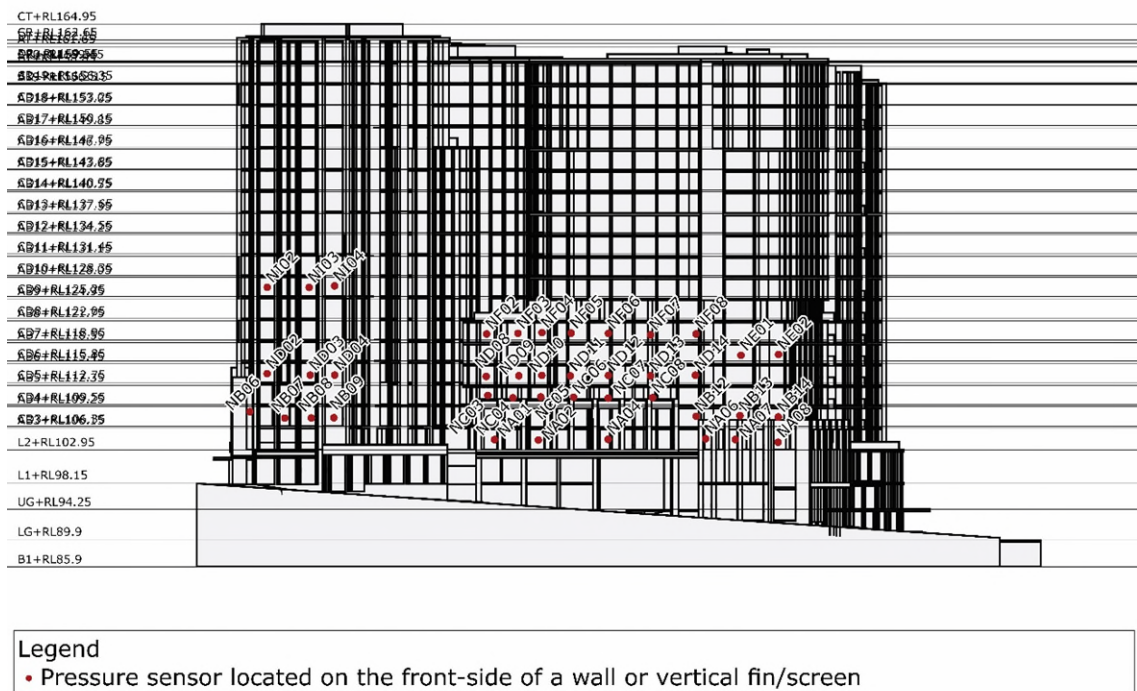


Figure C.1.1: Layout of Pressure Sensors – North Elevation

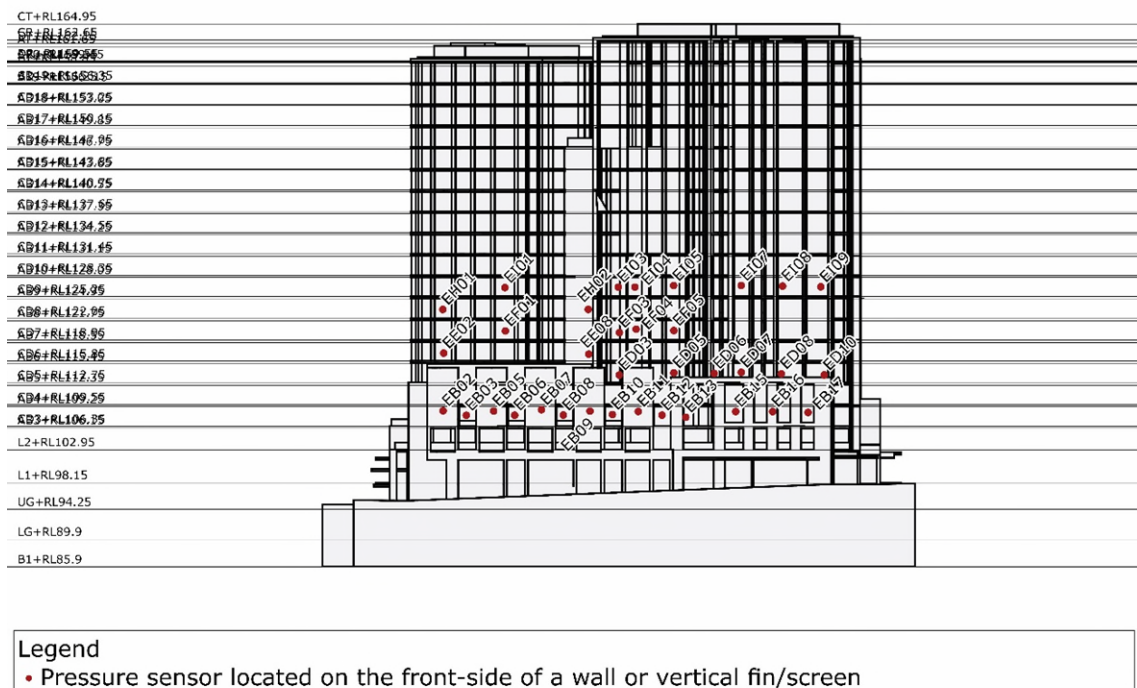


Figure C.1.2: Layout of Pressure Sensors – East Elevation

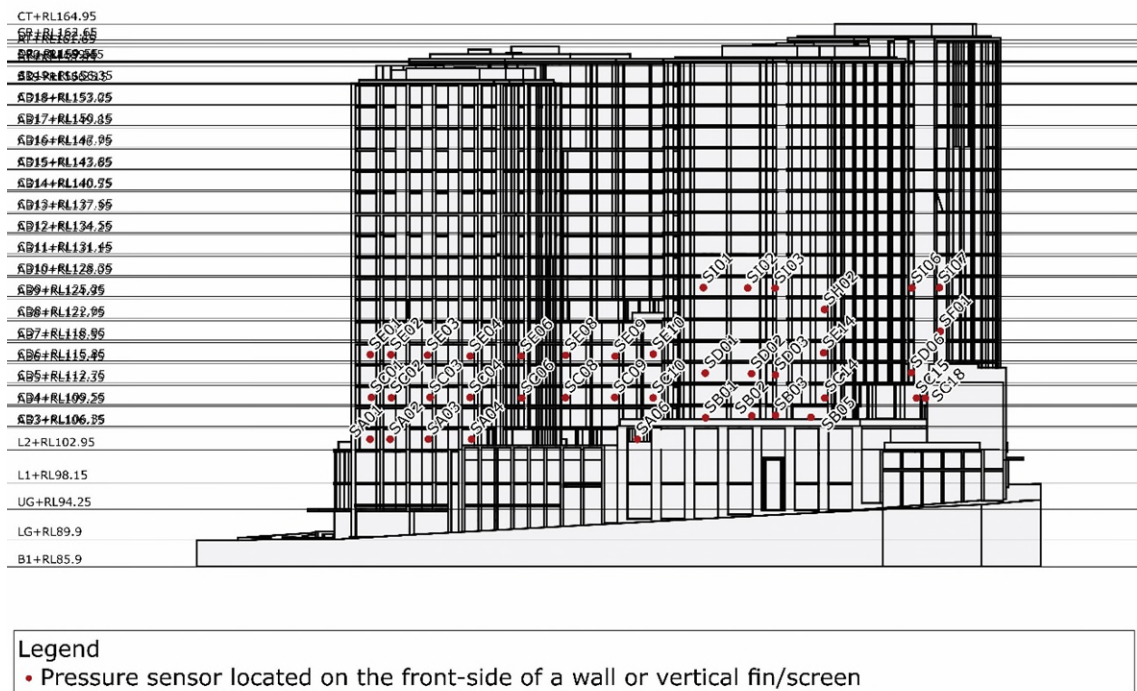


Figure C.1.3: Layout of Pressure Sensors – South Elevation

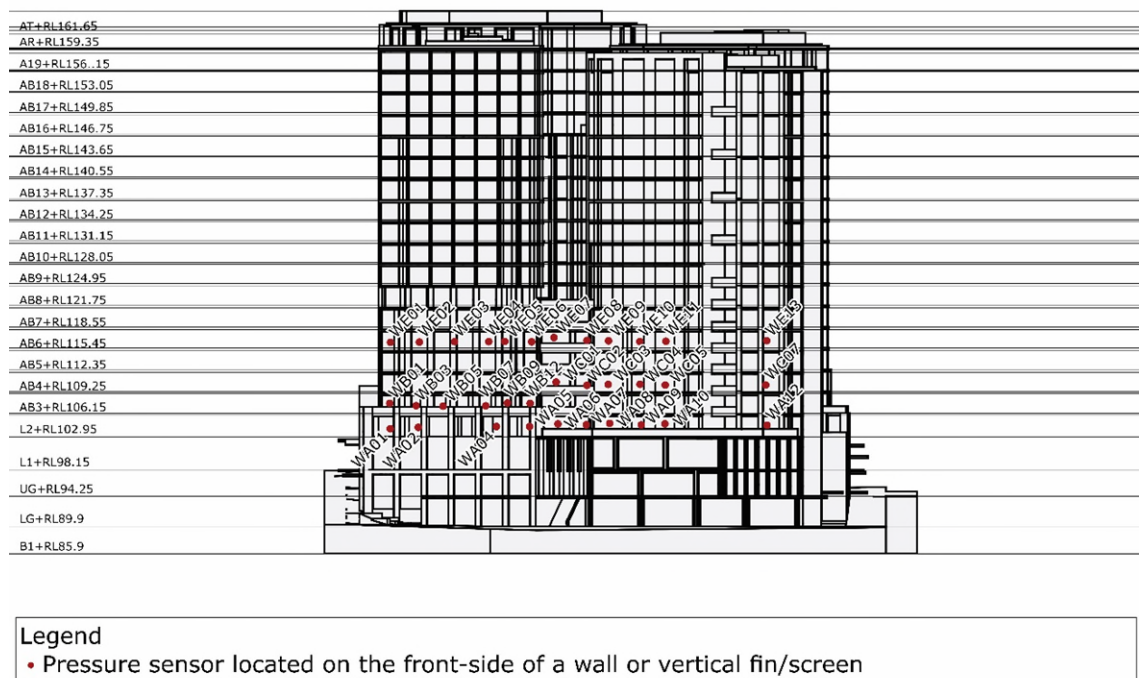
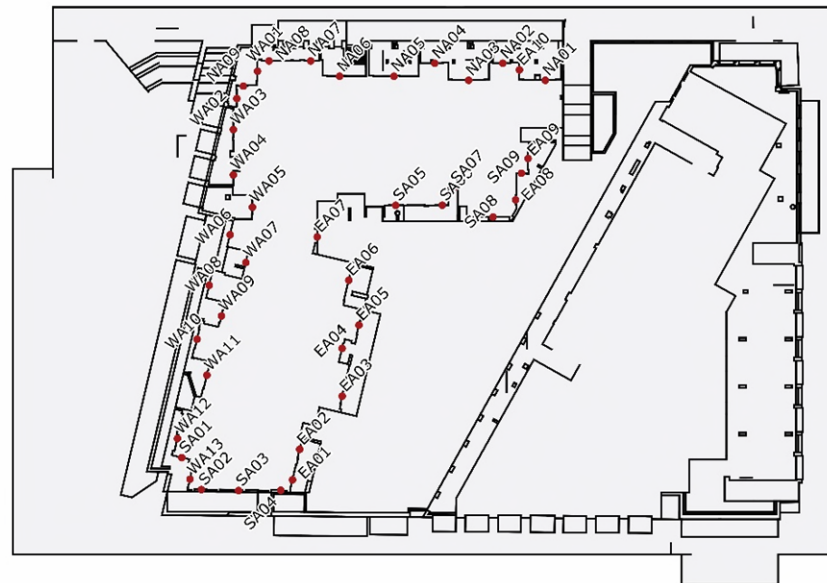
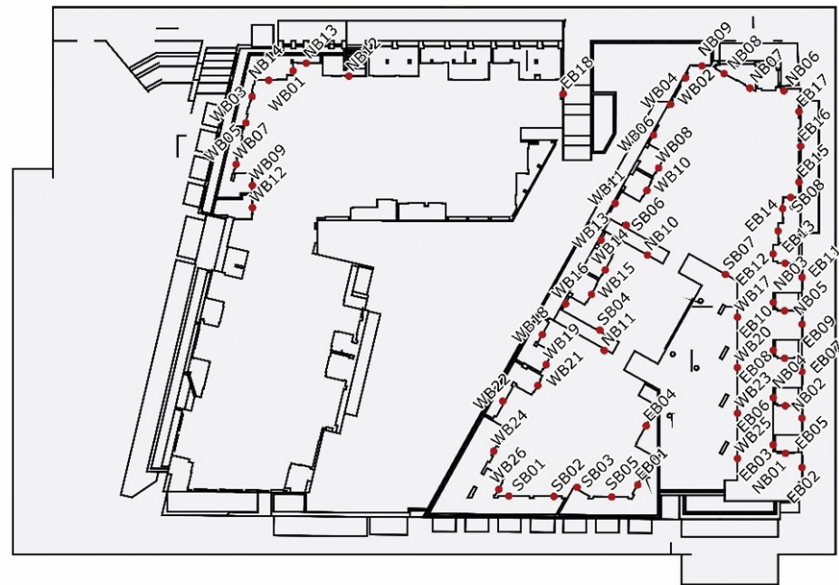


Figure C.1.4: Layout of Pressure Sensors – West Elevation



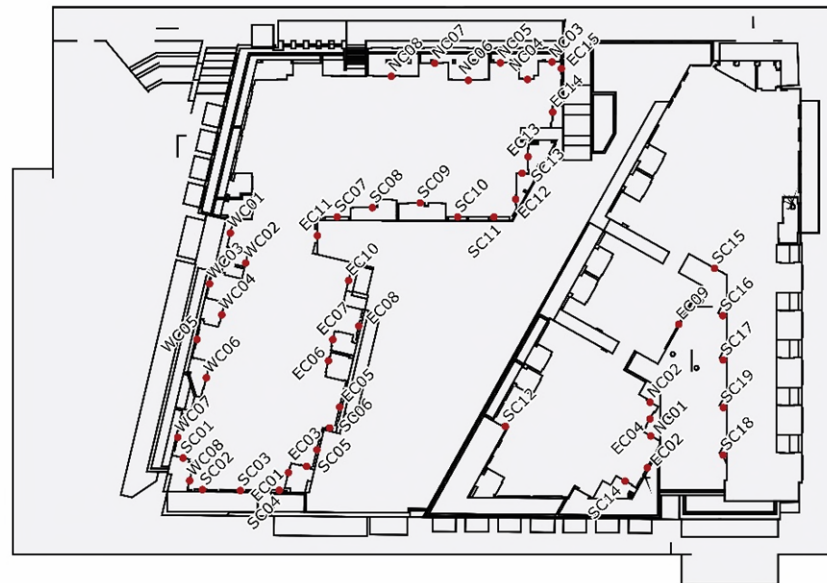
Legend
• Pressure sensor located on the front-side of a wall or vertical fin/screen

Figure C.1.5: Layout of Pressure Sensors – Level 2 Plan



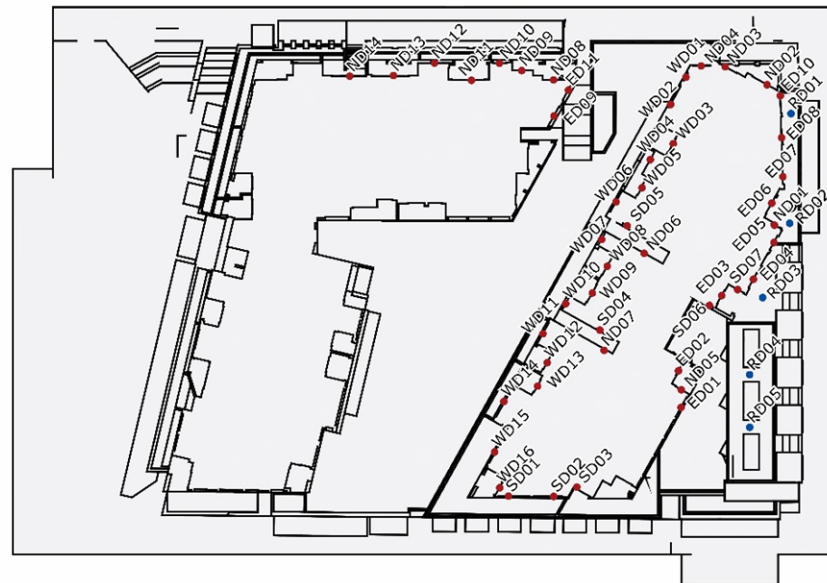
- Pressure sensor located on the front-side of a wall or vertical fin/screen

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Legend
• Pressure sensor located on the front-side of a wall or vertical fin/screen

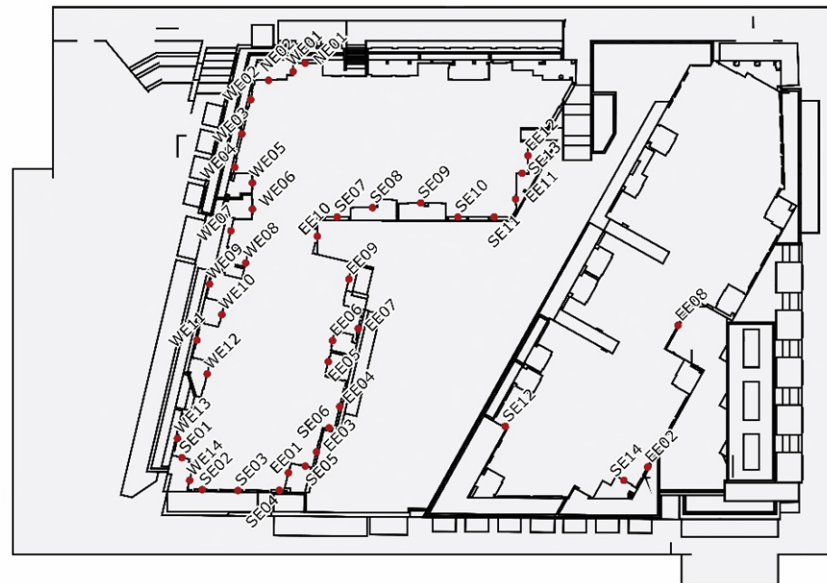
Figure C.1.7: Layout of Pressure Sensors – Level 4 Plan



Legend

- Pressure sensor located on the front-side of a wall or vertical fin/screen
- Pressure sensor located on the top-side of a horizontal surface.

Figure C.1.8: Layout of Pressure Sensors – Level 5 Plan



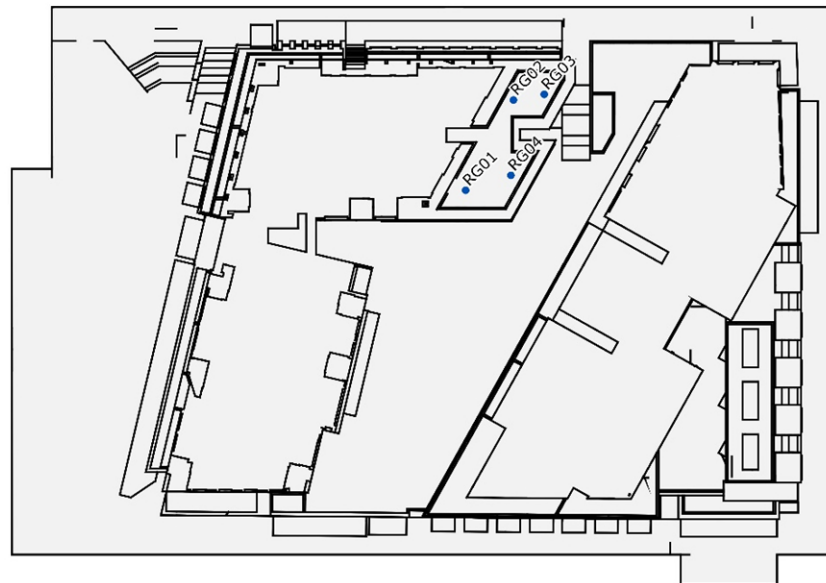
Legend
• Pressure sensor located on the front-side of a wall or vertical fin/screen

Figure C.1.9: Layout of Pressure Sensors – Level 6 Plan



Legend
• Pressure sensor located on the front-side of a wall or vertical fin/screen

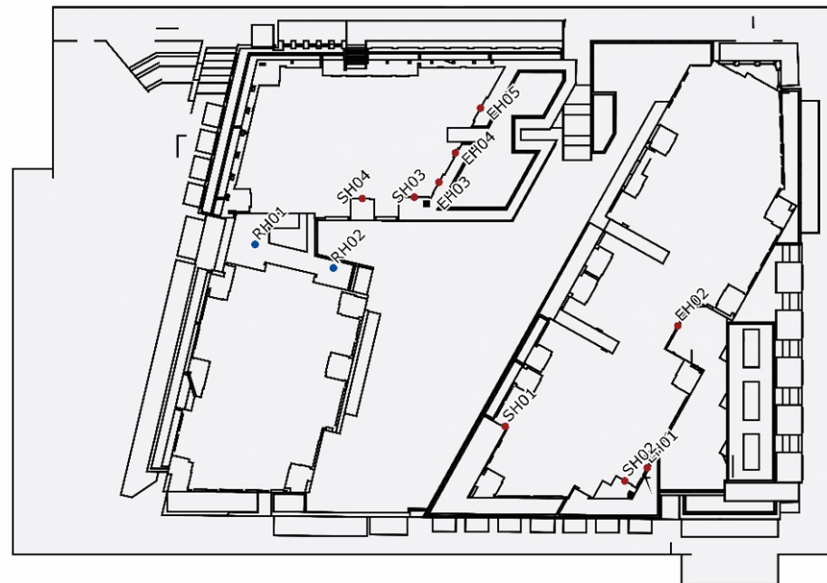
Figure C.1.10: Layout of Pressure Sensors – Level 7 Plan



Legend

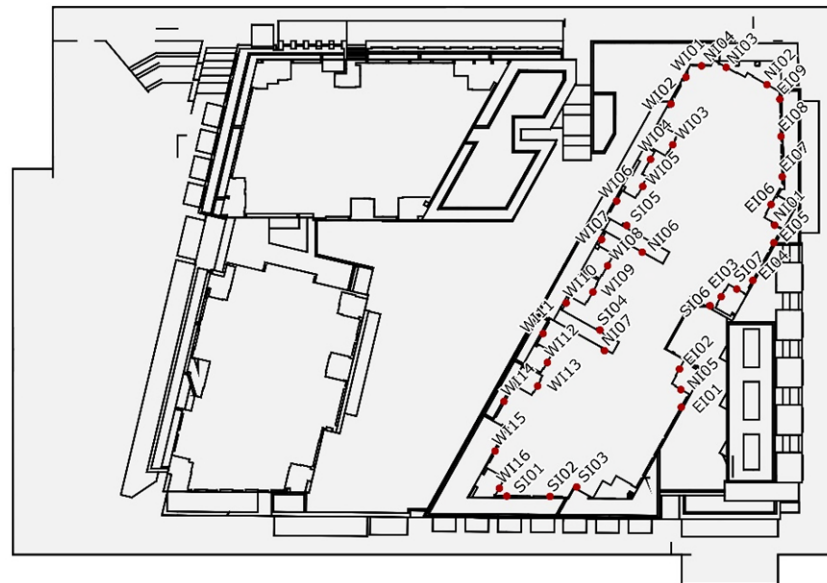
- Pressure sensor located on the top-side of a horizontal surface.

Figure C.1.11: Layout of Pressure Sensors – Terrace



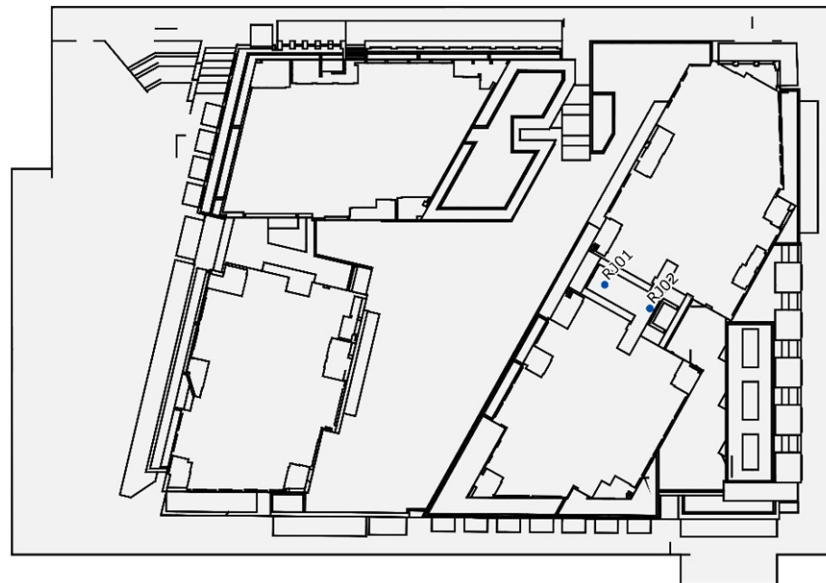
Legend	
•	Pressure sensor located on the front-side of a wall or vertical fin/screen
•	Pressure sensor located on the top-side of a horizontal surface.

Figure C.1.12: Layout of Pressure Sensors – Level 8 Plan



Legend
• Pressure sensor located on the front-side of a wall or vertical fin/screen

Figure C.1.13: Layout of Pressure Sensors – Level 9 Plan



Legend

- Pressure sensor located on the top-side of a horizontal surface.

Figure C.1.14: Layout of Pressure Sensors – Level 16 Plan

C.2 Opening Locations and Notations



Figure C.2. 1: Opening Locations and Notations – Level 02



Figure C.2. 2: Opening Locations and Notations – Level 03



Figure C.2. 3: Opening Locations and Notations – Level 04



Figure C.2. 4: Opening Locations and Notations – Level 05

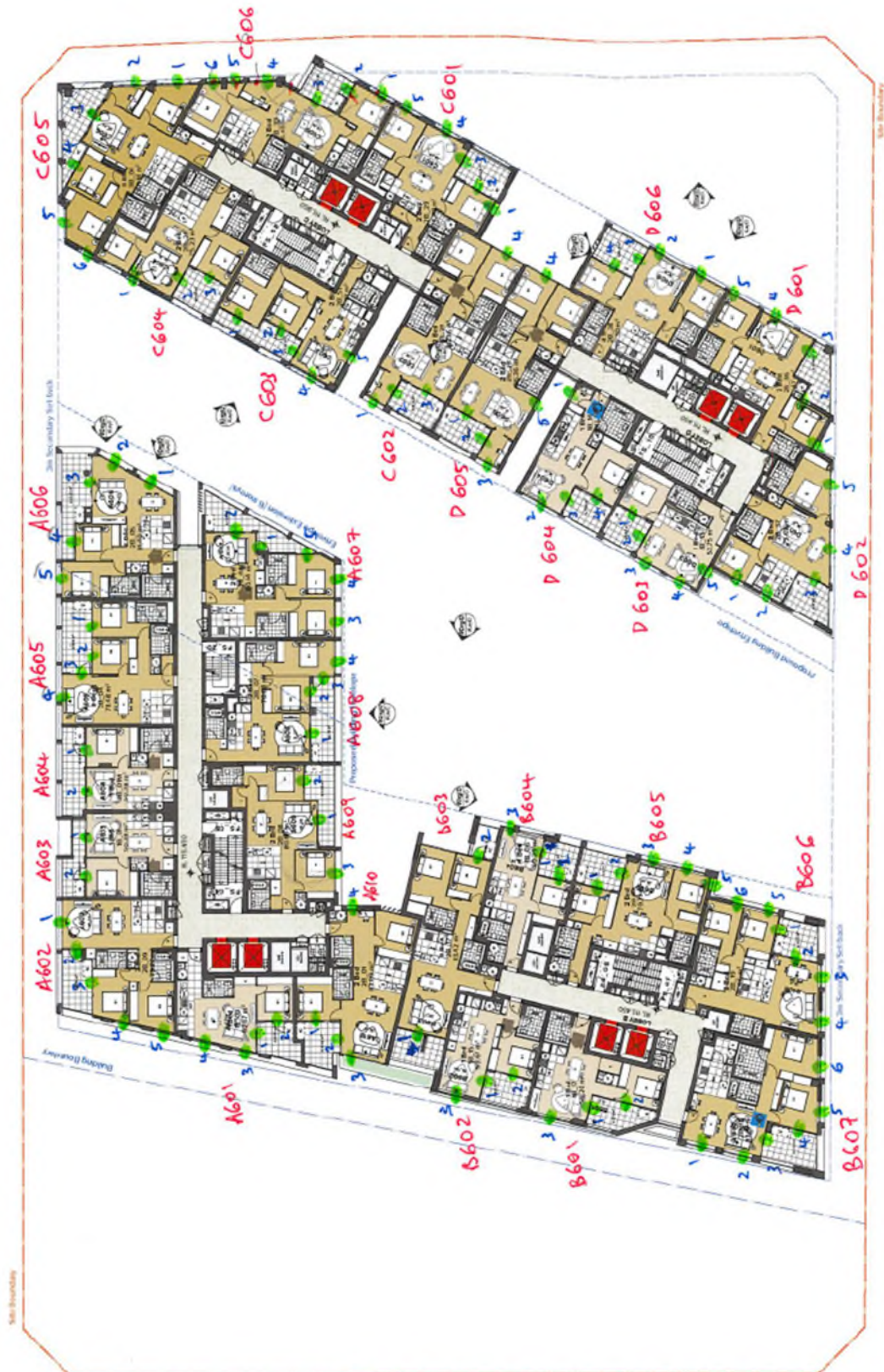


Figure C.2. 5: Opening Locations and Notations – Level 06

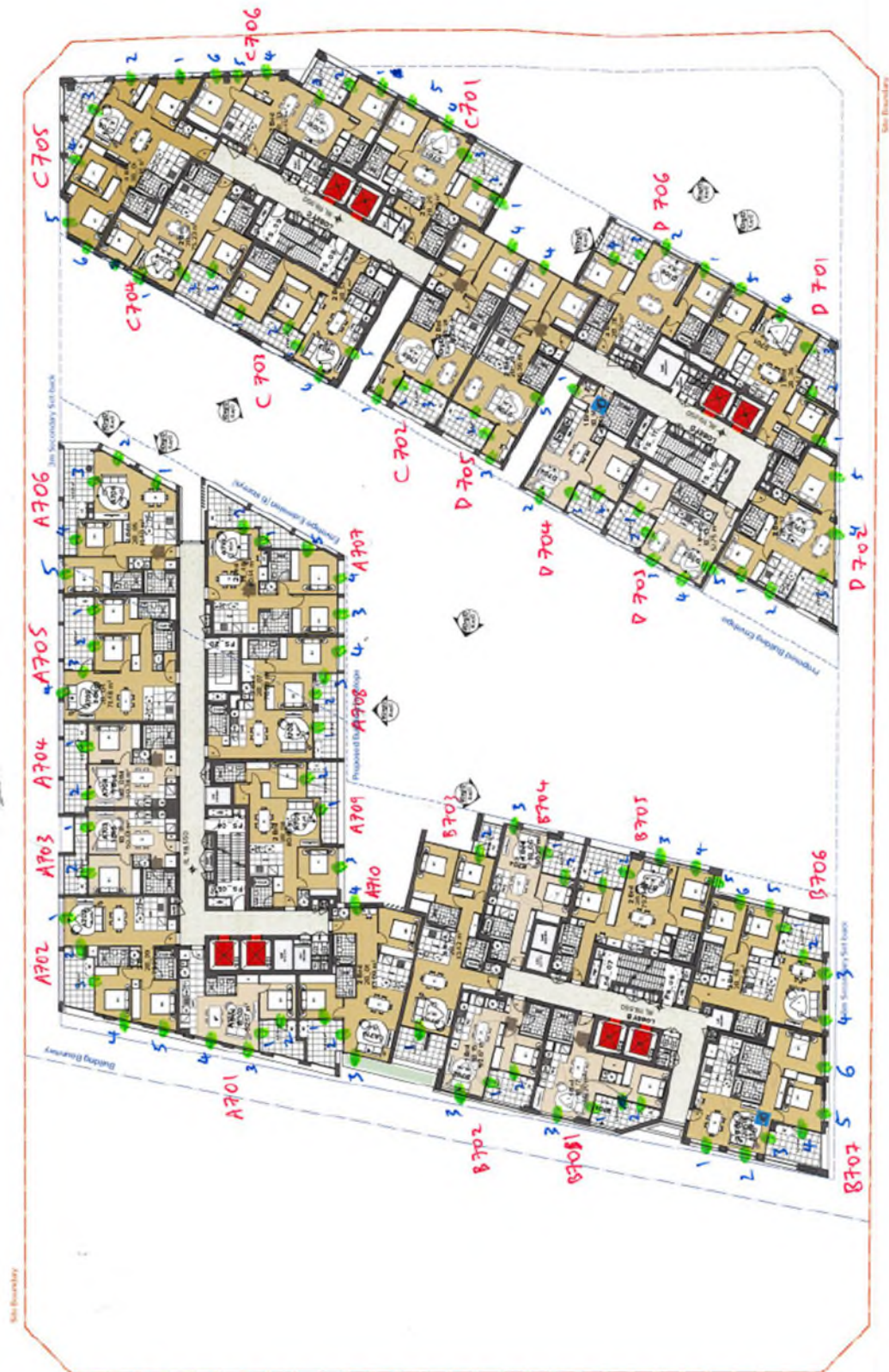


Figure C.2. 6: Opening Locations and Notations – Level 07



Figure C.2. 7: Opening Locations and Notations – Level 08



Figure C.2. 8: Opening Locations and Notations – Level 09

APPENDIX D FLOW PERFORMANCE THROUGH A TYPICAL APARTMENT

Table D.1: Table of Relative Flow Performance through a Typical Apartment

Flow Path through Typical Apartment	Description	Comparative Pressure Loss	Comparative Flow Rate
Door to A	Door to 1 Sliding Window	1	1
Door to B	Door to 2 Sliding Windows	0.25	1.99
Door to C	Door to 1 Awning Window	0.25	1.99
Door to D	Door to 4 Awning Windows	0.11	2.97
Door to E	Door to Highlight Awning Window (125mm Open)	0.17	2.40
Door to F	Door to Highlight Awning Window (30° Open)	0.04	4.84
Door to G	Door to internal louvre + plenum duct + external louvre	0.86	1.08
Door to H	Door to internal louvre + external louvre only	0.74	1.16

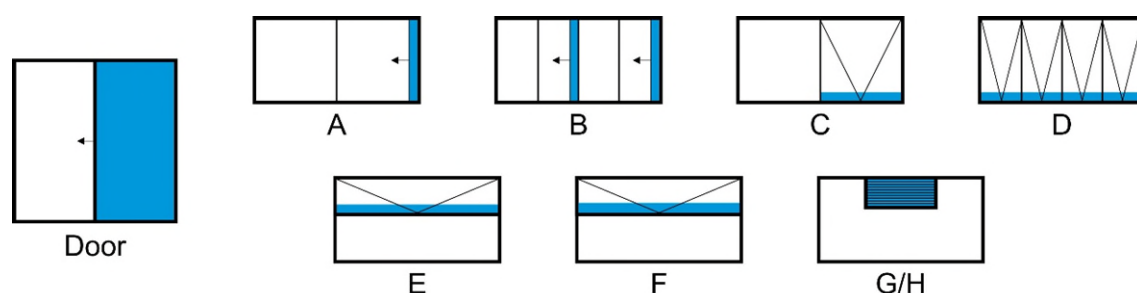


Figure D.1: Typical Balcony Door Frame Size of 2.4m×2.4m Frame Size (Door) and Typical 2nd Opening Types for a 2.4m×1.2m Overall Frame Size (A-H)

Door: Sliding door leading to a balcony (1.2m wide opening size)

A: Single sliding window with child safety device (125mm maximum opening size)

B: Double sliding windows with child safety devices (125mm maximum opening size each)

C: Single awning window with child safety device (125mm maximum opening size)

D: Four awning windows with child safety devices (125mm maximum opening size each)

E: Highlight awning window 500mm high opened out 125mm

F: Highlight awning window 500mm high opened out 30° (approx. 260mm)

G: 0.4m×1.0m internal louvre, 0.4m×1.0m plenum duct and 0.4m×1.0m external louvre

H: 0.4m×1.0m internal louvre and 0.4m×1.0m external louvre

The natural ventilation performance summarised in Table C.1 was determined for openings in series, and can be calculated from the following:

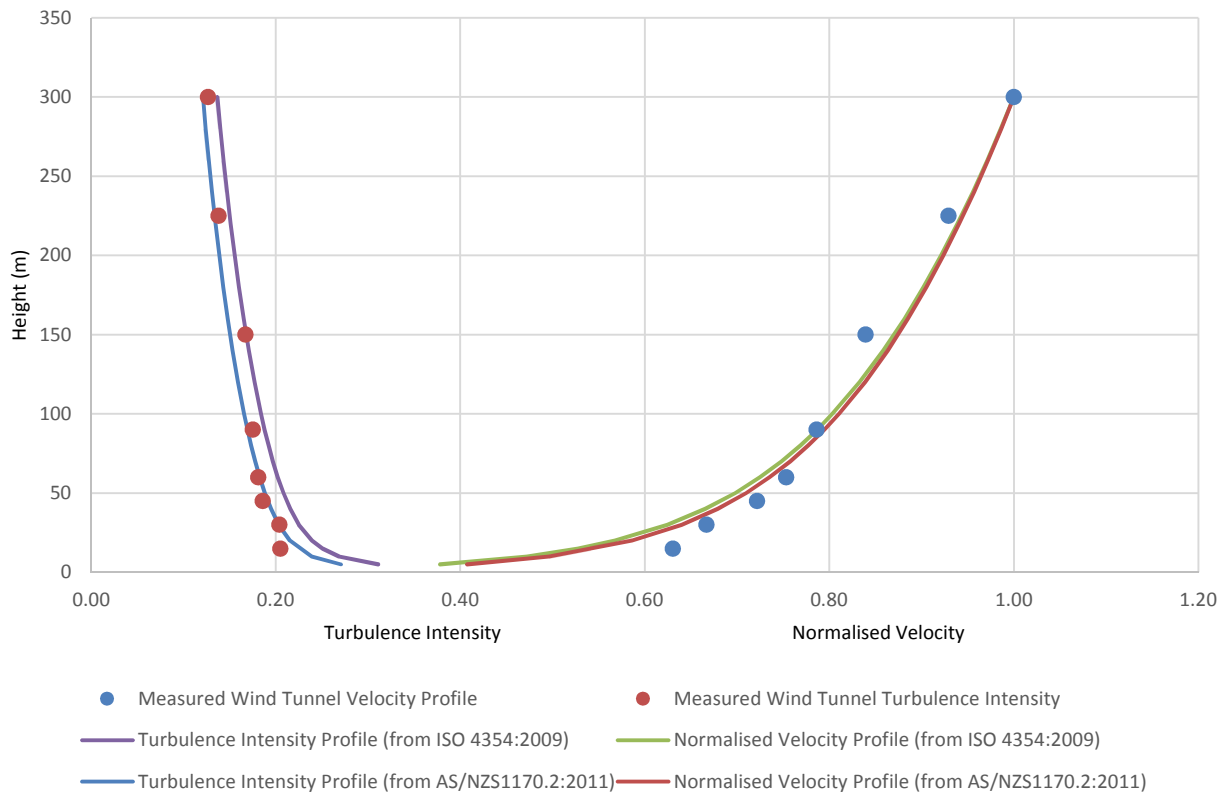
$$Q = \left[\frac{(C_{p_1} - C_{p_{n+1}}) V_h^2}{\frac{1}{C_{d_1}^2 A_1^2} + \frac{1}{C_{d_2}^2 A_2^2} + \frac{1}{C_{d_3}^2 A_3^2} + \dots + \frac{1}{C_{d_n}^2 A_n^2}} \right]^{\frac{1}{2}} \quad (5.6)$$

C_{p_1}	mean pressure coefficient at Opening 1	V_h	reference mean wind speed at building height, h (m/s)
C_d	discharge coefficient of the opening	A	openable area of the opening (m ²)
Q	volumetric flow rate along the flow path through the unit (m ³ /s)	v_1	average air speed at Opening 1 (m/s)

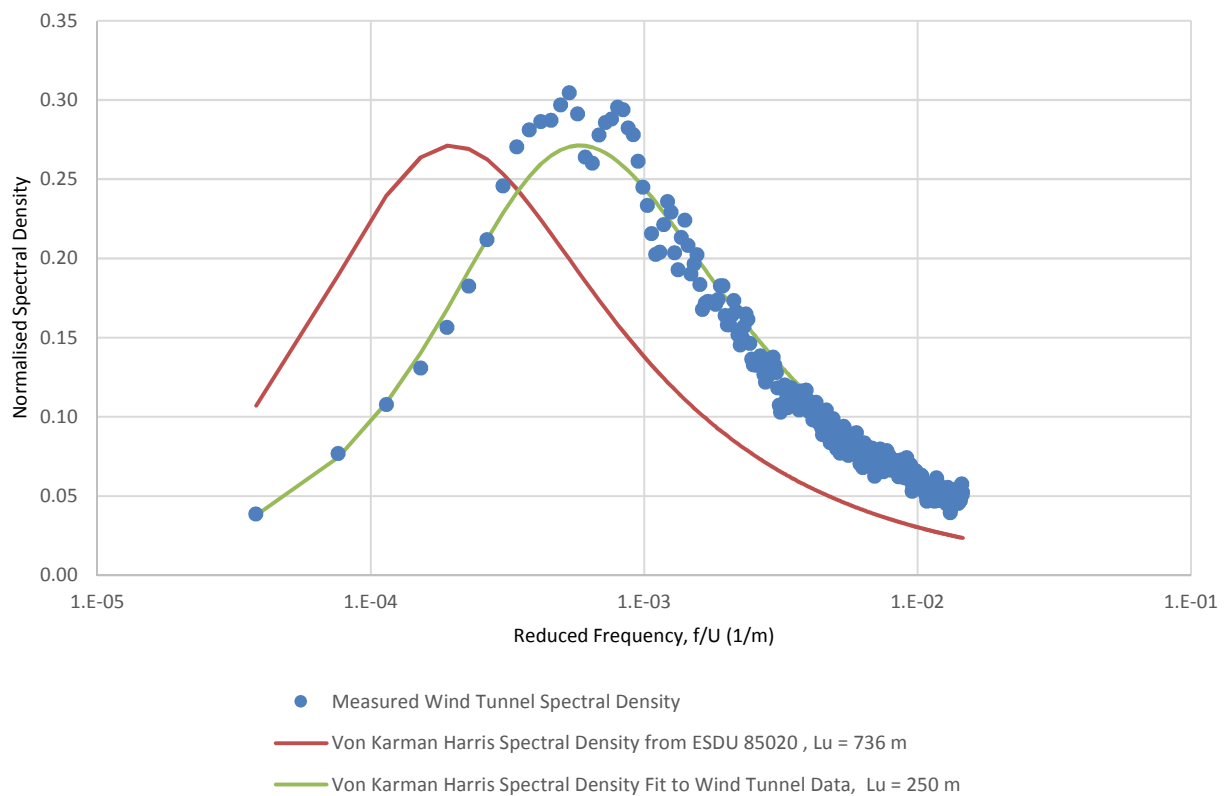
The discharge coefficient of the openings have been based on the typical opening sizes. These range from 0.7 for the balcony door and plenum duct, 0.65 for the windows, and 0.4 for the louvres.

APPENDIX E VELOCITY AND TURBULENCE INTENSITY PROFILES

Mean Velocity and Turbulence Intensity for Suburban/Forest Terrain ($0.2\text{m} < z_0 < 0.3\text{m}$) (TC3) at a 1:300 Scale



Longitudinal Spectra Density for Suburban/Forest Terrain ($0.2\text{m} < z_0 < 0.3\text{m}$) (TC3) at a 1:300 Scale



APPENDIX F METHODOLOGY

F.1 Wind Tunnel Data Acquisition

Wind pressures acting on the model of the development are monitored in the wind tunnel from 16 wind directions at 22.5 degree intervals. The phase lag between the various channels where data is acquired simultaneously is within 10% of a typical pressure cycle. A sample rate of 1,024Hz is used, which is more than adequate for the given frequency band. The signal is low-pass filtered at 500Hz and then digital filtering is applied over this range to provide an unbiased response from the pressure measurement system (A.W. Rofail, 2004). This corresponds to a full-scale frequency range of approximately 0 to 4 Hz.

Based on the results of the analysis of the boundary layer wind profiles at the site, and incorporating the regional wind model, the data sampling length of the wind tunnel test for each wind direction corresponds to a full-scale sample length of at least 30 minutes. Research by A.W. Rofail and K.C.S. Kwok (1991) has shown that the mean wind is stable for sample lengths of 30 minutes or more (full-scale).

Mean external pressure coefficients are obtained from the wind tunnel measurements for each individual pressure sensor for each wind direction tested. The application of wind tunnel testing for the modelling of natural ventilation has been reported previously by Rofail and Aurelius (2004) and Peddie and Rofail (2010 and 2011).

F.2 Calculation of the Pressure Coefficients

The mean external pressure coefficients obtained from the wind tunnel are referenced to the mean velocity pressure at the building reference height. The external pressure coefficients are defined as follows:

$$C_{p,mean} = \frac{\bar{p} - p_0}{\frac{1}{2} \rho \bar{V}_{BH}^2} \quad E.1$$

Definitions of the terms above are described as follows:

$C_{p,mean}$	mean pressure coefficient	$\bar{p}$	mean pressure
ρ	air density (1.2kg/m ³)	p_0	reference static pressure
$\bar{V}_{BH}$	mean velocity at the building reference height		

Table A1 in Appendix A presents the maximum and minimum mean and peak external pressure coefficients based on the most critical values for the range of wind directions tested, for each pressure sensor location. The corresponding wind direction that each critical value occurred at is also shown in Table A1 of Appendix A. The directional results of these coefficients are plotted in Appendix C of this report. All coefficient data presented in this report is referenced to the mean velocity pressure at the study reference height defined in Section 3.

F.3 Calculation of the Full-Scale Results

To calculate the full-scale mean hourly external pressures at the openings, the wind tunnel coefficient measurements need to be combined with information about the local wind climate. The aim of combining the wind tunnel measurements with wind climate information is to determine the expected pressure level that will occur for a given return period (mean recurrence interval). As the return period of a pressure level is directly related to the hourly probability of occurrence of this pressure level, this process may also be considered to be the determination of the pressure level for a given probability of occurrence.

The local wind climate is normally described using a statistical model, which relates wind speed to a probability of occurrence. A feature of this process is to include the impact of wind directionality which includes any local variations in wind speed or frequency with wind direction. This is important as the natural ventilation performance of a building may be highly dependent on the prevailing wind direction, and that the highest wind speed event in a given return period may not necessarily produce the highest pressure differential in the same return period.

The contribution to the probability of occurrence of a pressure level is calculated for each wind direction. These contributions are then summed over all wind directions to calculate the total probability of occurrence of this level. The pressure level is selected such that the summed probability of occurrence for this level equals the hourly probability of exceedance. A detailed description of the calculation of the pressure level and a justification for the choice of probability distribution is given by J.D. Holmes (1990).

The reference pressure is related to the reference mean wind speed by the following equation;

$$\text{Reference Pressure (Pa)} = \frac{1}{2} \rho V^2 \quad (3.1)$$

where the air density ρ is taken to be 1.2 kg/m³, which is typical for sea-level atmospheric conditions.

F.4 References

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