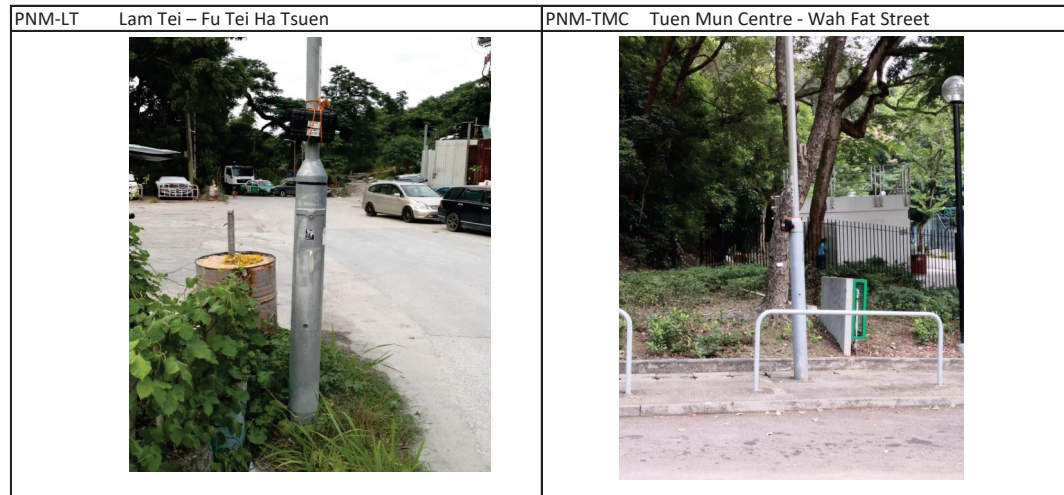


**Tuen Mun Bypass
Prevailing Noise Measurement
Noise Measurement Location**



**Tuen Mun Bypass
Prevailing Noise Measurement
Measurement Result**

Location : PNM-LT

Measurement Start Date & Time	L90	Remarks
10/14/2022 0:00	48	Weekday
10/14/2022 1:00	47	Weekday
10/14/2022 2:00	45	Weekday
10/14/2022 3:00	45	Weekday
10/14/2022 4:00	45	Weekday
10/14/2022 5:00	45	Weekday
10/14/2022 6:00	52	Weekday
10/14/2022 7:00	56	Weekday
10/14/2022 8:00	57	Weekday
10/14/2022 9:00	57	Weekday
10/14/2022 10:00	56	Weekday
10/14/2022 11:00	56	Weekday
10/14/2022 12:00	55	Weekday
10/14/2022 13:00	54	Weekday
10/14/2022 14:00	53	Weekday
10/14/2022 15:00	54	Weekday
10/14/2022 16:00	55	Weekday
10/14/2022 17:00	52	Weekday
10/14/2022 18:00	52	Weekday
10/14/2022 19:00	51	Weekday
10/14/2022 20:00	51	Weekday
10/14/2022 21:00	50	Weekday
10/14/2022 22:00	51	Weekday
10/14/2022 23:00	50	Weekday
10/15/2022 0:00	48	Weekend
10/15/2022 1:00	47	Weekend
10/15/2022 2:00	49	Weekend
10/15/2022 3:00	47	Weekend
10/15/2022 4:00	48	Weekend
10/15/2022 5:00	49	Weekend
10/15/2022 6:00	53	Weekend
10/15/2022 7:00	56	Weekend
10/15/2022 8:00	56	Weekend
10/15/2022 9:00	57	Weekend
10/15/2022 10:00	56	Weekend
10/15/2022 11:00	56	Weekend
10/15/2022 12:00	55	Weekend
10/15/2022 13:00	56	Weekend
10/15/2022 14:00	57	Weekend
10/15/2022 15:00	58	Weekend
10/15/2022 16:00	58	Weekend
10/15/2022 17:00	58	Weekend
10/15/2022 18:00	57	Weekend
10/15/2022 19:00	53	Weekend
10/15/2022 20:00	52	Weekend
10/15/2022 21:00	54	Weekend
10/15/2022 22:00	55	Weekend
10/15/2022 23:00	53	Weekend

Day (0700 - 1900)	MAX	58
	MIN	52
Evening (1900 - 2300)	MAX	55
	MIN	50
Night (2300 - 0700)	MAX	53
	MIN	45

Location : PNM-TMC

Measurement Start Date & Time	L90	Remarks
10/14/2022 0:00	51	Weekday
10/14/2022 1:00	50	Weekday
10/14/2022 2:00	50	Weekday
10/14/2022 3:00	49	Weekday
10/14/2022 4:00	49	Weekday
10/14/2022 5:00	49	Weekday
10/14/2022 6:00	52	Weekday
10/14/2022 7:00	55	Weekday
10/14/2022 8:00	59	Weekday
10/14/2022 9:00	57	Weekday
10/14/2022 10:00	56	Weekday
10/14/2022 11:00	54	Weekday
10/14/2022 12:00	59	Weekday
10/14/2022 13:00	56	Weekday
10/14/2022 14:00	56	Weekday
10/14/2022 15:00	56	Weekday
10/14/2022 16:00	57	Weekday
10/14/2022 17:00	56	Weekday
10/14/2022 18:00	55	Weekday
10/14/2022 19:00	54	Weekday
10/14/2022 20:00	53	Weekday
10/14/2022 21:00	54	Weekday
10/14/2022 22:00	54	Weekday
10/14/2022 23:00	52	Weekday
10/15/2022 0:00	48	Weekend
10/15/2022 1:00	51	Weekend
10/15/2022 2:00	51	Weekend
10/15/2022 3:00	50	Weekend
10/15/2022 4:00	51	Weekend
10/15/2022 5:00	51	Weekend
10/15/2022 6:00	51	Weekend
10/15/2022 7:00	53	Weekend
10/15/2022 8:00	56	Weekend
10/15/2022 9:00	55	Weekend
10/15/2022 10:00	57	Weekend
10/15/2022 11:00	56	Weekend
10/15/2022 12:00	55	Weekend
10/15/2022 13:00	68	Weekend
10/15/2022 14:00	68 [2]	Weekend
10/15/2022 15:00	58	Weekend
10/15/2022 16:00	57	Weekend
10/15/2022 17:00	55	Weekend
10/15/2022 18:00	54	Weekend
10/15/2022 19:00	54	Weekend
10/15/2022 20:00	54	Weekend
10/15/2022 21:00	54	Weekend
10/15/2022 22:00	53	Weekend
10/15/2022 23:00	52	Weekend

Day (0700 - 1900)	MAX	59
	MIN	53
Evening (1900 - 2300)	MAX	54
	MIN	53
Night (2300 - 0700)	MAX	52
	MIN	49

Remarks [1] Free field noise measurements were conducted. Noise levels with additional 3dB(A) façade correction are presented above.
 [2] The high noise levels were caused by gardening activities nearby and the typical noise level at Wah Fat Playground during day time is less than 60dB(A). These high noise levels will not be considered in the fixed noise assessment.

1. Introduction

1.1. In accordance with Table 1A of the EIAO-TM, noise criteria for planned fixed plant sources should be determined as follows:

- 5 dB(A) below the appropriate ANL set out in the IND-TM; or
- prevailing background noise level where the prevailing background noise level is 5 dB(A) below the appropriate ANL (i.e. ANL – 5 dB(A)).

1.2. Prevailing background noise measurements were conducted to determine the noise criteria for fixed plant noise assessment. This appendix presents the details of the prevailing background noise measurement, and the results of the measurement were summarized in **Section 4.2.2** of the EIA Report.

2. Details Of Noise Measurement

Measurement Location and Date

2.1. Prevailing noise measurements have been conducted at Lam Tei and Tuen Mun in order to capture the existing noise environment near ventilation shaft for tunnel. The prevailing noise measurements were conducted in October 2022 and the measurement locations are shown in **Figure 4.1**. $L_{90(1hr)}$ was used as the parameter to establish the corresponding noise criteria according to HKPSG. A summary of the measurement locations is given in Table below.

ID	Location	Measurement Condition	Measurement Date
PNM-LT	Fu Tei Ha Tsuen, Lam Tei	Free field	14 – 15 October 2022
PNM-TMC	Wah Fat Street, Tuen Mun Centre	Free field	14 – 15 October 2022

Measurement Equipment

2.2. In accordance with the Technical Memorandum for the Assessment of Noise from Places Other Than Domestic Premises, Public Places or Construction Sites (IND-TM), sound level meter in compliance with the International Electrotechnical Commission Publications 651:1979 (Type 1) and 804:1985 (Type 1) specifications was used for carrying out the noise measurement. Immediately prior to and following each noise measurement, the accuracy of sound level meter was checked using an acoustic calibrator generating 94dB at 1000 Hz. Measurement was considered to be valid with the calibration level from before and after the noise

measurement within 1.0 dB. The equipment used in the noise measurement has been summarized below.

Equipment	Model
Sound Level Meter	Rion NL-52 (Serial No. 01143483)
	Rion NL-52 (Serial No. 00175560)
Sound Level Calibrator	Rion NC-74 (Serial No. 34678506)

Measurement Parameter and Procedurest

2.3. Parameters such as frequency weighting, the time weighting and the duration of measurement were set as follows:

- Frequency weighting: A
- Time weighting: Fast
- Duration of measurement: 48 hours (with data being logged at every one second)

2.4. During the noise measurement, the following procedures were followed:

- Prior to and after each noise measurement, the sound level meter was calibrated using the Calibrator for 94 dB at 1000 Hz. If the difference in the calibration level before and after measurement was more than 1 dB (A), the measurement is considered invalid and repeat of noise measurement should be required after repair or re-calibration of the equipment.
- All the measurement data within the sound level meter system were downloaded through the computer software. All these data were then checked and reviewed properly.
- Noise measurement was conducted in the absence of fog, rain, and wind with a steady speed lower than 5 m/s, or wind with gusts lower than 10 m/s.

Calibration Certificates

Calibration Certificate

Certificate No. 201030

Page 1 of 3 Pages

Customer : Enovative Environmental Service Limited

Address : Room 23, 6/F, Block C, Goldfield Industrial Centre, Shatin, N.T.

Order No. : Q20449

Date of receipt : 8-Feb-22

Item Tested

Description : Sound Level Meter

Manufacturer : Rion

I.D. : N15-RION-006

Model : NL-52

Serial No. : 01143483

Test Conditions

Date of Test : 17-Feb-22

Supply Voltage : --

Ambient Temperature : (23 ± 3)°C

Relative Humidity : (50 ± 25) %

Test Specifications

Calibration check.

Ref. Document/Procedure: Z01, IEC 61672.

Test Results

All results were within the IEC 61672 type 1 or manufacturer's specification.


The results are shown in the attached page(s).

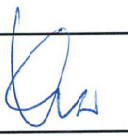
Main Test equipment used:

Equipment No.	Description	Cert. No.	Traceable to
S017	Multi-Function Generator	C211339	SCL-HKSAR
S240	Sound Level Calibrator	106446	NIM-PRC & SCL-HKSAR

The values given in this Calibration Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environmental changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Hong Kong Calibration Ltd. shall not be liable for any loss or damage resulting from the use of the equipment.

The test equipment used for calibration are traceable to International System of Units (SI), or by reference to a natural constant. The test results apply to the above Unit-Under-Test only

Calibrated by : 
Elva Chong

Approved by : 
Kin Wong

Date: 17-Feb-22

This Certificate is issued by:
Hong Kong Calibration Ltd.
Unit 8B, 24/F., Well Fung Industrial Centre, No. 58-76, Ta Chuen Ping Street, Kwai Chung, NT, Hong Kong.
Tel: 2425 8801 Fax: 2425 8646

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Calibration Certificate

Certificate No. 201030

Page 2 of 3 Pages

Results :

Acoustical signal test

1. Self-generated noise: 14.5 dBA (Mfr's Spec ≤ 17 dBA)

2. Reference Sound Pressure Level

UUT Setting				Applied Value (dB)	UUT Reading (dB)
Range (dB)	Frequency Weighting	Time Weighting	Octave Filter		
20 ~ 130	A	F	OFF	94.0	94.0
		S	OFF		94.0
	C	F	OFF		94.0
	Z	F	OFF		94.0
	A	F	OFF	114.0	114.0
		S	OFF		114.0
	C	F	OFF		114.0
	Z	F	OFF		114.0

IEC 61672 Type 1 Spec. : ± 1.1 dB

Uncertainty : ± 0.1 dB

Electrical signal tests

3. Electrical signal tests of frequency weightings (A weighting)

Frequency	Attenuation (dB)	IEC 61672 Type 1 Spec.
31.5 Hz	-39.5	- 39.4 dB, ± 2 dB
63 Hz	-26.1	- 26.2 dB, ± 1.5 dB
125 Hz	-16.1	- 16.1 dB, ± 1.5 dB
250 Hz	-8.6	- 8.6 dB, ± 1 dB
500 Hz	-3.1	- 3.2 dB, ± 1.4 dB
1 kHz	0.0 (Ref)	0 dB, ± 1.1 dB
2 kHz	+1.1	+ 1.2 dB, ± 1.6 dB
4 kHz	+0.7	+ 1.0 dB, ± 1.6 dB
8 kHz	-1.1	- 1.1 dB, + 2.1 dB ~ -3.1 dB
16 kHz	-8.5	- 6.6 dB, - 3.5 dB ~ - 17.0 dB

Uncertainty : ± 0.1 dB

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Calibration Certificate

Certificate No. 201030

Page 3 of 3 Pages

4. Frequency & Time weightings at 1 kHz

4.1 Frequency Weighting (Fast)

UUT Setting	Applied Value (dB)	UUT Reading (dB)	Difference (dB)	IEC 61672 Type 1 Spec.
A	94.0	94.0 (Ref.)	--	± 0.4 dB
C	94.0	94.0	0.0	
Z	94.0	94.0	0.0	

4.2 Time Weighting (A-weighted)

UUT Setting	Applied Value (dB)	UUT Reading (dB)	Difference (dB)	IEC 61672 Type 1 Spec.
Fast	94.0	94.0 (Ref.)	--	± 0.3 dB
Slow	94.0	94.0	0.0	
Time-averaging	94.0	94.0	0.0	

Uncertainty : ± 0.1 dB

- Remarks :
1. UUT : Unit-Under-Test
 2. The uncertainty claimed is for a confidence probability of not less than 95%.
 3. Atmospheric Pressure : 1 012 hPa.
 4. Microphone model: UC-59, S/N : 11558.
 5. Preamplifier model : NH-25 , S/N : 43502.
 6. Firmware Version: 1.8
 7. Power Supply Check: OK
 8. The UUT was adjusted with the supplied sound calibrator at the reference sound pressure level before the calibration.

----- END -----

Calibration Certificate

Certificate No. 203515

Page 1 of 4 Pages

Customer : Enovative Environmental Service Limited

Address : Room 23, 6/F, Block C, Goldfield Industrial Centre, Shatin, N.T.

Order No. : Q21405

Date of receipt : 28-Apr-22

Item Tested

Description : Sound Level Meter

Manufacturer : Rion

I.D. : --

Model : NL-52

Serial No. : 00175560

Test Conditions

Date of Test : 3-May-22

Supply Voltage : --

Ambient Temperature : (23 ± 3)°C

Relative Humidity : (50 ± 25) %

Test Specifications

Calibration check.

The UUT has an indication that it conforms to IEC 61672-1:2013/2002 class 1.

Ref. Document/Procedure: Z01, IEC 61672-1:2013, IEC 61260-1:2014.

Test Results

All results were within the IEC 61672 Class 1, manufacturer's specification or Tolerance. (where applicable)

The results are shown in the attached page(s).

Main Test equipment used:

Equipment No.	Description	Cert. No.	Traceable to
S017	Multi-Function Generator	C211339	SCL-HKSAR
S240	Sound Level Calibrator	106446	NIM-PRC & SCL-HKSAR

The values given in this Calibration Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environmental changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Hong Kong Calibration Ltd. shall not be liable for any loss or damage resulting from the use of the equipment.

The test equipment used for calibration are traceable to International System of Units (SI), or by reference to a natural constant.

The test results apply to the above Unit-Under-Test only

Calibrated by :

Elva Chong

Approved by :

Steve Kwan

Date: 3-May-22

This Certificate is issued by

Hong Kong Calibration Ltd.

Unit 8B, 24/F., Well Fung Industrial Centre, No. 58-76, Ta Chuen Ping Street, Kwai Chung, NT, Hong Kong.

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Calibration Certificate

Certificate No. 203515

Page 2 of 4 Pages

All tests were performed on UUT's 20-130 dB range, unless specified otherwise.

Results :

Acoustical signal test

1. Indication at the Calibration Check Frequency (1kHz)

UUT Setting		Applied Value (dB)	UUT Reading (dB)
Weight.	Response		After Adjust.*
A	F	94.0	93.9
	S		93.9
C	F		93.9
Z			93.9

*Adjustment using the laboratory's sound calibrator was performed immediately before test.

Tolerance : ± 1.0 dB

Uncertainty : ± 0.1 dB

2. Self-generated noise (Microphone Installed, most sensitive range) : 14.6 dBA (Mfr's Spec. ≤ 17 dBA)

Electrical signal tests

3. Frequency weightings (A ,F)

Frequency	Attenuation (dB)	IEC 61672-1 Class 1 Spec.
31.5 Hz	-39.7	- 39.4 dB, ± 1.5 dB
63 Hz	-26.2	- 26.2 dB, ± 1.0 dB
125 Hz	-16.1	- 16.1 dB, ± 1.0 dB
250 Hz	-8.6	- 8.6 dB, ± 1.0 dB
500 Hz	-3.2	- 3.2 dB, ± 1.0 dB
1 kHz	0.0 (Ref)	0 dB, ± 0.7 dB
2 kHz	+1.0	+ 1.2 dB, ± 1.0 dB
4 kHz	+0.7	+ 1.0 dB, ± 1.0 dB
8 kHz	-1.2	- 1.1 dB, + 1.5 dB ~ -2.5 dB
16 kHz	-8.6	- 6.6 dB, + 2.5 dB ~ - 16.0 dB

Uncertainty : ± 0.1 dB

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Calibration Certificate

Certificate No. 203515

Page 3 of 4 Pages

4. Frequency & Time weightings

4.1 Frequency Weighting (1kHz)

UUT Setting		Anticipated Value (dB)	UUT Reading (dB)	IEC 61672-1 Class 1 Spec.
Time Weight.	Freq. Weight.			
F	A	94.0	94.0 (Ref.)	-- ± 0.2 dB
	C		94.0	
	Z		94.0	

Uncertainty : ± 0.1 dB

4.2 Time Weighting (1kHz)

UUT Setting		Anticipated Value (dB)	UUT Reading (dB)	IEC 61672-1 Class 1 Spec.
Time Weight.	Freq. Weight.			
F	A	94.0	94.0 (Ref.)	-- ± 0.1 dB
S			94.0	
eq			94.0	

Uncertainty : ± 0.1 dB

5. Level Linearity on the Reference Level Range (8 kHz, A, F)

Anticipated Value (dB)	UUT Reading (dB)	IEC 61672-1 Class 1 Spec.
124.0	123.9	± 0.8 dB
114.0	114.0	
104.0	104.0	
94.0	94.0 (Ref.)	
84.0	84.0	
74.0	73.9	
64.0	63.9	
54.0	54.0	
44.0	44.1	

Uncertainty : ± 0.1 dB

6. Level Linearity including the level range control (1 kHz, A, F)

N.A. (UUT is single range)

Calibration Certificate

Certificate No. 203515

Page 4 of 4 Pages

7. Filter Characteristics

7.1 1/1 – Octave Filter

Frequency	Attenuation (dB)	Tolerance (dB) <small>(Ref: IEC 61260-1 Class 1 Spec.)</small>
125 Hz	-76.8	< - 60
250 Hz	-71.3	< - 40.5
500 Hz	-39.8	< - 16.6
707 Hz	-3.3	- 2 ~ - 5
1 kHz (Ref)	--	--
1.414 kHz	-3.4	- 2 ~ - 5
2 kHz	-41.0	< - 16.6
4 kHz	-86.2	< - 40.5
8 kHz	-86.5	< - 60

Uncertainty : ± 0.25 dB

7.2 1/3 – Octave Filter

Frequency	Attenuation (dB)	Tolerance (dB) <small>(Ref: IEC 61260-1 Class 1 Spec.)</small>
326 Hz	-65.2	< - 60
530 Hz	-47.2	< - 40.5
772 Hz	-22.4	< - 16.6
891 Hz	-3.6	+ 0.4 ~ - 5.3
1 kHz (Ref)	--	--
1.122 kHz	-3.8	+ 0.4 ~ - 5.3
1.296 kHz	-22.8	< - 16.6
1.887 kHz	-47.8	< - 40.5
3.070 kHz	-92.4	< - 60

Uncertainty : ± 0.25 dB

Remarks : 1. UUT : Unit-Under-Test

2. The uncertainty claimed is for a confidence probability of not less than 95%.

3. Atmospheric Pressure: 1 013 hPa.

4. Microphone model: UC-59, S/N: 10989.

5. Preamplifier model: NH-25, S/N: 65662.

----- END -----

Calibration Certificate

Certificate No. **201032**

Page 1 of 2 Pages

Customer : Enovative Environmental Service Limited

Address : Room 23, 6/F, Block C, Goldfield Industrial Centre, Shatin, N.T.

Order No. : Q20449

Date of receipt : 8-Feb-22

Item Tested

Description : Sound Level Calibrator

Manufacturer : Rion

I.D. : --

Model : NC-74

Serial No. : 34678506

Test Conditions

Date of Test : 17-Feb-22

Supply Voltage : --

Ambient Temperature : (23 ± 3)°C

Relative Humidity : (50 ± 25) %

Test Specifications

Calibration check.

Ref. Document/Procedure : F21, Z02, IEC 60942.

Test Results

All results were within the IEC 60942 Class 1 specifications.


The results are shown in the attached page(s).

Main Test equipment used:

Equipment No.	Description	Cert. No.	Traceable to
S014	Spectrum Analyzer	106615	NIM-PRC & SCL-HKSAR
S240	Sound Level Calibrator	106446	NIM-PRC & SCL-HKSAR
S041	Universal Counter	101743	SCL-HKSAR
S206	Sound Level Meter	106447	SCL-HKSAR

The values given in this Calibration Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environmental changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Hong Kong Calibration Ltd. shall not be liable for any loss or damage resulting from the use of the equipment.

The test equipment used for calibration are traceable to International System of Units (SI), or by reference to a natural constant.
The test results apply to the above Unit-Under-Test only

Calibrated by : 
Elva Chong

Approved by : 
Kin Wong

Date: 17-Feb-22

This Certificate is issued by:
Hong Kong Calibration Ltd.
Unit 8B, 24/F., Well Fung Industrial Centre, No. 58-76, Ta Chuen Ping Street, Kwai Chung, NT, Hong Kong.
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Calibration Certificate

Certificate No. **201032**

Page 2 of 2 Pages

Results :

1. Generated Sound Pressure Level

UUT Nominal Value (dB)	Measured Value (dB)	IEC 60942 Class 1 Spec.
94.0	94.1	± 0.4 dB

Uncertainty : ± 0.2 dB

2. Short-term Level Fluctuation : 0.0 dB

IEC 60942 Class 1 Spec. : ± 0.1 dB

Uncertainty : ± 0.01 dB

3. Frequency

UUT Nominal Value (kHz)	Measured Value (kHz)	IEC 60942 Class 1 Spec.
1	1.000	± 1 %

Uncertainty : ± 3.6 x 10⁻⁶

4. Total Distortion : < 0.9 %

IEC 60942 Class 1 Spec. : < 4 %

Uncertainty : ± 2.3 % of reading

Remark : 1. UUT : Unit-Under-Test

2. The uncertainty claimed is for a confidence probability of not less than 95%.

3. Atmospheric Pressure : 1 012 hPa.

----- END -----