



GVK MARINE SYSTEMS

Plot No. 21, IDA Mallapur, IE Nacharam, Hyderabad-500076

(Specialized in Shock, Noise, Vibration Analysis &
Measurements and valve testing for Marine Systems)
AN ISO 9001:2015 CERTIFIED COMPANY

TEST REPORT

SBN MEASUREMENTS ON 40 NB Ball valve

Customer : M/s. VINPRA ENGINEERING INDIA PVT LTD
Date : 11/07/2023
Report No. : GVK/NV/VINPRA/01

A handwritten signature in purple ink, appearing to read 'G V Ramany'.

G V RAMANUJAM
Engineer NVH
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Background

As part of Design validation and acceptance criteria, Structure Borne Noise (SBN) levels are measured. Measurements were performed as per the standards and the results are given in this report.

Objective

The aim of the project is to study the Structure Borne Noise levels above the Mounting arrangement points. The tests were conducted on the test rig. The actual boundary conditions of the valves are simulated.

Reference standards and documents

- MIL STD 740-2 for Structural Bone Noise (Vibration)

Description of the valve :

Client : VINPRA ENGINEERING INDIA PVT LTD
 Drawing No. : VP/1PC/TEBV/FLG/002
 Test Item : 40 NB Ball valve
 Model No. & S.No. : B12150
 Material : LG4C
 Heat No. : 17723

Test requirements:

Structure Borne Noise (SBN) – Vibrations

Vibration Levels were measured above all the mounts in three perpendicular directs X, Y and Z in 1/3rd octave frequency band in the range 10 Hz to 10 kHz. All the measurements are performed in the above-mentioned operating conditions. SBN levels are measured in acceleration in dB with a reference of 1e-05 m/s².

n

$$\text{Acceleration in dB L} = 10 \log \left(\sum_{i=1}^n 10^{0.1L_i} \right) - 10 \log n$$

Where, L = Vibration level in AdB at any particular 1/3 octave band frequency.

Li = Vibration level in AdB measured at ith point.

n = Number of measuring points.

A_{ref} - 1e-05 m/s²





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Test Description

Measurements of Structure Borne Noise Levels were performed at 3 locations. Tri-axial Accelerometers were used to measure the vibrations in all three directions as Horizontal – X direction (suction and discharge side), Axial – Y direction and Vertical - Z direction.

Acceptable values as per specifications:

Vibration: The vibration level 'L' as calculated above is to be compared with the vibration level of the equipment in the 1/3 octave frequency band of 10 Hz to 10 KHz in dB with respect to reference threshold $1 \times 10^{-5} \text{ m/sec}^2$ measured above the securing bolts of the equipment should not exceed the value limited by the straight line joining 80dB at 25 Hz and 105 dB at 8 KHz respectively.

Parameters:

SBN levels were measured using Accelerometers fixed to the valve above of all 3 mounting locations. The signal was analyzed for the SBN levels in 1/3rd Octave bands.

Frequency Bands	: 10 - 10 kHz
Sampling Frequency	: 32 kHz
Averaging time	: 20 seconds
Average type	: Linear

Conclusions:

The performance of the 40 NB BALL valve is found to be satisfactory and the SBN levels are within the allowable limits.





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Instrument Details:

Data Acquisition System

Make : Bruel & Kjaer
Model : Photon+
DAQ : ICP
No. of Channels : 4 Channel
Serial No. : 5027845
Date of Calibration : 28-10-2022
Next Calibration : 27-10-2023

Tri-axial Accelerometers

Make : Dytran
Model : 3313A1
Serial No. : 1249
Nominal Sensitivity : 10 mV/g
Date of Calibration : 11-10-2022
Next Calibration : 11-10-2023





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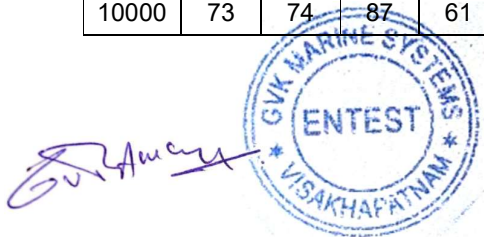
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Table 1: Vibration Levels in 1/3rd Octave Band in AdB at 25% opening

Freq	Suction Side			Discharge Side			Centre of valve			Max	Limits
	M1X	M1Y	M1Z	M2X	M2Y	M2Z	M3X	M3Y	M3Z		
10	56	57	57	47	44	45	45	42	43	57	76
12.5	56	55	57	48	48	47	43	43	39	57	77
16	56	54	53	47	49	44	44	48	43	56	78
20	52	54	54	48	48	44	44	49	41	54	79
25	51	54	53	46	50	42	40	46	39	54	80
31.5	54	53	54	44	44	45	44	45	43	54	81
40	52	52	60	54	55	55	60	45	57	60	82
50	58	62	70	71	71	69	77	55	69	77	83
63	50	52	58	52	52	57	56	49	58	58	84
80	52	53	52	54	53	53	49	52	49	54	85
100	54	63	62	58	67	58	56	65	55	67	86
125	64	66	63	62	67	61	59	65	59	67	87
160	70	74	69	66	76	65	62	74	61	76	88
200	67	69	65	72	71	66	66	68	63	72	89
250	67	66	66	64	73	60	70	68	71	73	90
315	70	66	71	68	77	59	65	72	70	77	91
400	68	70	64	65	73	61	68	67	64	73	92
500	66	72	62	66	76	65	69	67	66	76	93
630	62	72	66	70	70	63	68	68	67	72	94
800	62	79	72	69	79	69	67	71	68	79	95
1000	71	89	70	72	87	75	69	74	65	89	96
1250	76	91	76	70	84	74	72	81	71	91	97
1600	84	88	81	69	77	79	73	84	73	88	98
2000	88	90	89	66	68	76	77	91	77	91	99
2500	82	89	86	70	67	80	78	91	79	91	100
3150	78	91	83	70	69	86	78	93	79	93	101
4000	84	82	84	75	76	93	77	91	81	93	102
5000	80	91	91	80	81	92	77	89	81	92	103
6300	86	93	99	79	76	88	82	90	85	99	104
8000	86	87	96	70	65	78	86	86	92	96	105
10000	73	74	87	61	60	72	88	78	96	96	106





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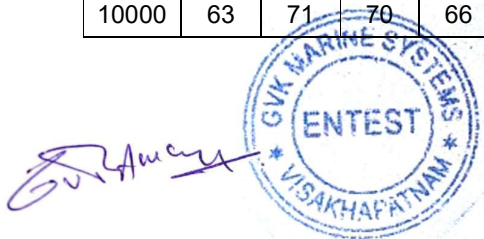
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Table 2: Vibration Levels in 1/3rd Octave Band in AdB at 50% opening

Freq	Suction Side			Discharge Side			Centre of valve			Max	Limits
	M1X	M1Y	M1Z	M2X	M2Y	M2Z	M3X	M3Y	M3Z		
10	49	48	45	49	45	41	55	52	56	56	76
12.5	48	47	45	47	46	44	53	51	50	53	77
16	54	52	44	45	53	46	51	54	49	54	78
20	46	49	44	47	47	39	49	53	50	53	79
25	43	46	41	45	48	40	48	49	50	50	80
31.5	43	45	44	46	46	45	50	50	48	50	81
40	57	54	55	46	49	57	61	48	58	61	82
50	74	70	71	61	65	72	78	60	74	78	83
63	53	52	59	46	51	60	60	51	60	60	84
80	51	53	51	49	51	50	54	53	51	54	85
100	53	61	56	53	58	59	60	60	53	61	86
125	54	63	55	54	63	56	60	65	55	65	87
160	62	63	57	61	67	59	60	67	57	67	88
200	63	65	58	59	63	56	62	62	58	65	89
250	61	70	58	66	62	66	69	65	69	70	90
315	62	73	57	68	61	69	68	67	69	73	91
400	59	66	57	66	66	60	64	65	64	66	92
500	57	71	59	69	72	60	61	66	60	72	93
630	68	67	60	66	73	66	65	71	66	73	94
800	66	69	62	61	77	69	63	74	65	77	95
1000	65	75	66	67	87	76	69	81	65	87	96
1250	64	77	70	65	88	78	73	85	69	88	97
1600	65	74	70	71	94	85	68	80	70	94	98
2000	65	69	68	72	92	84	66	79	75	92	99
2500	63	70	72	69	83	82	67	78	77	83	100
3150	59	71	78	71	79	83	66	74	77	83	101
4000	64	77	85	73	77	84	67	70	76	85	102
5000	66	82	85	77	83	86	74	83	85	86	103
6300	64	81	77	81	88	86	80	87	84	88	104
8000	66	74	73	77	88	77	76	81	80	88	105
10000	63	71	70	66	75	71	69	70	70	75	106





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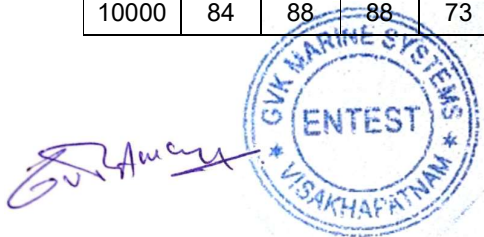
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Table 3: Vibration Levels in 1/3rd Octave Band in AdB at 75% opening

Freq	Suction Side			Discharge Side			Centre of valve			Max	Limits
	M1X	M1Y	M1Z	M2X	M2Y	M2Z	M3X	M3Y	M3Z		
10	60	56	57	59	51	53	63	59	60	63	76
12.5	55	52	52	60	60	49	57	55	55	60	77
16	57	61	51	61	64	48	60	64	54	64	78
20	54	56	49	56	55	46	57	59	52	59	79
25	52	56	50	55	59	47	54	59	53	59	80
31.5	52	53	51	53	57	48	55	56	53	57	81
40	68	53	62	65	64	58	72	56	65	72	82
50	81	66	77	81	80	73	81	69	81	81	83
63	65	59	67	62	63	63	68	61	70	70	84
80	54	56	57	60	61	54	57	59	60	61	85
100	60	66	60	76	73	57	63	69	63	76	86
125	58	64	58	63	70	55	61	67	61	70	87
160	63	70	59	64	73	56	66	73	62	73	88
200	66	65	62	68	70	59	70	68	65	70	89
250	73	69	75	73	78	71	77	72	79	79	90
315	72	73	72	71	80	68	75	76	76	80	91
400	68	68	65	65	76	62	71	71	69	76	92
500	69	69	66	62	78	62	72	72	69	78	93
630	70	70	70	78	76	66	73	73	73	78	94
800	63	71	70	76	78	66	66	75	73	78	95
1000	68	76	68	78	85	64	71	80	71	85	96
1250	73	84	70	76	87	66	76	88	73	88	97
1600	74	86	72	69	78	68	78	90	75	90	98
2000	86	91	86	66	71	82	90	84	90	91	99
2500	82	94	86	69	73	82	86	98	90	98	100
3150	70	82	80	69	73	75	73	86	84	86	101
4000	66	75	76	74	79	72	69	79	80	80	102
5000	71	82	85	82	84	81	75	86	89	89	103
6300	78	87	92	83	82	86	81	91	96	96	104
8000	81	87	98	78	79	93	85	91	103	103	105
10000	84	88	88	73	74	83	88	92	92	92	106





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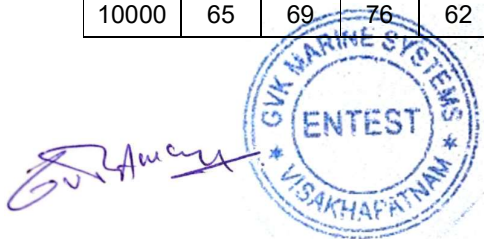
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Table 4: Vibration Levels in 1/3rd Octave Band in AdB at 100% opening

Freq	Suction Side			Discharge Side			Centre of valve			Max	Limits
	M1X	M1Y	M1Z	M2X	M2Y	M2Z	M3X	M3Y	M3Z		
10	49	53	46	52	50	50	48	54	50	54	76
12.5	48	52	49	51	55	48	52	58	49	58	77
16	57	60	48	53	58	48	56	59	50	60	78
20	57	58	47	61	59	51	56	57	49	61	79
25	55	59	47	56	60	49	50	60	49	60	80
31.5	55	60	58	58	62	58	57	62	58	62	81
40	54	62	69	65	64	68	71	64	64	71	82
50	48	53	59	52	60	55	68	60	52	68	83
63	56	60	73	64	64	75	68	63	74	75	84
80	58	62	62	61	63	64	59	61	66	66	85
100	65	66	68	63	67	65	63	66	59	68	86
125	72	69	72	67	68	67	69	68	66	72	87
160	76	75	66	81	77	74	77	75	69	81	88
200	74	79	73	83	80	78	82	77	74	83	89
250	76	75	73	69	80	68	77	76	77	80	90
315	78	73	74	75	81	67	79	77	74	81	91
400	82	79	72	73	82	71	76	75	71	82	92
500	84	85	69	76	83	75	76	74	74	85	93
630	80	79	73	79	81	72	74	75	74	81	94
800	77	88	77	80	82	75	71	77	74	88	95
1000	80	92	75	83	89	77	72	80	73	92	96
1250	80	92	76	78	88	77	79	88	79	92	97
1600	84	96	74	69	79	77	81	88	77	96	98
2000	81	94	80	65	68	77	77	97	80	97	99
2500	76	93	81	71	66	83	83	93	89	93	100
3150	72	89	77	66	66	83	77	97	83	97	101
4000	74	75	77	71	69	88	71	82	76	88	102
5000	71	88	84	77	70	87	72	82	76	88	103
6300	78	89	90	71	63	78	73	80	79	90	104
8000	77	81	87	63	61	67	75	75	84	87	105
10000	65	69	76	62	61	62	77	68	84	84	106





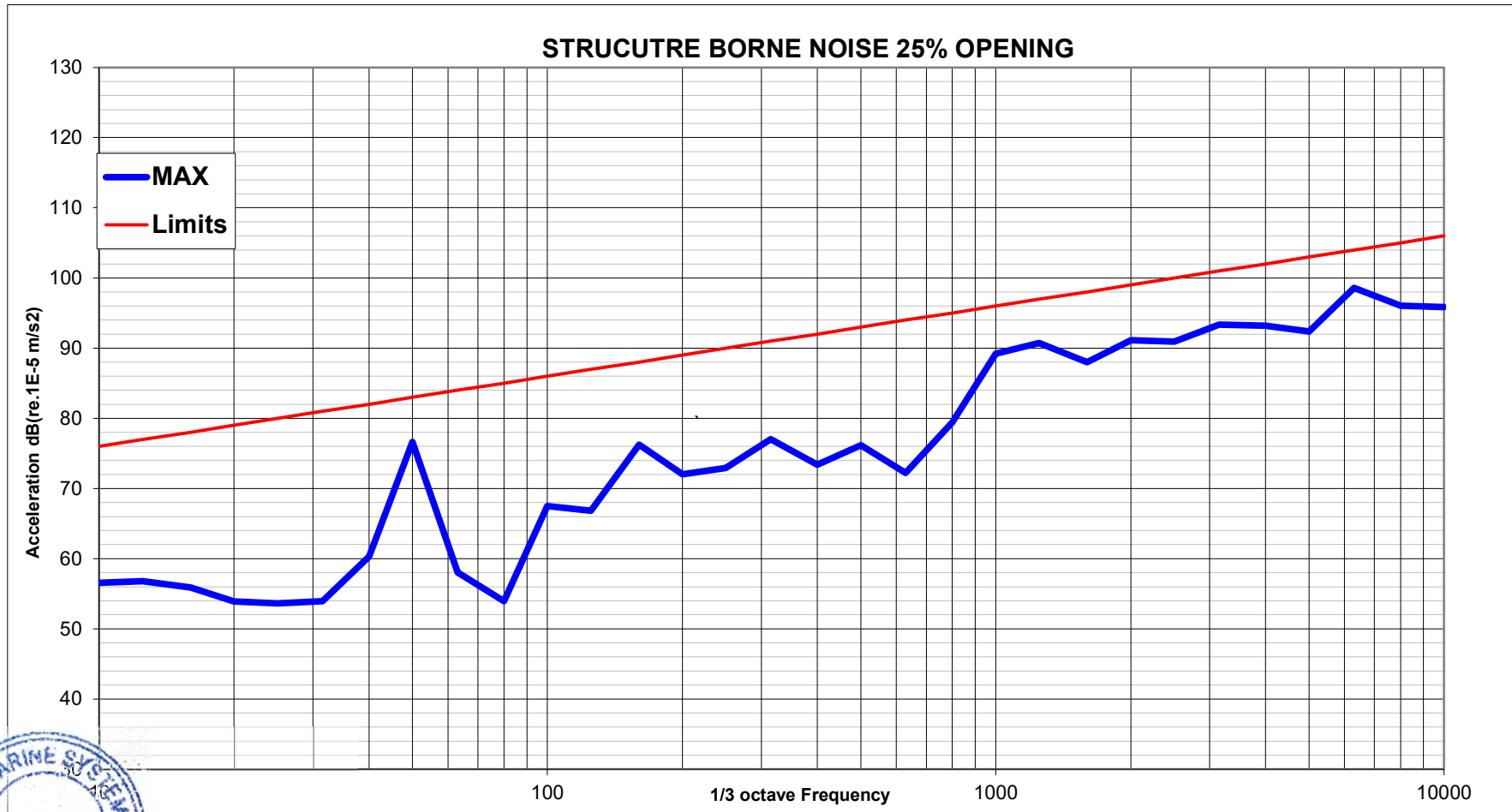
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Figure 1: Maximum SBN levels across 3 locations with Limit Levels at 25% Opening





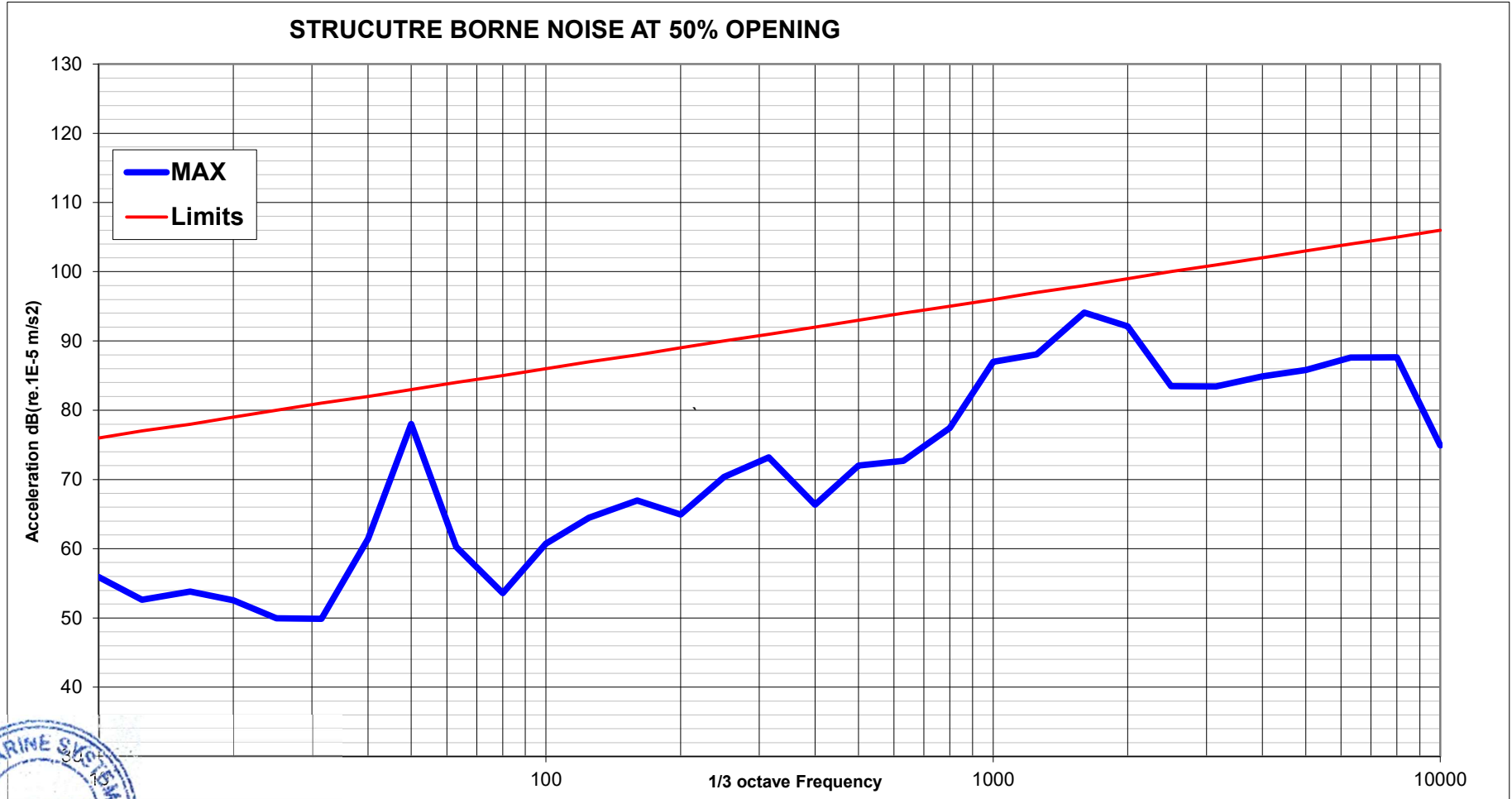
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Figure 2: Maximum SBN levels across 3 locations with Limit Levels at 50% Opening



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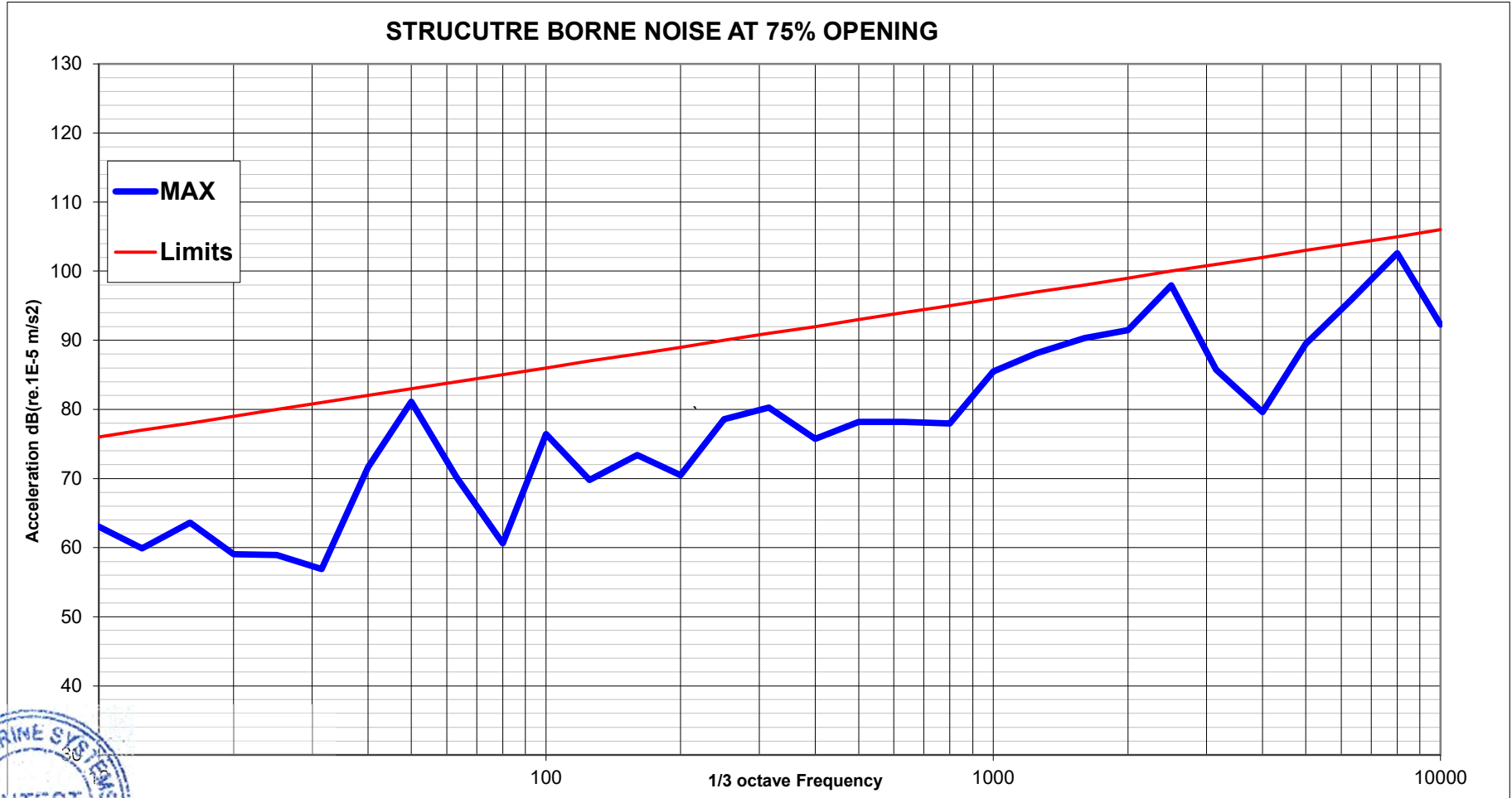
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Figure 3: Maximum SBN levels across 3 locations with Limit Levels at 75% Opening



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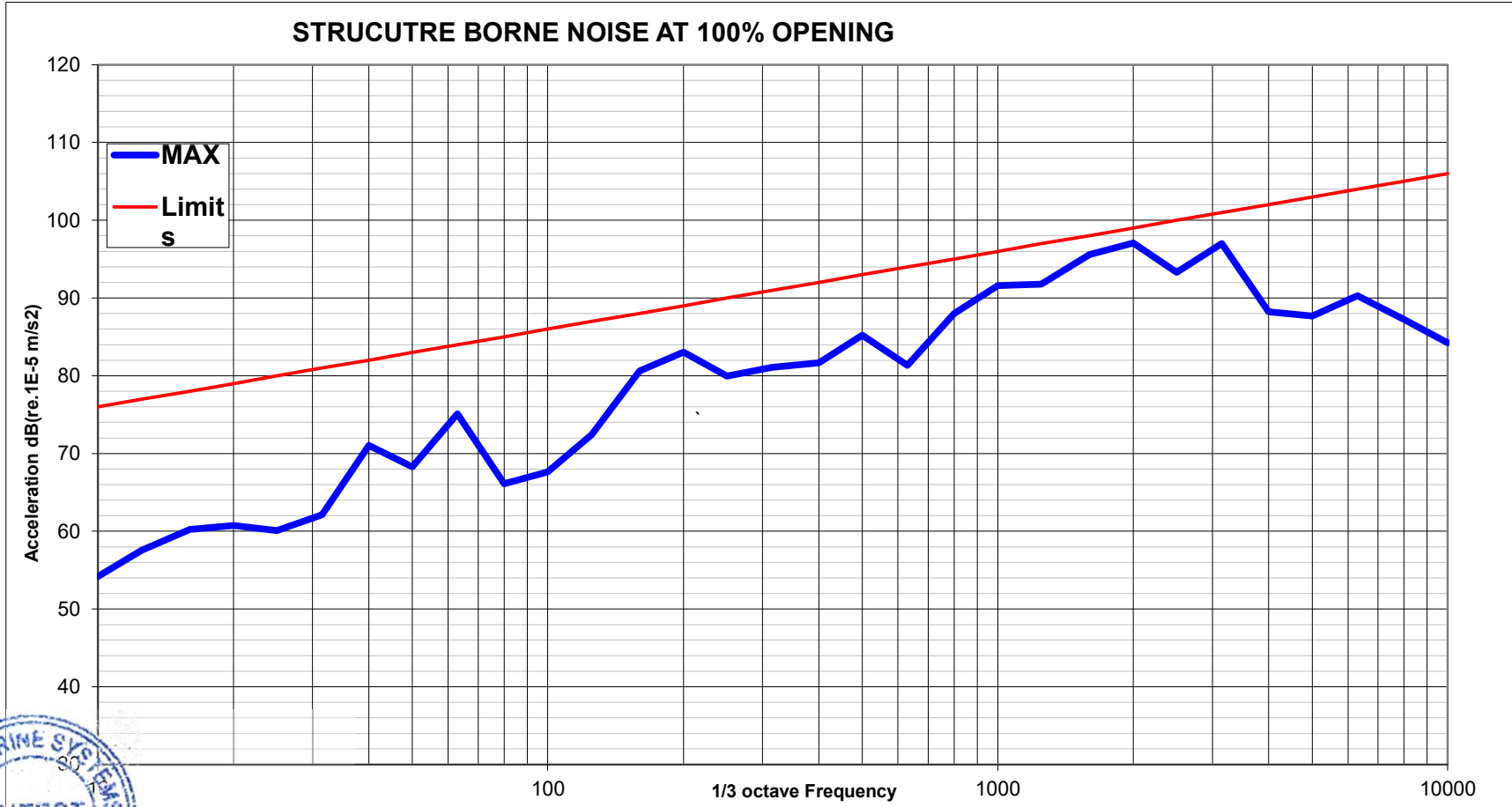
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Figure 4: Maximum SBN levels across 3 locations with Limit Levels at 100% Opening



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Figure 5: Maximum SBN levels across 3 locations with Limit Levels at 25%, 50%, 75%, 100% Opening

