



# TEST REPORT

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                              |                                                                                                                                                                         |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <b>Dt&amp;C Co., Ltd.</b><br>42, Yurim-ro, 154Beon-gil, Cheoin-gu, Yongin-si<br>Gyeonggi-do, Korea<br>Tel : 031-321-2664, Fax : 031-321-0220 |   |
| <p>1. Report No : DRCKREL2510-0348</p> <p>2. Customer</p> <ul style="list-style-type: none"> <li>• Name : VIONS INC.</li> <li>• Address : 12-35, Seounsaneop-ro 50beon-gil, Gyeyang-gu, Incheon, Republic of Korea</li> </ul> <p>3. Use of Report : For quality control</p> <p>4. Product Name / Model Name : Seismic Support Hanger / VOS-038-001</p> <p>5. Test Method Used : Seismic Test Method for Telecommunication Facilities<br/>(National Radio Research Agency Announcement No. 2022-7)</p> <p>6. Date of Test : September 05, 2025</p> <p>7. Location of Test : <input checked="" type="checkbox"/> Permanent Testing Lab <input type="checkbox"/> On Site Testing<br/>(Address : 28, Baengnyeong-ro, 20Beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea)</p> <p>8. Testing Environment : Temperature (25.0 ± 3.0) °C , Humidity (62.0 ± 3.0) % R.H.</p> <p>9. Test Result : Refer to the attached Document</p> <p>The results shown in this test report refer only to the sample(s) tested unless otherwise stated.<br/>This laboratory is not accredited for the test results marked. * * *</p> |                                                                                                                                              |                                                                                                                                                                         |
| Affirmation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Tested by<br>Name : Jeongeun Lee                          | Technical Manager<br>Name : Seungsik Bong                                          |
| The above test report is the accredited test result by Korea Laboratory Accreditation Scheme, which signed the ILAC-MRA.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                              |                                                                                                                                                                         |
| <p style="text-align: center;"><b>October 15, 2025</b></p> <p style="text-align: center;"><b>Dt&amp;C Co., Ltd.</b><br/>Accredited by KOLAS, Republic of KOREA</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                              |                                                                                                                                                                         |

If this report is required to confirmation of authenticity, please contact to [report@dtnc.net](mailto:report@dtnc.net)



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## 1. SUMMART

The excitation test was performed for "Seismic Support Hanger" in accordance with "National Radio Research Agency Announcement No. 2022-7 : Seismic Test Method for Communication Facilities". The excitation test was performed to demonstrate the structural integrity of the specimen under the specified excitation condition and the excitation test was performed by using Dt&C's tri-axial seismic simulator.

Required Response Spectrum (RRS) for the test specimen is determined by "National Radio Research Agency Announcement No. 2022-7 : Seismic Test Method for Communication Facilities". Tri-axial multi-frequency random motion was used for deriving the seismic simulator's motion. The random motion was amplitude-controlled in one-sixth octave bandwidths. For the excitation tests, earthquake wave excitation test (2 times) performed and the resonance search tests were performed before and after each earthquake wave excitation test.

Before, during and after excitation test, any obvious structural failures were not observed.

Based upon the results of the seismic testing, it is concluded that the subject equipment possesses sufficient structural integrity against the stress due to the given excitation event, therefore, the specimen has been qualified for the specified excitation conditions.

- RRS : Required Response Spectrum
- TRS : Test Response Spectrum

## 2. APPLICABLE DOCUMENT

National Radio Research Agency Announcement No. 2022-7 : Seismic Test Method for Communication Facilities



### 3. SPECIMEN IDENTIFICATION

#### 3.1. Specimen Description

The description and figure of the specimen are shown in "Table 1" and "Figure 1". The size and weight of specimen is visual check and record.

<Table 1> Specimen Description

| Description    | Specification                                                                                                         |
|----------------|-----------------------------------------------------------------------------------------------------------------------|
| Equipment Name | Seismic Support Hanger                                                                                                |
| Model Name     | VOS-038-001                                                                                                           |
| Manufacturer   | VIONS INC.                                                                                                            |
| Size           | (W) 54.51 mm x (D) 54.51 mm x (H) 72.43 mm                                                                            |
| Weight         | Seismic Support Hanger (4 ea) : 0.67 kg<br>Fixture : 172 kg<br>Cable Tray (1/2) + Dummy : 105 kg<br>Total : 277.67 kg |



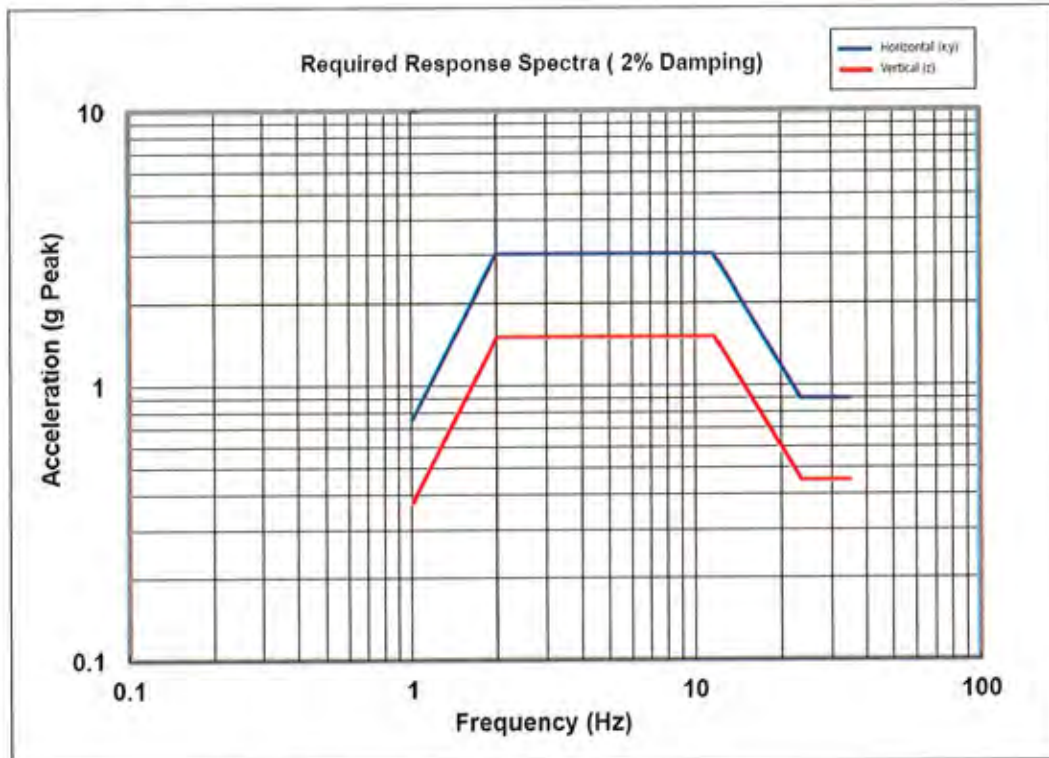
[Figure 1] Seismic Support Hanger – VOS-038-001





#### 4. TEST QUALIFICATION REQUIREMENTS

"Figure 2" and "Table 2" show the required response spectra presented in "Seismic Test Method for Communication Facilities". For demand response spectra in the vertical direction, 50% of the zero period acceleration (ZPA) is used.



[Figure 2] Required Response Spectrum

<Table 2> Required Response Spectrum

| Horizontal Direction |                  | Vertical Direction |                  |
|----------------------|------------------|--------------------|------------------|
| Frequency (Hz)       | Acceleration (g) | Frequency (Hz)     | Acceleration (g) |
| 1                    | 0.75             | 1                  | 0.375            |
| 2                    | 3                | 2                  | 1.5              |
| 11.67                | 3                | 11.67              | 1.5              |
| 23.33                | 0.9              | 23.33              | 0.45             |
| 35                   | 0.9              | 35                 | 0.45             |



## 5. SEISMIC TEST DETERMINATION CONDITION

- 1) There is no overturning or falling of the equipment to be tested.
- 2) There shall be no departure from the bottom of the equipment to be tested.
- 3) There shall be no departure components from the equipment.
- 4) There is no frame deformation or breakage of the equipment to be tested.
- 5) There shall be no deviation of the joints of the floor facilities or deviations from the fixed part of the shaking table.
- 6) There shall be no cracks, deformation or cutting of the anchoring, bolt, etc. fixing device itself.
- 7) There shall be no visible deformation or damage.





## 6. SEISMIC TEST METHOD

The seismic test of the test specimen was carried out according to the following procedure.  
The results of the seismic test are as follows.

### 6.1. Initial Inspection

In the initial visual inspection, the presence or absence of abnormality of the product before the test was checked, and the components and the fixing state were confirmed.

### 6.2. Test Setup

The specimen was fixed in the same manner as "Table 3". Accelerometers were installed on the Table, Fixture, VOS-038-001, Cable Tray. The test setup is shown to "Figure 3"~"Figure 4".

<Table 3> Specimen Setup

| Description     | Bolt     | Q'ty<br>(EA) | Torque<br>(kgf-cm) |
|-----------------|----------|--------------|--------------------|
| Table - Fixture | M12 Bolt | 8            | 770                |



※ Note - X : Front-Back, Y : Side-side, Z : Vertical

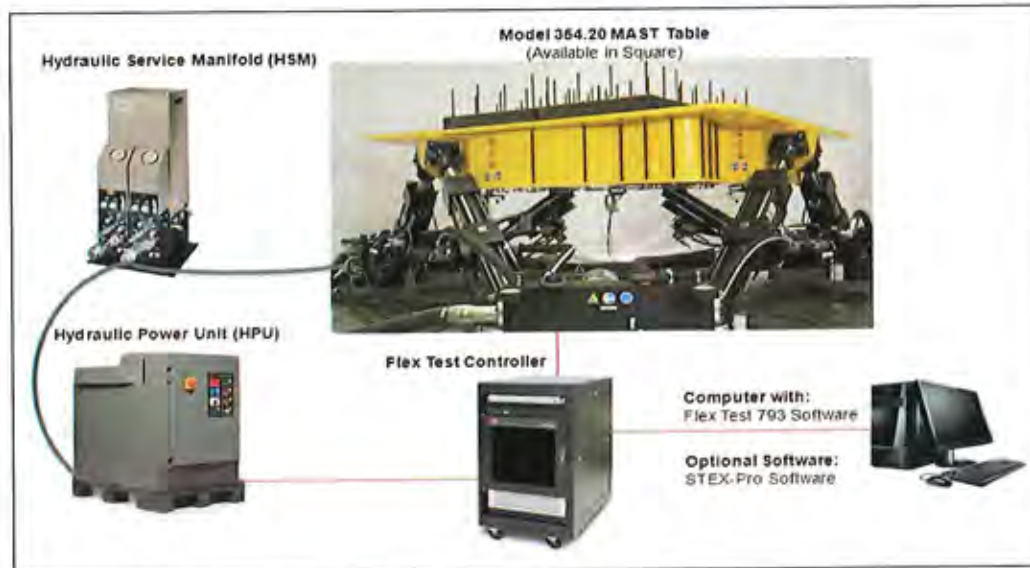
[Figure 3] Seismic Test Setup





### 6.2.1. Test Facilities

Dt&C's shaker table information and measuring instrument are shown in "Figure 5", "Table 4" and "Table 5".



[Figure 4] 6 D.O.F Vibration System Configuration

<Table 4> 6 D.O.F Vibration System Specification

| Description                         | Specification                                                                                |
|-------------------------------------|----------------------------------------------------------------------------------------------|
| Manufacturer                        | MTS systems Corporation                                                                      |
| Table size                          | (2 200 x 2 200) mm                                                                           |
| Max. Payload                        | 2 000 kg                                                                                     |
| Excitation Axes                     | Translational 3 axes, Rotational 3 axes                                                      |
| Max. Displacement                   | Vertical (Z) : $\pm 140$ mm<br>Lateral (Y) : $\pm 110$ mm<br>Longitudinal (X) : $\pm 125$ mm |
| Max. Acceleration,<br>ZPA(2 000 kg) | Vertical (Z) : 6 g<br>Lateral (Y) : 4.6 g<br>Longitudinal (X) : 4.9 g                        |
| Simulation Frequency                | (0.8 ~ 100) Hz                                                                               |
| Excitation Mechanism                | Electro-hydraulic Servo, 3 Variable Control                                                  |



&lt;Table 5&gt; Measuring Instruments

| Description                   | Model No. / Manufacturer    | Serial No. | The Next Scheduled Calibration Date | Calibration Laboratory |
|-------------------------------|-----------------------------|------------|-------------------------------------|------------------------|
| SEISMIC TABLE                 | 354.20 / MTS                | SC-01-01   | 2026. 03. 18                        | SICT                   |
| ACCELEROMETER                 | 8395A050ATTA00<br>/ KISTLER | 4789922    | 2026. 04. 11                        | SICT                   |
|                               |                             | 4789923    | 2026. 04. 11                        | SICT                   |
|                               |                             | 4789925    | 2026. 04. 14                        | SICT                   |
|                               | 8396A050ATTA00<br>/ KISTLER | 5545364    | 2026. 05. 09                        | SICT                   |
|                               |                             | 5415979    | 2026. 04. 14                        | SICT                   |
|                               | 8315A050ATTA00<br>/ KISTLER | 4795583    | 2026. 05. 07                        | SICT                   |
|                               |                             | 4795576    | 2026. 05. 07                        | SICT                   |
|                               |                             | 4795577    | 2026. 05. 07                        | SICT                   |
| HYGRO-THERMOMETER             | TE-303N / CAS               | 191040     | 2026. 01. 17                        | SICT                   |
| ELECTRIC BLANCE<br>(2 000 kg) | 2THB / CAS                  | OA33       | 2026. 03. 10                        | SICT                   |
| ELECTRIC BLANCE<br>(200 kg)   | ES6200C / PRECISA           | 4800834    | 2026. 05. 30                        | SICT                   |
| TORQUE WRENCH                 | 1800QL4-MH / TOHNICHI       | 113532E    | 2025. 11. 07                        | SICT                   |
| Digital Vernier Caliper       | CD-30C / Mitutoyo           | 1207904    | 2026. 02. 14                        | SICT                   |





### 6.3. Seismic Test

The seismic test was carried out for each item as follows.

#### 6.3.1. Resonance Search Test

A low-level (approximately 0.2 g) single-axis sine sweep from (1 ~ 35) Hz was performed in each of the three orthogonal axes to determine major resonances. The sweep rate was 2 octave per minute. The resonance search tests were performed before and after earthquake wave excitation tests. The results of the resonance search test are shown in "Table 6".

<Table 6> Result of the resonance search test

| Description |                  | Before Excitation Test              |                    | After Excitation Test               |                    |
|-------------|------------------|-------------------------------------|--------------------|-------------------------------------|--------------------|
|             |                  | 1st Resonance <sup>1)</sup><br>(Hz) | Amplitude<br>(g/g) | 1st Resonance <sup>1)</sup><br>(Hz) | Amplitude<br>(g/g) |
| X           | Fixture          | 12.88                               | 23.30              | 12.88                               | 17.70              |
|             | VOS-038-001      | 12.88                               | 28.20              | 12.88                               | 21.50              |
|             | Cable Tray (1/2) | No Resonance                        |                    | No Resonance                        |                    |
| Y           | Fixture          | 12.88                               | 24.00              | 12.88                               | 28.20              |
|             | VOS-038-001      | 12.88                               | 31.90              | 12.88                               | 37.20              |
|             | Cable Tray (1/2) | No Resonance                        |                    | No Resonance                        |                    |
| Z           | Fixture          | No Resonance                        |                    | No Resonance                        |                    |
|             | VOS-038-001      | 15.88                               | 4.04               | 15.88                               | 3.91               |
|             | Cable Tray (1/2) | 12.00                               | 26.30              | 12.13                               | 27.00              |

<sup>1)</sup> 1st mode value of resonance search test



### 6.3.2. Excitation Test

The earthquake wave excitation test was performed by using the independent tri-axial test method. The test specimen was subjected a minimum of 20 seconds strong motion multi-frequency random motion which is amplitude-controlled in one-sixth octave bandwidths, spaced one-sixth octave apart over the frequency range of (1 ~ 35) Hz. The input motions of each axis were proved as statistically independent of each other. Test Response Spectrum (TRS) for the shake table motions were analyzed at 2 % attenuation constant for earthquake wave excitation test and plotted at one-sixth octave intervals over the frequency range of (1 ~ 35) Hz. The TRS were greater than the corresponding RRS, during and after earthquake wave excitation test, any noticeable damage and structural defects were not also observed. Maximum acceleration results are shown in "Table 7".

<Table 7> Maximum Acceleration during the excitation test

| Description       |   | Table (g) | Fixture (g) | VOS-038-001 (g) | Cable Tray (1/2) (g) |
|-------------------|---|-----------|-------------|-----------------|----------------------|
| 1st<br>Excitation | X | 1.12      | 4.27        | 6.60            | 0.16                 |
|                   | Y | 1.03      | 5.11        | 9.07            | 2.28                 |
|                   | Z | 0.80      | 0.86        | 1.79            | 2.15                 |
| 2nd<br>Excitation | X | 1.12      | 4.37        | 6.82            | 0.17                 |
|                   | Y | 1.07      | 4.98        | 7.32            | 2.80                 |
|                   | Z | 0.68      | 0.91        | 1.82            | 2.40                 |

### 6.4. Visual Inspection After Test

Visual inspection after the seismic test was performed that verified and checked whether the product was abnormal after the test, and confirmed the components and mounting state.





## 7. TEST RESULT

The seismic test successfully completed. The test results are below to "Table 8". The detailed test data are shown in "Attachment 1" ~ "Attachment 4"

<Table 8> Summary of Seismic Test Results

| Description          | Measuring & Acceptance Criteria      | 1st Excitation | 2nd Excitation | Remark                  |
|----------------------|--------------------------------------|----------------|----------------|-------------------------|
| TRS Envelop          | (1 ~ 35) Hz<br>(1/6 octave Analysis) | Enveloped      | Enveloped      | Refer to Attachment 2   |
| Cross-correlation    | Does not exceed 0.3                  | Satisfied      | Satisfied      |                         |
| Structural integrity | No Physical damages or defects       | No abnormality | No abnormality | Refer to Attachment 1,3 |

## 8. CONCLUSION

"Seismic Support Hanger" was subjected to seismic tests under the conditions specified in "National Radio Research Agency Announcement 2022-7: Seismic Test Method for Communication Facilities", structural integrity were confirmed.



※ Attachment 1

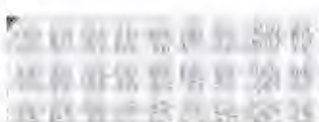
Resonance Search Test Data

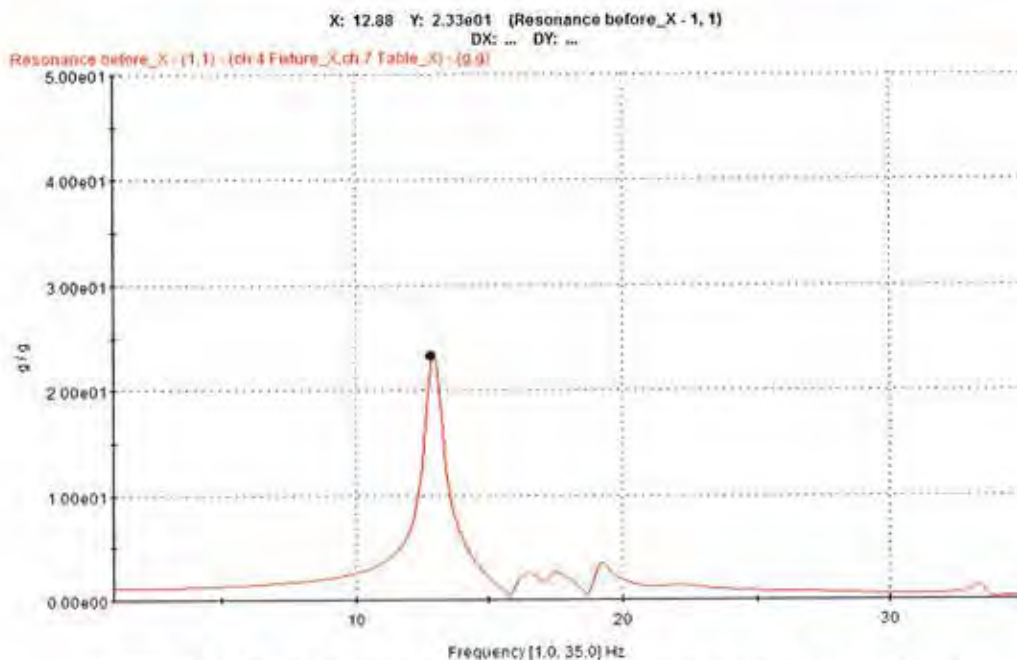




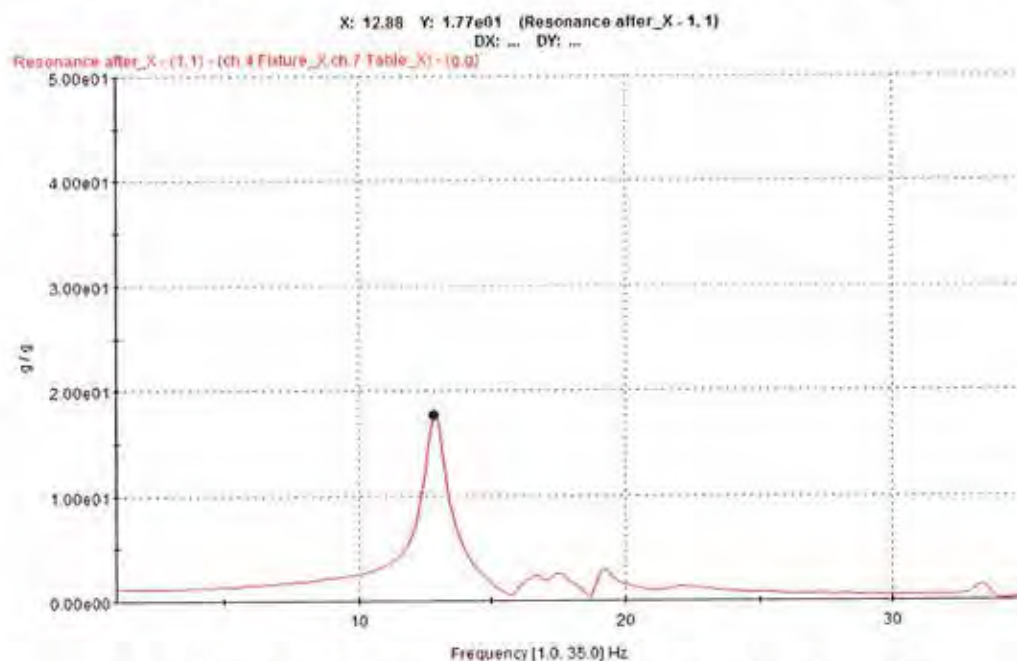
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| [Figure 1-18] Z axis Resonance Search Test after Excitation Test – Cable Tray (1/2)     |





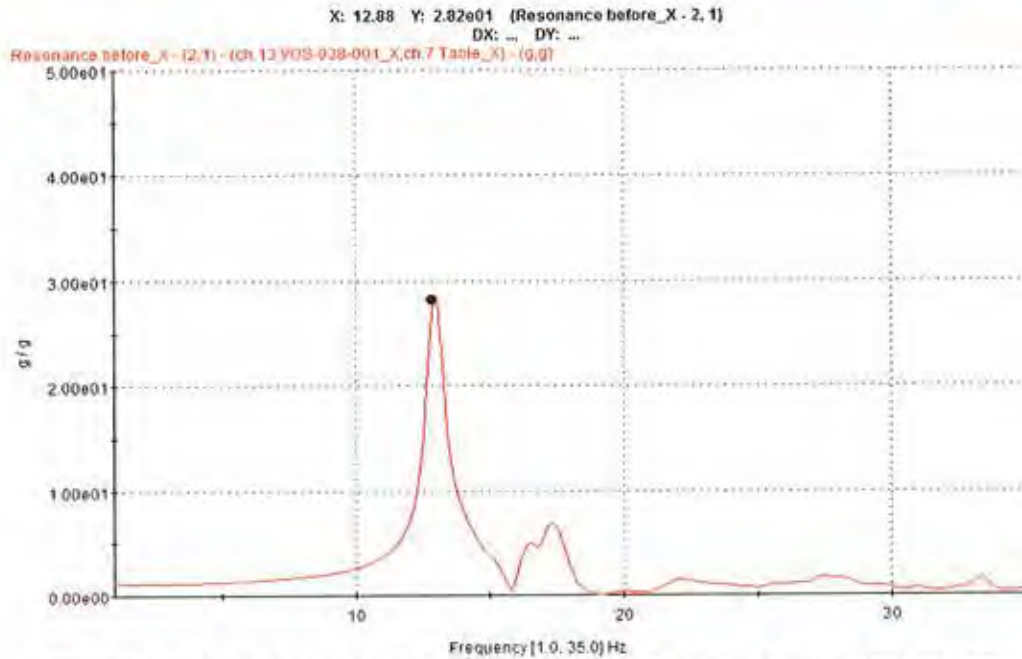
[Figure 1-1] X axis Resonance Search Test before Excitation Test - Fixture



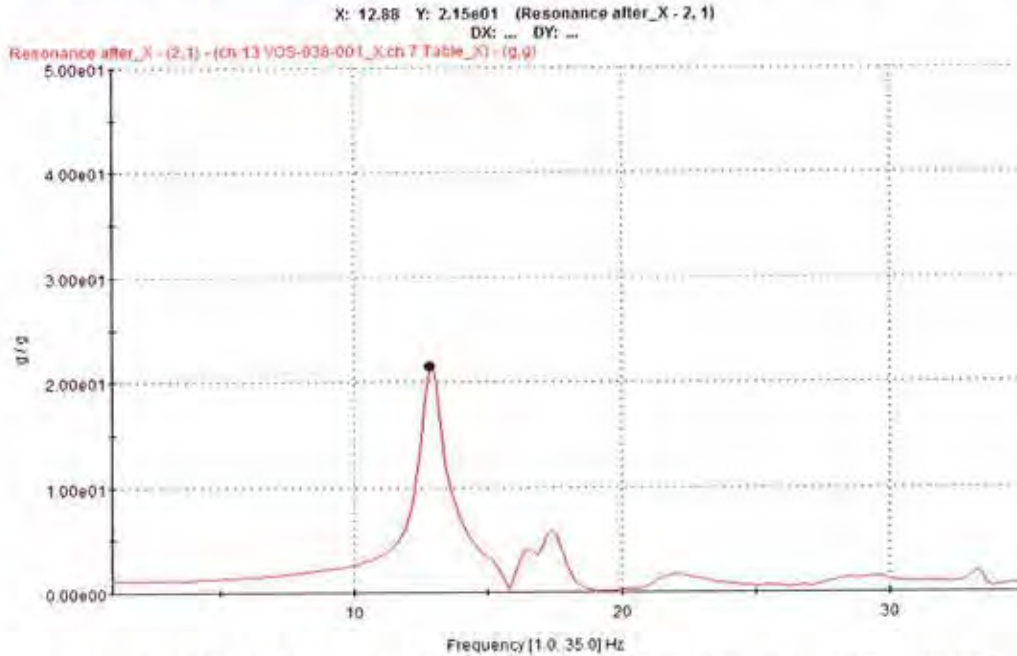
[Figure 1-2] X axis Resonance Search Test after Excitation Test - Fixture



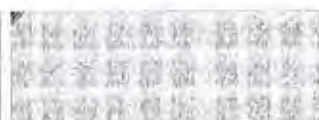




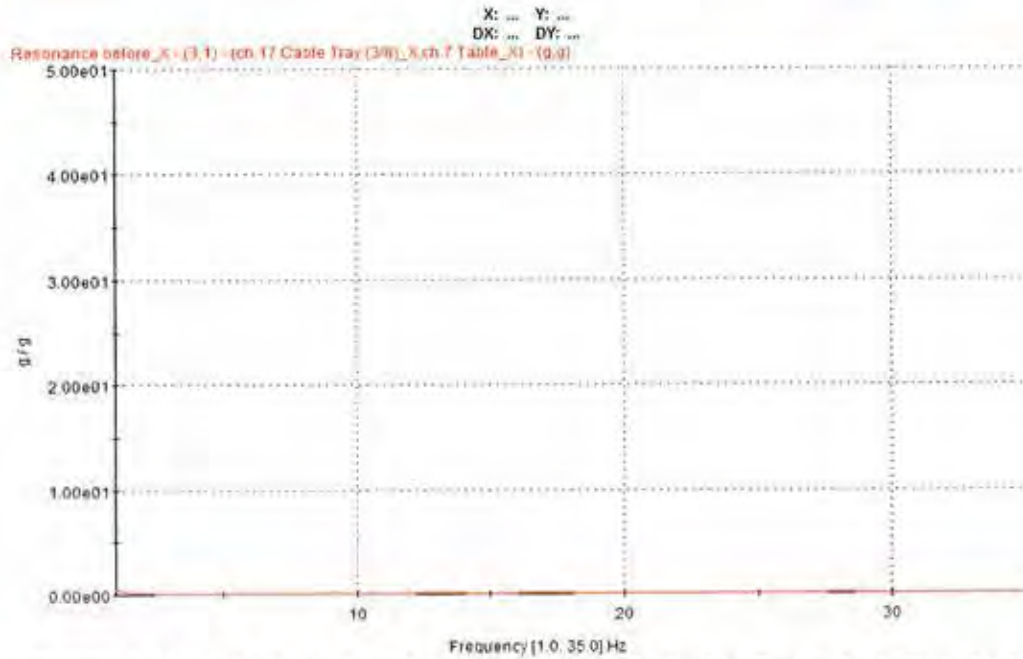
[Figure 1-3] X axis Resonance Search Test before Excitation Test - VOS-038-001



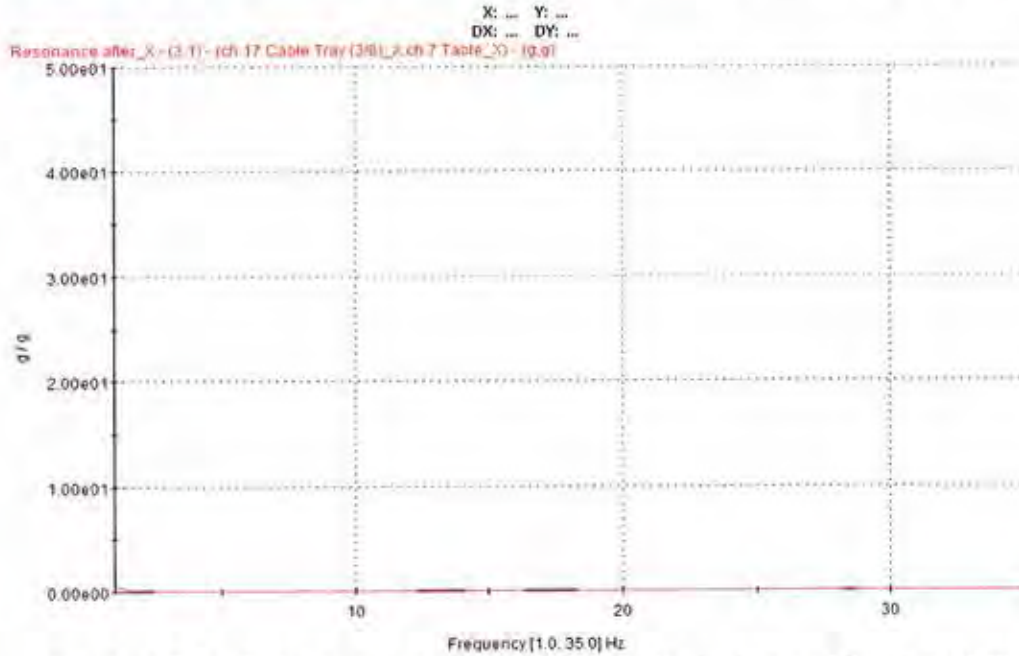
[Figure 1-4] X axis Resonance Search Test after Excitation Test - VOS-038-001





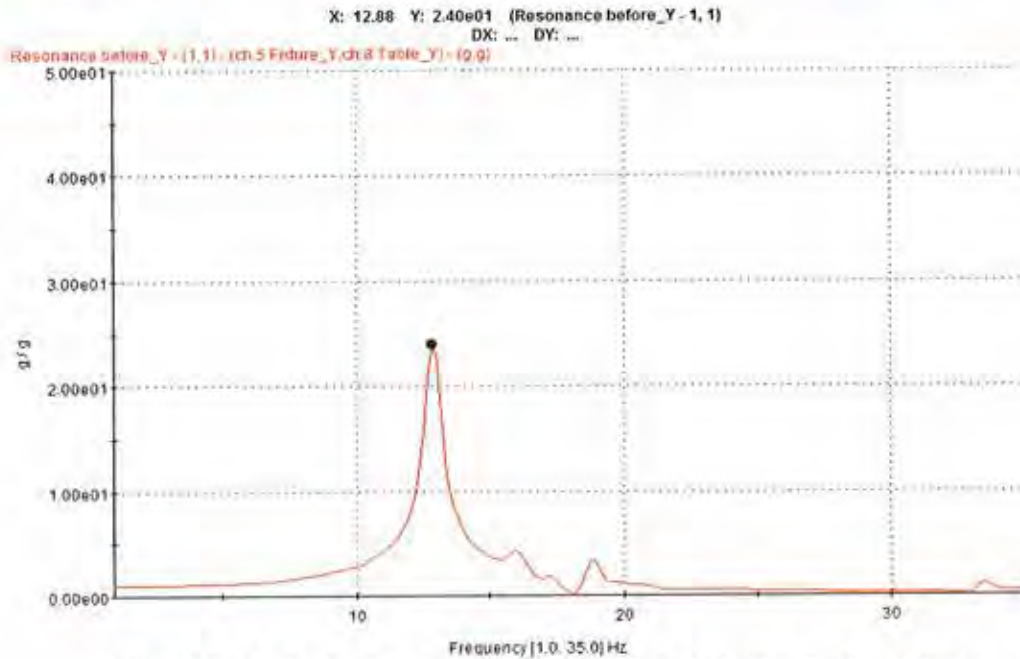


[Figure 1-5] X axis Resonance Search Test before Excitation Test – Cable Tray (1/2)

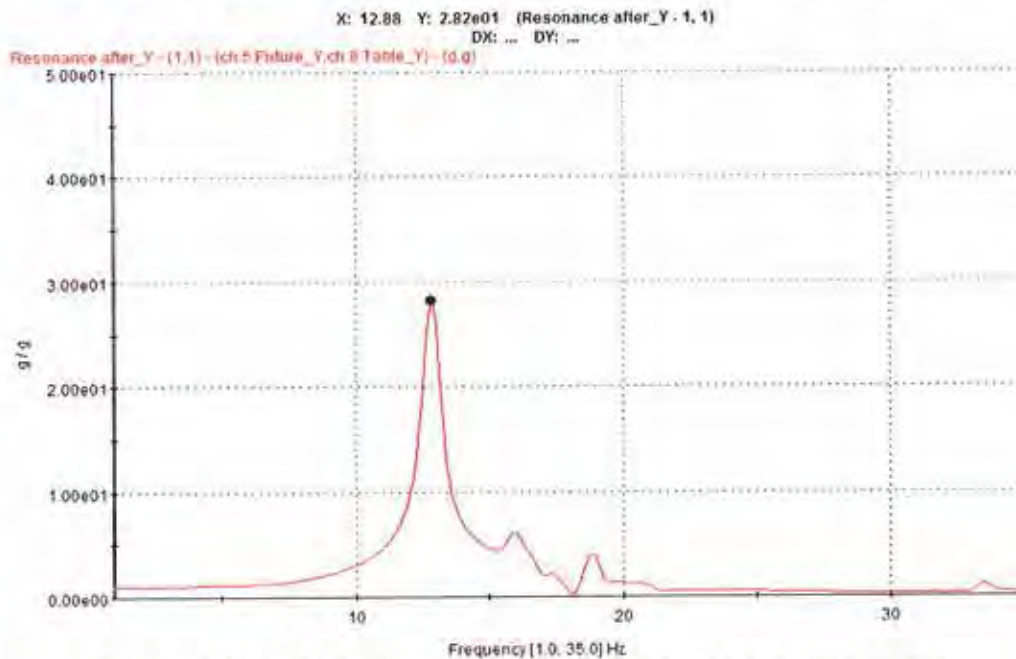


[Figure 1-6] X axis Resonance Search Test after Excitation Test – Cable Tray (1/2)



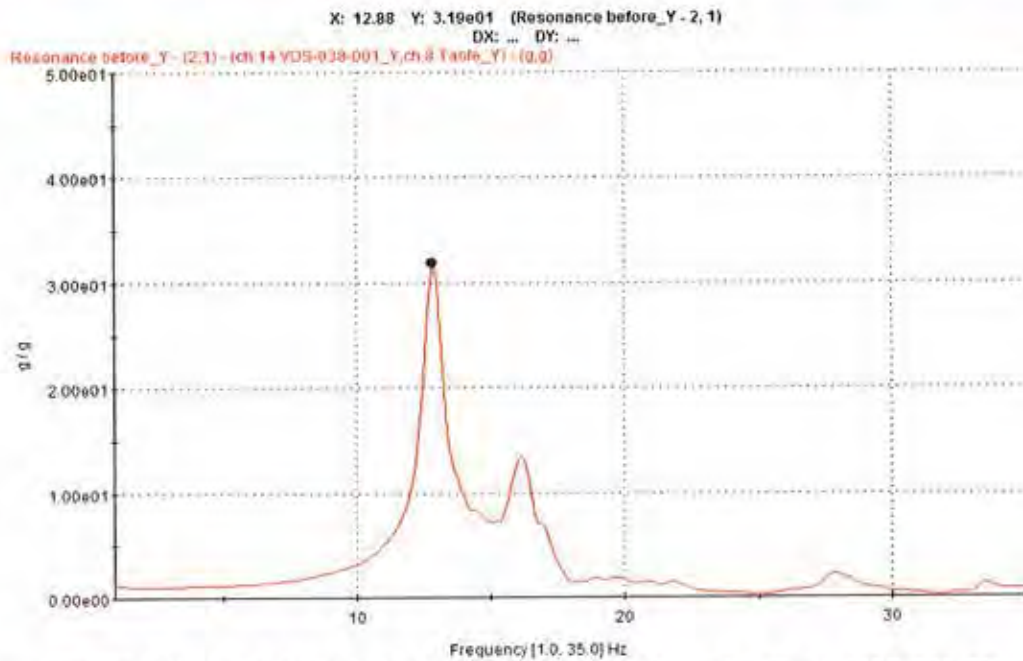


[Figure 1-7] Y axis Resonance Search Test before Excitation Test - Fixture

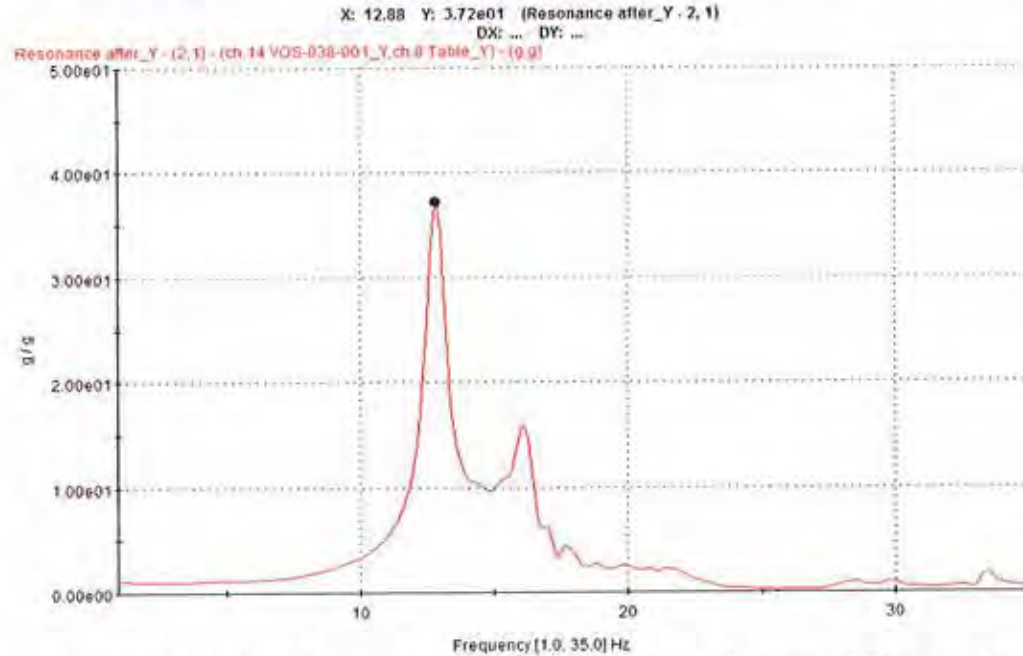


[Figure 1-8] Y axis Resonance Search Test after Excitation Test - Fixture





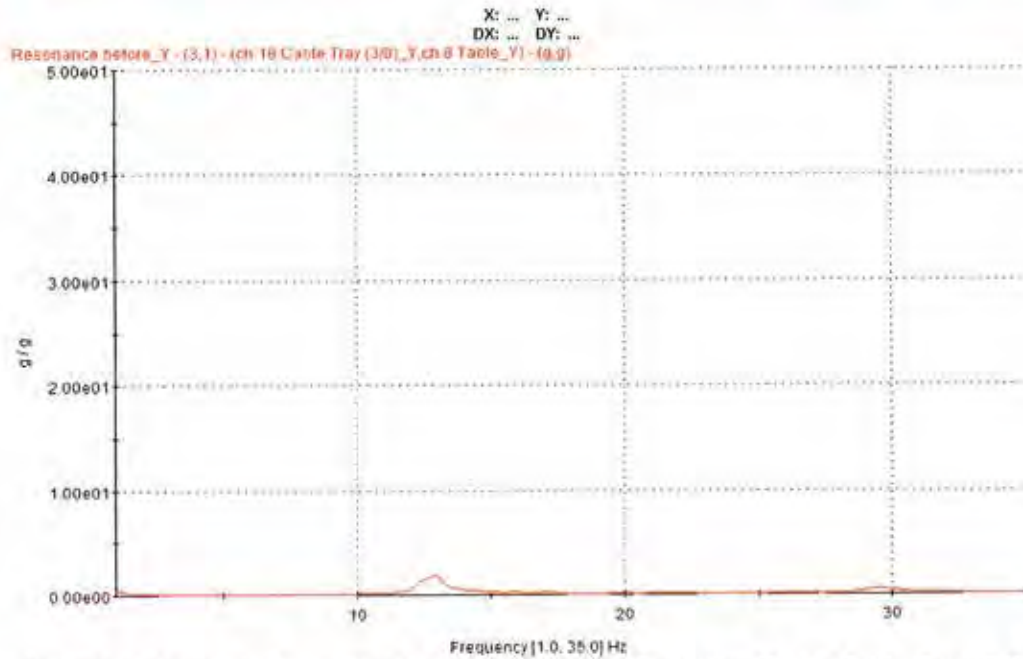
[Figure 1-9] Y axis Resonance Search Test before Excitation Test - VOS-038-001



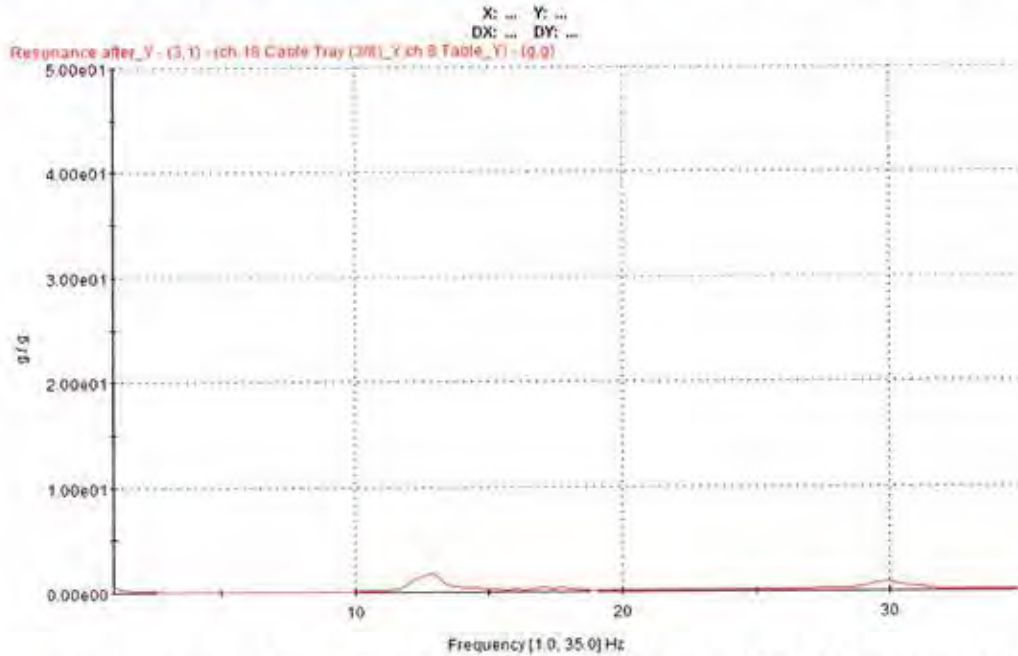
[Figure 1-10] Y axis Resonance Search Test after Excitation Test - VOS-038-001





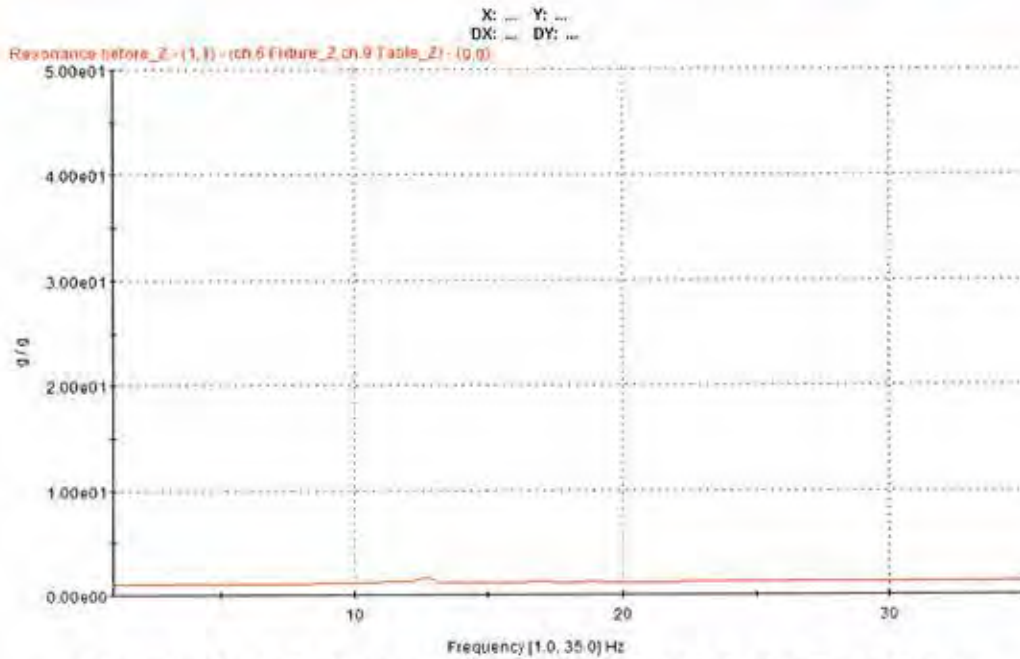


[Figure 1-11] Y axis Resonance Search Test before Excitation Test – Cable Tray (1/2)

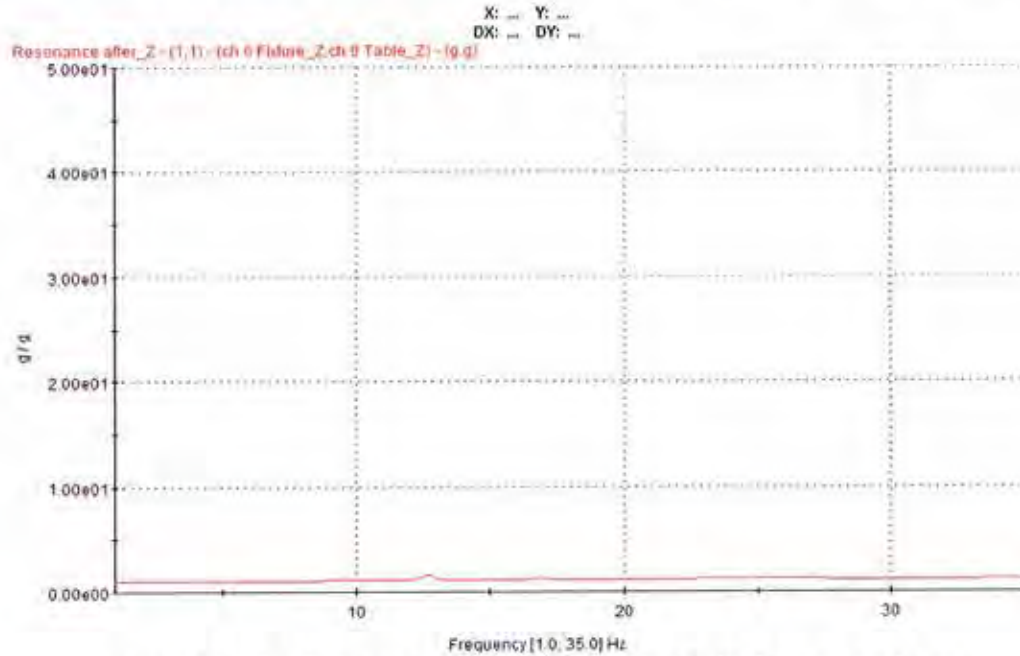


[Figure 1-12] Y axis Resonance Search Test after Excitation Test – Cable Tray (1/2)



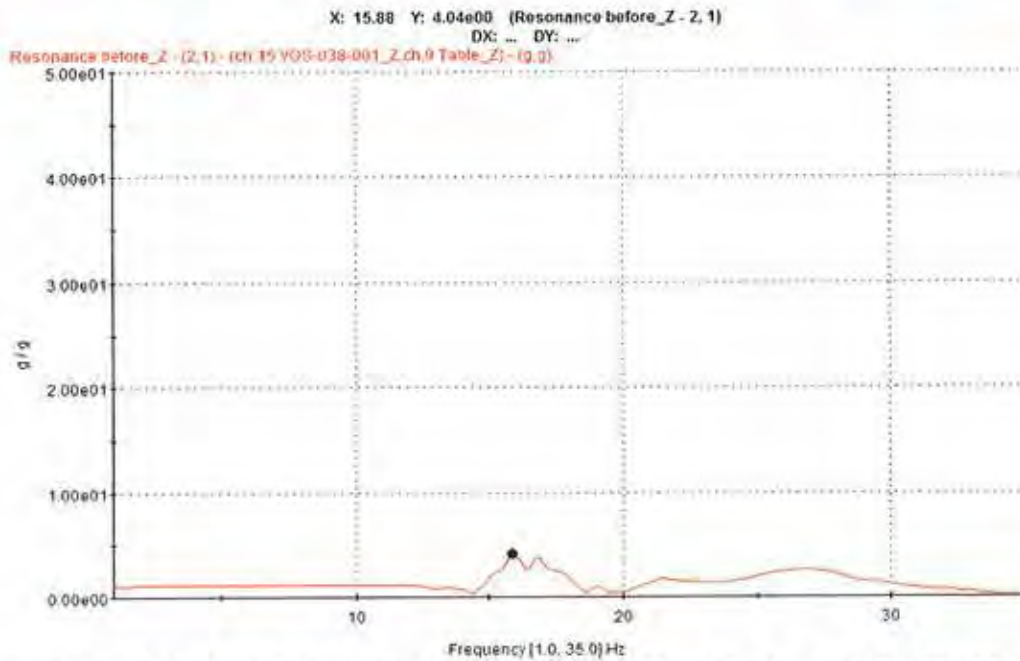


[Figure 1-13] Z axis Resonance Search Test before Excitation Test – Fixture

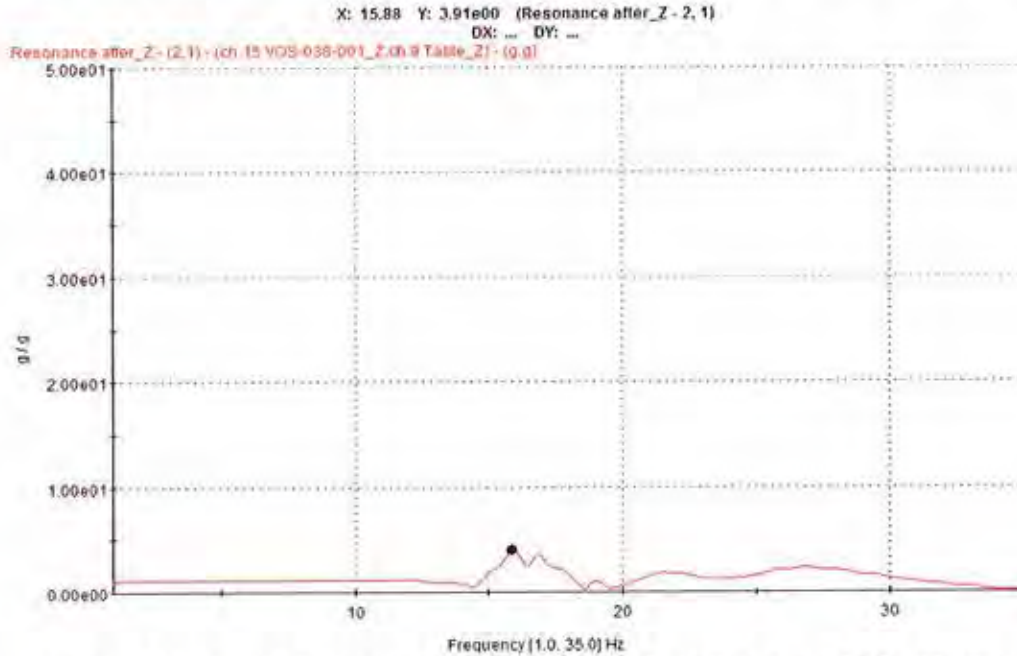


[Figure 1-14] Z axis Resonance Search Test after Excitation Test – Fixture





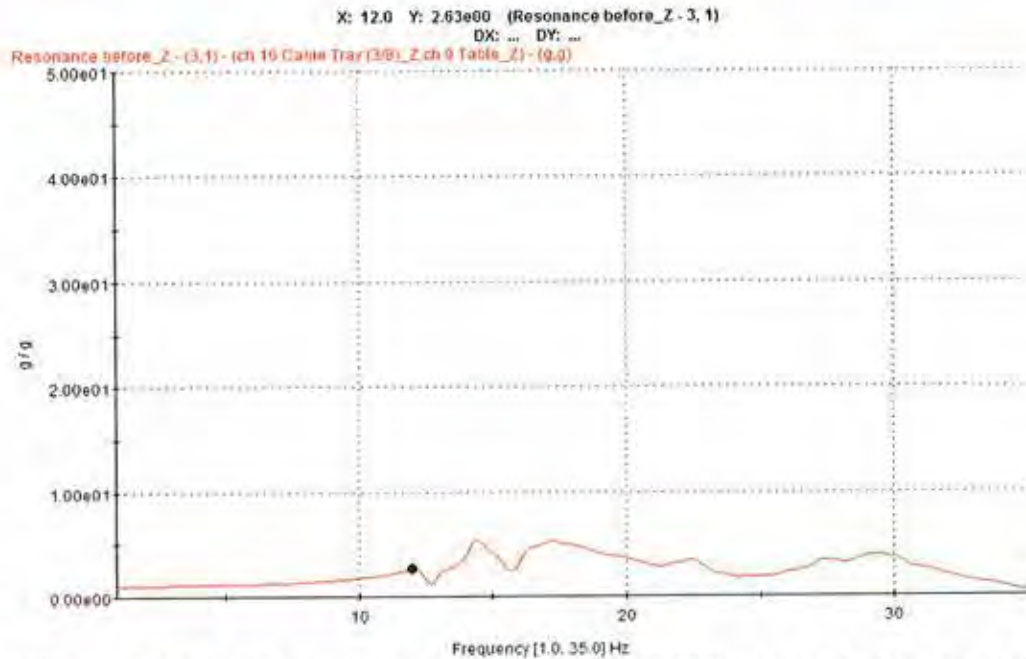
[Figure 1-15] Z axis Resonance Search Test before Excitation Test – VOS-038-001



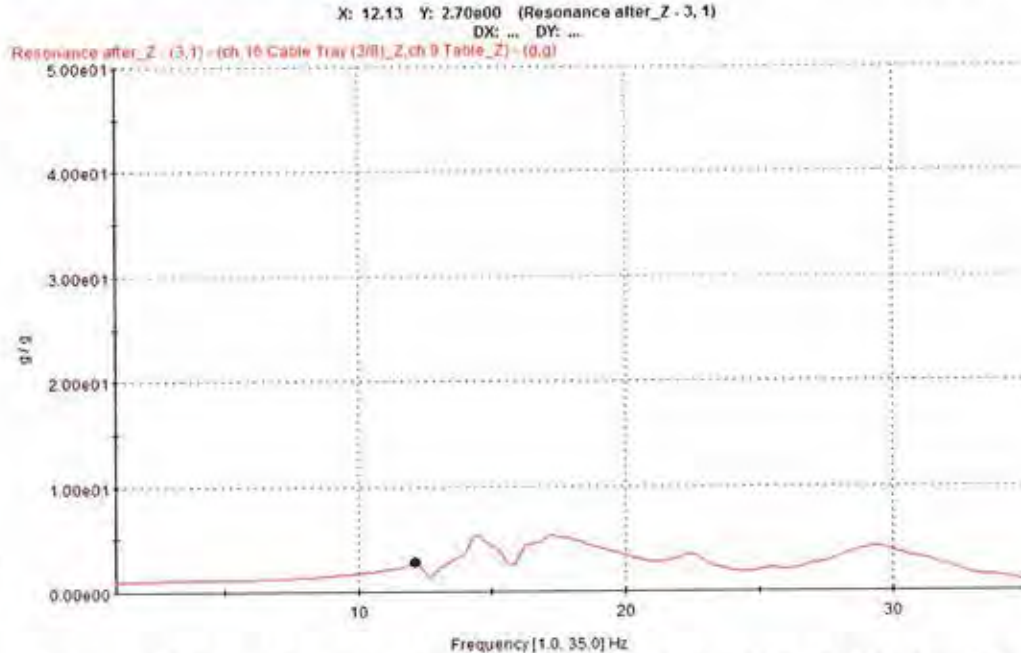
[Figure 1-16] Z axis Resonance Search Test after Excitation Test – VOS-038-001







[Figure 1-17] Z axis Resonance Search Test before Excitation Test – Cable Tray (1/2)



[Figure 1-18] Z axis Resonance Search Test after Excitation Test – Cable Tray (1/2)



※ Attachment 2

Excitation Test Data

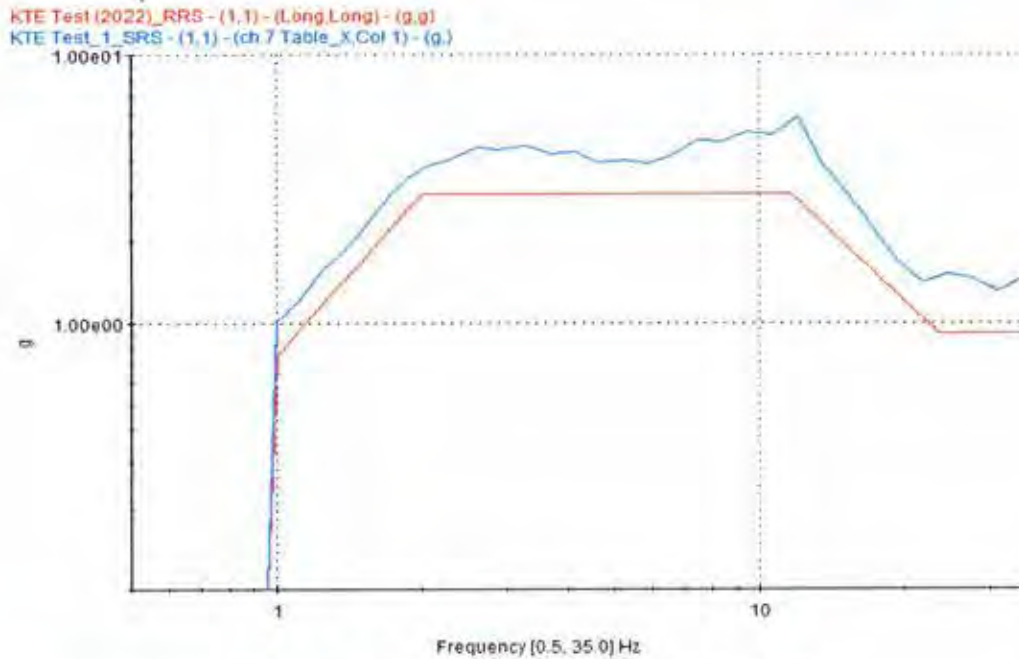


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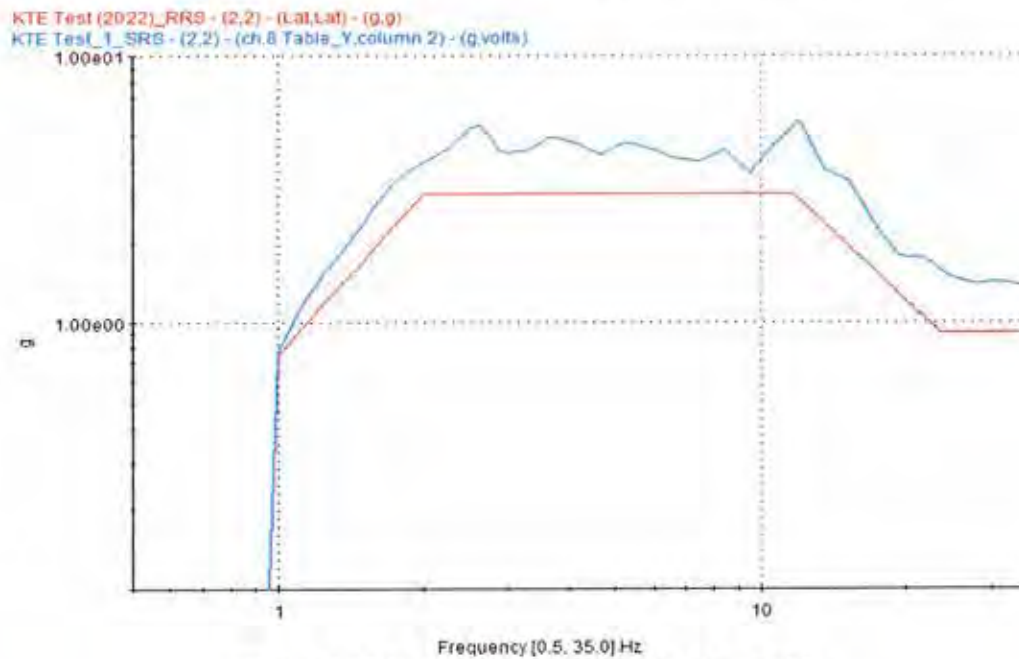
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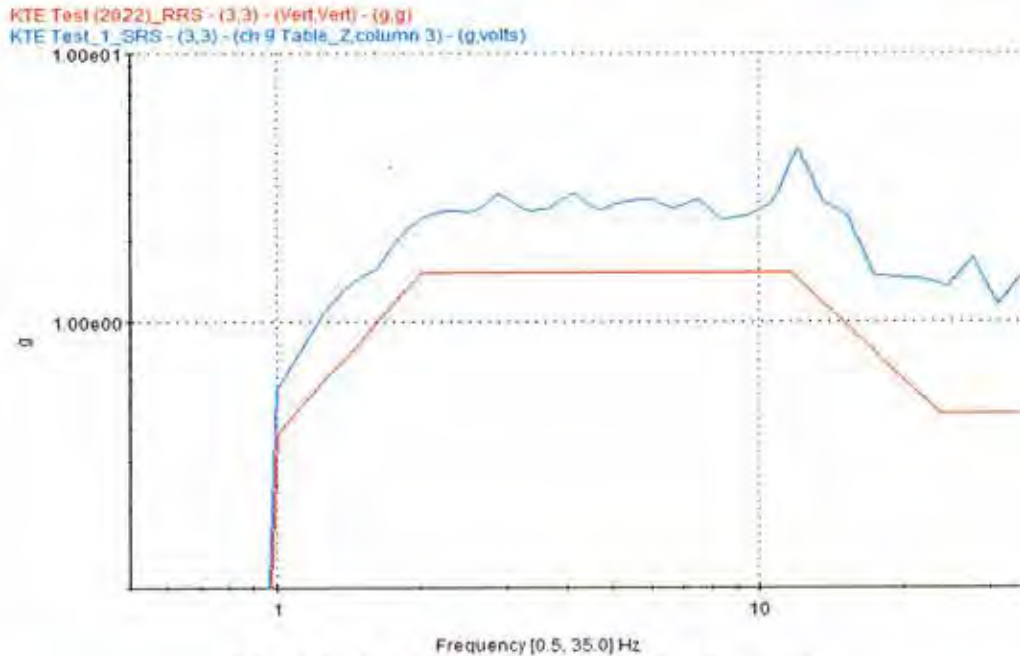


[Figure 2-1] 1st Excitation Test X axis TRS - Table

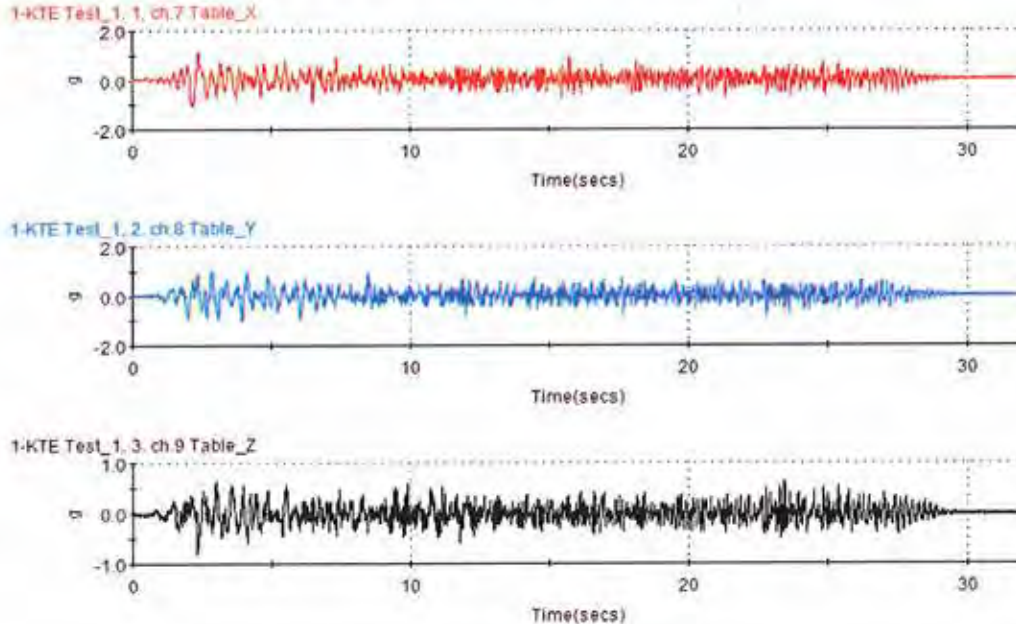


[Figure 2-2] 1st Excitation Test Y axis TRS - Table





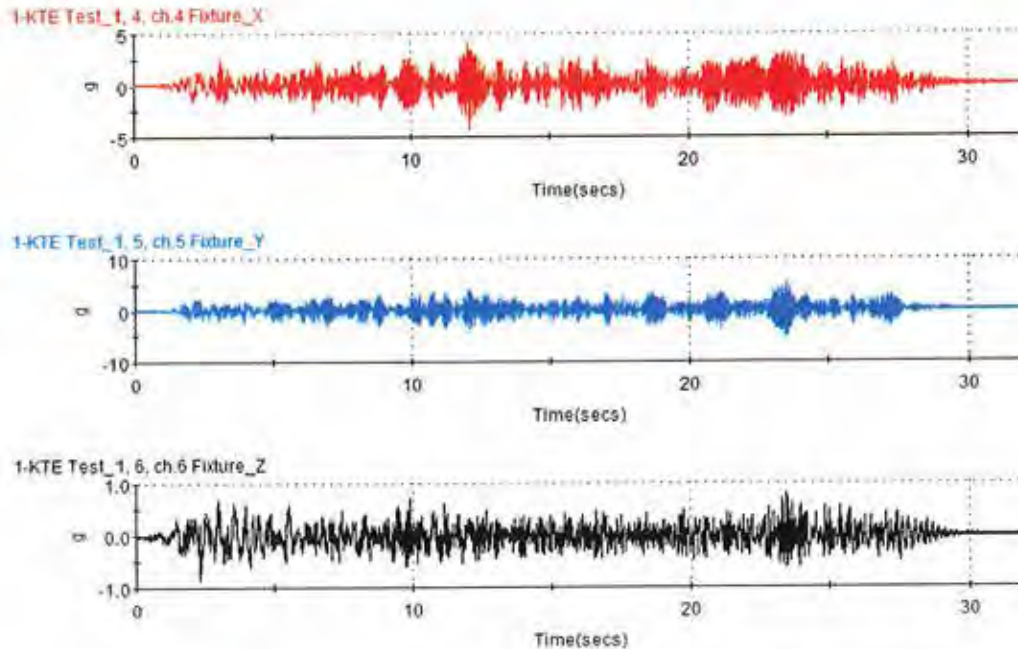
[Figure 2-3] 1st Excitation Test Z axis TRS - Table



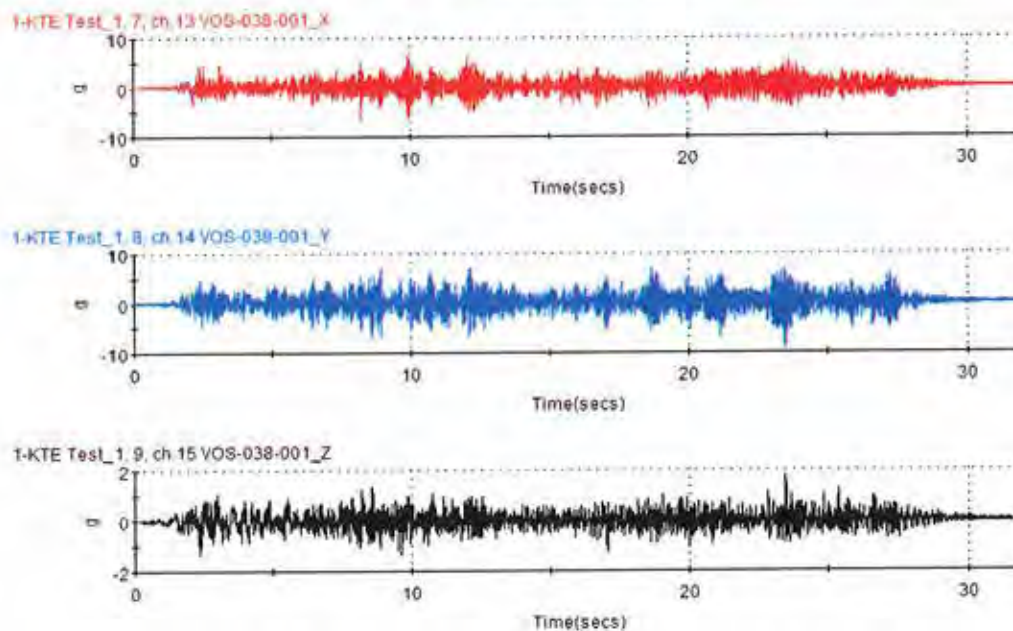
[Figure 2-4] 1st Excitation Test Time-history - Table







[Figure 2-5] 1st Excitation Test Time-history – Fixture

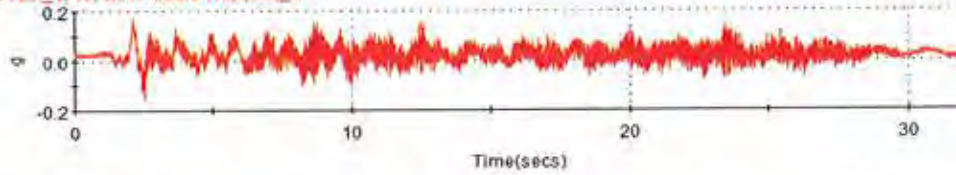


[Figure 2-6] 1st Excitation Test Time-history – VOS-038-001

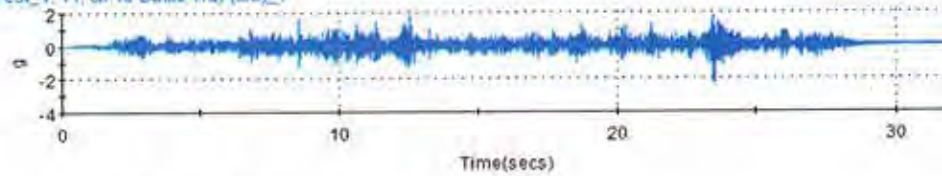




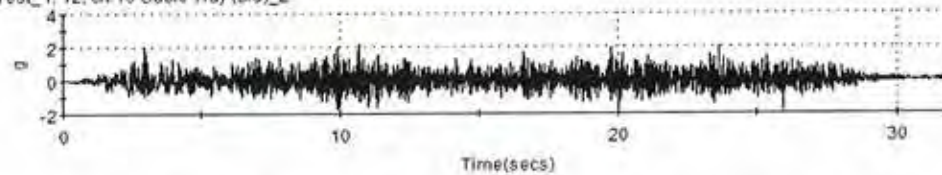
1-KTE Test\_1\_10, ch.17 Cable Tray (3/8)\_X



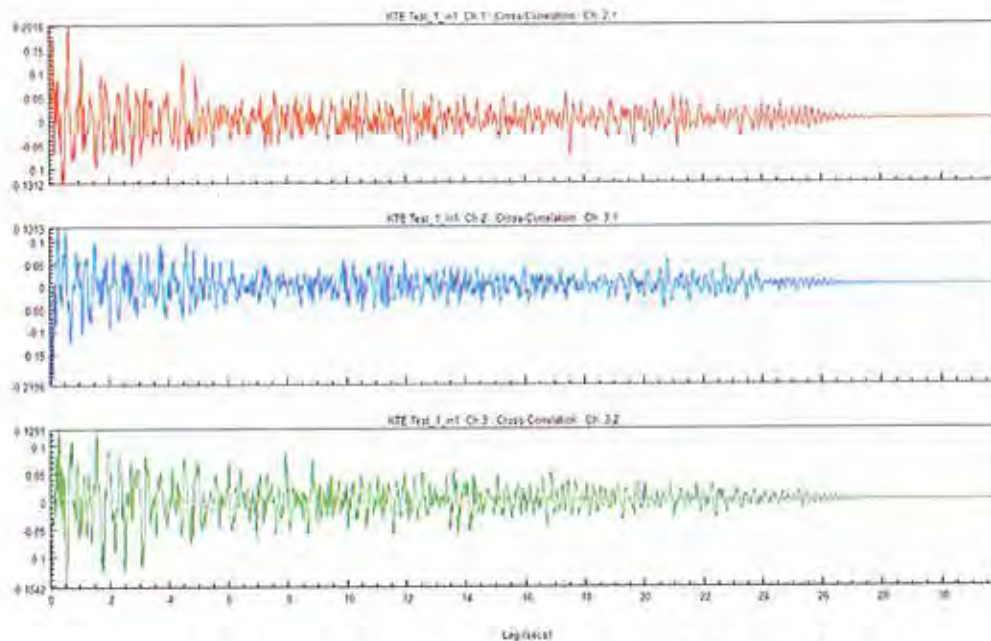
1-KTE Test\_1\_11, ch.18 Cable Tray (3/8)\_Y



1-KTE Test\_1\_12, ch.16 Cable Tray (3/8)\_Z

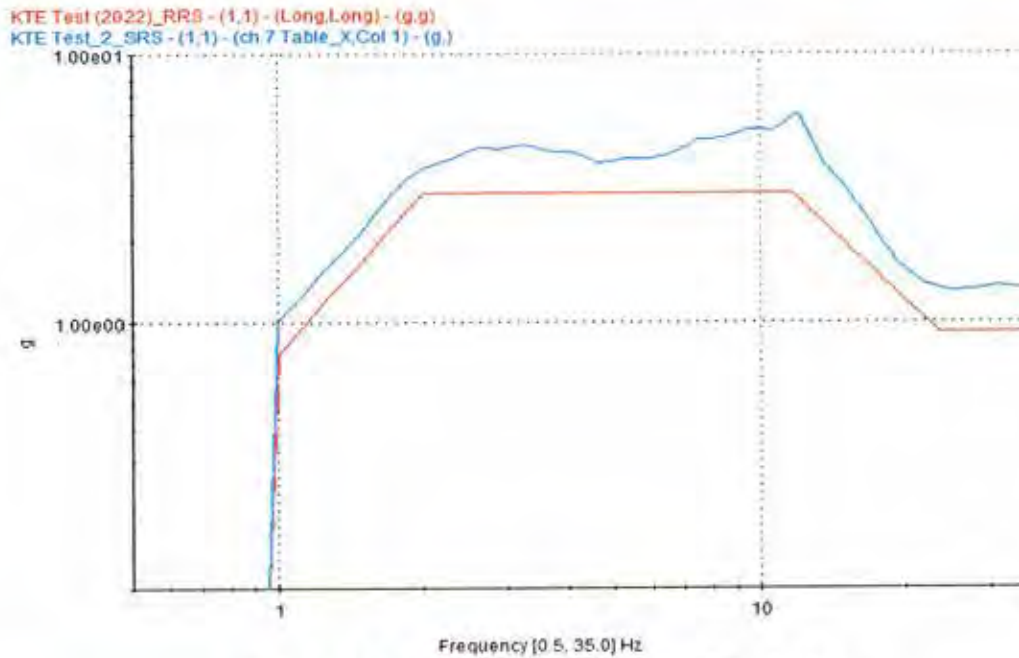


[Figure 2-7] 1st Excitation Test Time-history – Cable Tray (1/2)

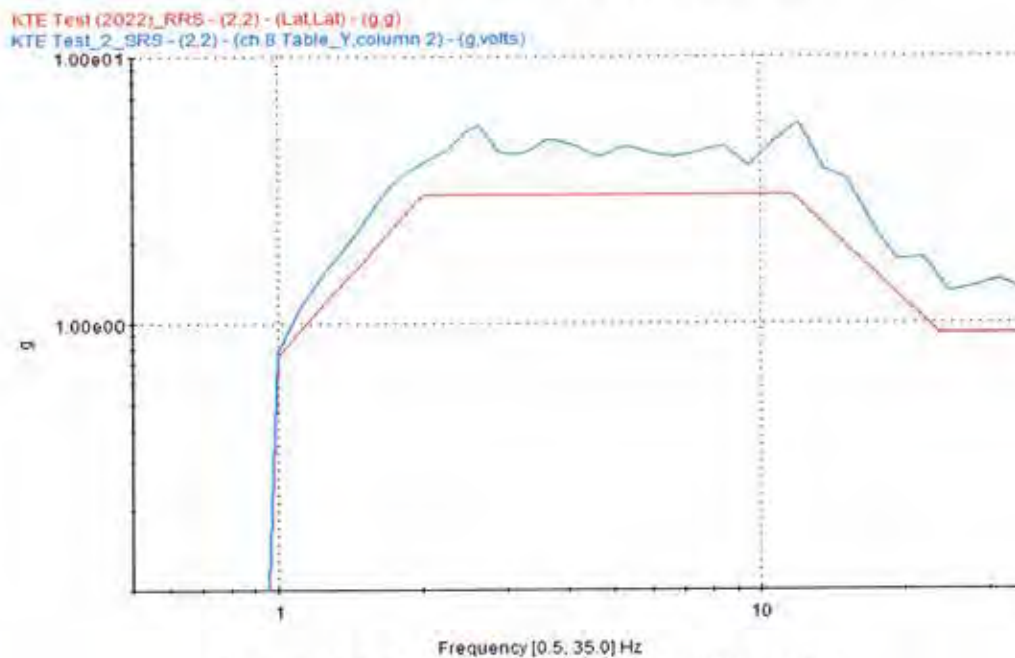


[Figure 2-8] 1st Excitation Test Cross-correlation – Table





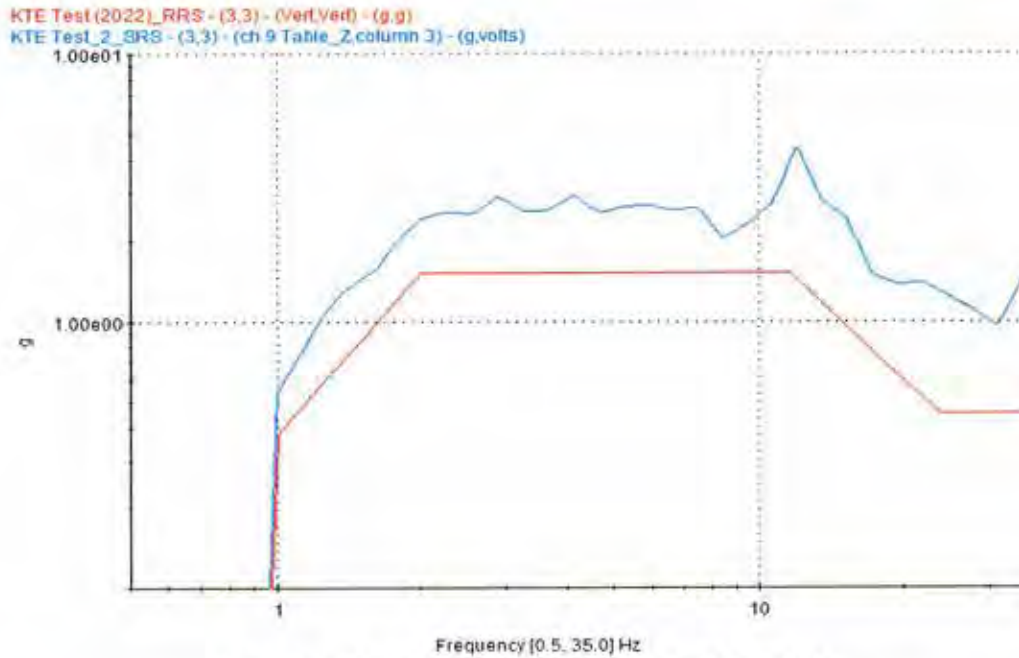
[Figure 2-9] 2nd Excitation Test X axis TRS – Table



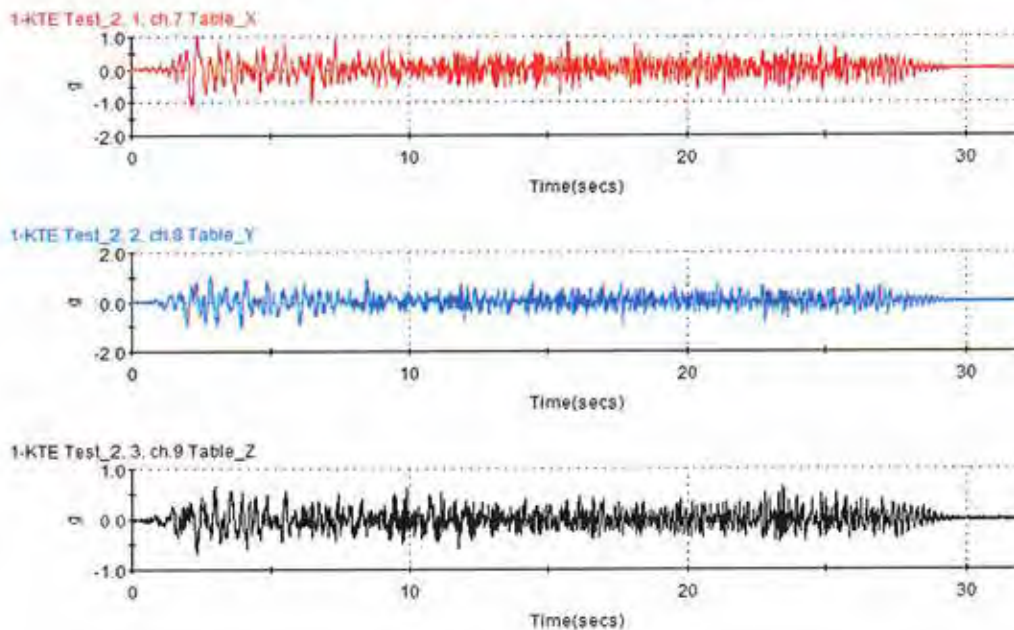
[Figure 2-10] 2nd Excitation Test Y axis TRS – Table







[Figure 2-11] 2nd Excitation Test Z axis TRS - Table

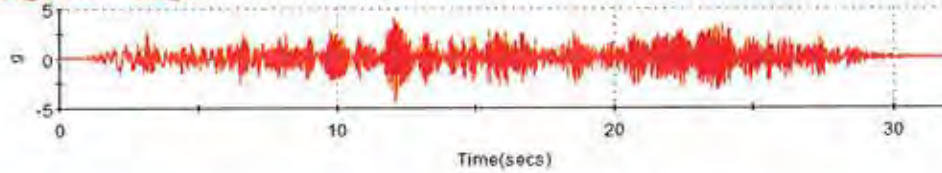


[Figure 2-12] 2nd Excitation Test Time-history - Table

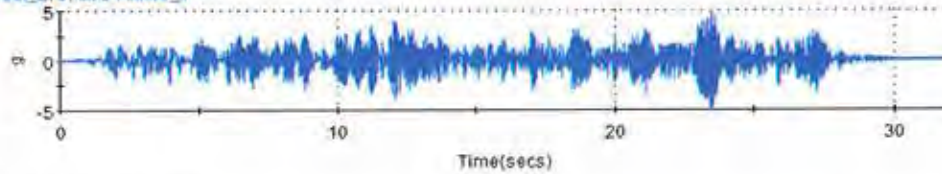




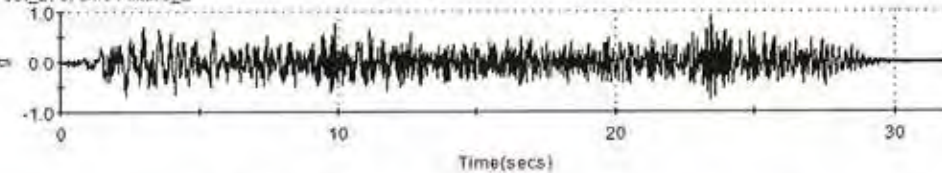
1-KTE Test\_2\_4, ch.4 Fixture\_X



1-KTE Test\_2\_5, ch.5 Fixture\_Y

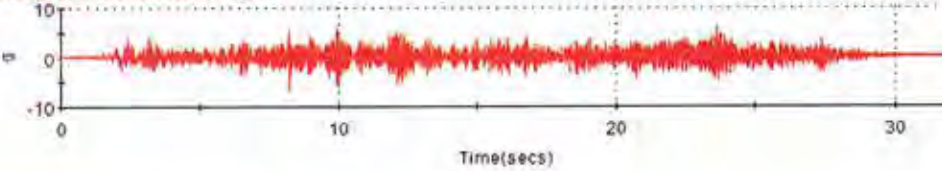


1-KTE Test\_2\_6, ch.6 Fixture\_Z

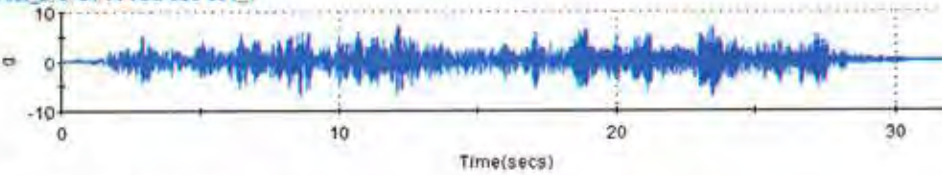


[Figure 2-13] 2nd Excitation Test Time-history – Fixture

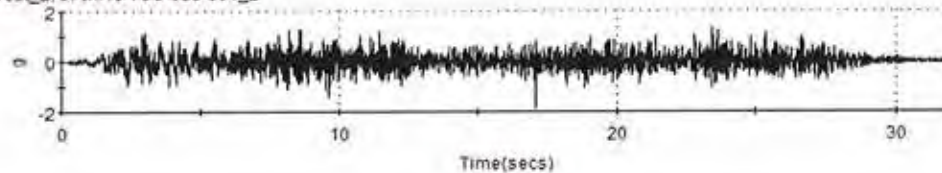
1-KTE Test\_2\_7, ch.13 VOS-038-001\_X



1-KTE Test\_2\_8, ch.14 VOS-038-001\_Y

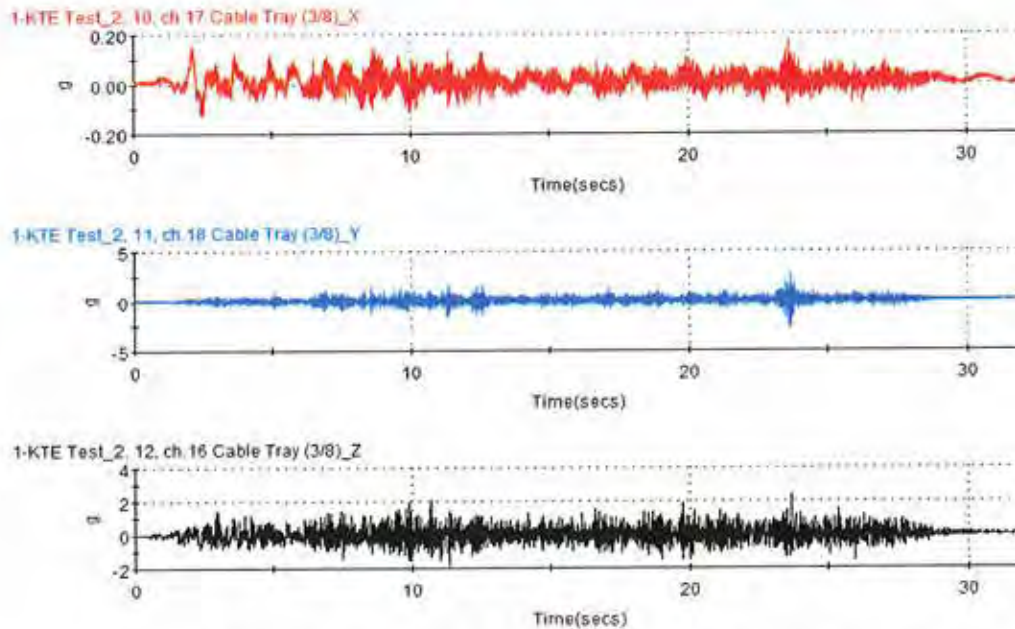


1-KTE Test\_2\_9, ch.15 VOS-038-001\_Z

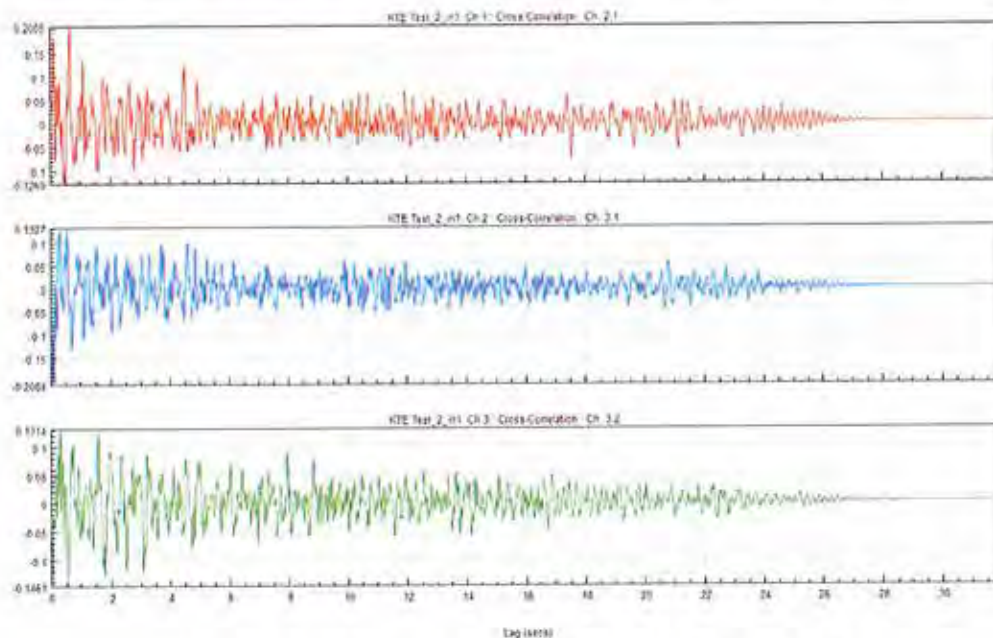


[Figure 2-14] 2nd Excitation Test Time-history – VOS-038-001





[Figure 2-15] 2nd Excitation Test Time-history – Cable Tray (1/2)



[Figure 2-16] 2nd Excitation Test Cross-correlation – Table





※ Attachment 3

Summary of Seismic Test Result





## 방송통신설비의 내진 시험결과 요약서

시험 책임자 : 이 정 근

|                |                                                      |              |    |
|----------------|------------------------------------------------------|--------------|----|
| 1. 시험대상설비명     |                                                      | 대진 서포드 빌딩    |    |
| 2. 의뢰자         |                                                      | 충식회사 비튼즈     |    |
| 3. 시험기간        |                                                      | 2025. 09. 05 |    |
| 4. 시험결과        |                                                      |              |    |
| 항 목            |                                                      | 이상여부         | 비고 |
| 기능<br>확인       | 통신설비 신호전송상태                                          | -            |    |
|                | 전원설비 전원공급상태                                          | -            |    |
| 구조<br>성능<br>확인 | 시험대상설비 상단의 단방향 최대 변위폭(<75 mm)                        | -            |    |
|                | 시험대상설비의 전폭 또는 정도                                     | 이상 없음        |    |
|                | 시험대상설비의 바닥 고정부 이탈                                    | 이상 없음        |    |
|                | 설치된 구성품의 이탈                                          | 이상 없음        |    |
|                | 시험대상설비의 프레임 변형 또는 파손                                 | 이상 없음        |    |
|                | 이중미루구조물 자체의 결합부분이 이탈되거나, 천동대 고정부분 이탈                 | -            |    |
|                | 앵커링, 볼트 등의 고정장치 자체의 균열, 변형 및 절단                      | 이상 없음        |    |
|                | 기타 육안으로 확인이 가능한 변형이나 파손                              | 이상 없음        |    |
| 옥외<br>설비<br>확인 | (장기복구수준) 옥외설비의 부분적 손상 여부 및 일정 기간 내 복구 대책 마련 여부       | -            |    |
|                | (붕괴방지수준) 옥외설비의 붕괴방지 설계여부, 내부 통신설비 및 선로가 있는 경우 안전성 확인 | -            |    |
| 5. 판정결과        |                                                      | 이상 없음        |    |



※ Attachment 4

Test Photo



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[Figure 4-1] Excitation Test Set up #1



[Figure 4-2] Excitation Test Set up #2







[Figure 4-3] Excitation Test Set up #3

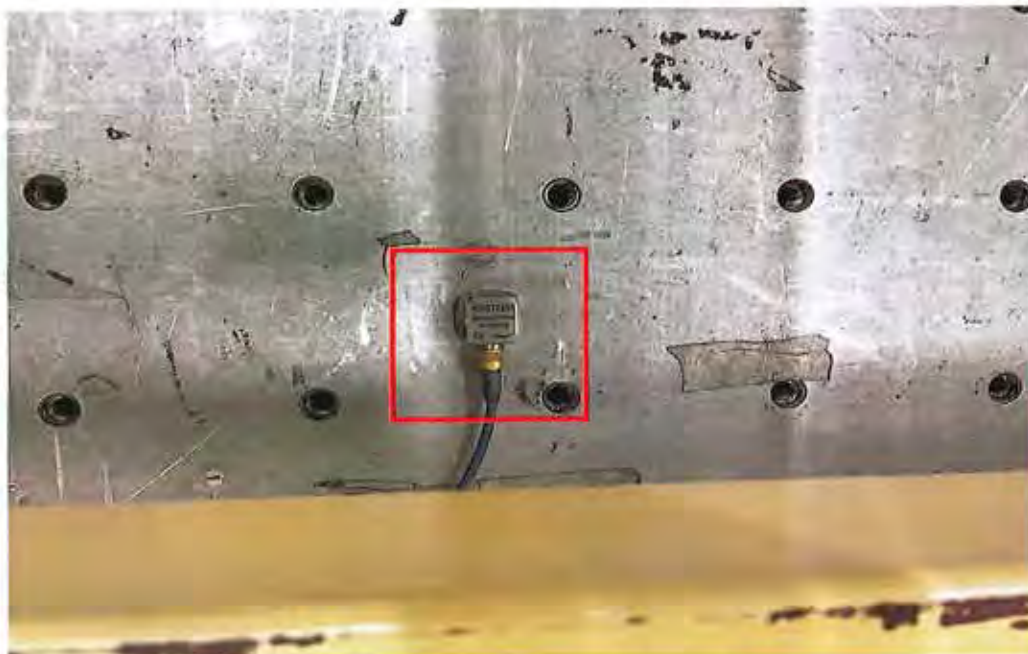


[Figure 4-4] Test Specimen - VOS-038-001 #1





[Figure 4-5] Test Specimen – VOS-038-001 #2



[Figure 4-6] Accelerometer Set up – Table







[Figure 4-7] Accelerometer Set up – Fixture



[Figure 4-8] Accelerometer Set up – VOS-038-001





[Figure 4-9] Accelerometer Set up – Cable Tray (1/2)

- The end -

