# 3G Response of Structures to Containment Loads

## 3G.1 Scope

This appendix specifies the design for safety-related structures, systems, and components as applicable due to dynamic excitations originating in the primary containment in the event of operational transients and LOCA. The input containment loads are described in Appendix 3B. The containment loads considered for structural dynamic response analysis are Condensation Oscillation (CO), Pool Chugging (CH), Horizontal Vent Chugging (HV), Safety/Relief Valve discharge (SRV), and Annulus Pressurization (AP).

## 3G.2 Dynamic Response

### 3G.2.1 Classification Of Analytical Procedure

Analytical procedure of hydrodynamic loads is classified into following three groups:

- Pipe nozzle break loads
- Symmetric loads
- Asymmetric loads

### 3G.2.2 Analysis Models

(1) Analysis Model

The structural models used in the analyses represent a synthesis of the reactor building model and the RPV & Internals model. The beam model used in the pipe break load analysis is illustrated in Figure 3G-1. The analysis model of the building structure is illustrated in Figure 3G-2 which is coupled with the RPV model shown in Figure 3G-3 for symmetric load cases and with the RPV model shown in Figure 3G-1 for asymmetric load cases.

(2) Structural Damping

Regulatory Guide 1.61 damping values were used for SRV and LOCA loads.

### 3G.2.3 Load Application

(1) Pipe Break Nozzle Load

The AP pressures were converted to horizontal forces according to the following formula.

For RSW side:

$$Fj(t) = 2\sum_{i=1}^{8} Pij(t) \int_{\theta=ai}^{\theta=bi} R\cos(\theta)d\theta \qquad (3G\text{-}1)$$

For RPV side:

$$Fj(t) = -2\sum_{i=1}^{8} Pij(t) \int_{\theta=ai}^{\theta=bi} r\cos(\theta)d\theta \qquad (3G\text{-}2)$$

Fj(t) = Force per unit height each level

Pij(t) = Pressure each level and angle

i = Cell No.

j = Level No.

R = RSW Inner Radius

r = RPV Outer Radius

l = Angle (180°)

Jet reaction, jet impingement, and pipe whip reaction forces were considered as steady state loads whose rise time for initial pulse was set as one millisecond.

(2) SRV Load

Symmetric SRV (all) response analysis is covered by n=0 harmonic. Asymmetric case of SRV (all) actuation is covered by n=1 harmonic that corresponds to overturning moment. SRV (1) is also in this category. The SRV air bubble frequencies are expected to be within a range of 5 to 12 Hz. Ways of selecting minimum number of bubble frequencies for dynamic analysis are as follows.

Frequency range of SRV Loads: $f_1 \leq f \leq f_2$ ($f_1$ = 5 Hz, $f_2$ = 12 Hz)

For vertical structural frequencies (n=0):

(a) If $(f_s)_v > f_2$ then use $f_2$

(b) If $f_1 < (f_s)_v < f_2$ then use $(f_s)_v$

For horizontal structural frequencies (n=1):

(a) If $(f_s)_h < f_1$ then use $f_1$

(b) If $f_1 < (f_s)_h < f_2$ then use $(f_s)_h$

(c) If $f_2 < (f_s)_h$ then use $f_2$

In symmetric load case, 12 Hz was adopted as bubble frequency, because the vertical frequencies of the structure were higher than 12 Hz. In asymmetric load case, 3 horizontal beam frequencies of the structure within the above range 7.73 Hz, 9.59 Hz, and 11.58 Hz were adopted as bubble frequencies.

(3) HV Load

Both symmetric and non-symmetric upward loads on pedestal due to chugging in the top horizontal vents was considered.

(4) Chugging, Condensation Oscillation Loads

According to the study of the natural frequencies of the structure and the frequencies of the input motion, 4 critical pressure time histories out of 8 for CH and 2 out of 4 for CO, were selected for dynamic analysis. Furthermore, 1 local spike load was added in CO response study.

### 3G.2.4 Analysis Method

(1) Pipe Nozzle Break Load Analysis

For pipe nozzle break cases, multi-input excitation time history analyses were performed by using mode superposition method. Strain energy damping was used for this analyses.

(2) Symmetric Load Analysis

For symmetric load cases, frequency response method for n=0 harmonic was used. Hysteresis damping was considered.

(3) Asymmetric Load Analysis

For asymmetric load cases, frequency response method for n=1 harmonic was used. Hysteresis damping was considered.

(4) Analysis Parameters

The analysis parameters in terms of time/frequency steps in analysis are shown in Table 3G-1.

## 3G.3 Hydrodynamic Load Analysis Results

The acceleration response spectra at a few selected locations for each loading event are presented in Figures 3G-4 through 3G-108. The maximum displacements and accelerations at a few selected locations for each loading event are presented Tables 3G-2 through 3G-5.

The input excitation of suppression pool boundary horizontal loads (SRV, Chugging, and HV) was considered unidirectional which can be set at any direction in the horizontal plane, and the AP analysis was performed assuming that pipe break can be associated with any one of the vessel nozzles for each of the postulated line breaks.

The resulting response of structures considered in the analyses is thus unidirectional applicable to any azimuth angle for suppression pool loads and to the horizontal direction corresponding to the break direction for AP loads.

For subsystem analyses using floor response spectra and, if applicable, building displacement data, the input direction of the horizontal load shall be selected to result in worst subsystem response.

As an alternate approach, the horizontal input to subsystem may be taken to be the same in the two orthogonal horizontal directions.

The SRV (one) loads can be obtained by multiplying the SRV (all) loads by 0.4 and 0.3 in the horizontal and vertical directions respectively.

## Table 3G-1 Analysis Parameters in Terms of Time/Frequency Steps

| Load | Analysis Case | Domain Time/ Freq. | Input Time Pitch $\Delta t$ (s) | Given Time Step $n_1$ | Given Duration Time $t_1(=n_1 \cdot \Delta t)$ (s) | Trailing Zero Step $n_2$ | Analysis Time Step $N(=n_1+n_2)$ | Analysis Duration Time $T(=N\Delta t)$ (s) | Frequency Resolution 1/T (Hz) | Transfer Function Interpolation Method | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Interval | Method |
| **Pipe Break** | | | | | | | | | | | |
| | Definition of AP | Time | $1.0 \times 10^{-3}$ | 2000 | 2.0 | — | — | — | — | — | — |
| | Definition of $F_1$ ~ F4 | Time | $1.0 \times 10^{-3}$ | 2000 | 2.0 | — | — | — | — | — | — |
| | A P A 1, A P A 2<br>A P B 1, A P B 2<br>A P C 1, A P C 2 | Time | $1.0 \times 10^{-3}$ | 2000 | 2.0 | — | 2000 | 2.0 | — | — | — |
| **SRV** | | | | | | | | | | | |
| | Definition | Freq. | $5 \times 10^{-3}$ | 150 | 0.75 | — | — | — | — | — | — |
| | SRVV | Freq. | $3.333 \times 10^{-3}$ | 150 | 0.50 | 1898 | 2048 | 6.83 | 0.14649 | Every Step | — |
| | SRVH1 | Freq. | $4.170 \times 10^{-3}$ | 150 | 0.625 | 1898 | 2048 | 8.54 | 0.11710 | Every 2 Step | Reciprocal |
| | SRVH2 | Freq. | $3.454 \times 10^{-3}$ | 150 | 0.518 | 1898 | 2048 | 7.074 | 0.14136 | Every Step | — |
| | SRVH3 | Freq. | $5.175 \times 10^{-3}$ | 150 | 0.776 | 1898 | 2048 | 10.598 | 0.09436 | Every 2 Step | Reciprocal |
| **HV** | | | | | | | | | | | |
| | Definition | Freq. | $1 \times 10^{-3}$ | 2 | 0.002 | — | — | — | — | — | — |
| | HVV | Freq. | $1 \times 10^{-3}$ | 2 | 0.002 | 4094 | 4096 | 4.096 | 0.24414 | Every Step | — |
| | HVH | Freq. | $1 \times 10^{-3}$ | 2 | 0.002 | 4094 | 4096 | 4.096 | 0.24414 | Every Step | — |

## Table 3G-1 Analysis Parameters in Terms of Time/Frequency Steps (Continued)

| Load | Analysis Case | Domain Time/ Freq. | Input Time Pitch Δt (s) | Given Time Step $n_1$ | Given Duration Time $t_1(=n_1 \cdot \Delta t)$ (s) | Trailing Zero Step $n_2$ | Analysis Time Step $N(=n_1+n_2)$ | Analysis Duration Time $T(=N\Delta t)$ (s) | Frequency Resolution 1/T (Hz) | Transfer Function Interpolation Method: Interval | Transfer Function Interpolation Method: Method |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **CH** | | | | | | | | | | | |
| | Definition | Freq. | $1x10^{-3}$ | 1000 | 1.0 | — | — | — | — | — | — |
| | CHV1, CHH1<br>CHV2, CHH2<br>CHV3, CHH3<br>CHV4, CHH4 | Freq. | $1x10^{-3}$ | 1000 | 1.0 | 3096 | 4096 | 4.096 | 0.24414 | Every Step | — |
| **CO** | | | | | | | | | | | |
| | COV1 Definition | Freq. | $1x10^{-3}$ | 2000 | 2.0 | — | — | — | — | — | — |
| | COV3 Analysis | Freq. | $1x10^{-3}$ | 2000 | 2.0 | 2096 | 4096 | 4.096 | 0.24414 | Every Step | — |
| | COV2 Definition | Freq. | $1x10^{-3}$ | 3000 | 3.0 | — | — | — | — | — | — |
| | Analysis | Freq. | $1x10^{-3}$ | 3000 | 3.0 | 1096 | 4096 | 4.096 | 0.24414 | Every Step | — |

## Table 3G-2 Maximum Accelerations for AP Loadings (g)

| Location | Node | MSLB | FDW | RHR |
|---|---|---|---|---|
| Top of RPV | 28 | 1.246 | 0.616 | 1.015 |
| Top of Pedestal | 86 | 0.146 | 0.079 | 0.107 |
| Top of RSW | 80 | 4.84 | 0.729 | 1.045 |
| D/F Slab | 85 | 0.233 | 0.065 | 0.117 |

## Table 3G-3 Maximum Accelerations for Hydrodynamic Loads (g)

| Location | Direction | Node | SRV | HV | CH | CO |
|---|---|---|---|---|---|---|
| Top of RPV | Horizontal | 28 | 0.173 | 0.029 | 0.116 | |
| | Vertical | 1 | 0.273 | 0.002 | 0.057 | 0.517 |
| Top of Pedestal | Horizontal | 71 | 0.116 | 0.006 | 0.051 | |
| | Vertical | 42 | 0.216 | 0.003 | 0.020 | 0.217 |
| Top of RSW | Horizontal | 165 | 0.119 | 0.016 | 0.063 | |
| | Vertical | 165 | 0.220 | 0.008 | 0.065 | 0.475 |
| D/F Slab | Horizontal | 153 | 0.061 | 0.004 | 0.038 | |
| | Vertical | 157 | 0.147 | 0.002 | 0.031 | 0.303 |

## Table 3G-4 Maximum Displacements for AP Loadings (mm)

| Location | Node | MSLB | FDW | RHR |
|---|---|---|---|---|
| Top of RPV | 28 | 1.94 | 0.74 | 1.01 |
| Top of Pedestal | 86 | 0.11 | 0.04 | 0.06 |
| Top of RSW | 80 | 1.43 | 0.36 | 0.56 |
| D/F Slab | 85 | 0.15 | 0.05 | 0.07 |

## Table 3G-5 Maximum Displacements for Hydrodynamic Loads (mm)

| Location | Direction | Node | SRV | HV | CH | CO |
|---|---|---|---|---|---|---|
| Top of RPV | Horizontal | 28 | 0.110 | 0.013 | 0.029 | |
| | Vertical | 1 | 0.470 | 0.004 | 0.016 | 0.674 |
| Top of Pedestal | Horizontal | 71 | 0.069 | 0.003 | 0.012 | |
| | Vertical | 42 | 0.420 | 0.003 | 0.011 | 0.636 |
| Top of RSW | Horizontal | 165 | 0.065 | 0.006 | 0.001 | |
| | Vertical | 165 | 0.398 | 0.003 | 0.013 | 0.624 |
| D/F Slab | Horizontal | 153 | 0.039 | 0.002 | 0.006 | |
| | Vertical | 157 | 0.155 | 0.001 | 0.009 | 0.436 |

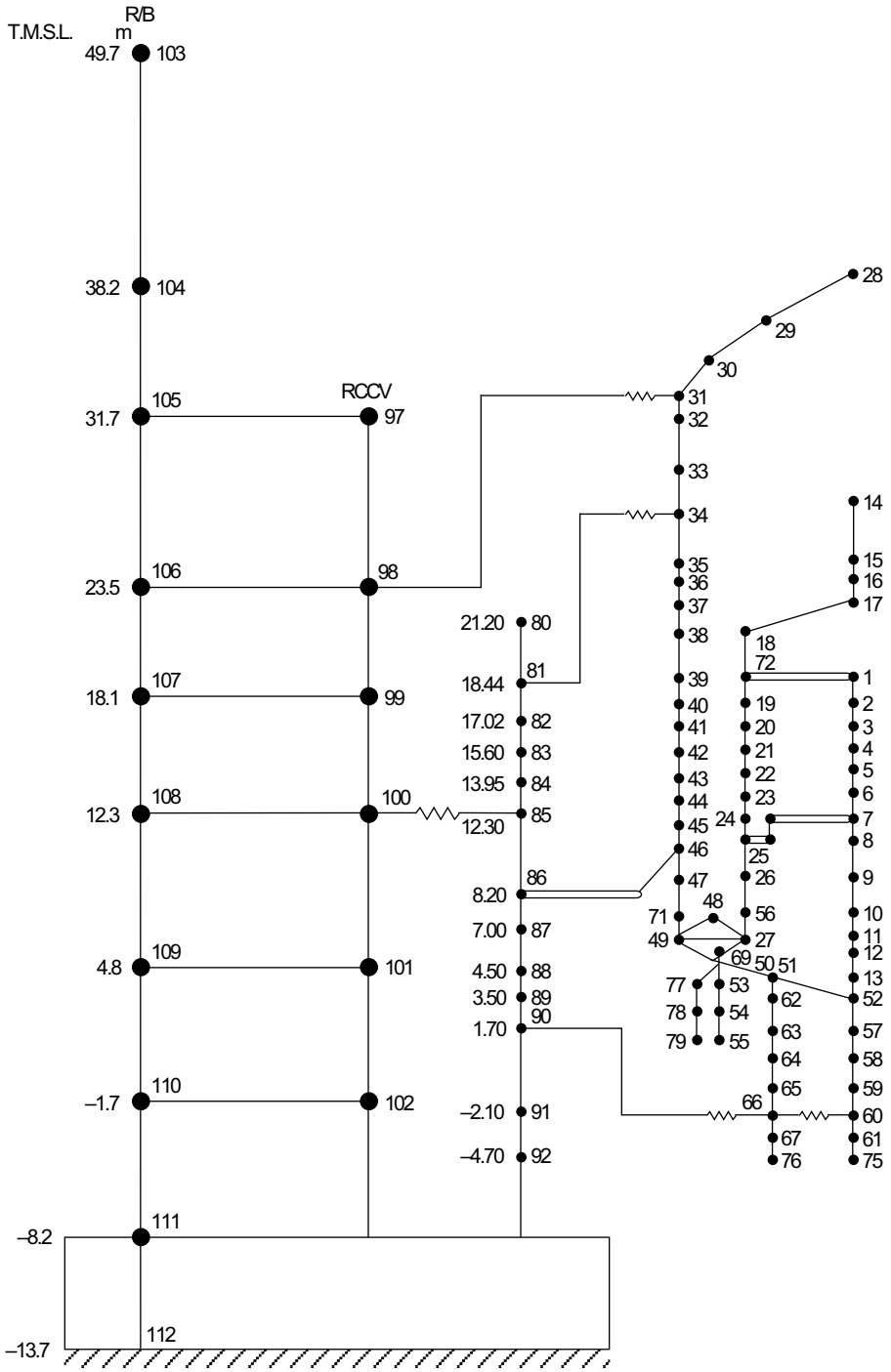


**Figure 3G-1 Horizontal Beam Model for AP Load**

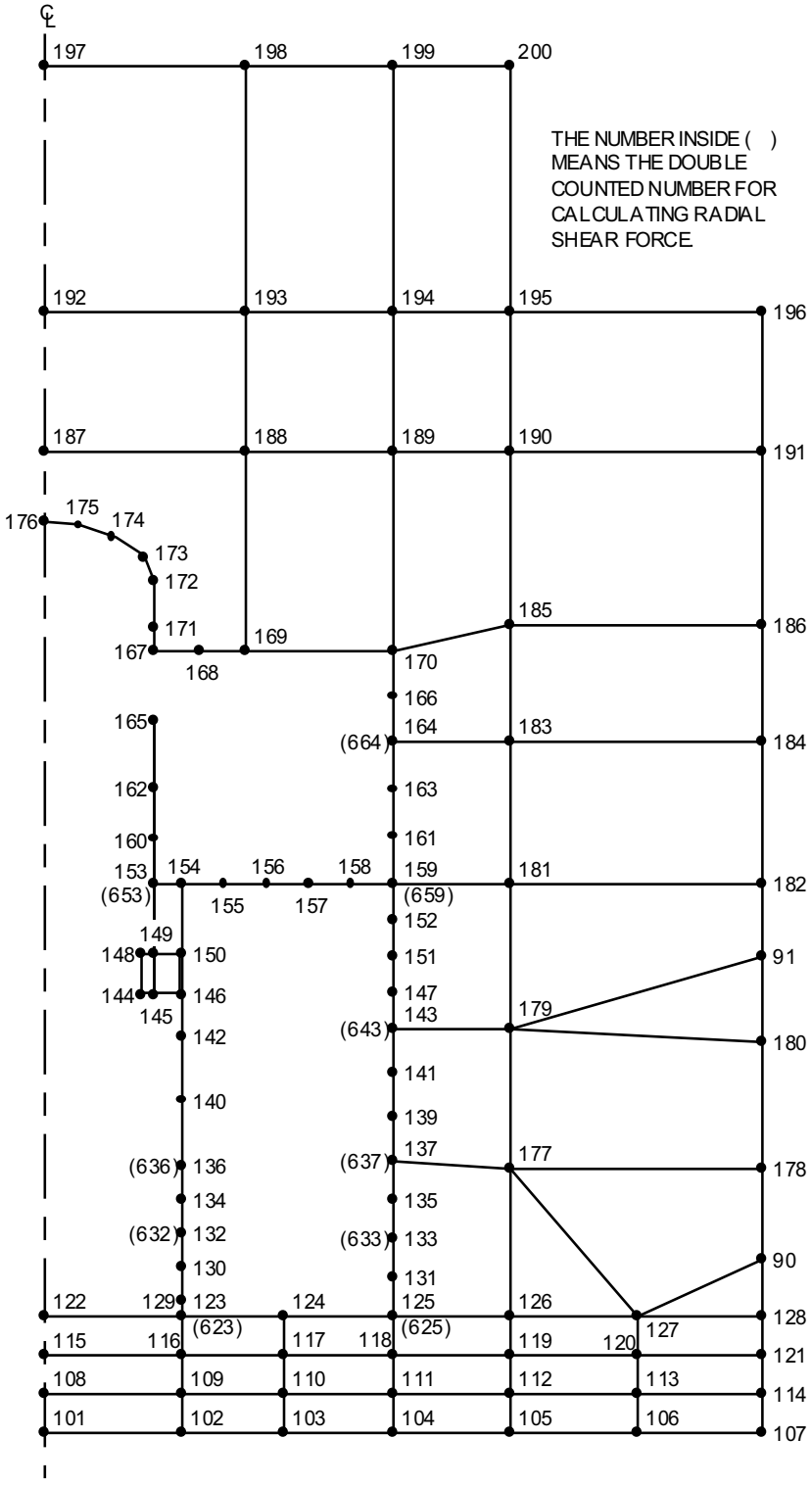


**Figure 3G-2 Nodal Point (R/B Horizontal/Vertical Shell Model)**

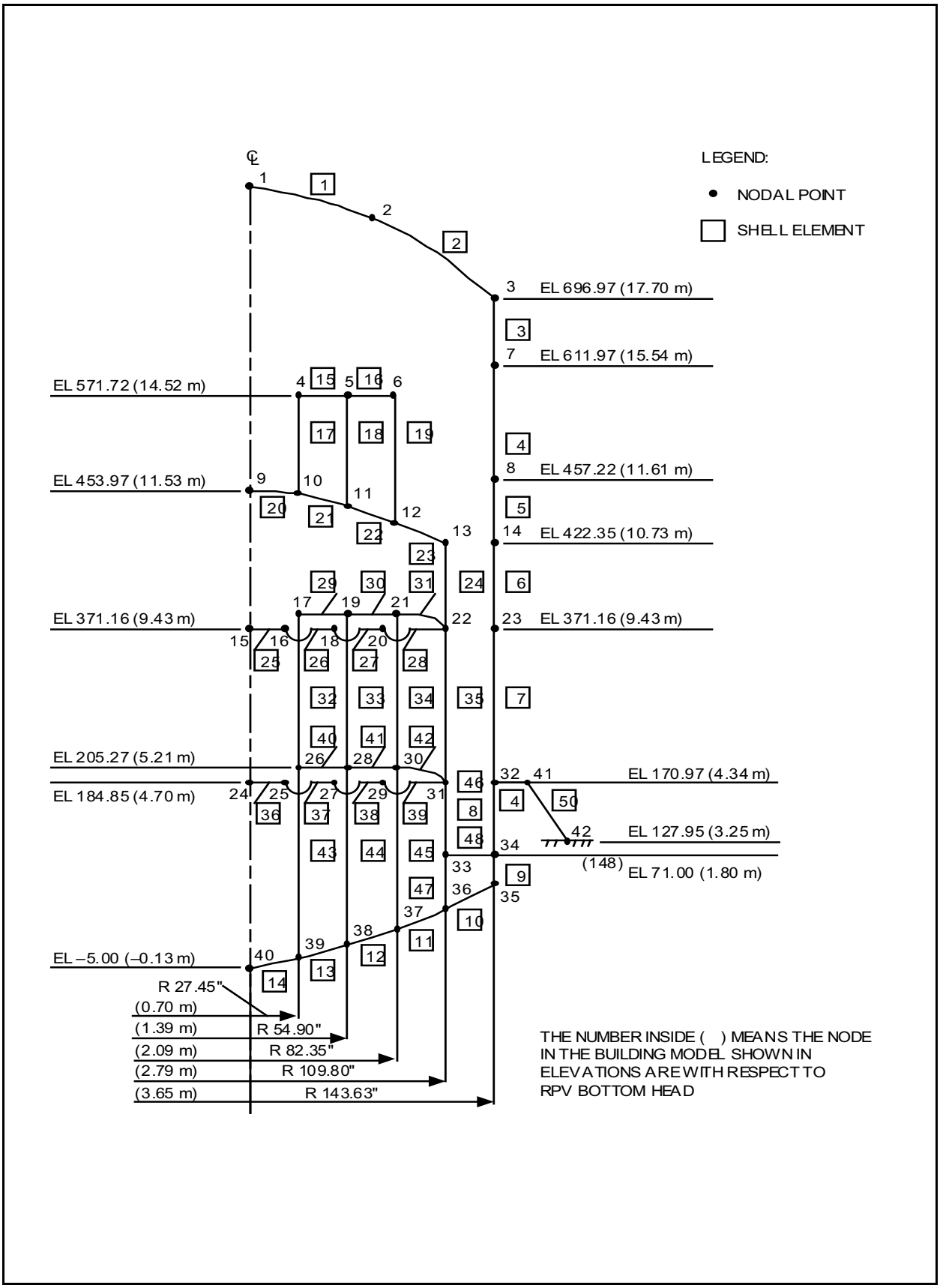


**Figure 3G-3 Nodal Point No. (RPV/Internal Vertical Shell Model)**

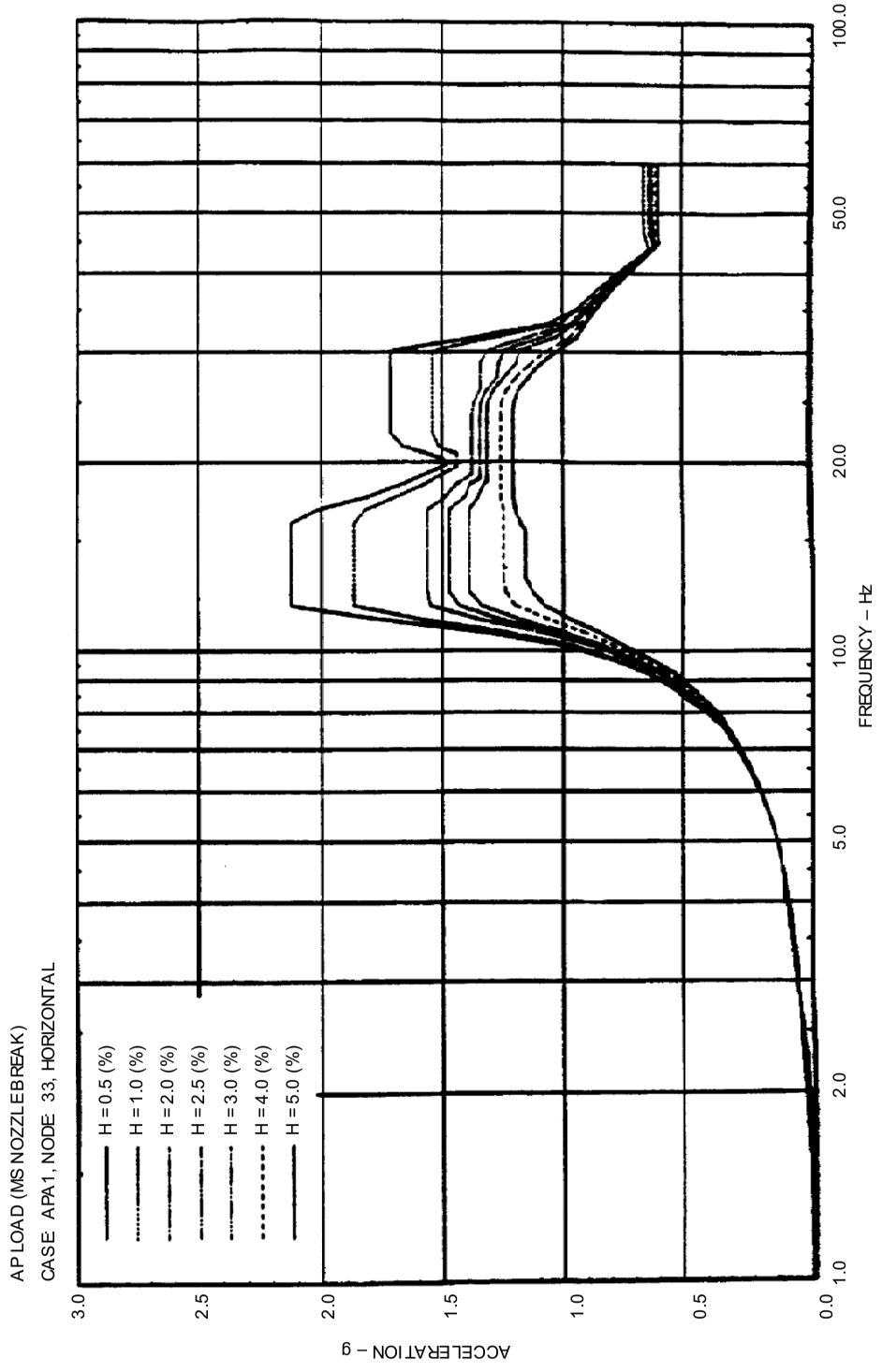


**Figure 3G-4 Floor Response Spectrum—Case: APA1, Node: 33, Horizontal**

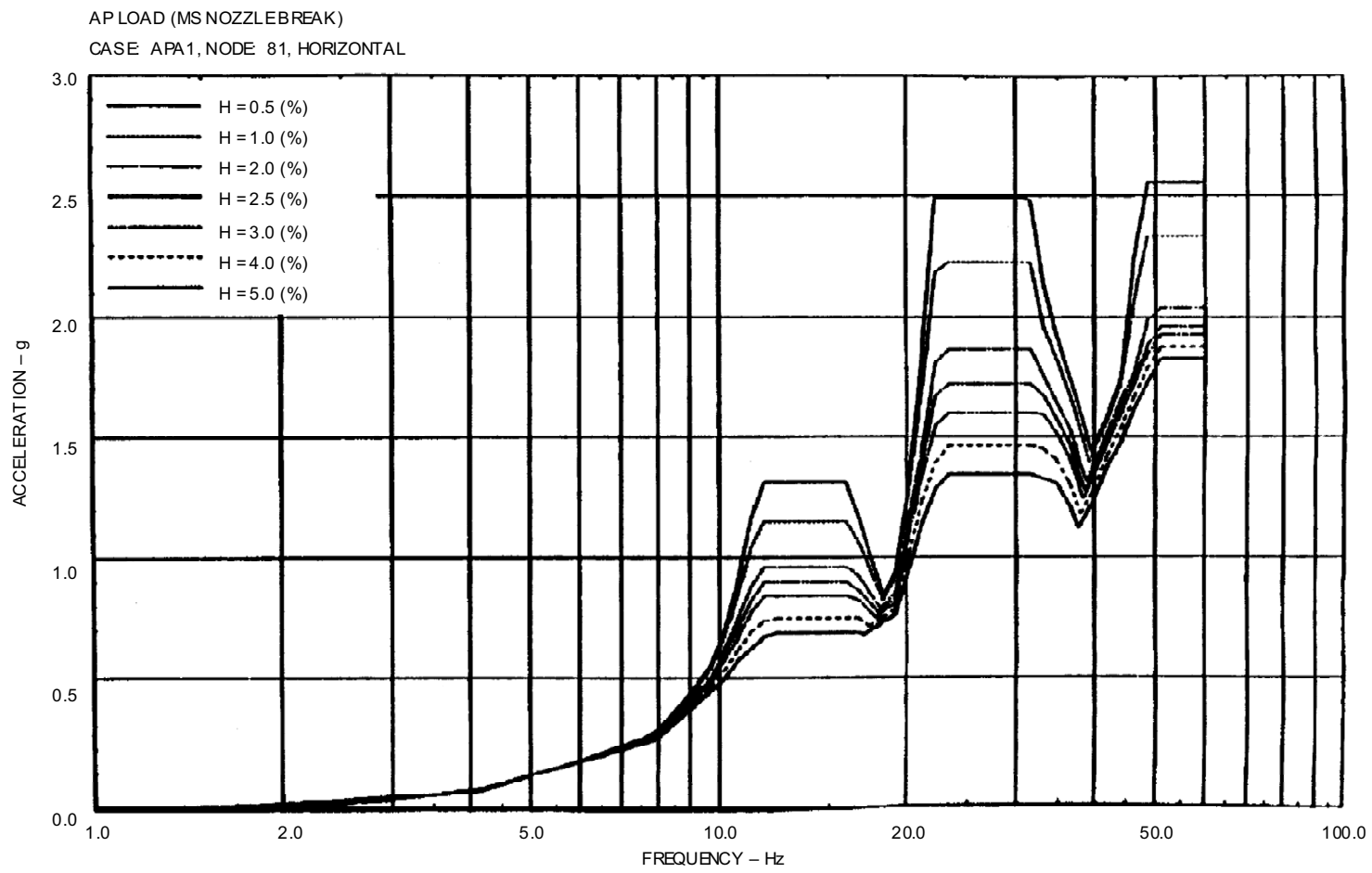


**Figure 3G-5 Floor Response Spectrum—Case: APA1, Node: 81, Horizontal**

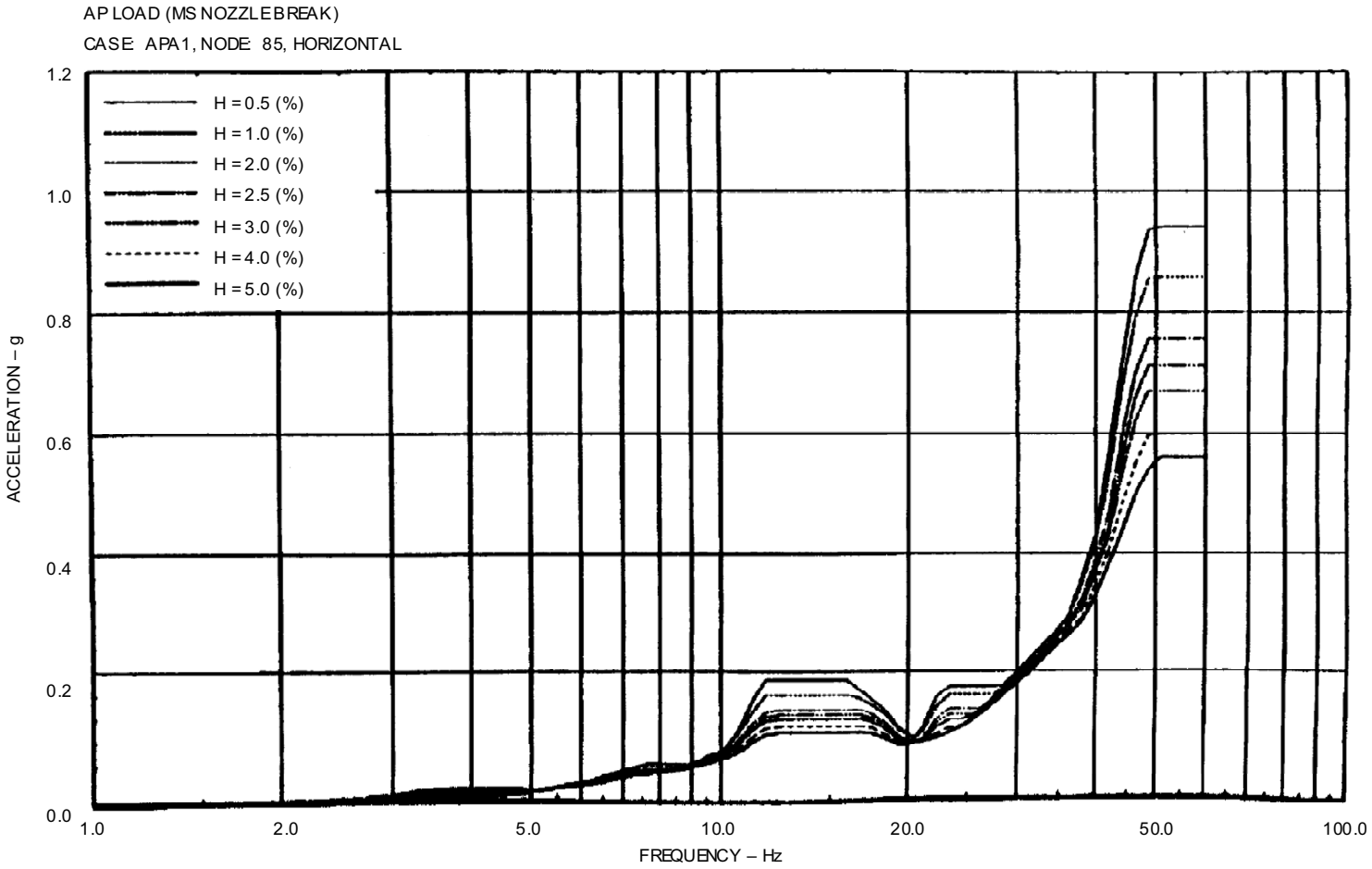


**Figure 3G-6 Floor Response Spectrum—Case: APA1, Node: 85, Horizontal**

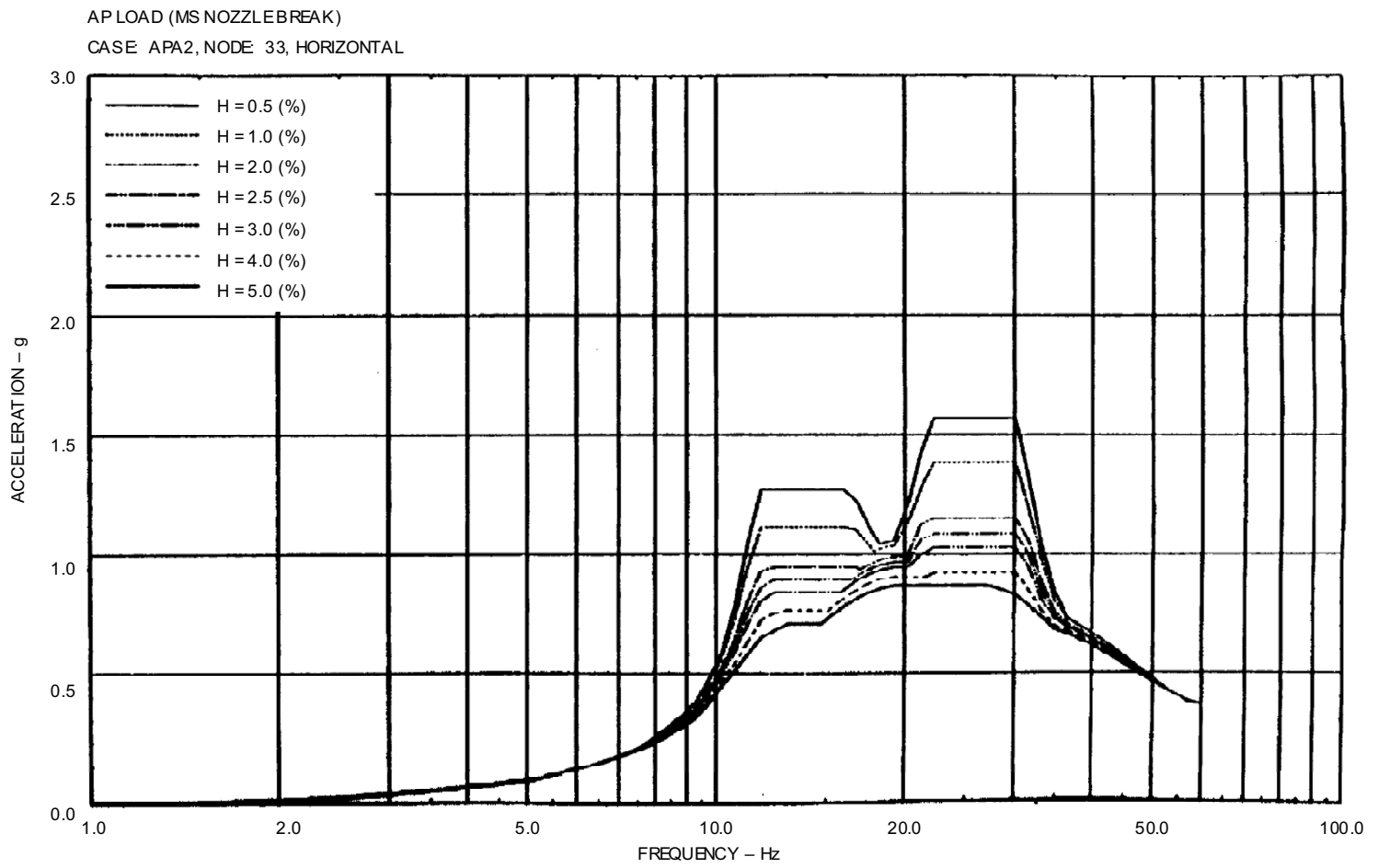


**Figure 3G-7 Floor Response Spectrum—Case: APA2, Node: 33, Horizontal**

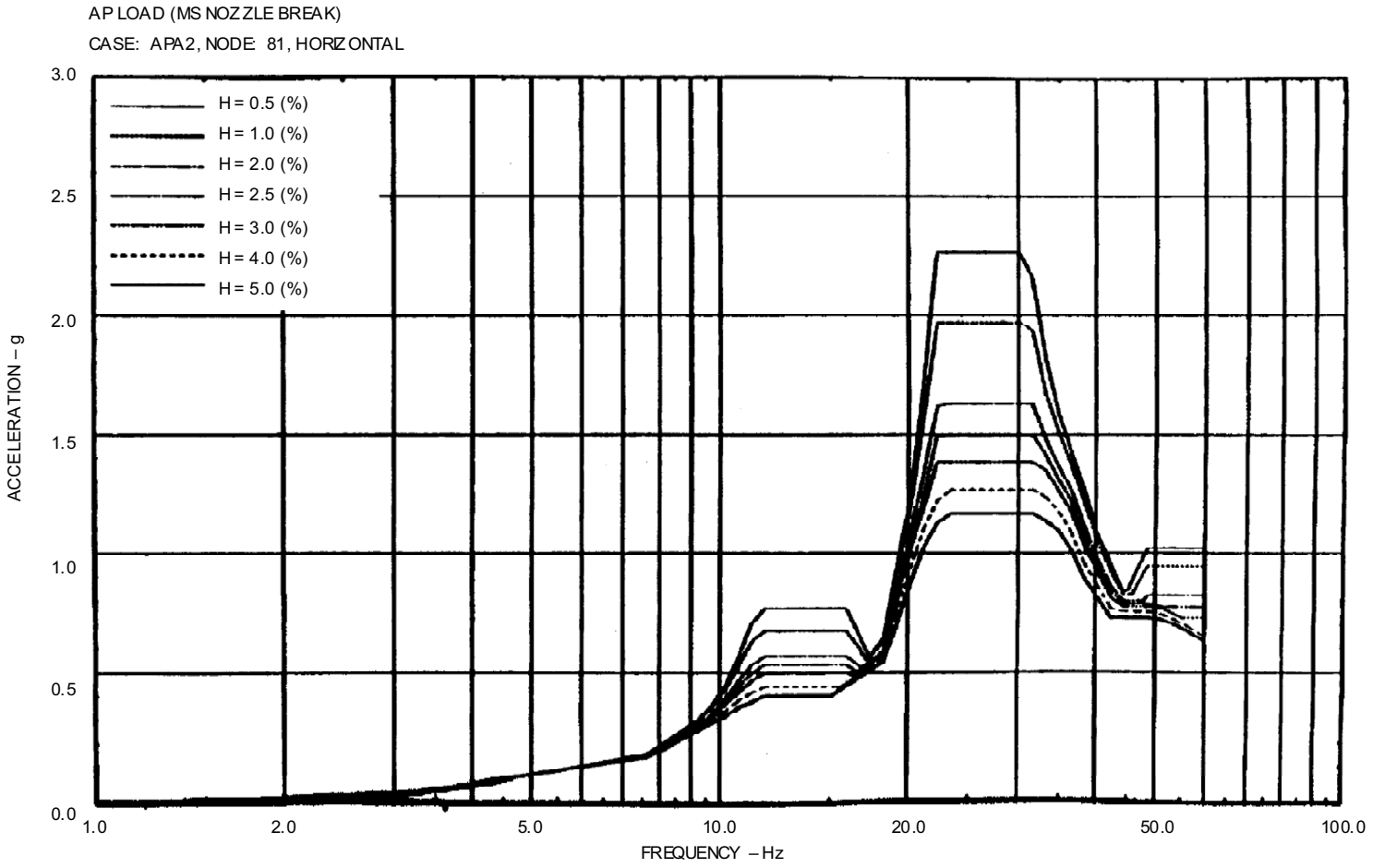


**Figure 3G-8 Floor Response Spectrum—Case: APA2, Node: 81, Horizontal**

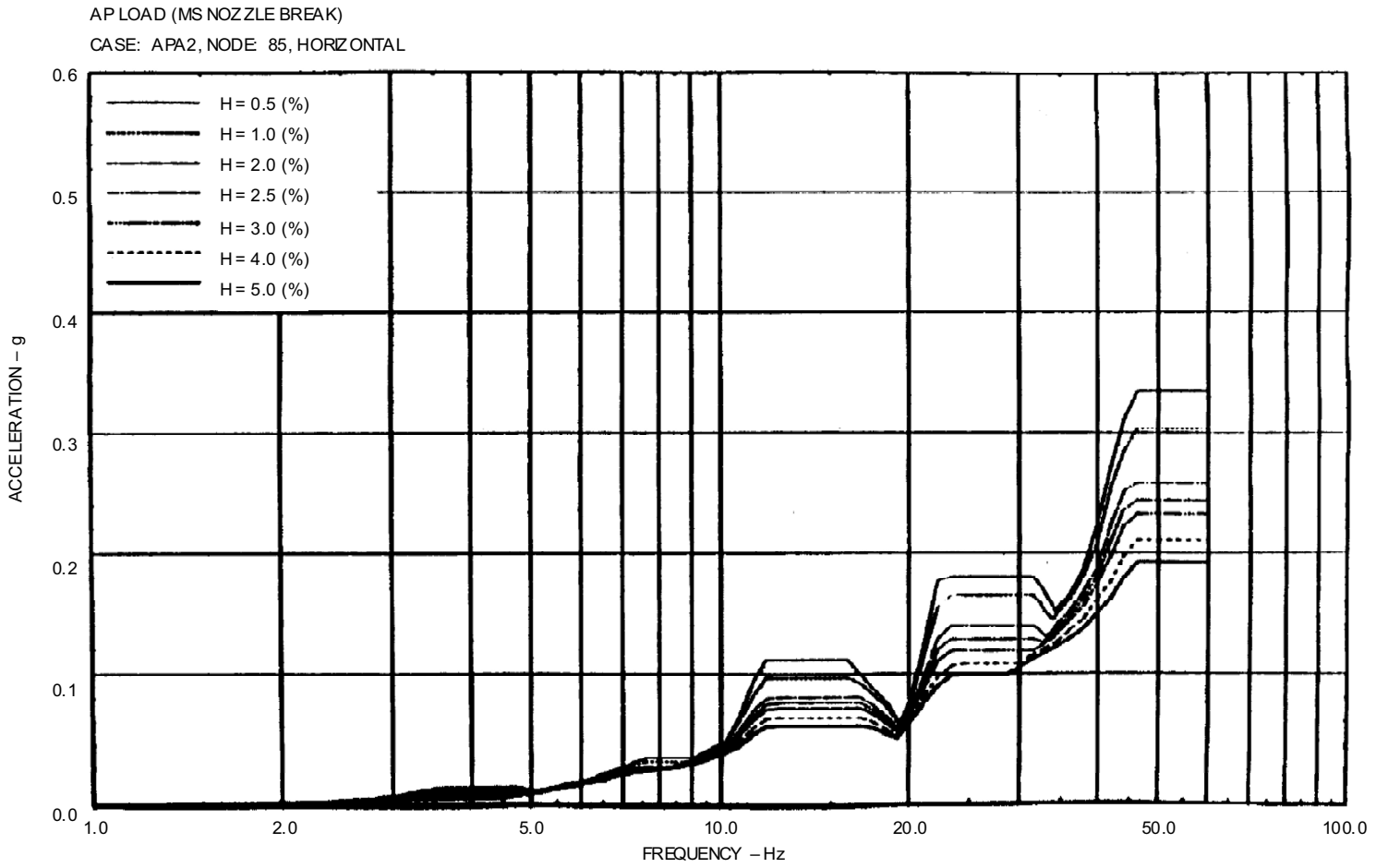


**Figure 3G-9 Floor Response Spectrum—Case: APA2, Node: 85, Horizontal**

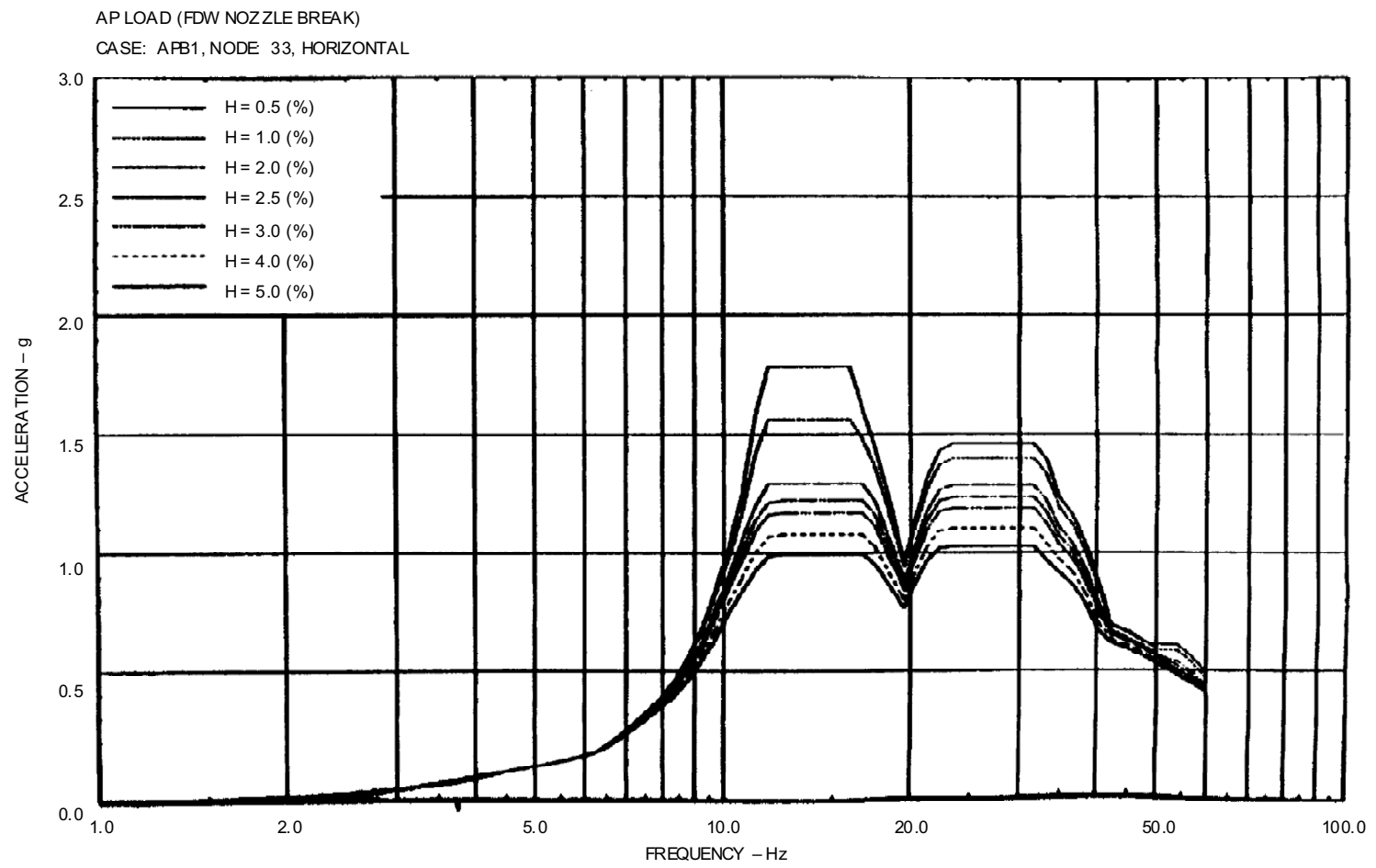


**Figure 3G-10 Floor Response Spectrum—Case: APB1, Node: 33, Horizontal**

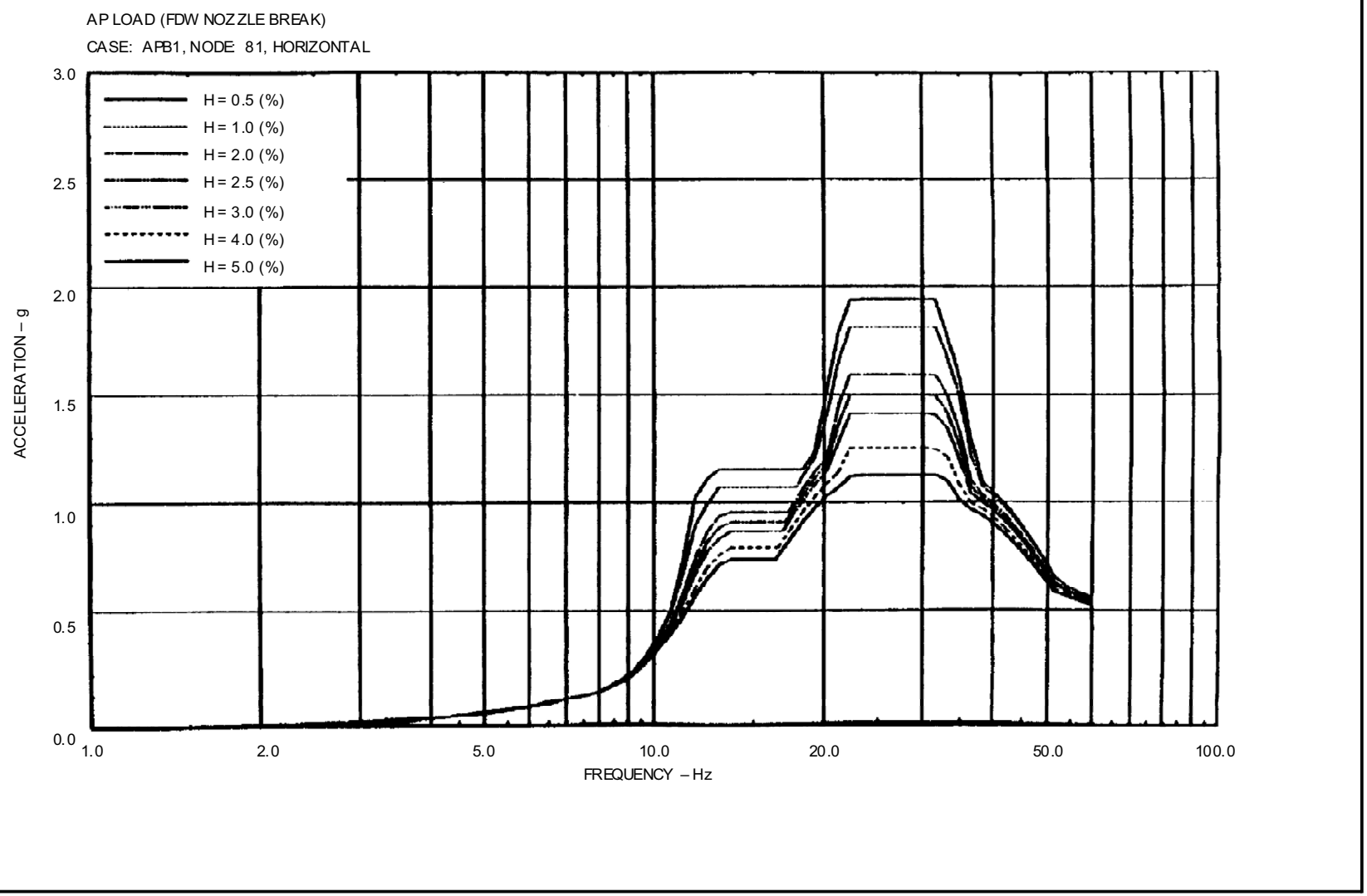


**Figure 3G-11 Floor Response Spectrum—Case: APB1, Node: 81, Horizontal**

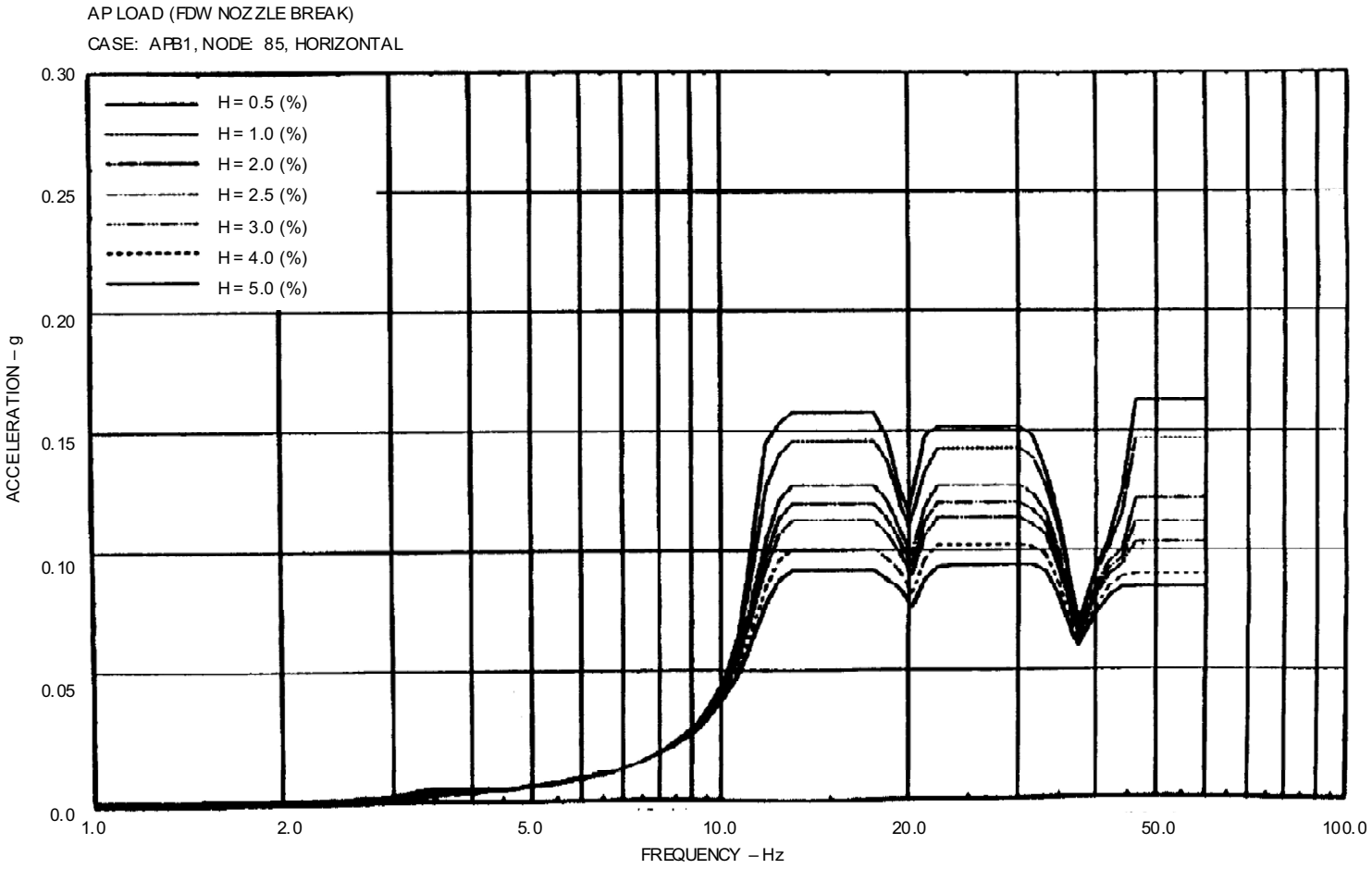


**Figure 3G-12 Floor Response Spectrum—Case: APB1, Node: 85, Horizontal**

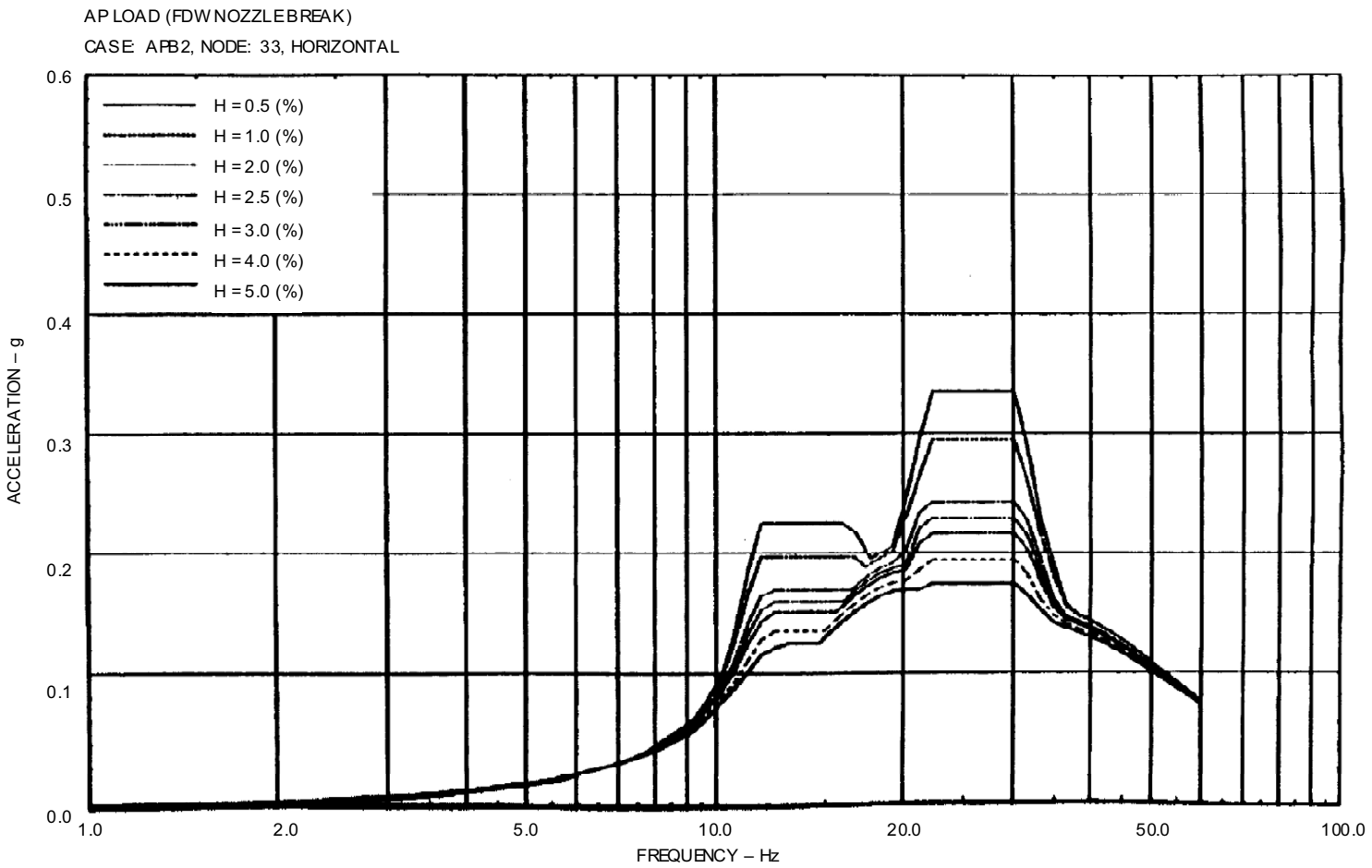


**Figure 3G-13 Floor Response Spectrum—Case: APB2, Node: 33, Horizontal**

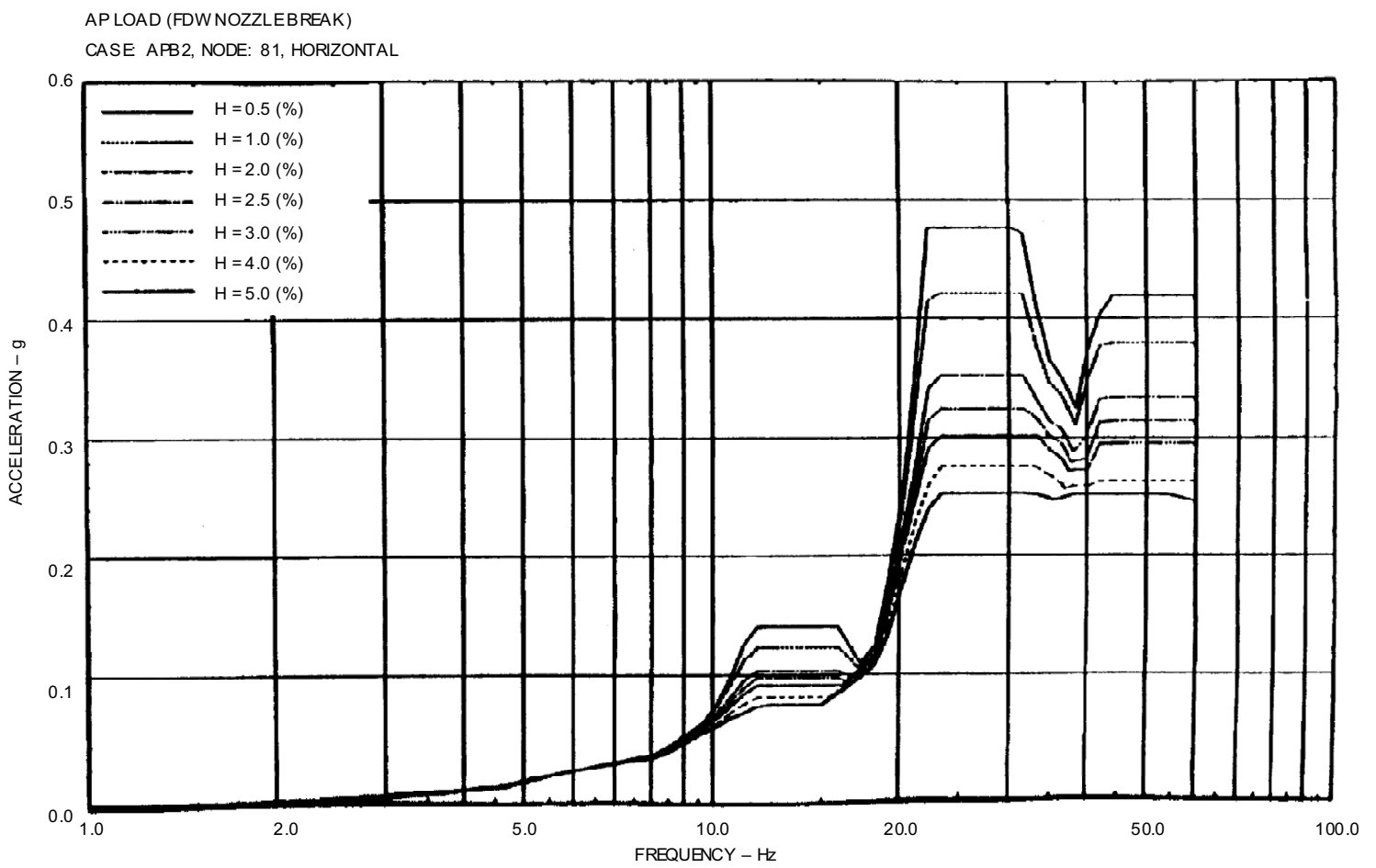


**Figure 3G-14 Floor Response Spectrum—Case: APB2, Node: 81, Horizontal**

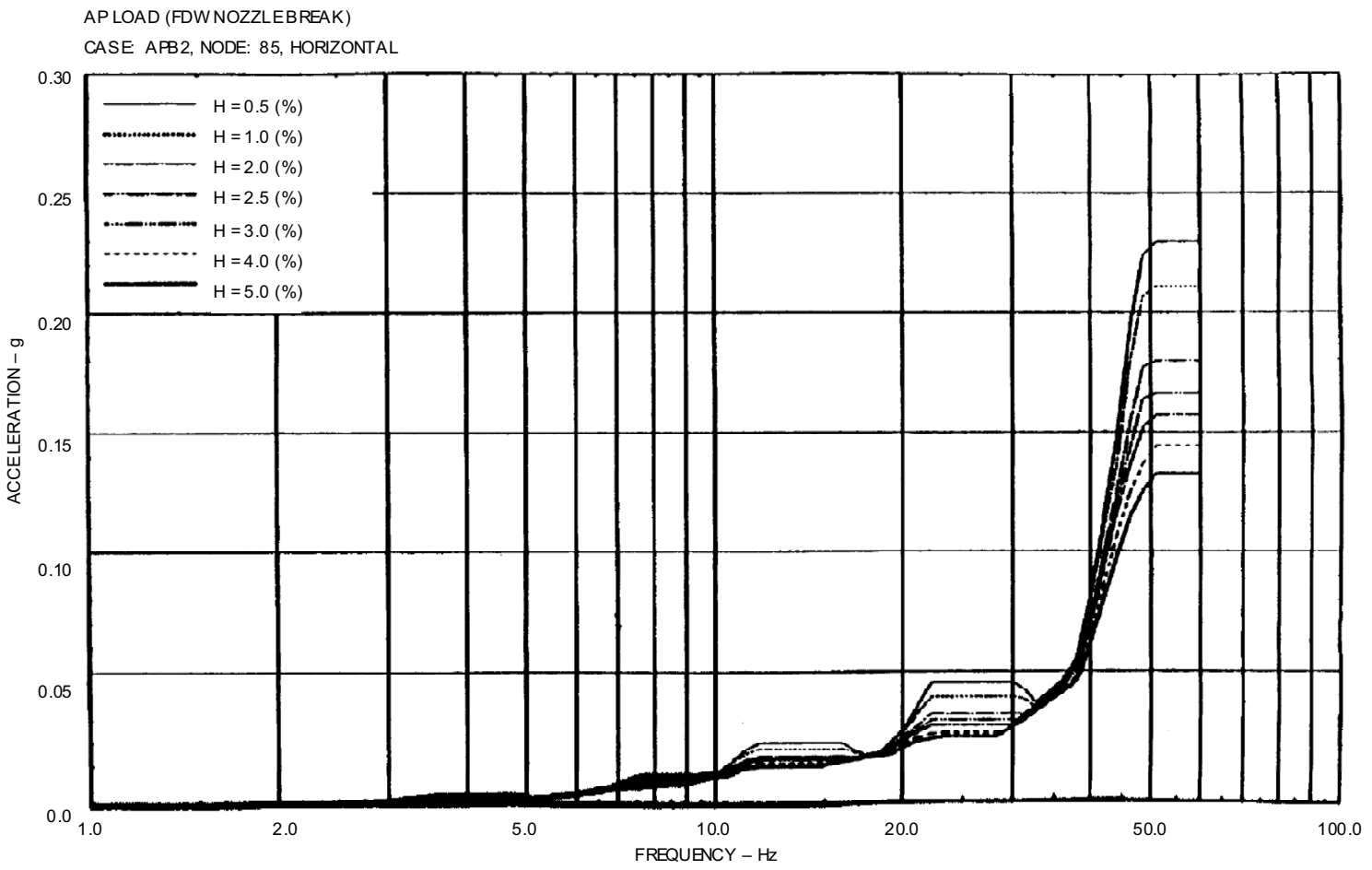


**Figure 3G-15 Floor Response Spectrum—Case: APB2, Node: 85, Horizontal**

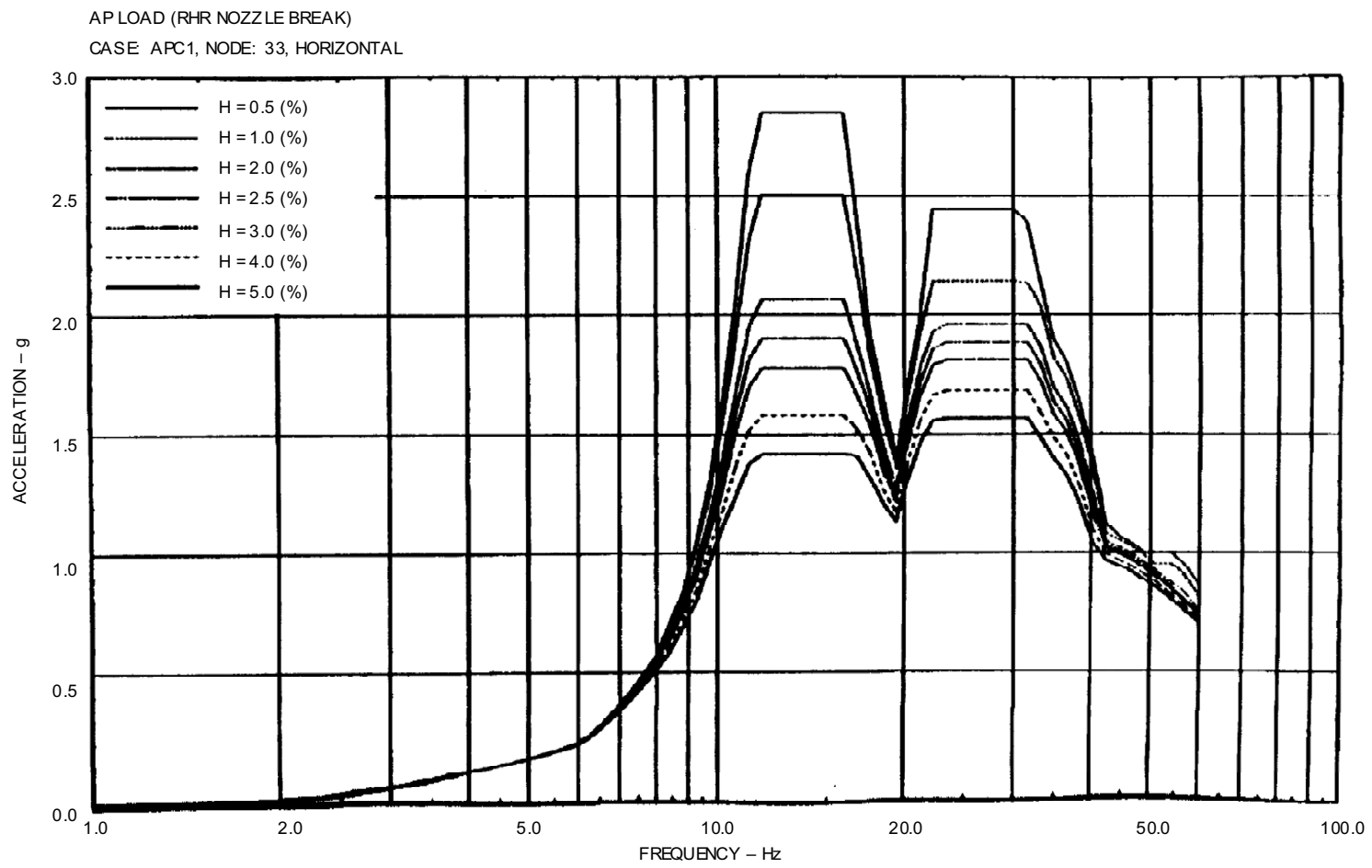


**Figure 3G-16 Floor Response Spectrum—Case: APC1, Node: 33, Horizontal**

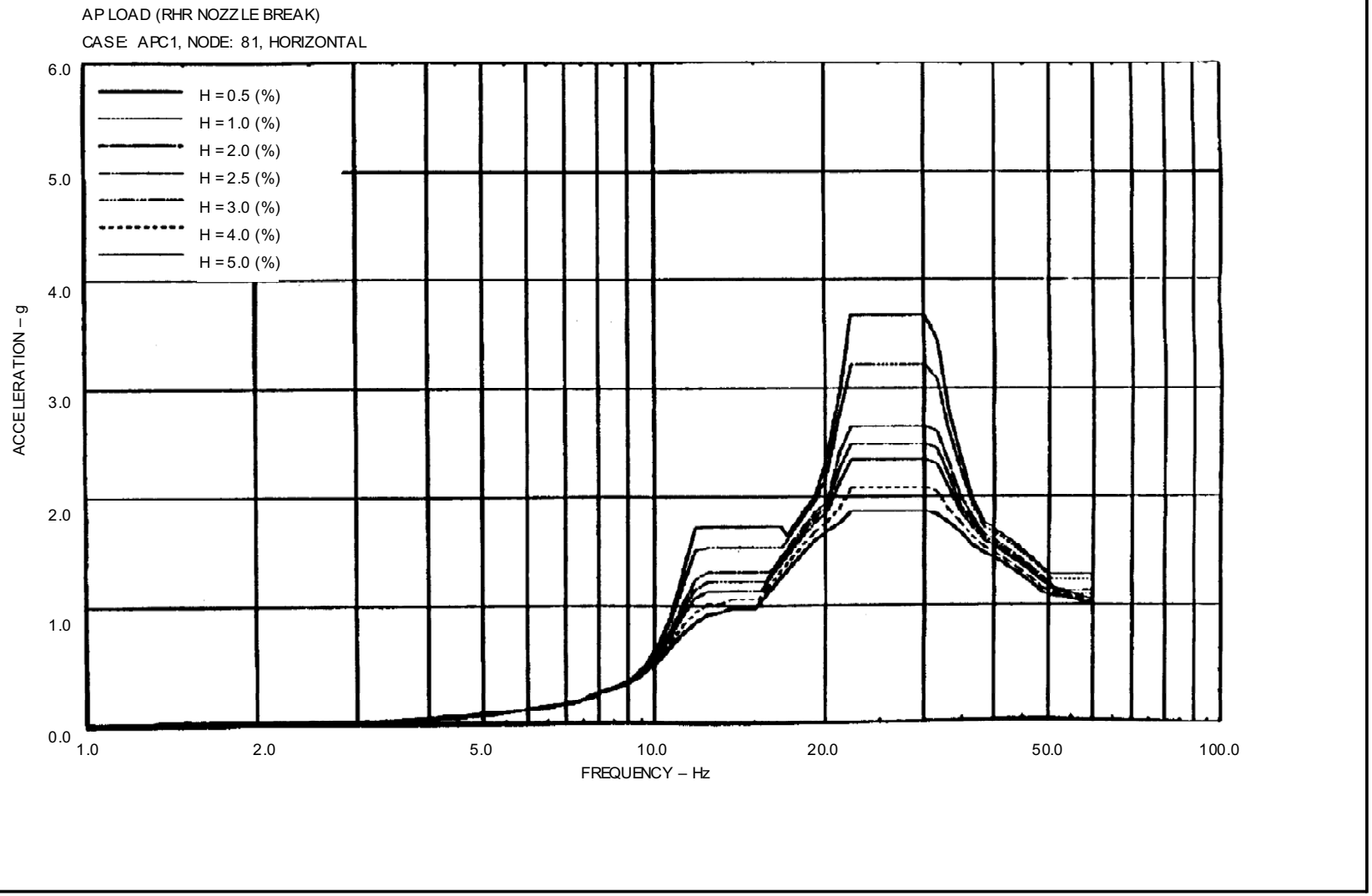


**Figure 3G-17 Floor Response Spectrum—Case: APC1, Node: 81, Horizontal**

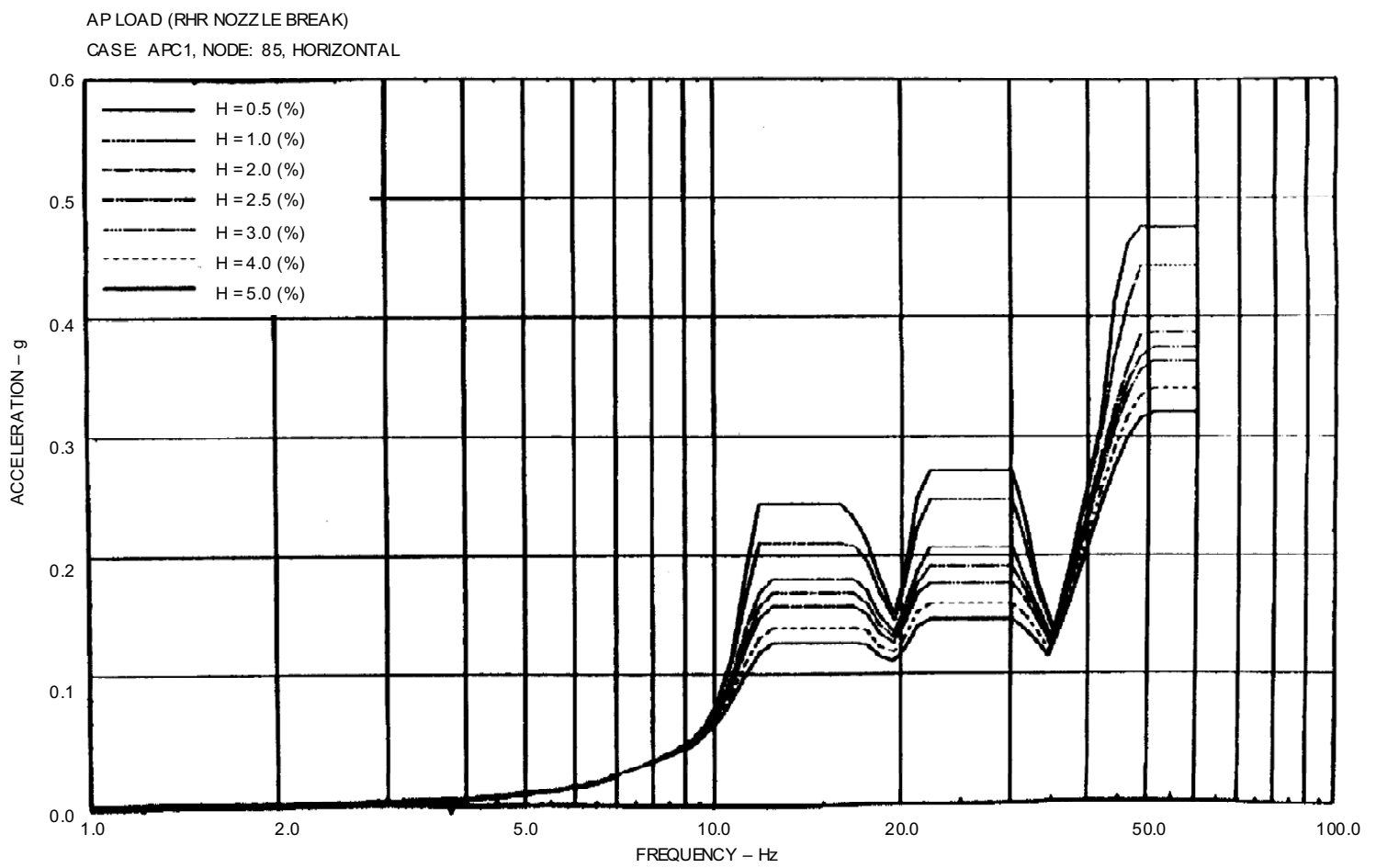


**Figure 3G-18 Floor Response Spectrum—Case: APC1, Node: 85, Horizontal**

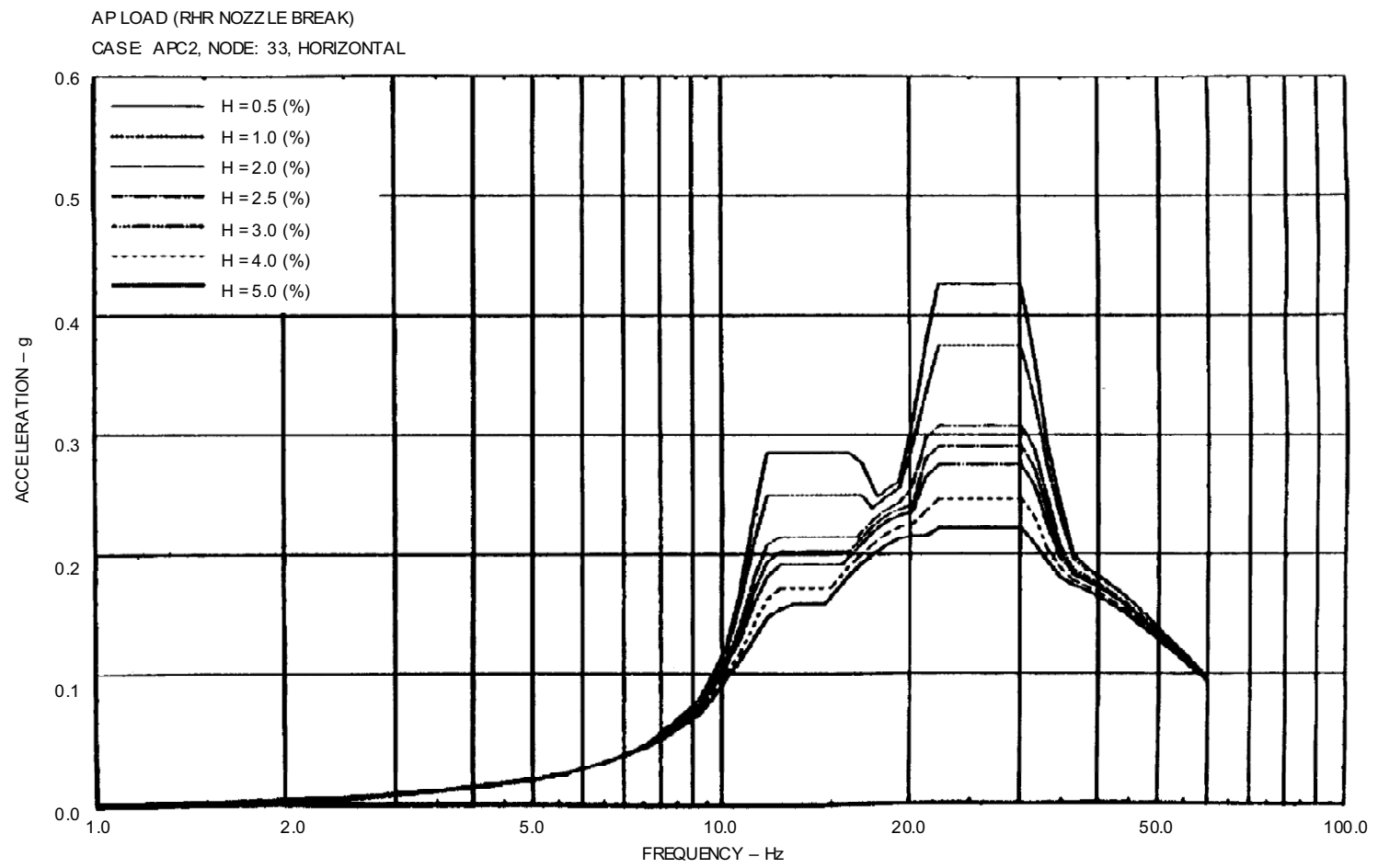


**Figure 3G-19 Floor Response Spectrum—Case: APC2, Node: 33, Horizontal**

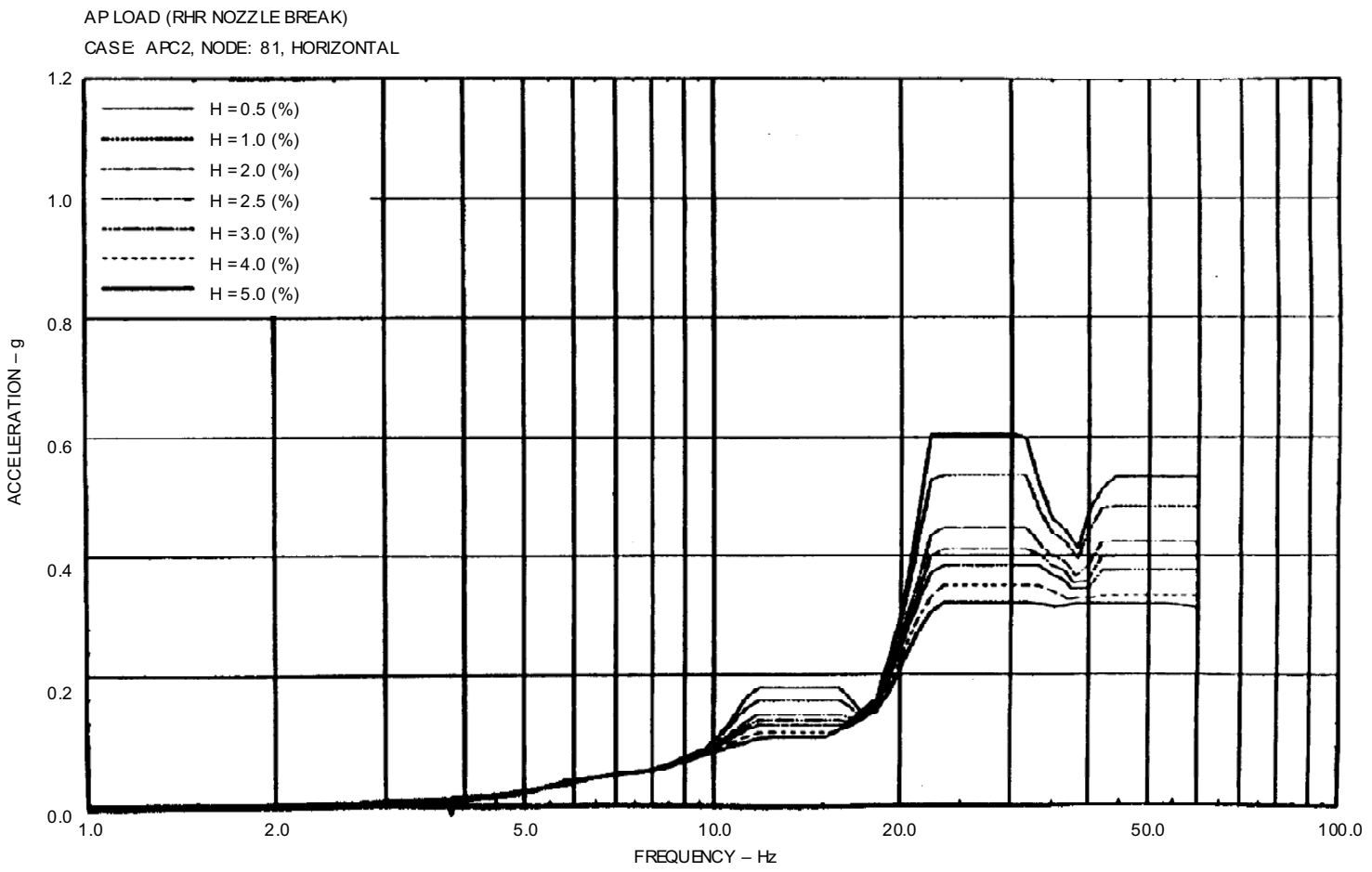


**Figure 3G-20 Floor Response Spectrum—Case: APC2, Node: 81, Horizontal**

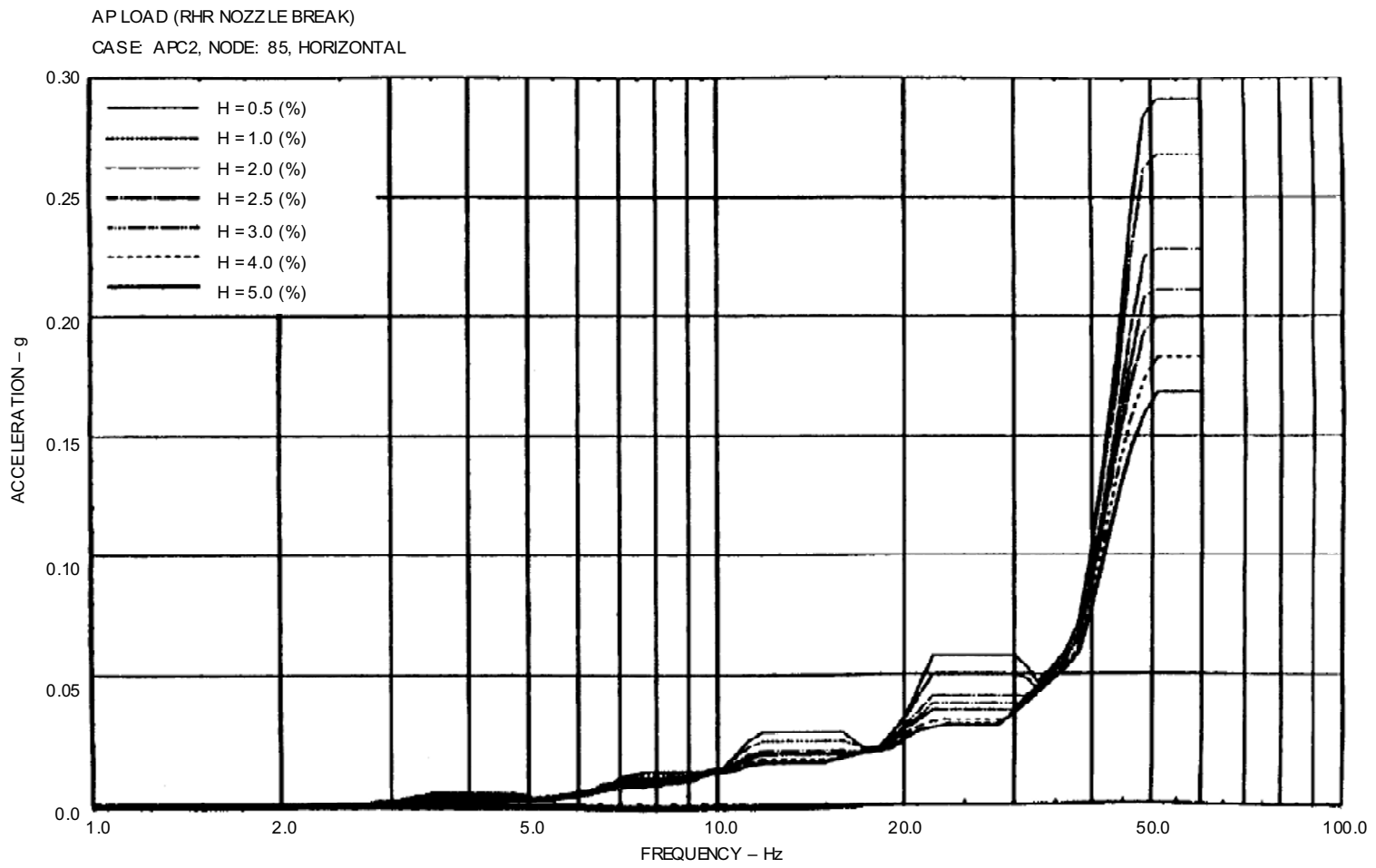


**Figure 3G-21 Floor Response Spectrum—Case: APC2, Node: 85, Horizontal**

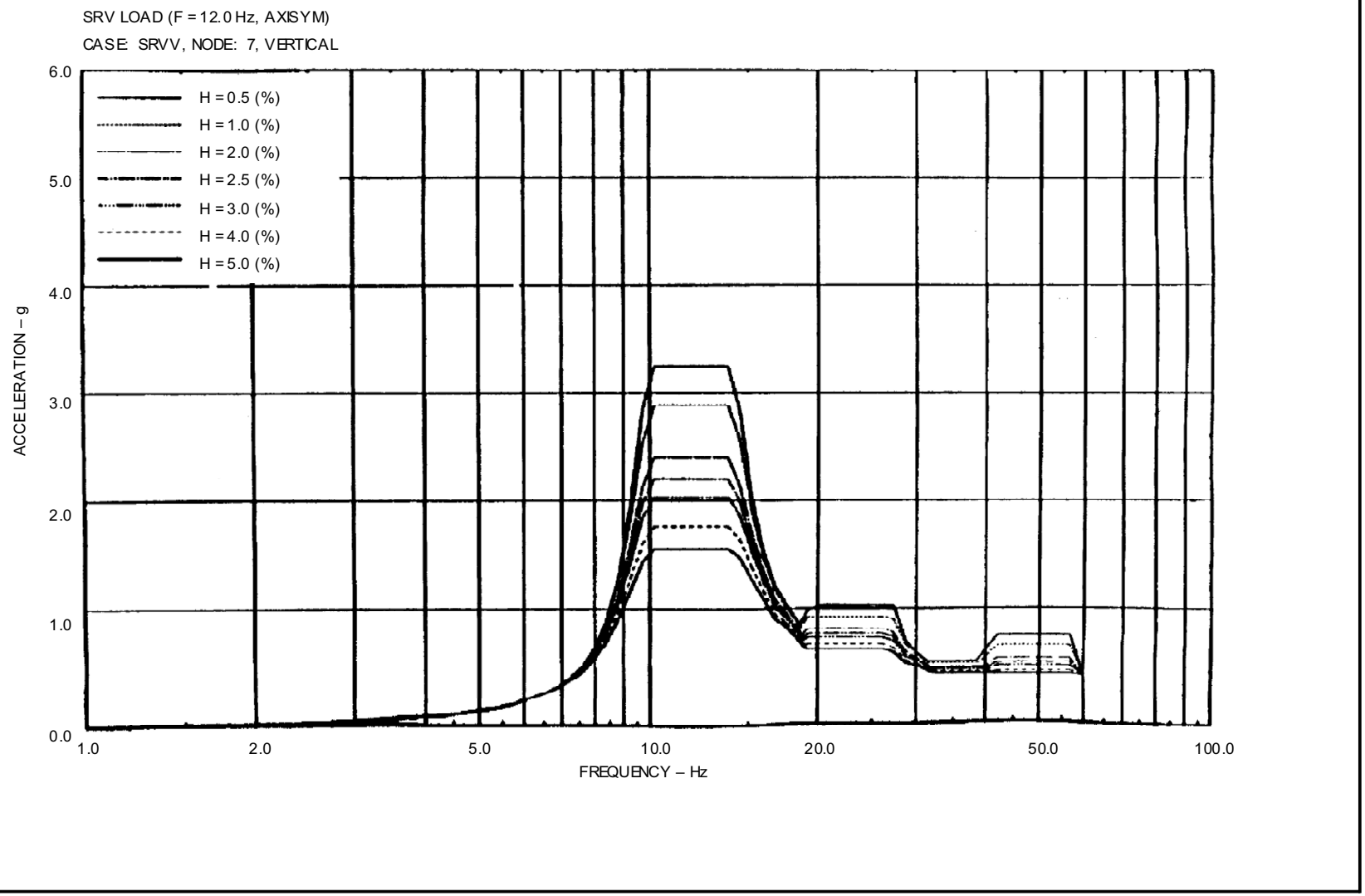


**Figure 3G-22 Floor Response Spectrum—Case: SRVV, Node: 7, Vertical**

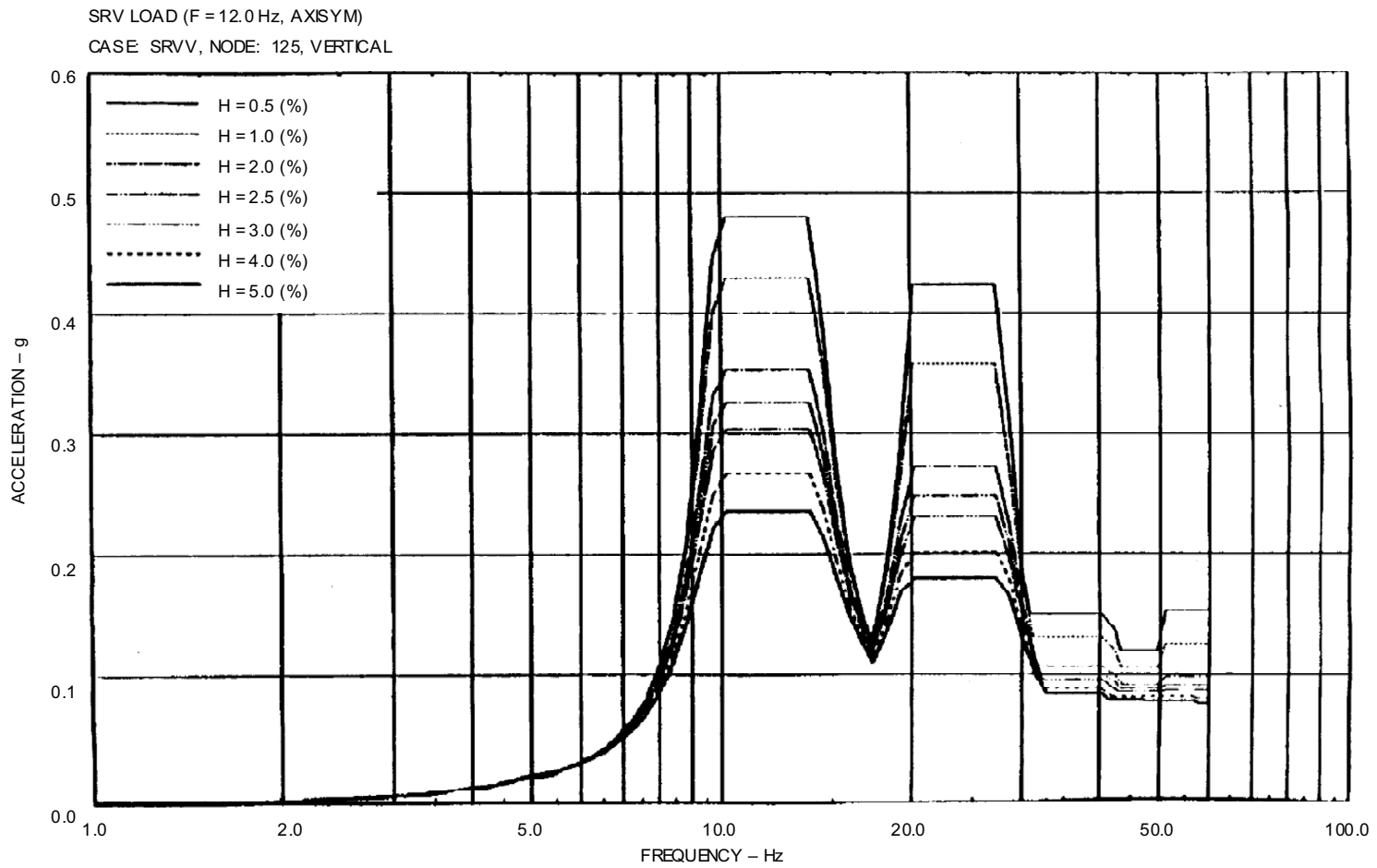


**Figure 3G-23 Floor Response Spectrum—Case: SRVV, Node: 125, Vertical**

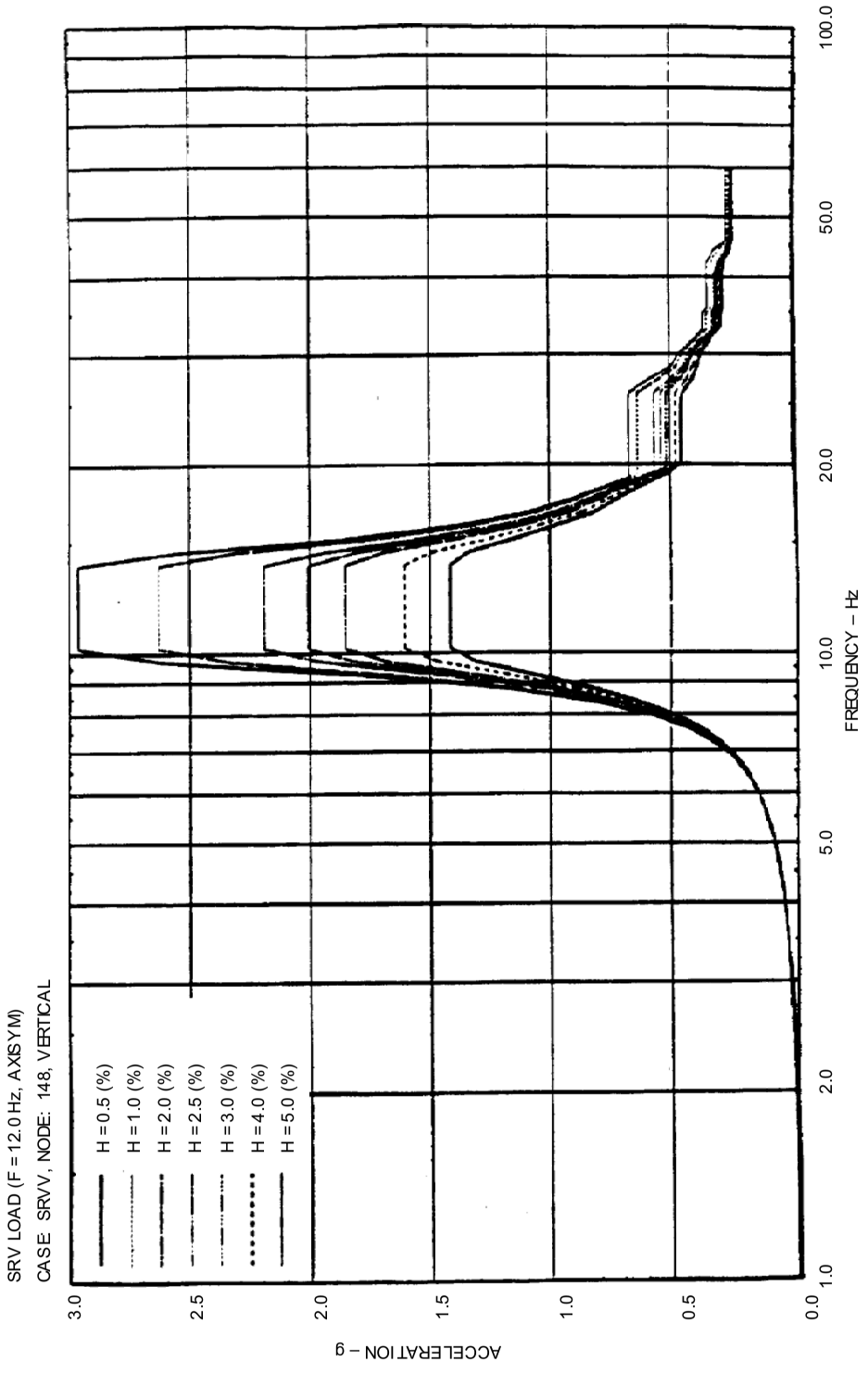


**Figure 3G-24 Floor Response Spectrum—Case: SRVV, Node: 148, Vertical**

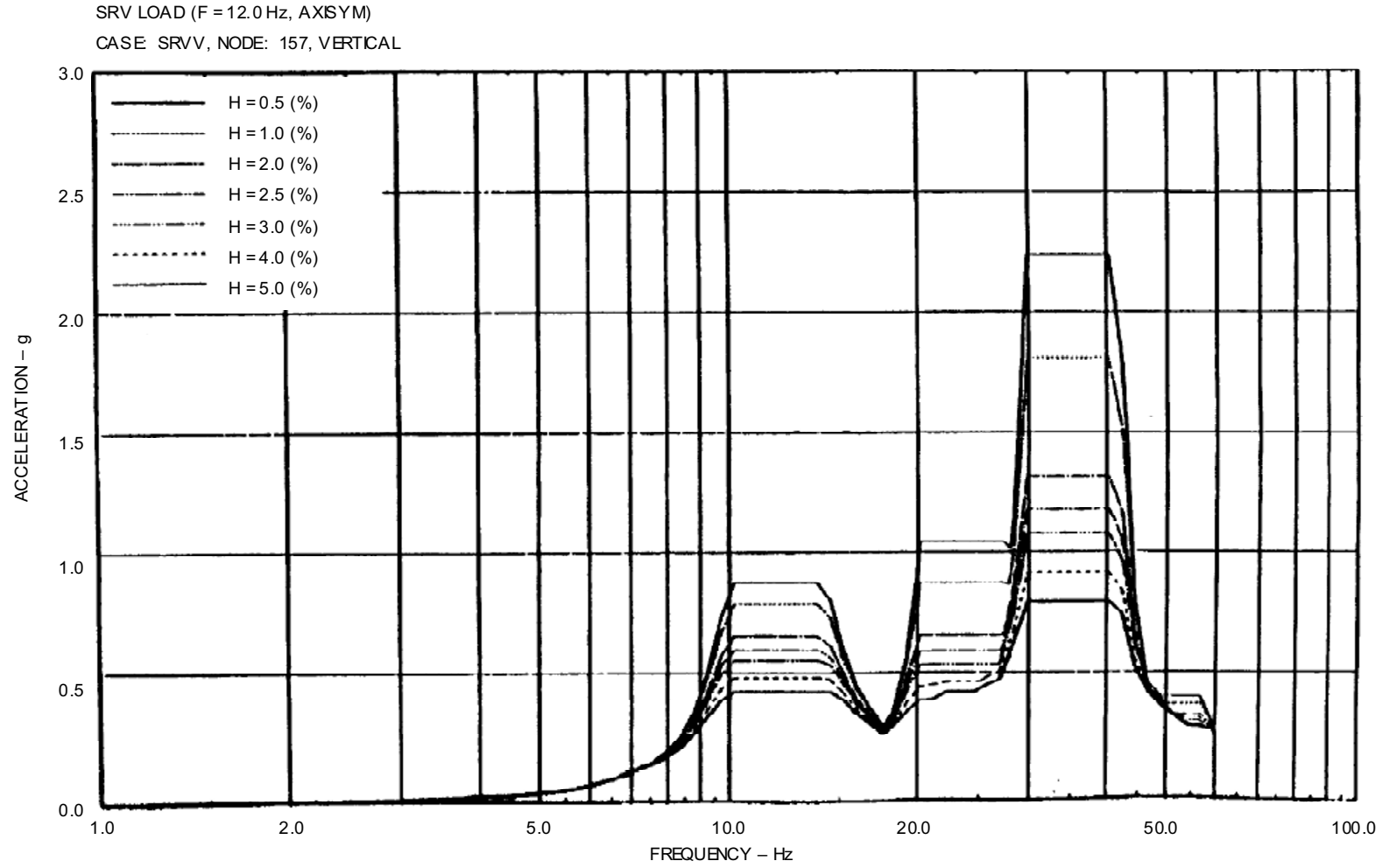


**Figure 3G-25 Floor Response Spectrum—Case: SRVV, Node: 157, Vertical**

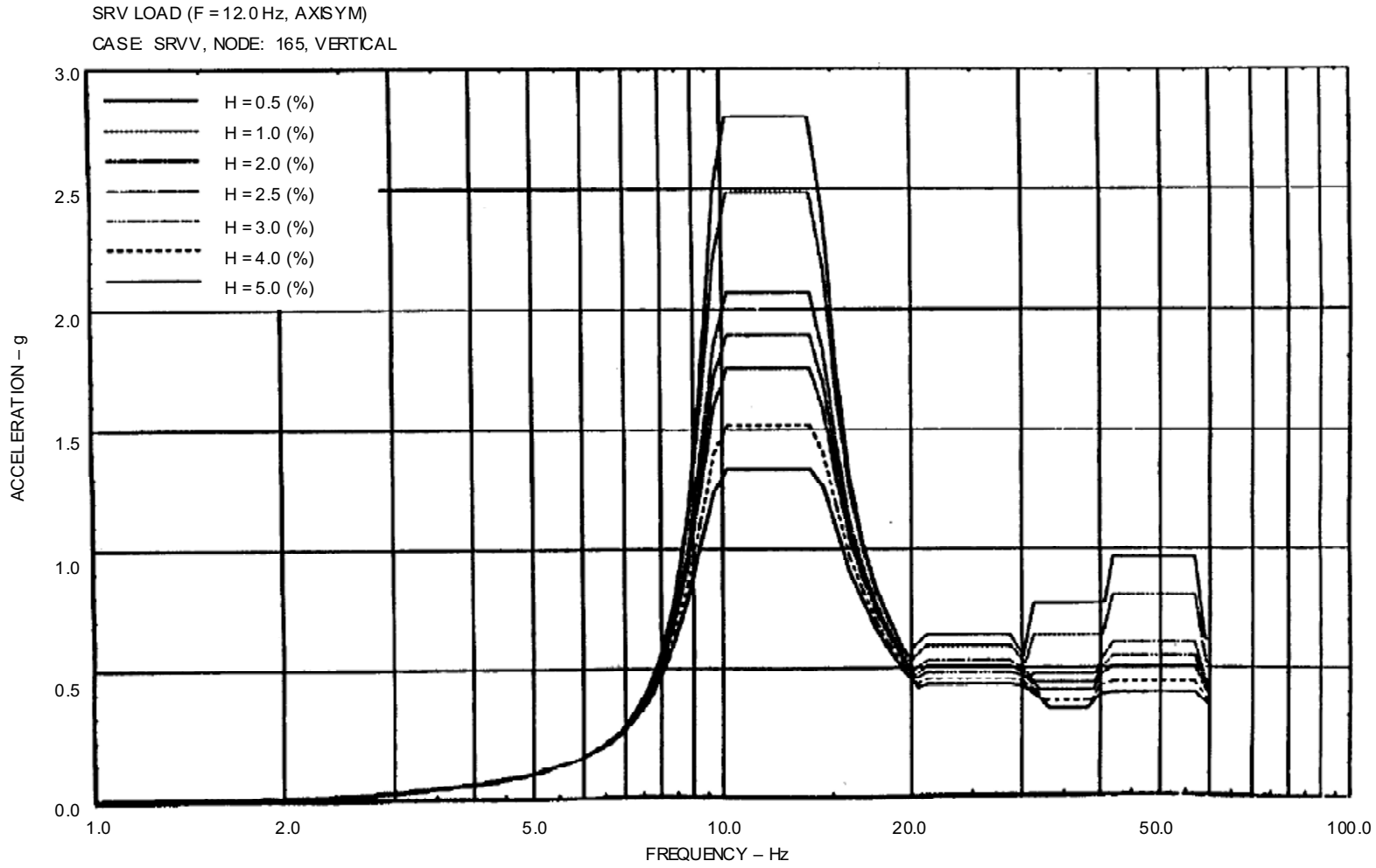


**Figure 3G-26 Floor Response Spectrum—Case: SRVV, Node: 165, Vertical**

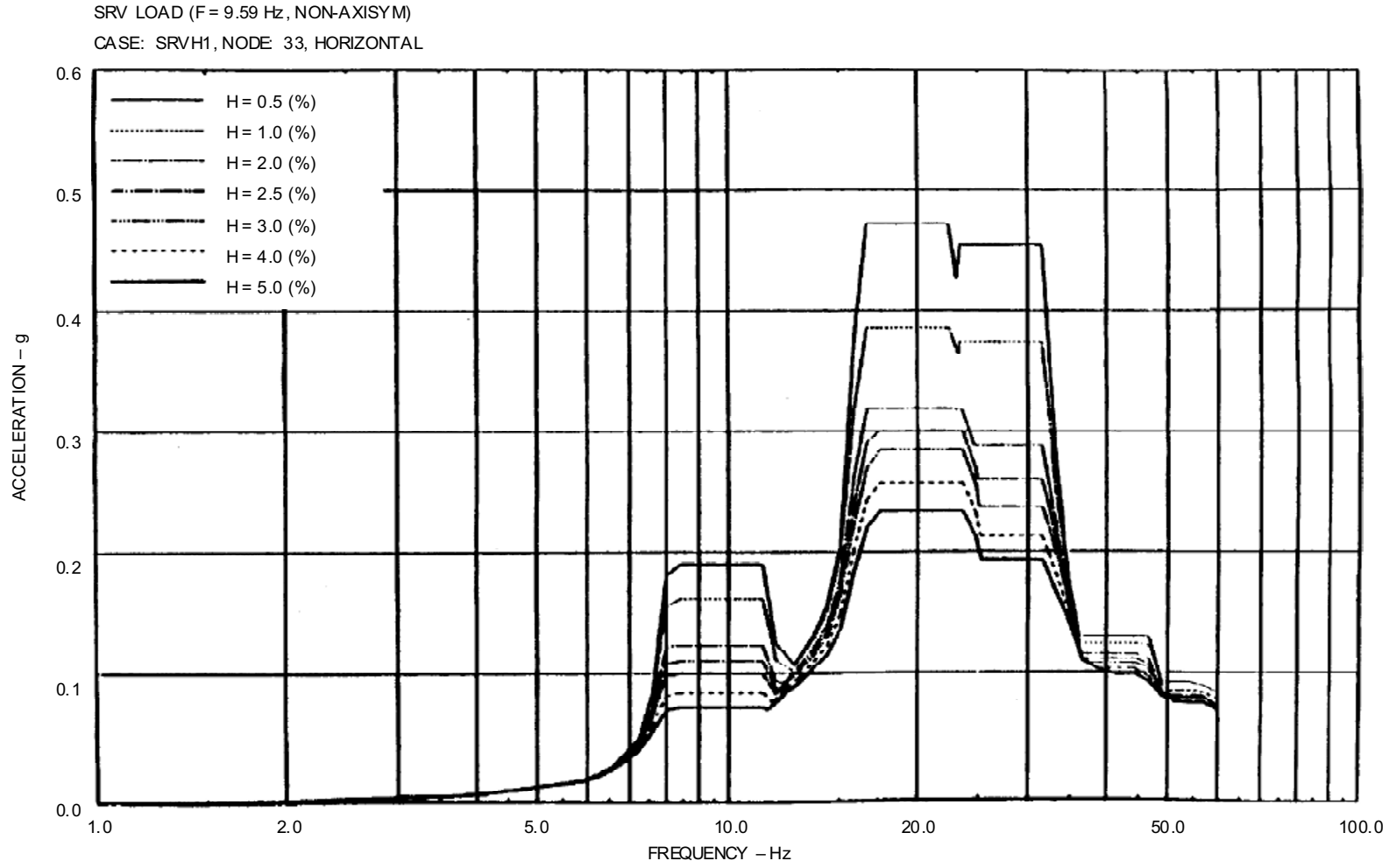


**Figure 3G-27 Floor Response Spectrum—Case: SRVH1, Node: 33, Horizontal**

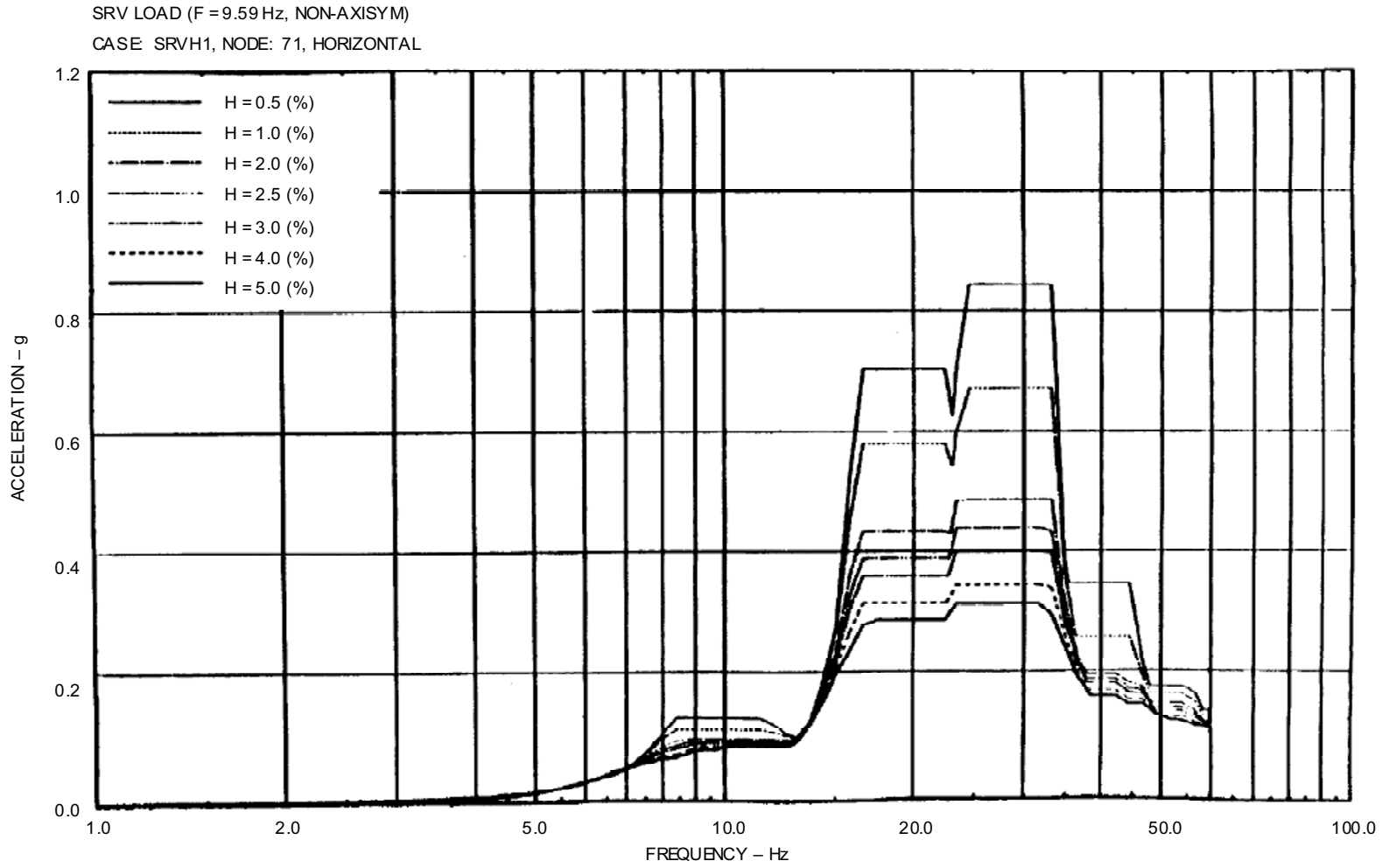


**Figure 3G-28 Floor Response Spectrum—Case: SRVH1, Node: 71, Horizontal**

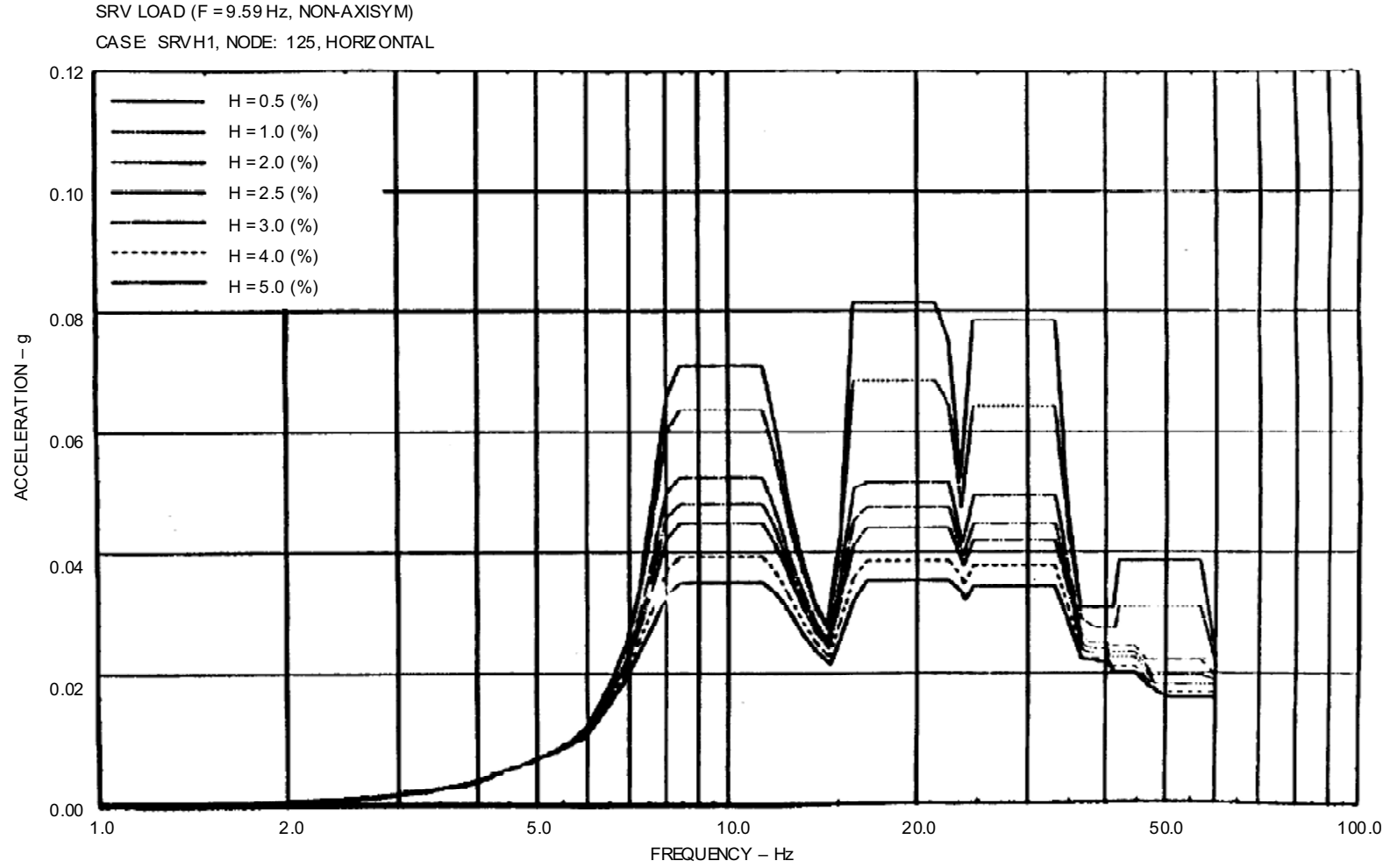


**Figure 3G-29 Floor Response Spectrum—Case: SRVH1, Node: 125, Horizontal**

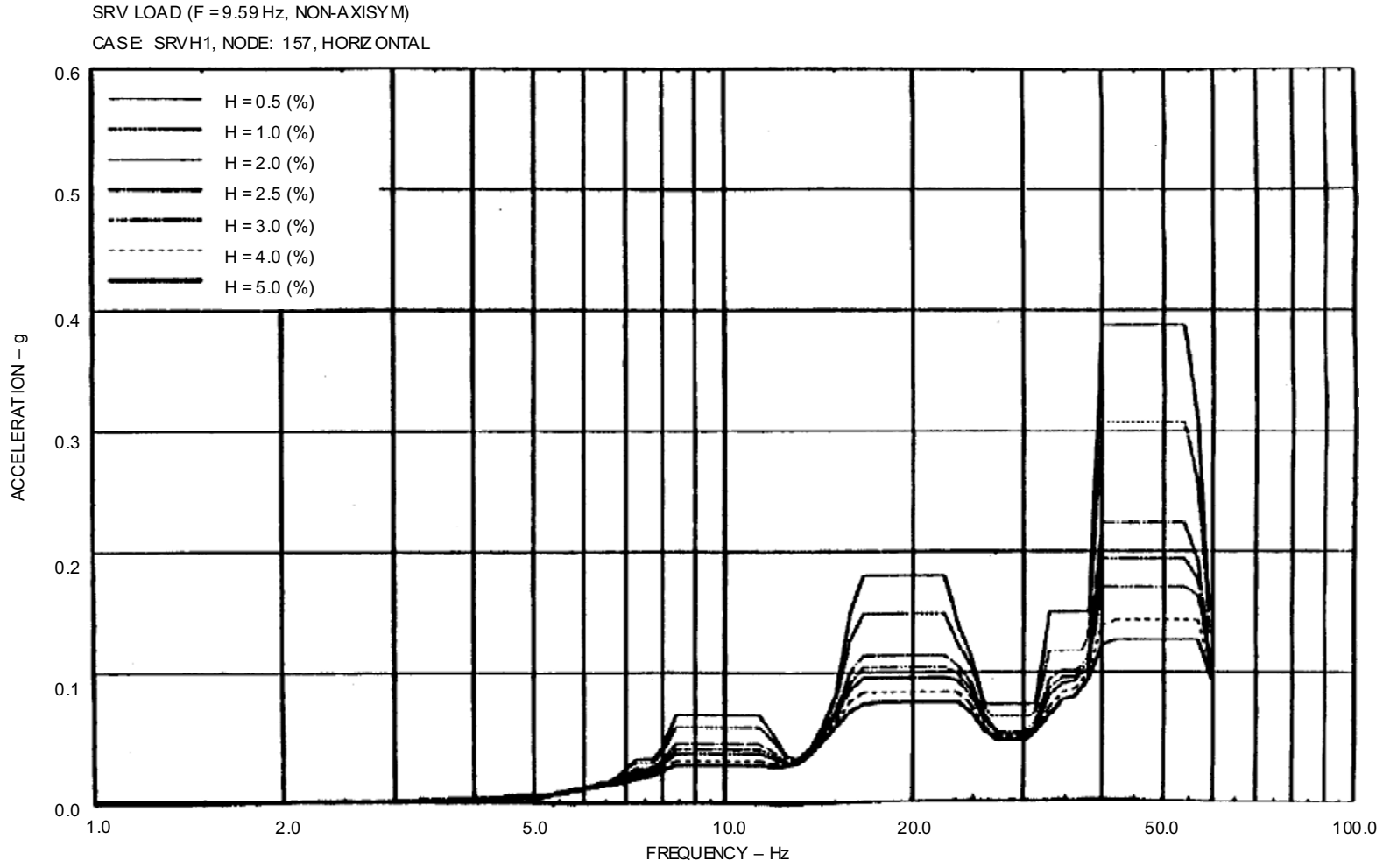


**Figure 3G-30 Floor Response Spectrum—Case: SRVH1, Node: 157, Horizontal**

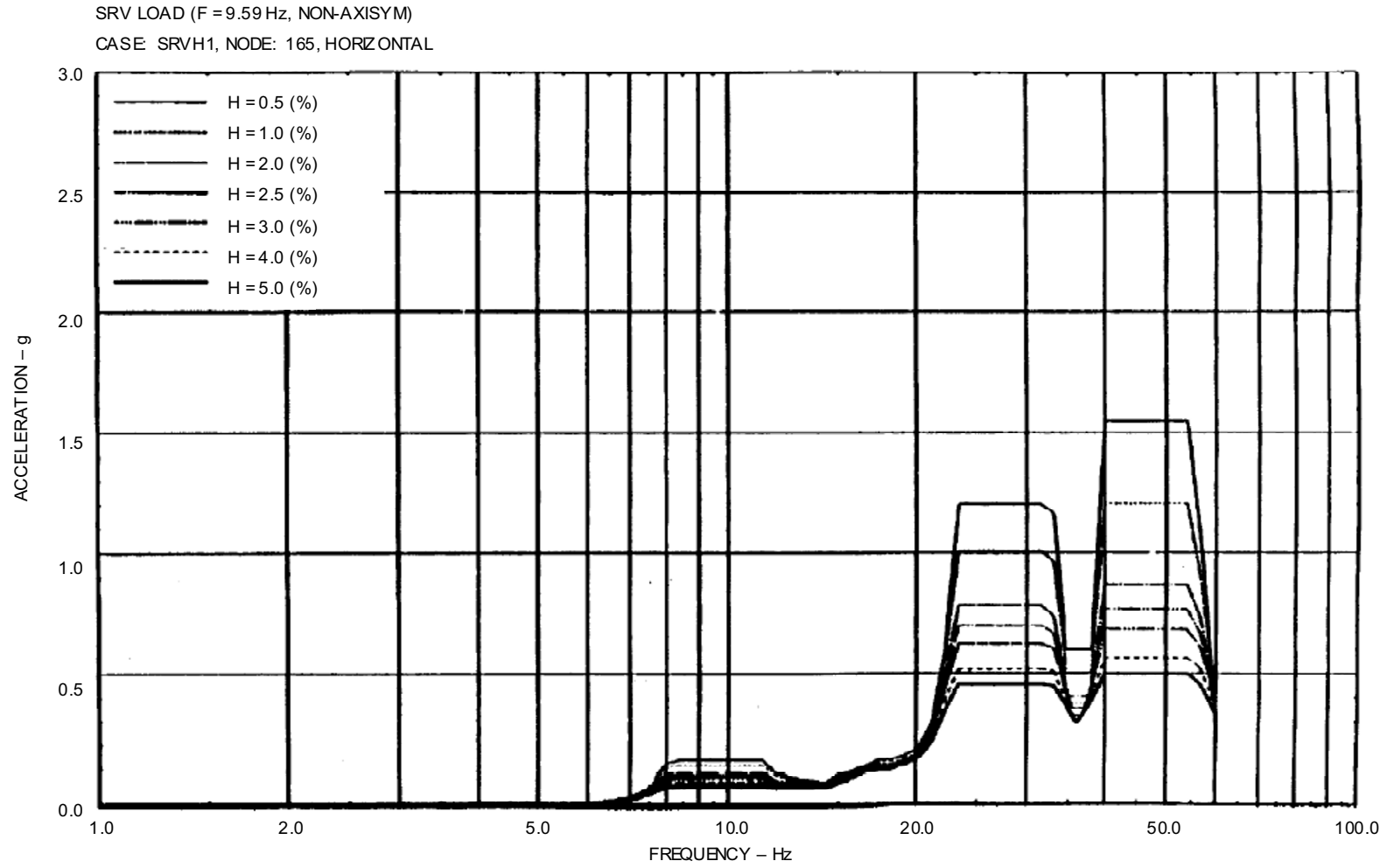


**Figure 3G-31 Floor Response Spectrum—Case: SRVH1, Node: 165, Horizontal**

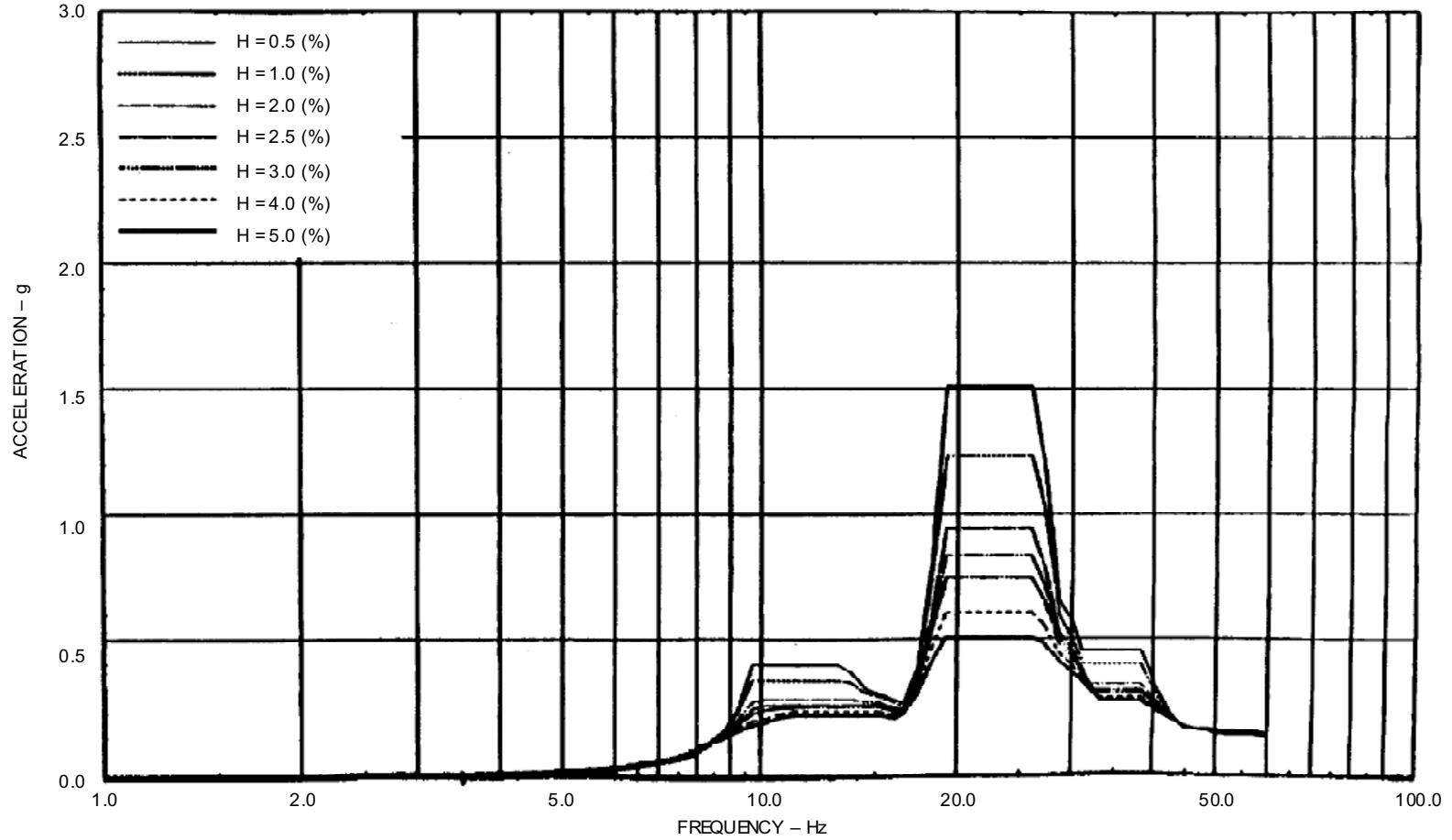


**Figure 3G-32 Floor Response Spectrum—Case: SRVH2, Node: 33, Horizontal**

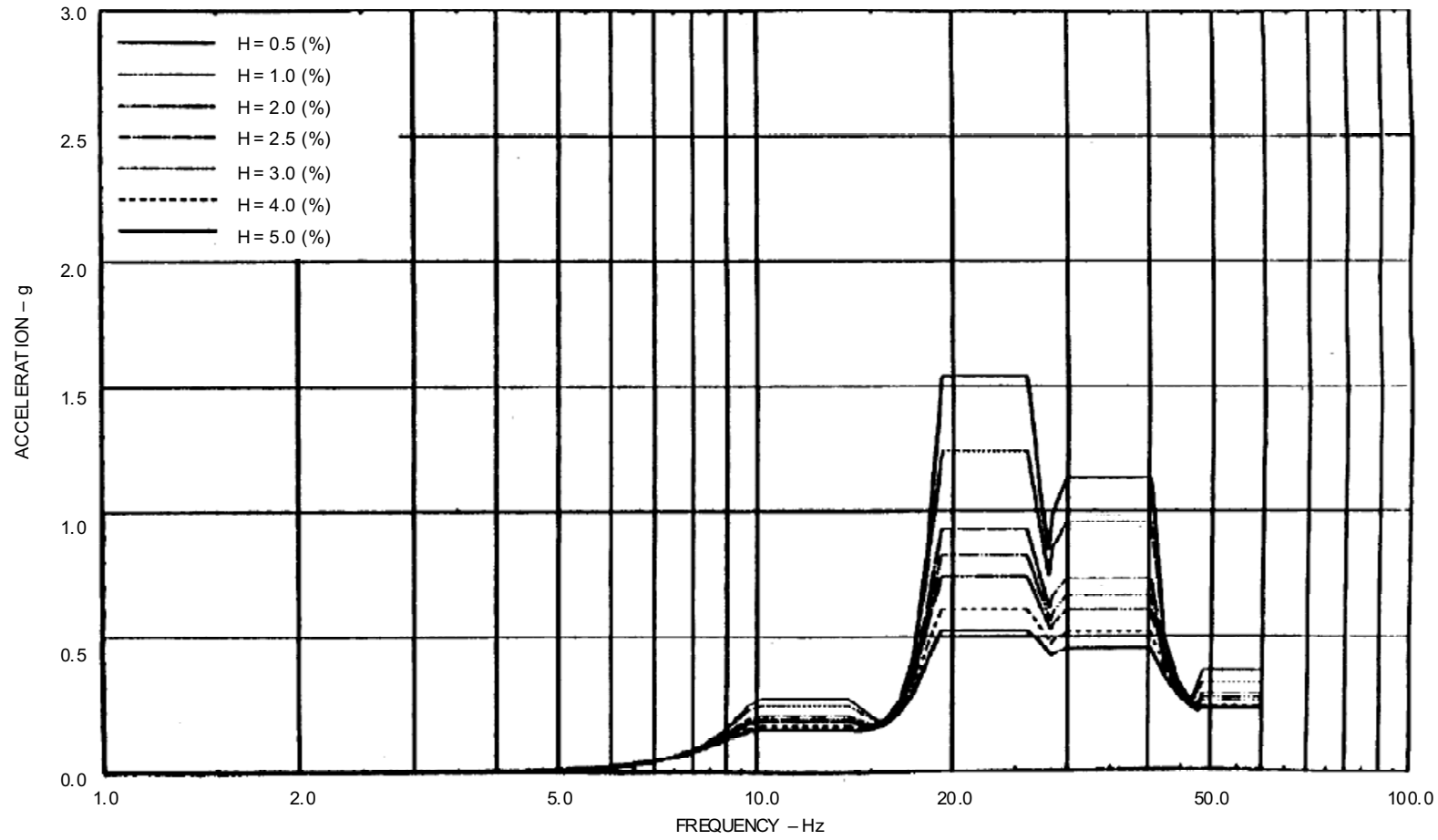


**Figure 3G-33 Floor Response Spectrum—Case: SRVH2, Node: 71, Horizontal**

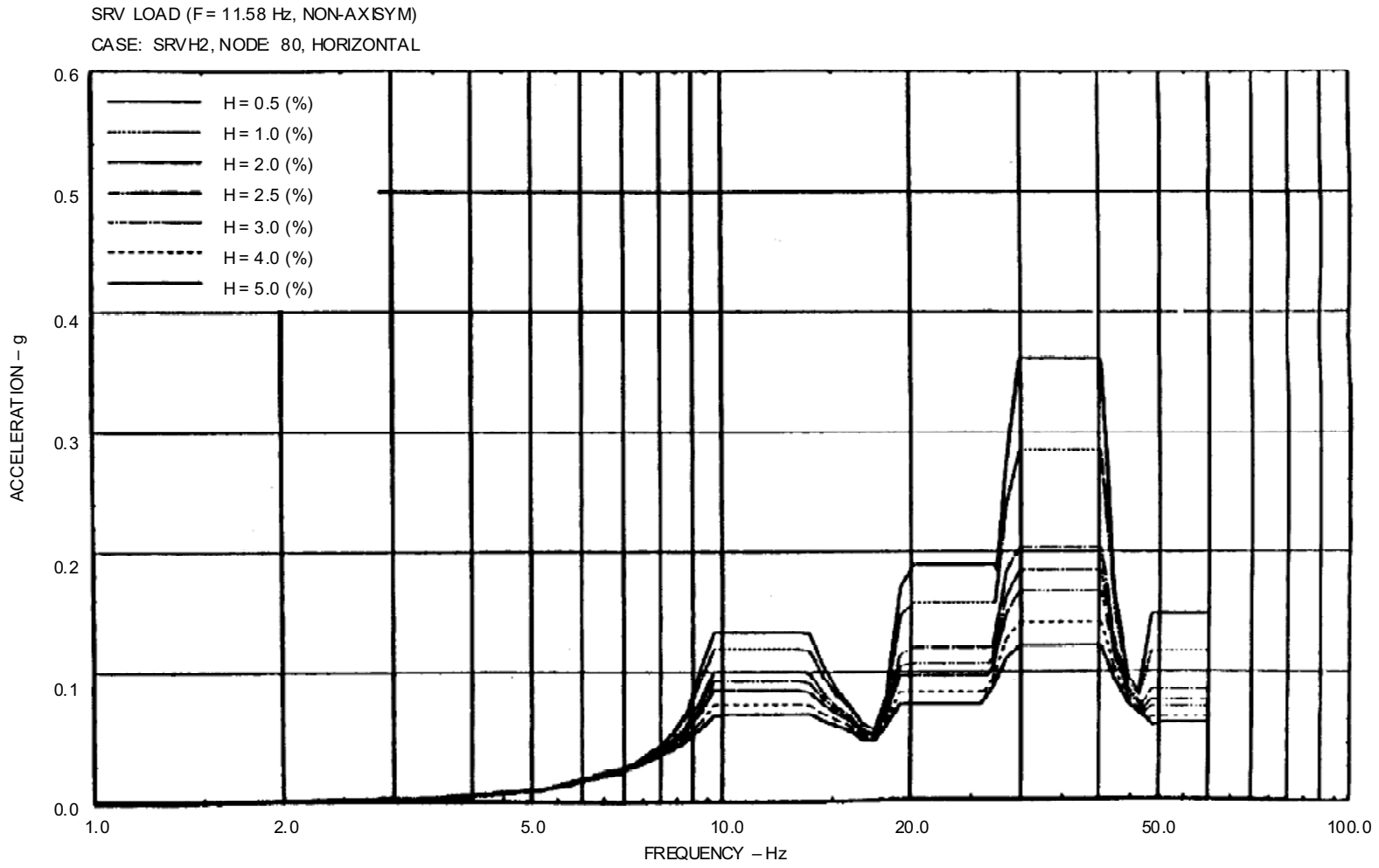


**Figure 3G-34 Floor Response Spectrum—Case: SRVH2, Node: 80, Horizontal**

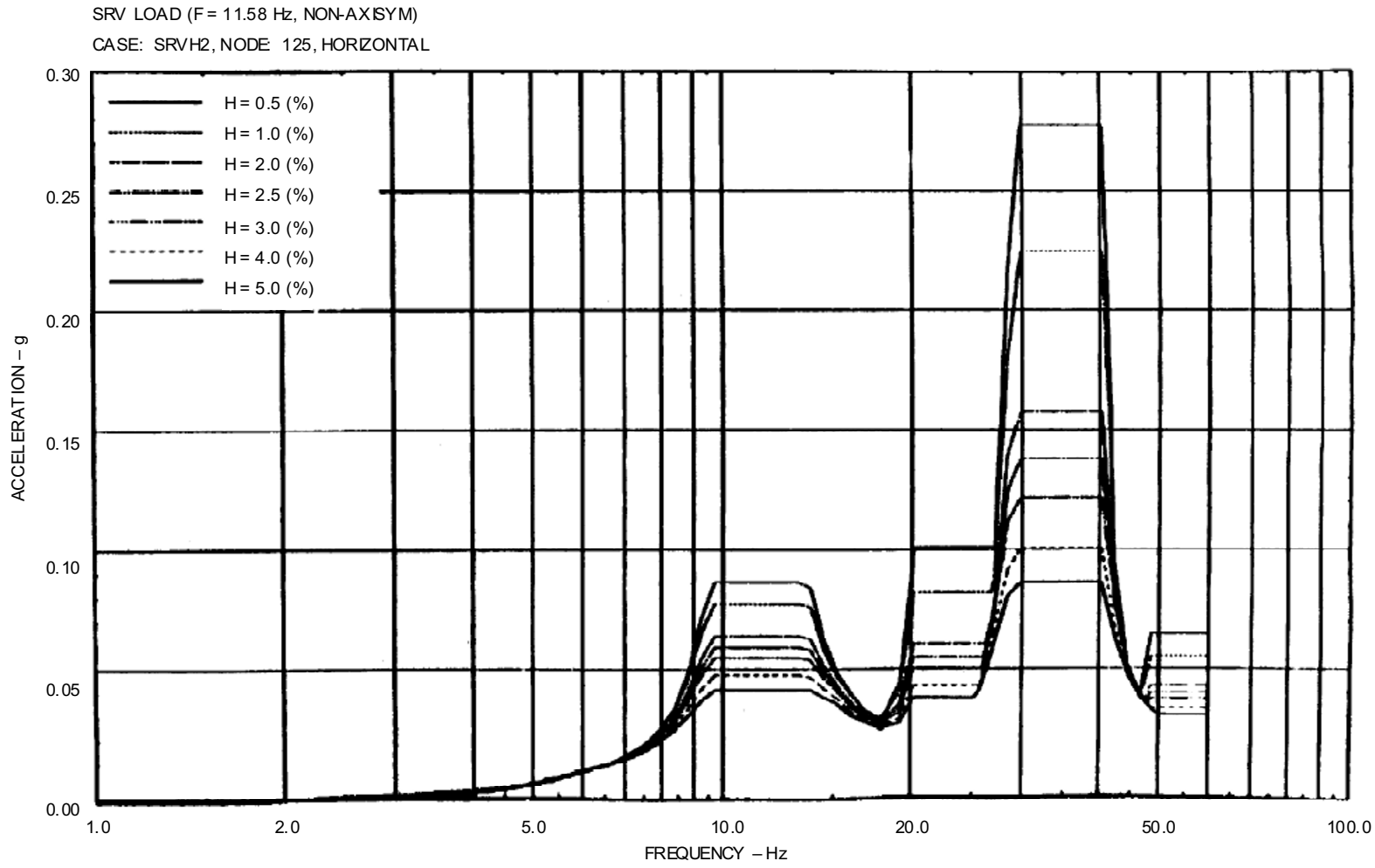


**Figure 3G-35 Floor Response Spectrum—Case: SRVH2, Node: 125, Horizontal**

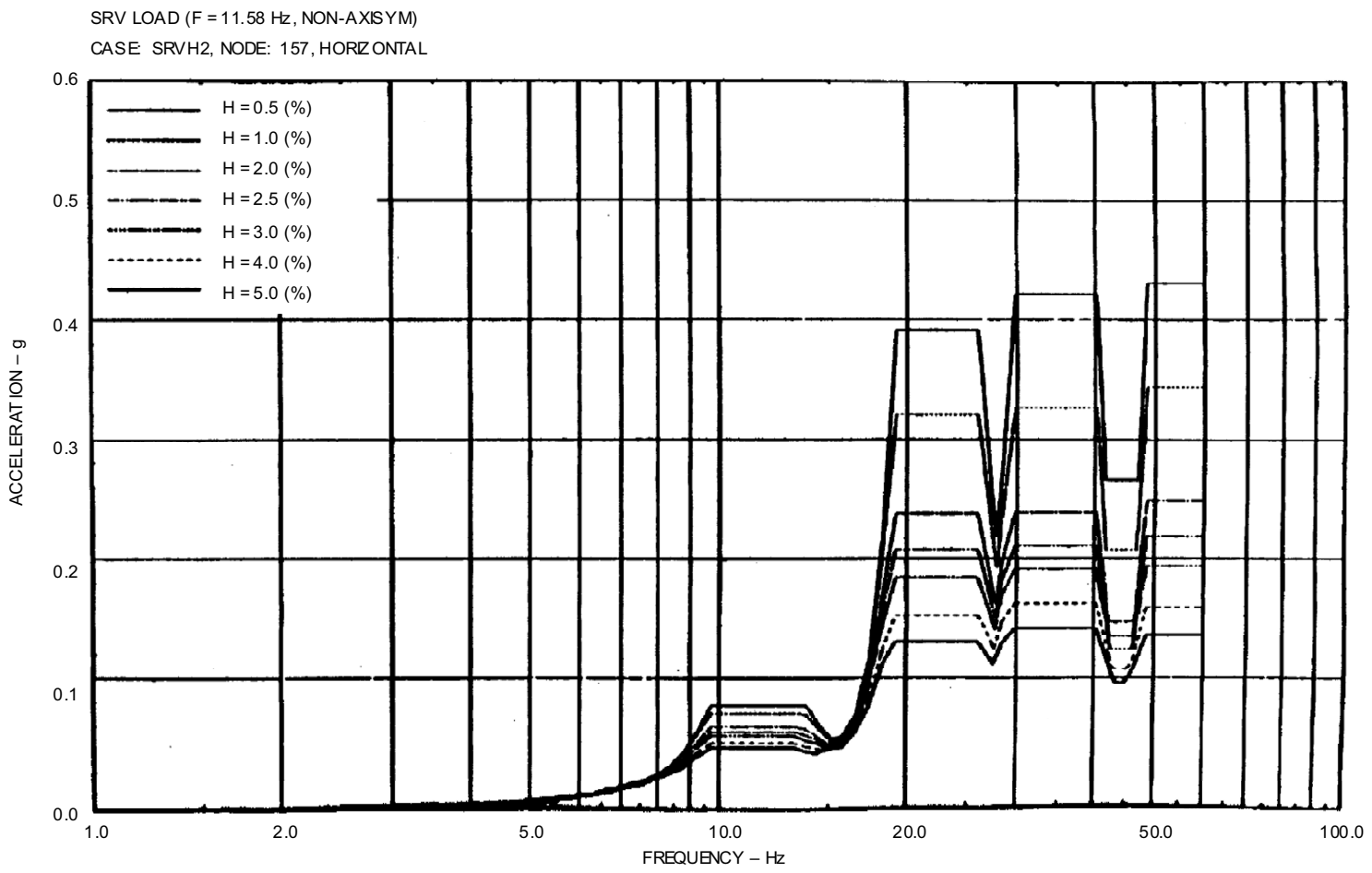


**Figure 3G-36 Floor Response Spectrum—Case: SRVH2, Node: 157, Horizontal**

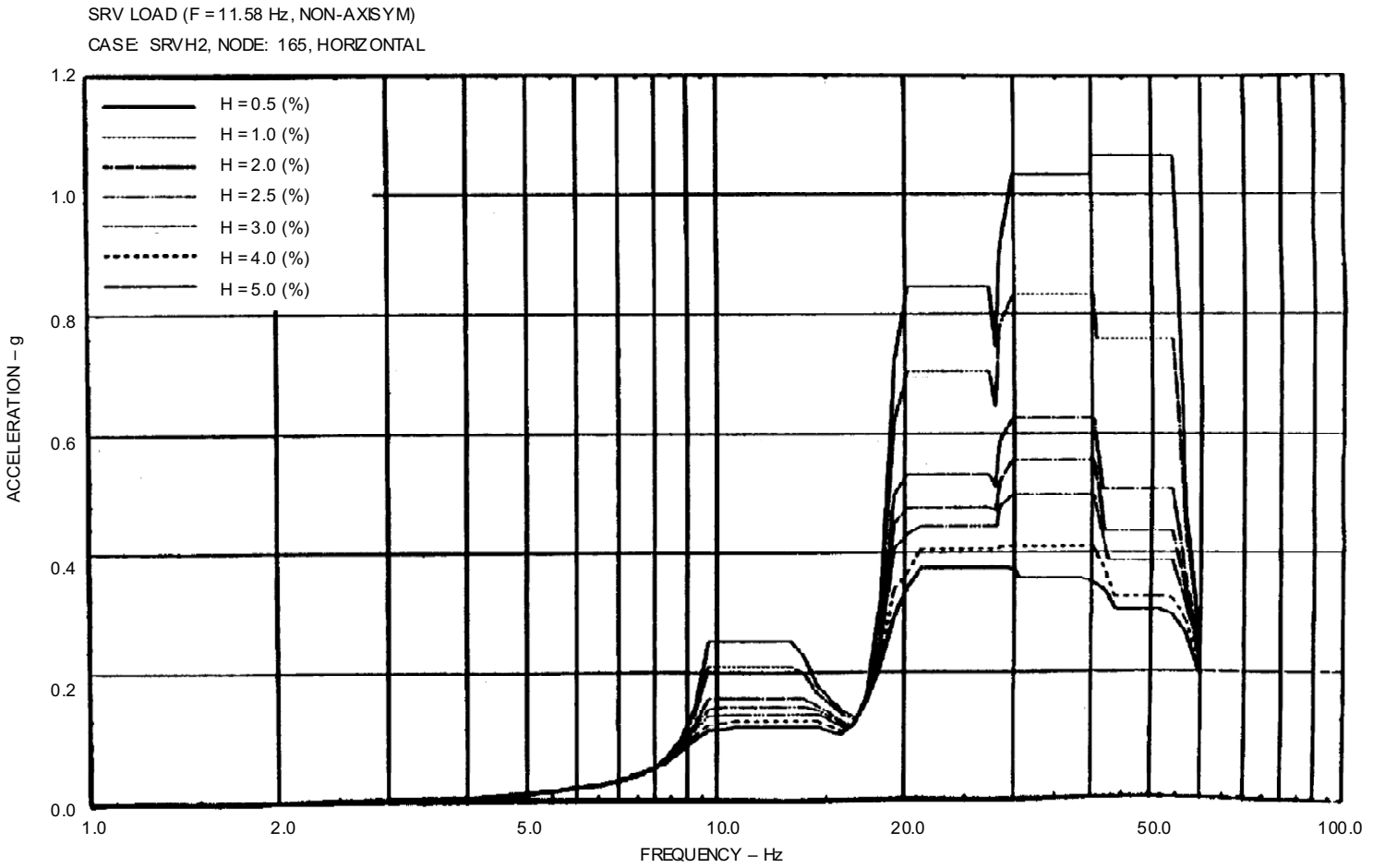


**Figure 3G-37 Floor Response Spectrum—Case: SRVH2, Node: 165, Horizontal**

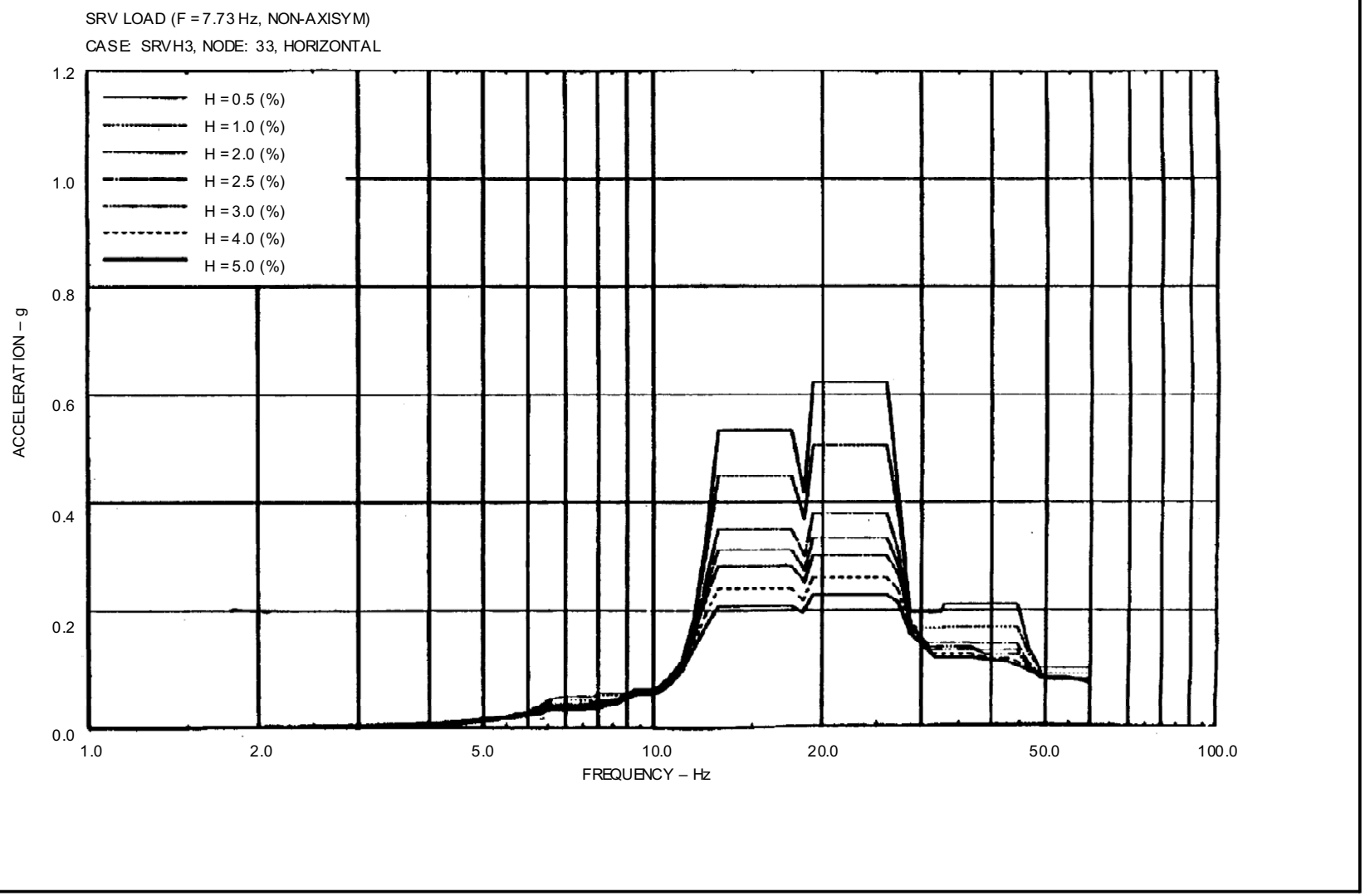


**Figure 3G-38 Floor Response Spectrum—Case: SRVH3, Node: 33, Horizontal**

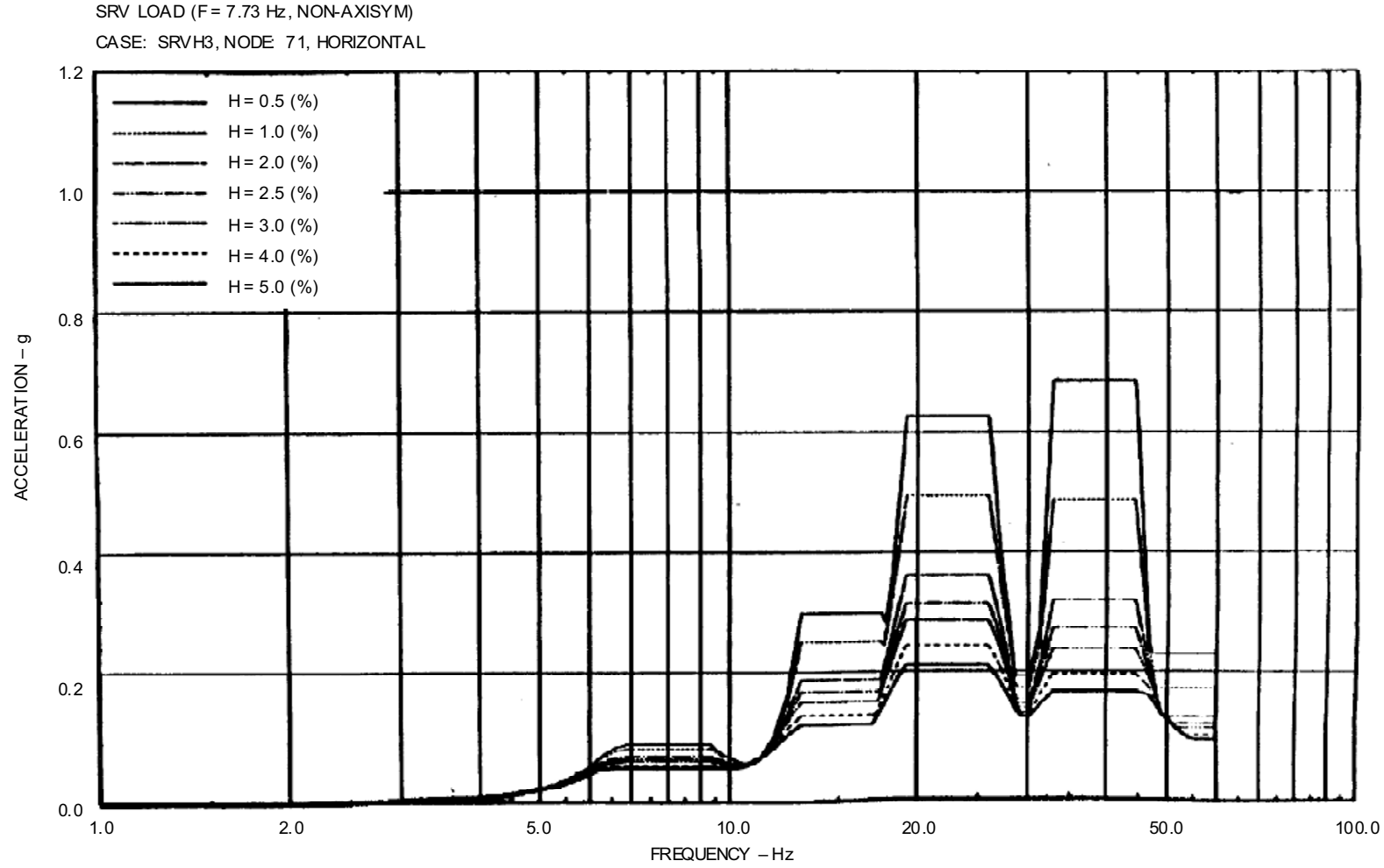


**Figure 3G-39 Floor Response Spectrum—Case: SRVH3, Node: 71, Horizontal**

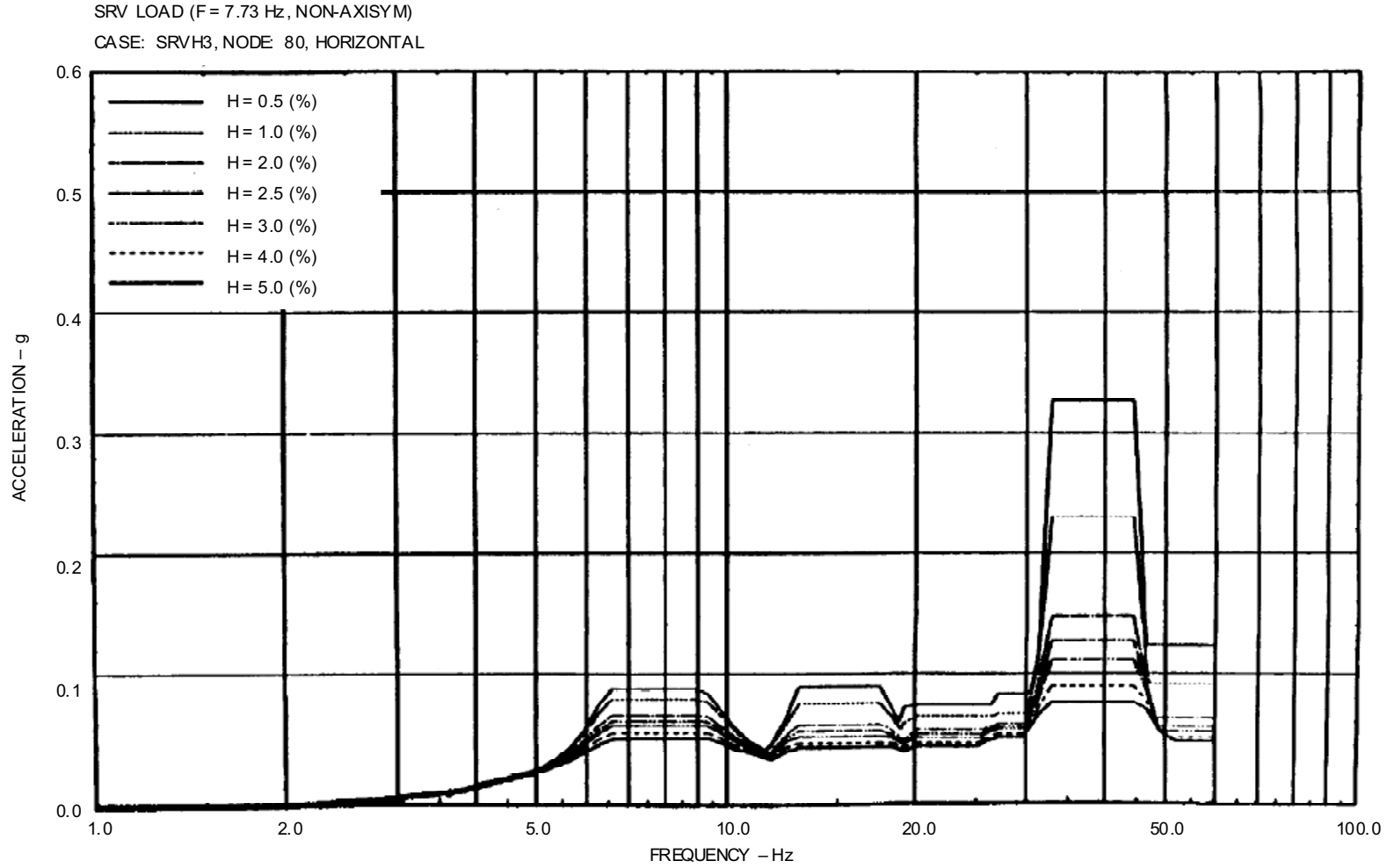


**Figure 3G-40 Floor Response Spectrum—Case: SRVH3, Node: 80, Horizontal**

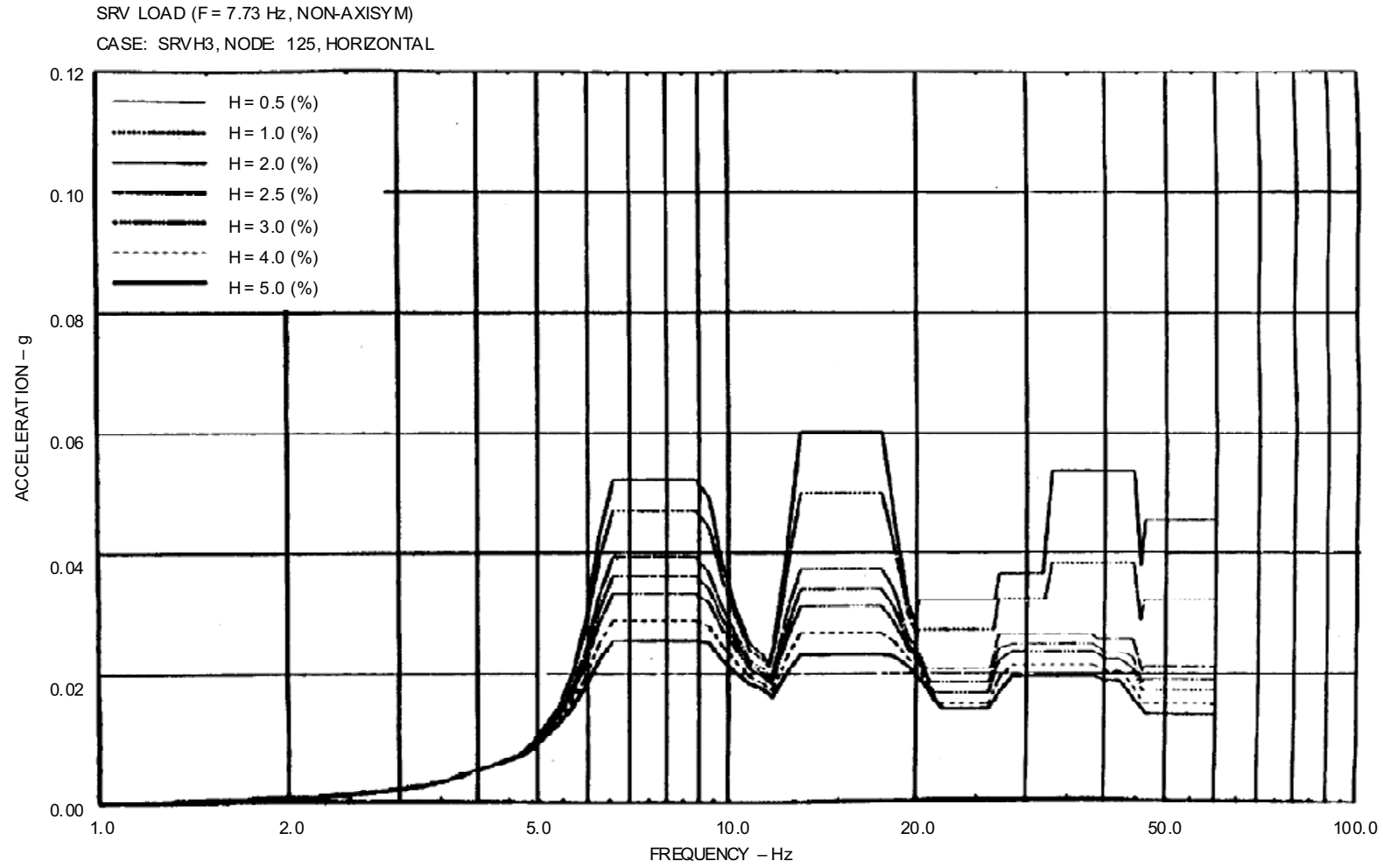


**Figure 3G-41 Floor Response Spectrum—Case: SRVH3, Node: 125, Horizontal**

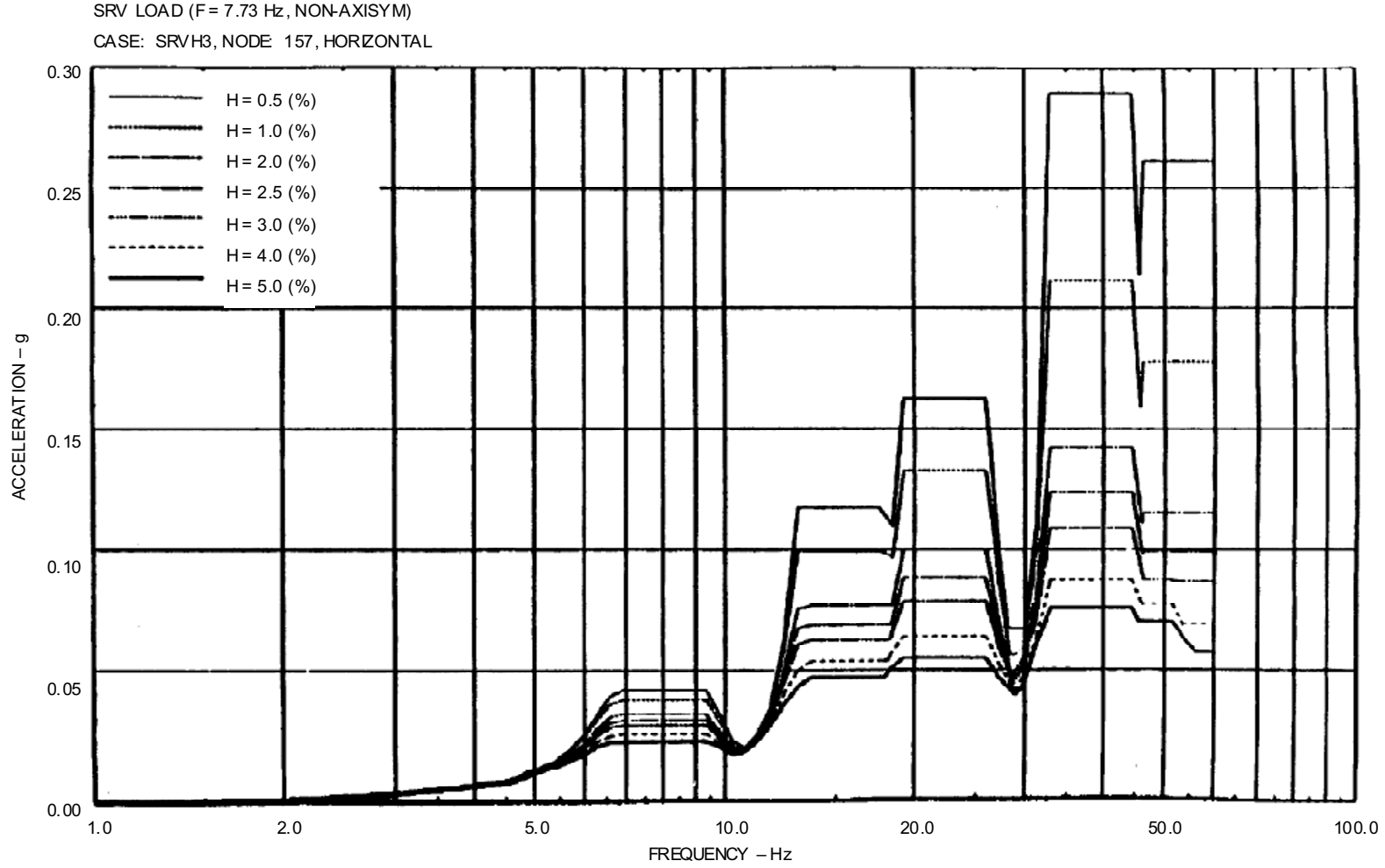


**Figure 3G-42 Floor Response Spectrum—Case: SRVH3, Node: 157, Horizontal**

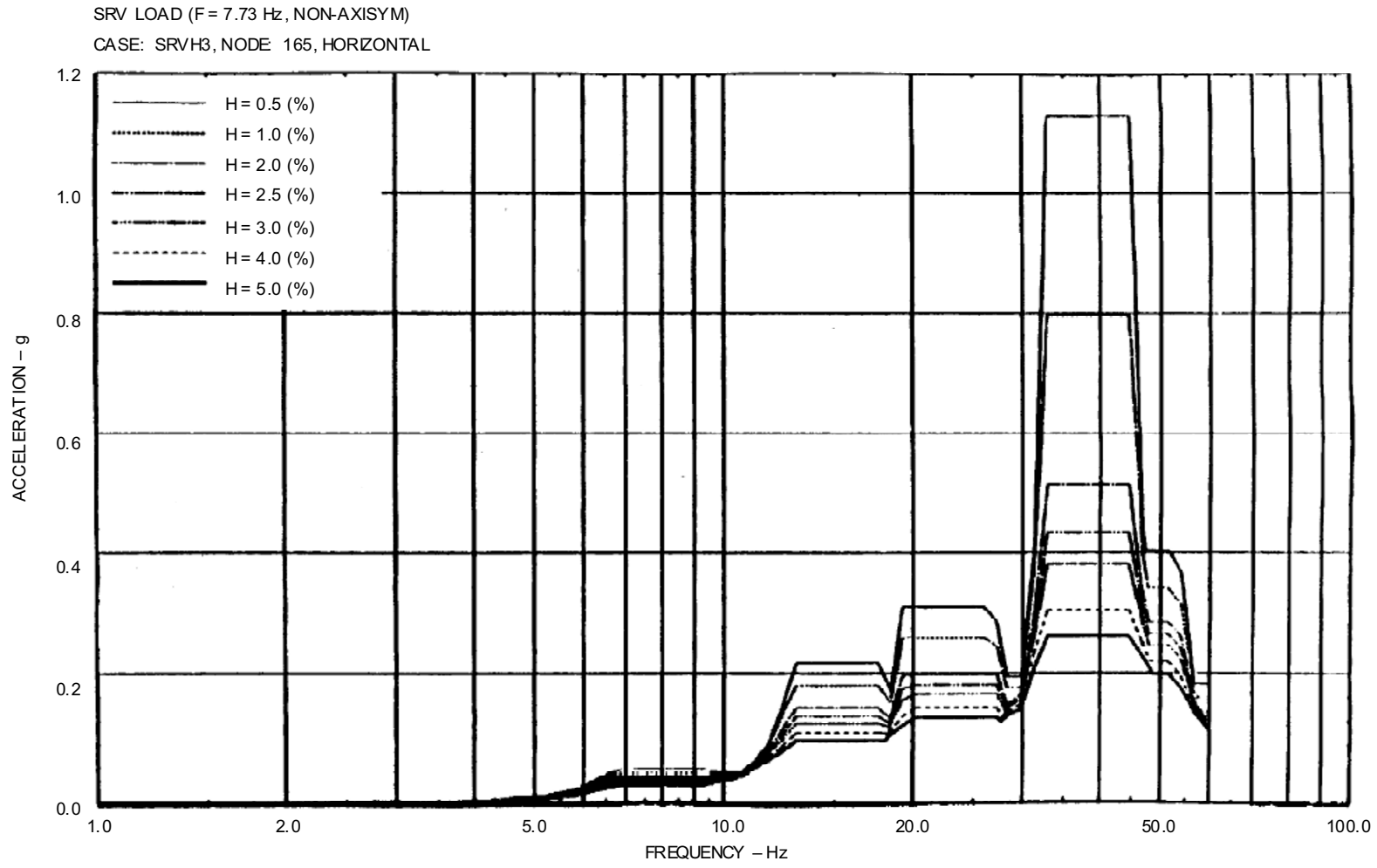


**Figure 3G-43 Floor Response Spectrum—Case: SRVH3, Node: 165, Horizontal**

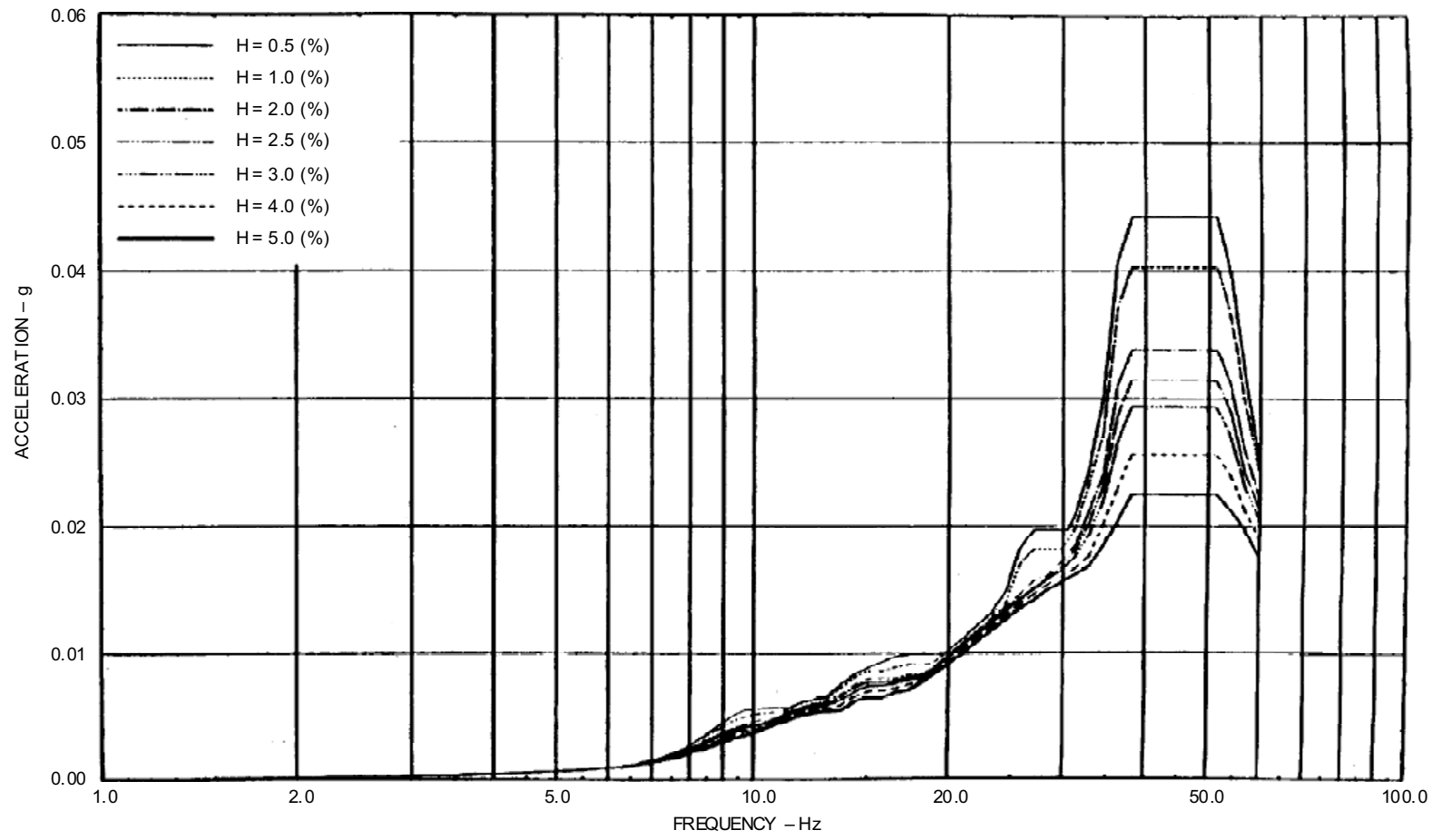


**Figure 3G-44 Floor Response Spectrum—Case: HVV, Node: 7, Vertical**

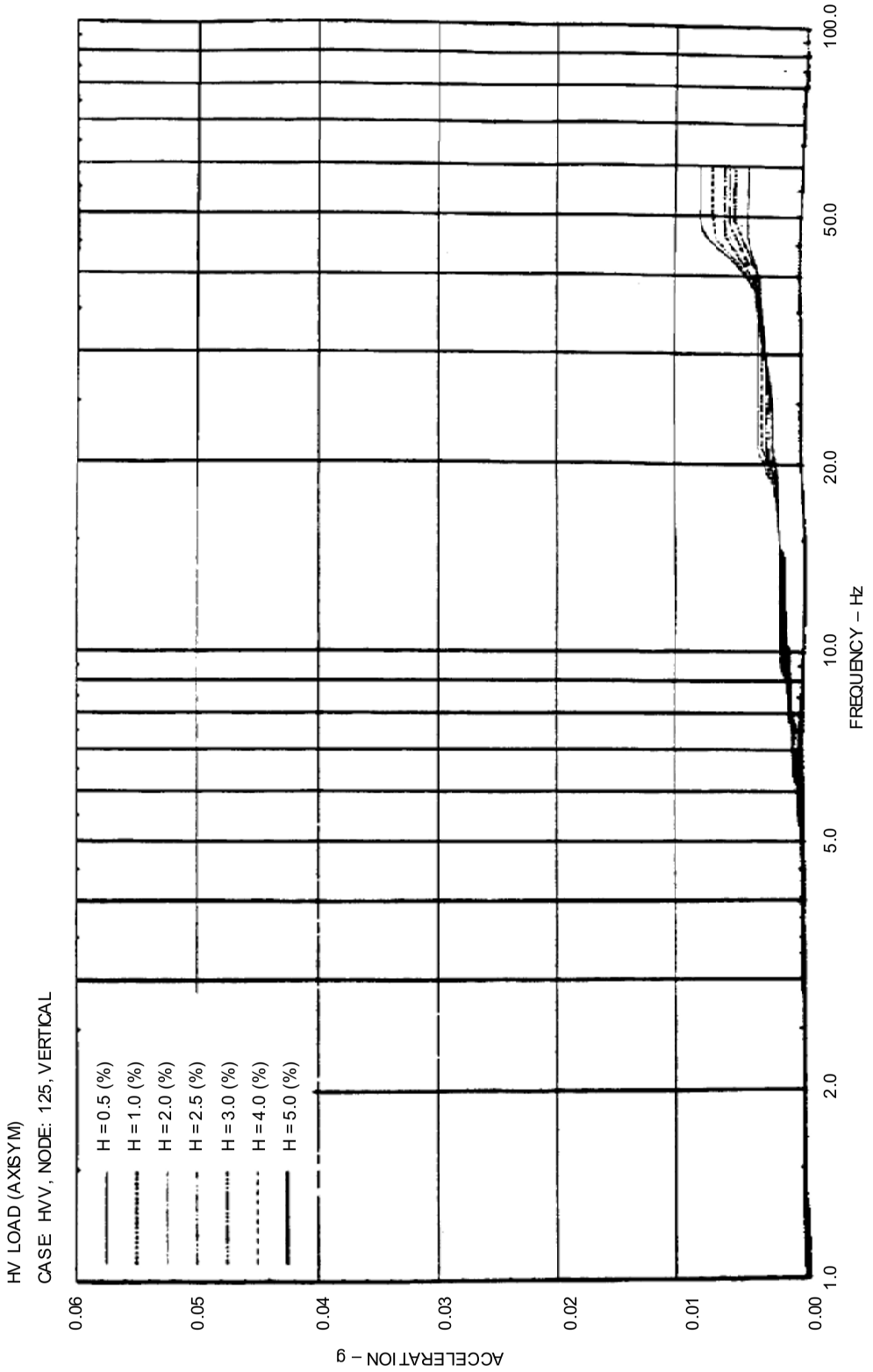


**Figure 3G-45 Floor Response Spectrum—Case: HVV, Node: 125, Vertical**

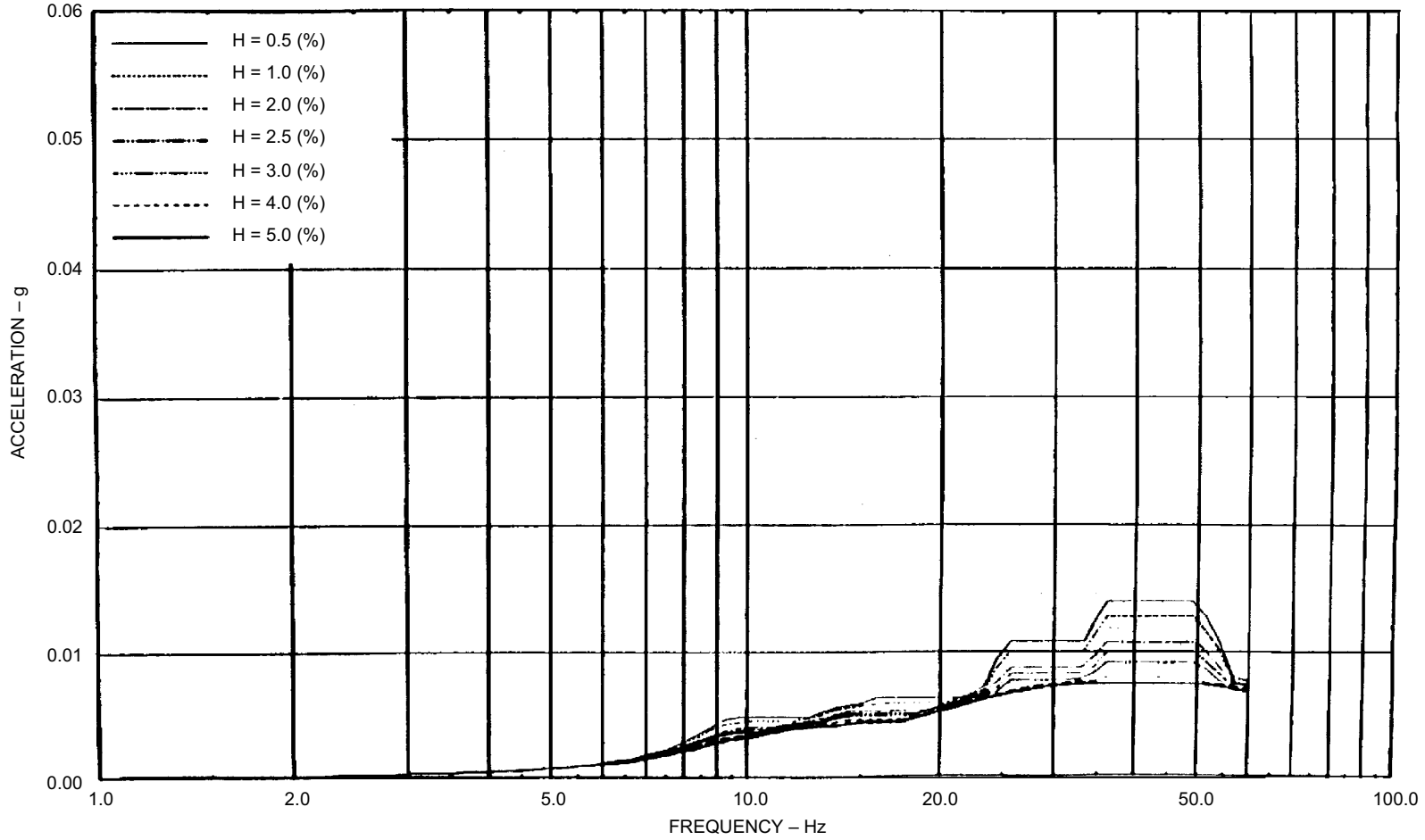


**Figure 3G-46 Floor Response Spectrum—Case: HVV, Node: 148, Vertical**

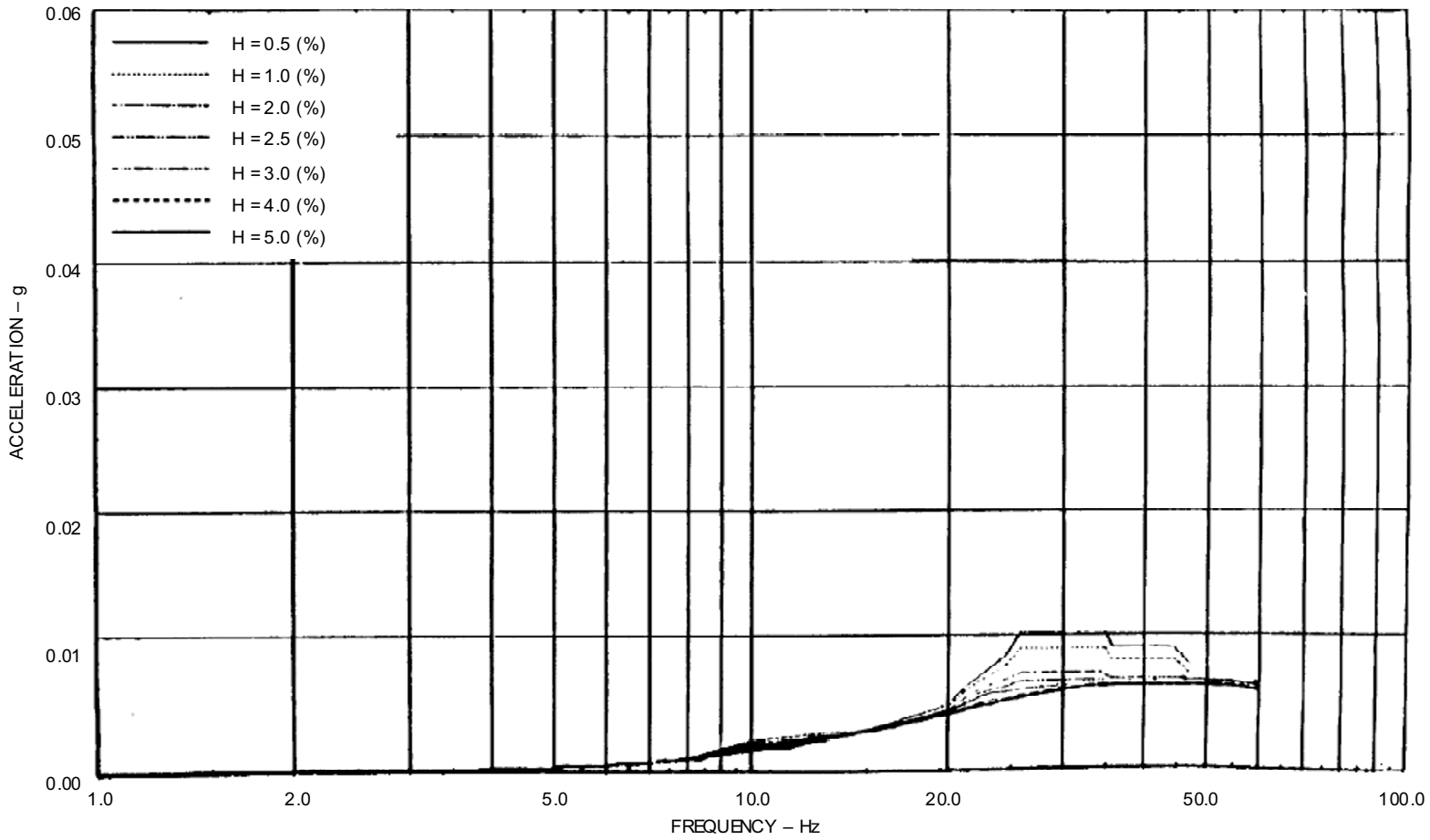


**Figure 3G-47 Floor Response Spectrum—Case: HVV, Node: 157, Vertical**

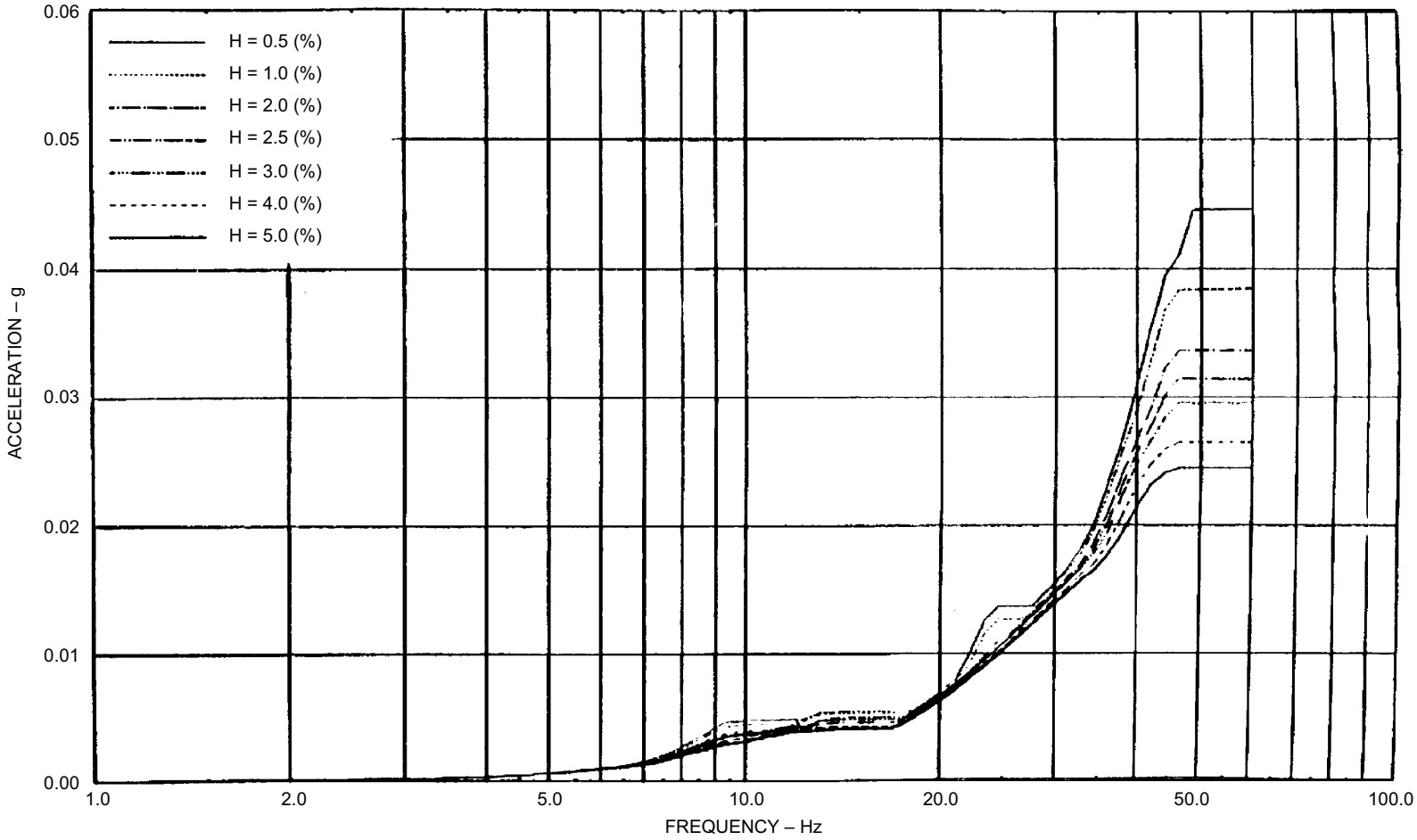


**Figure 3G-48 Floor Response Spectrum—Case: HVV, Node: 165, Vertical**

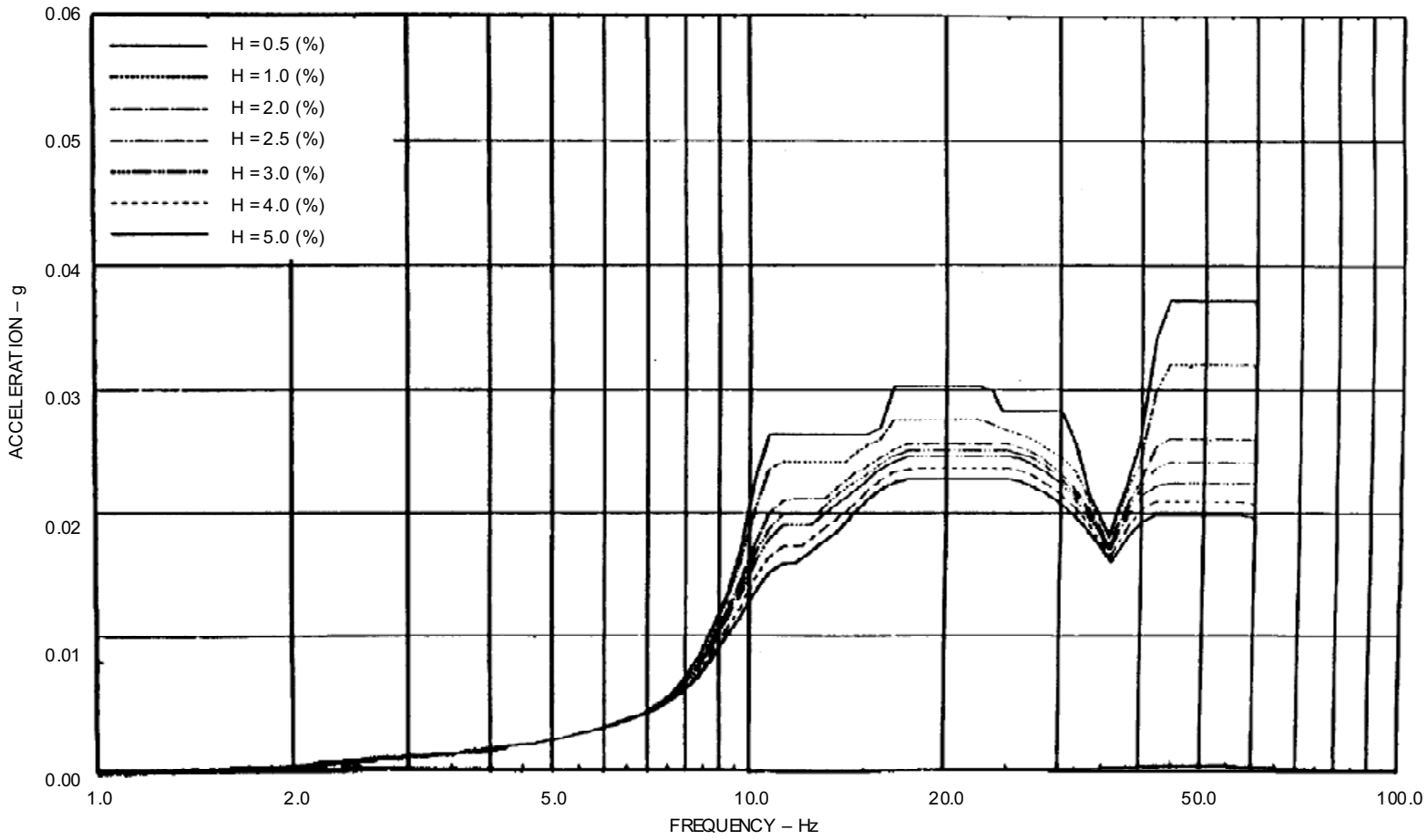


**Figure 3G-49 Floor Response Spectrum—Case: HVH, Node: 33, Horizontal**

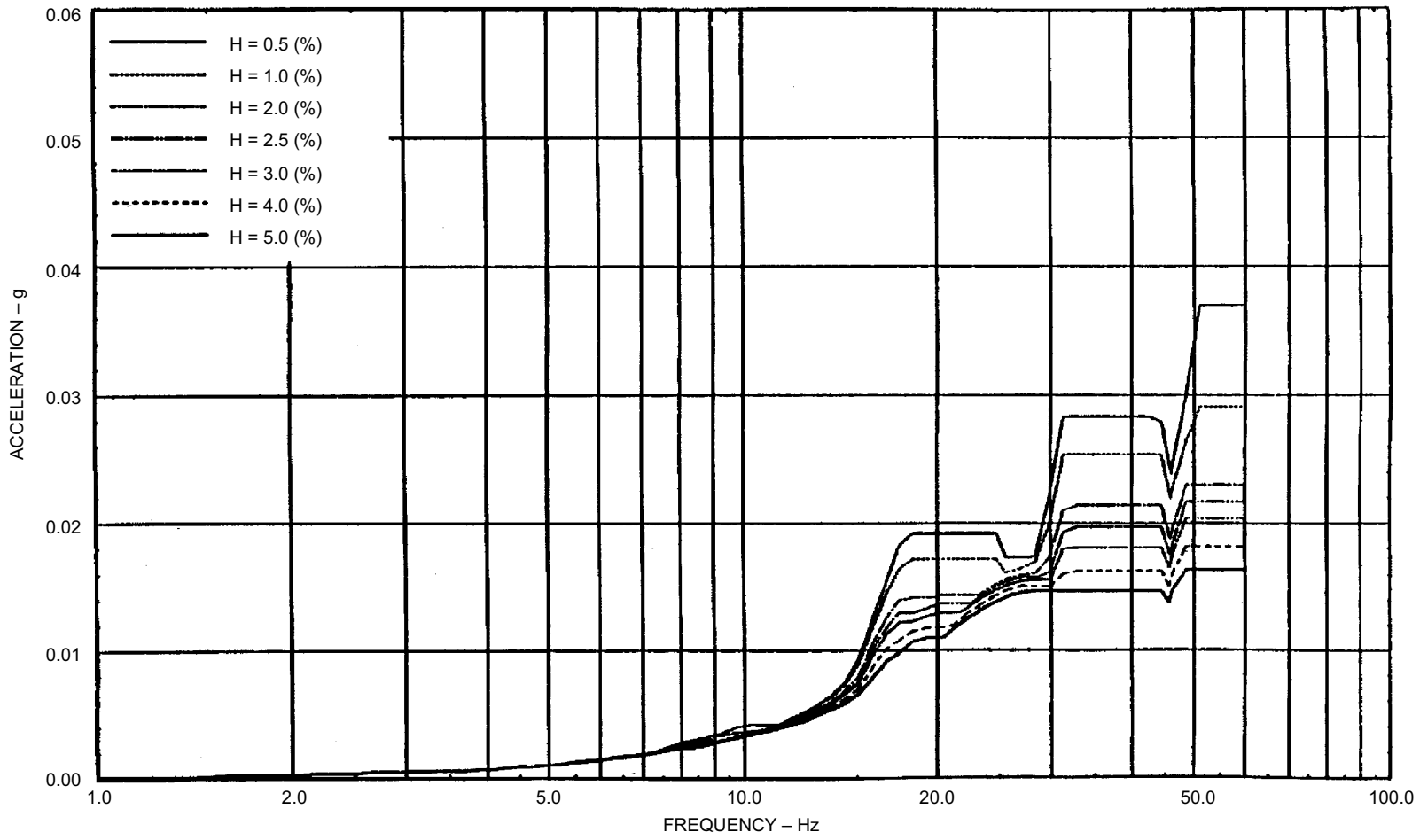


**Figure 3G-50 Floor Response Spectrum—Case: HVH, Node: 71, Horizontal**

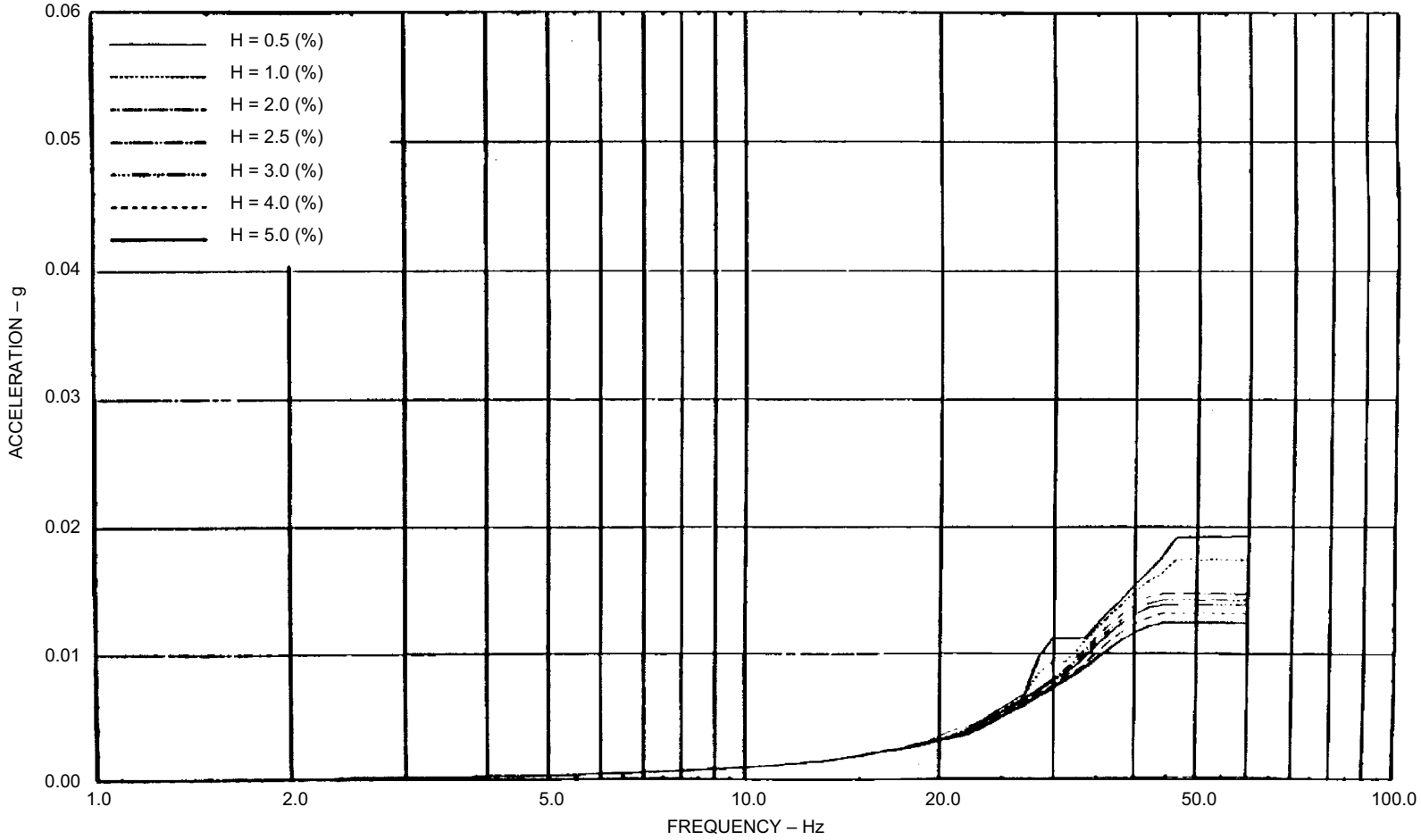


**Figure 3G-51 Floor Response Spectrum—Case: HVH, Node: 125, Horizontal**

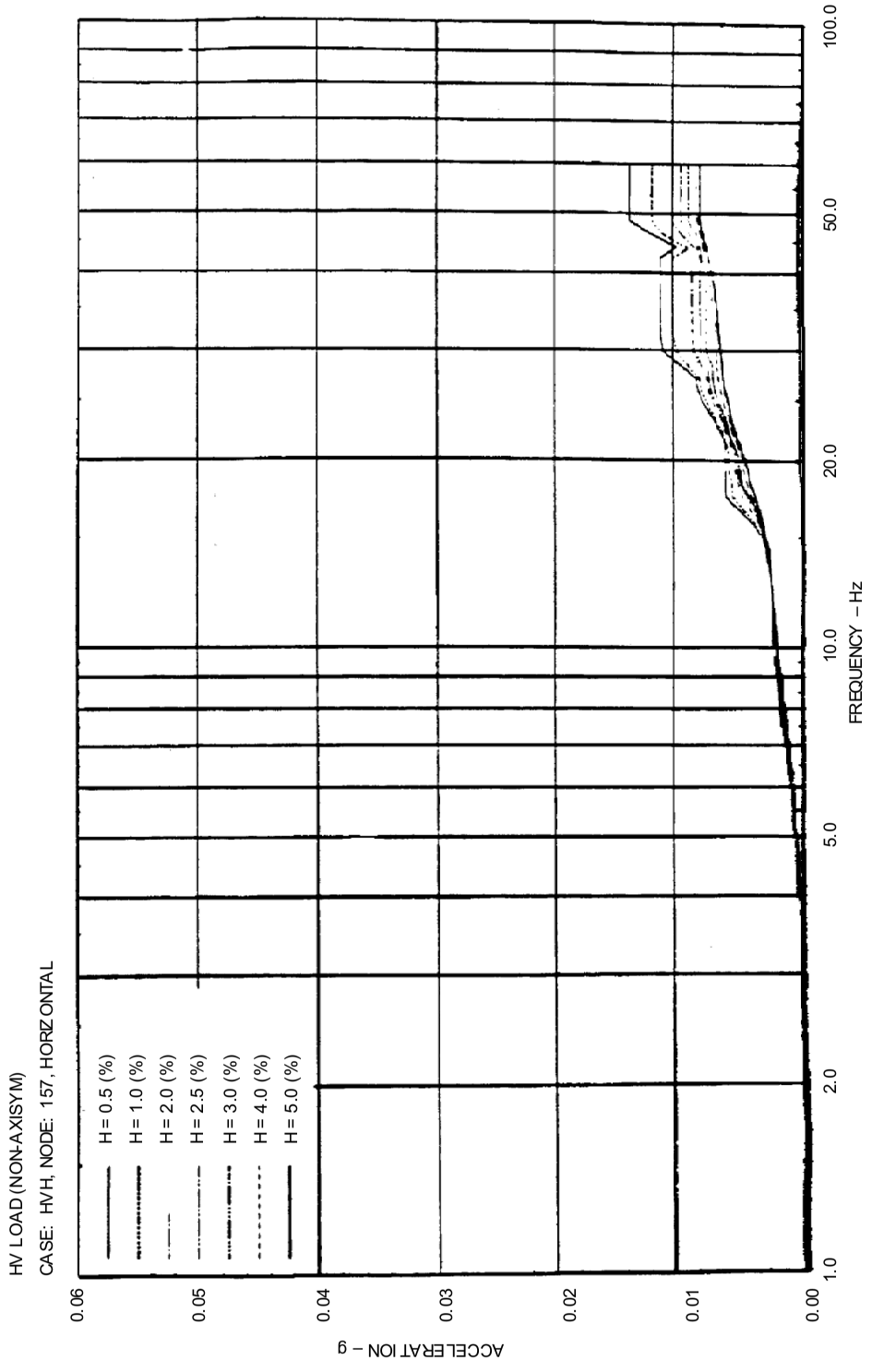


**Figure 3G-52 Floor Response Spectrum—Case: HVH, Node: 157, Horizontal**

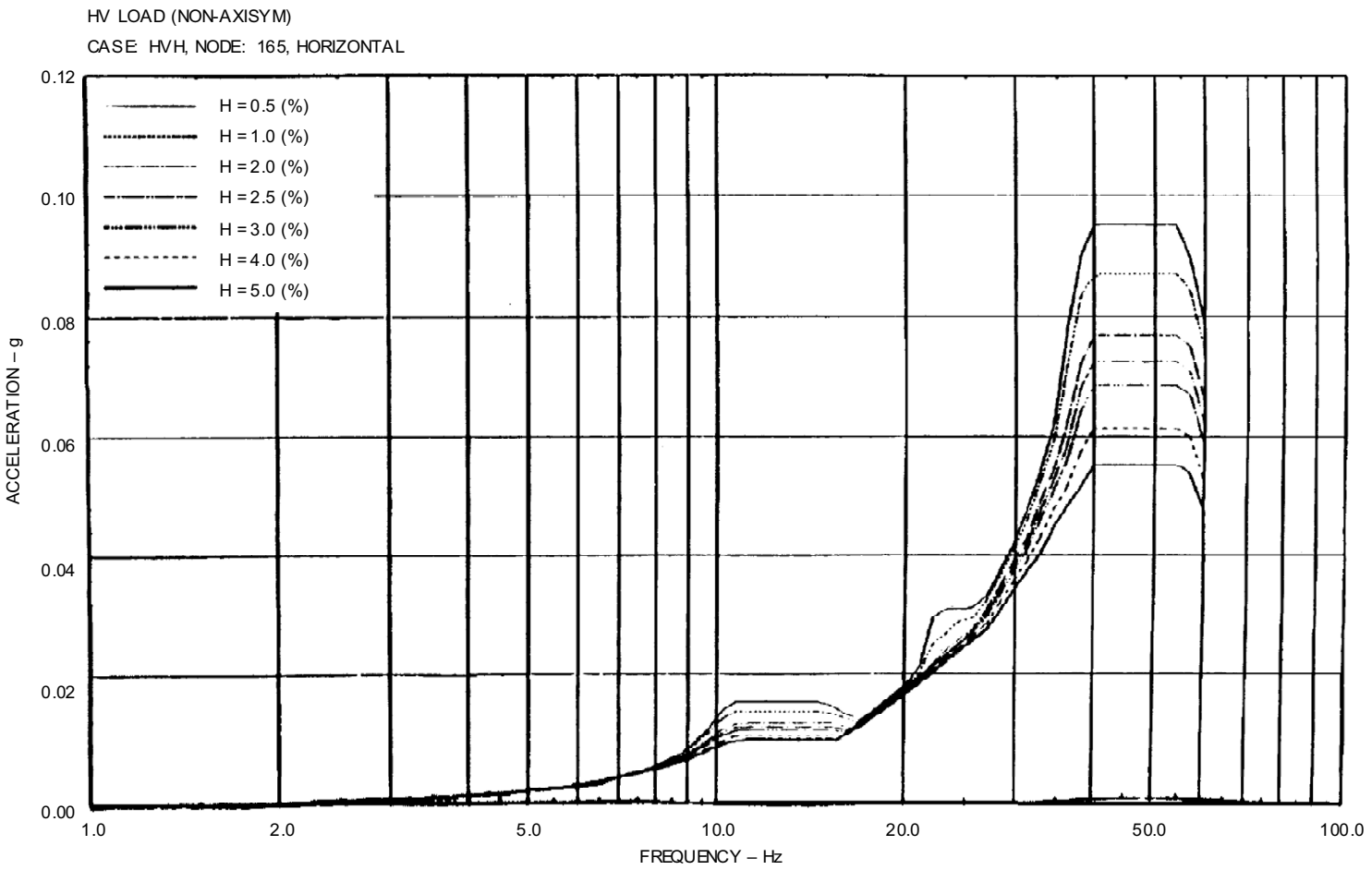


**Figure 3G-53 Floor Response Spectrum—Case: HVH, Node: 165, Horizontal**

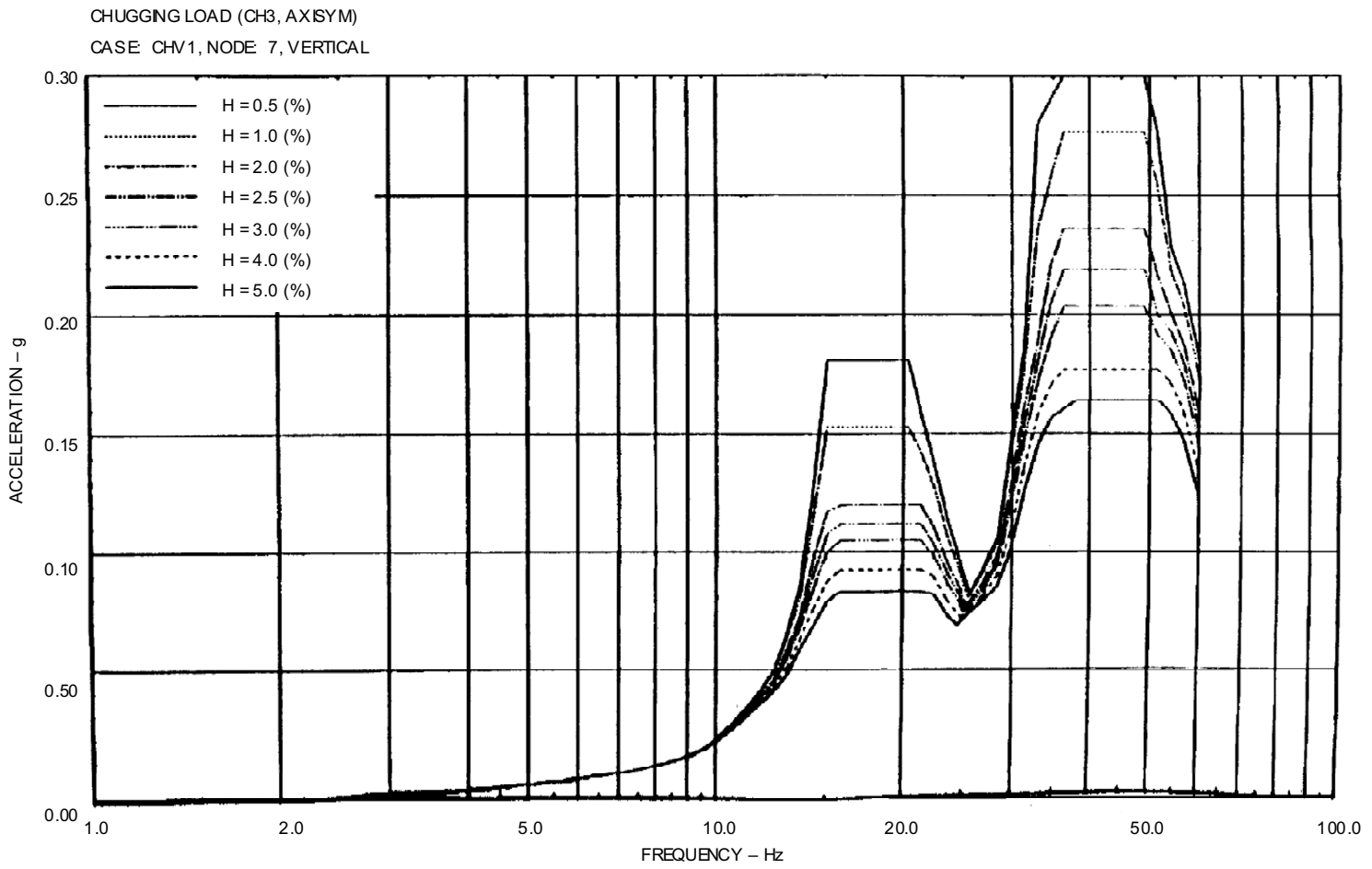


**Figure 3G-54 Floor Response Spectrum—Case: CHV1, Node: 7, Vertical**

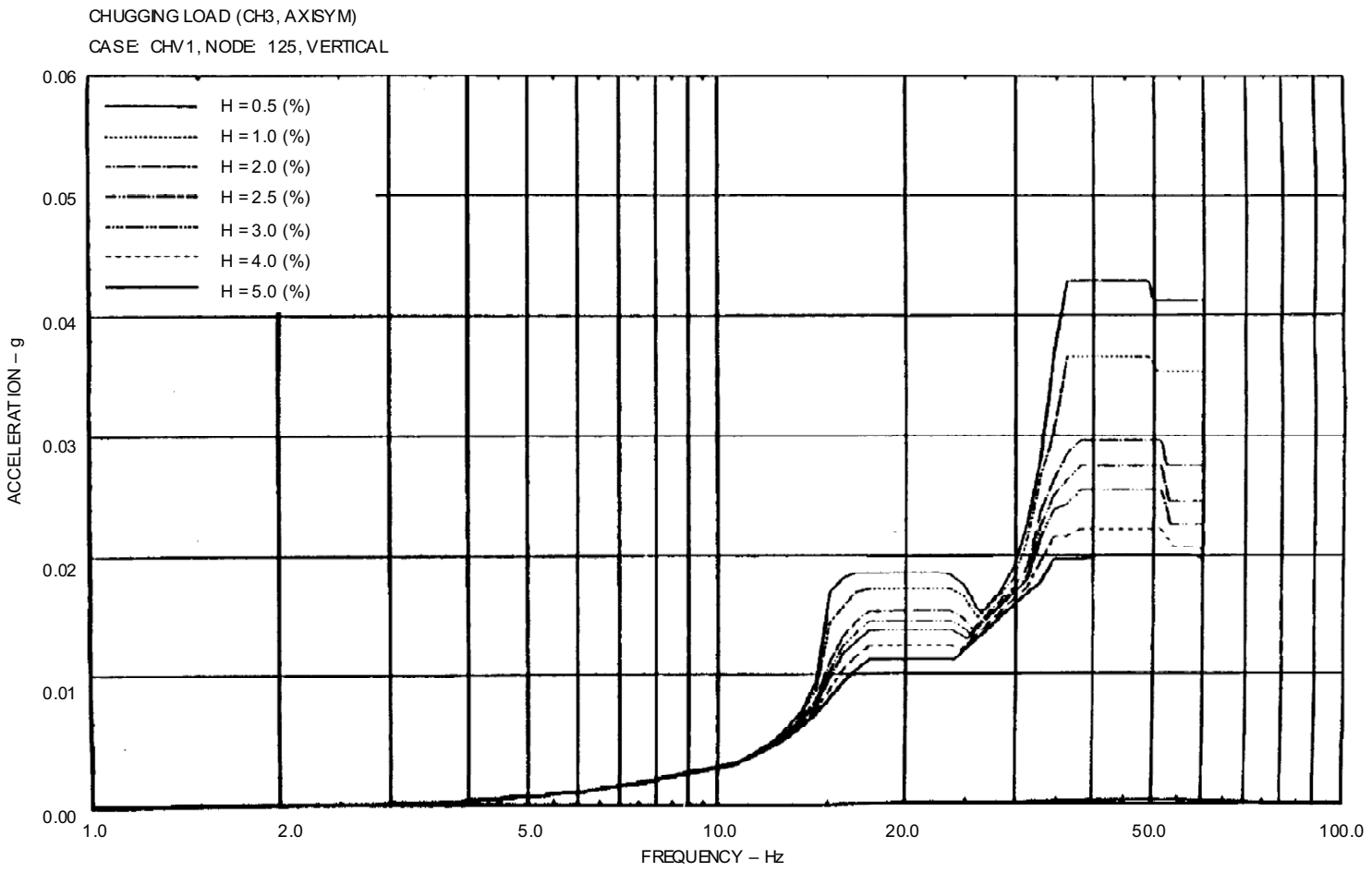


**Figure 3G-55 Floor Response Spectrum—Case: CHV1, Node: 125, Vertical**

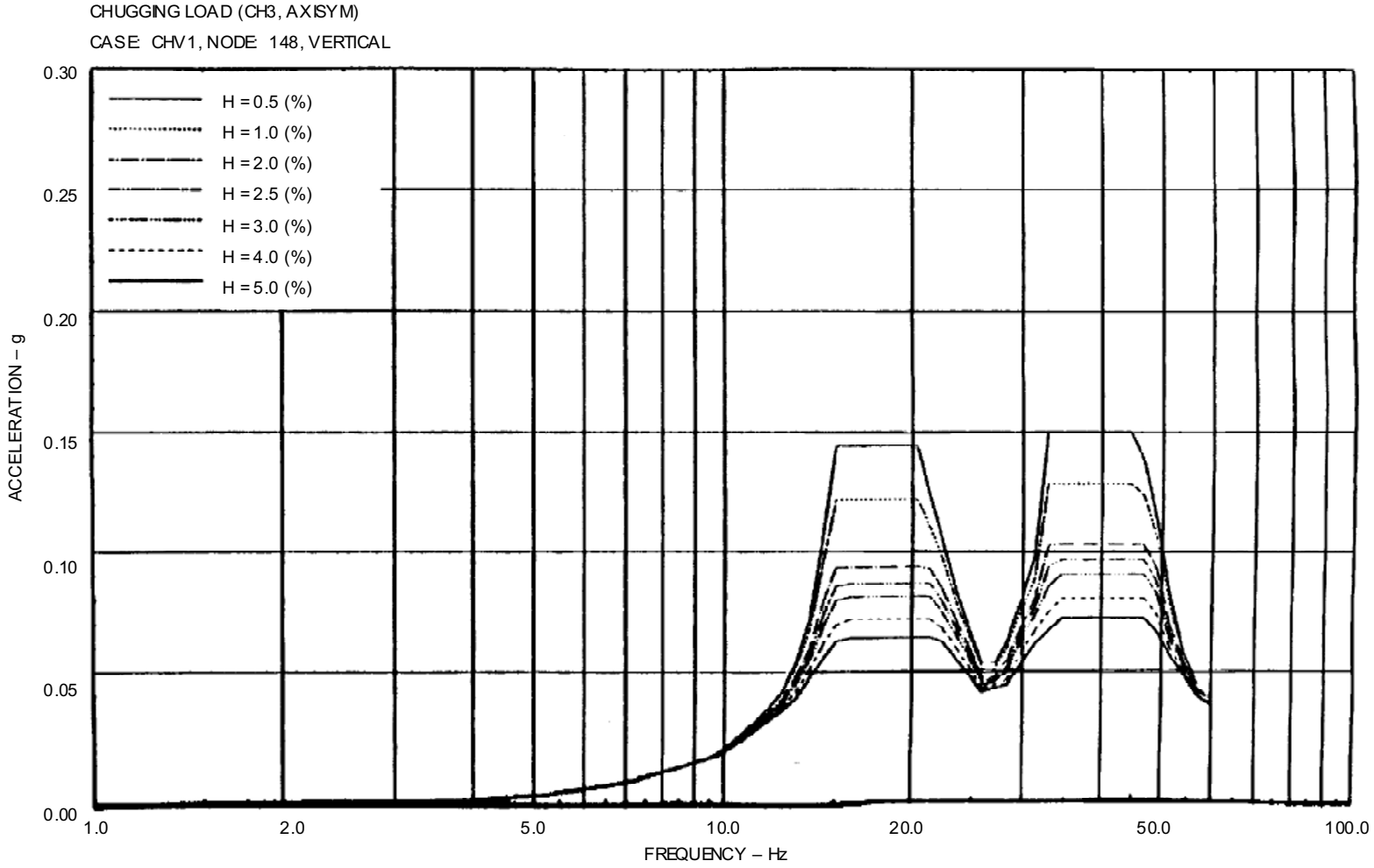


**Figure 3G-56 Floor Response Spectrum—Case: CHV1, Node: 148, Vertical**

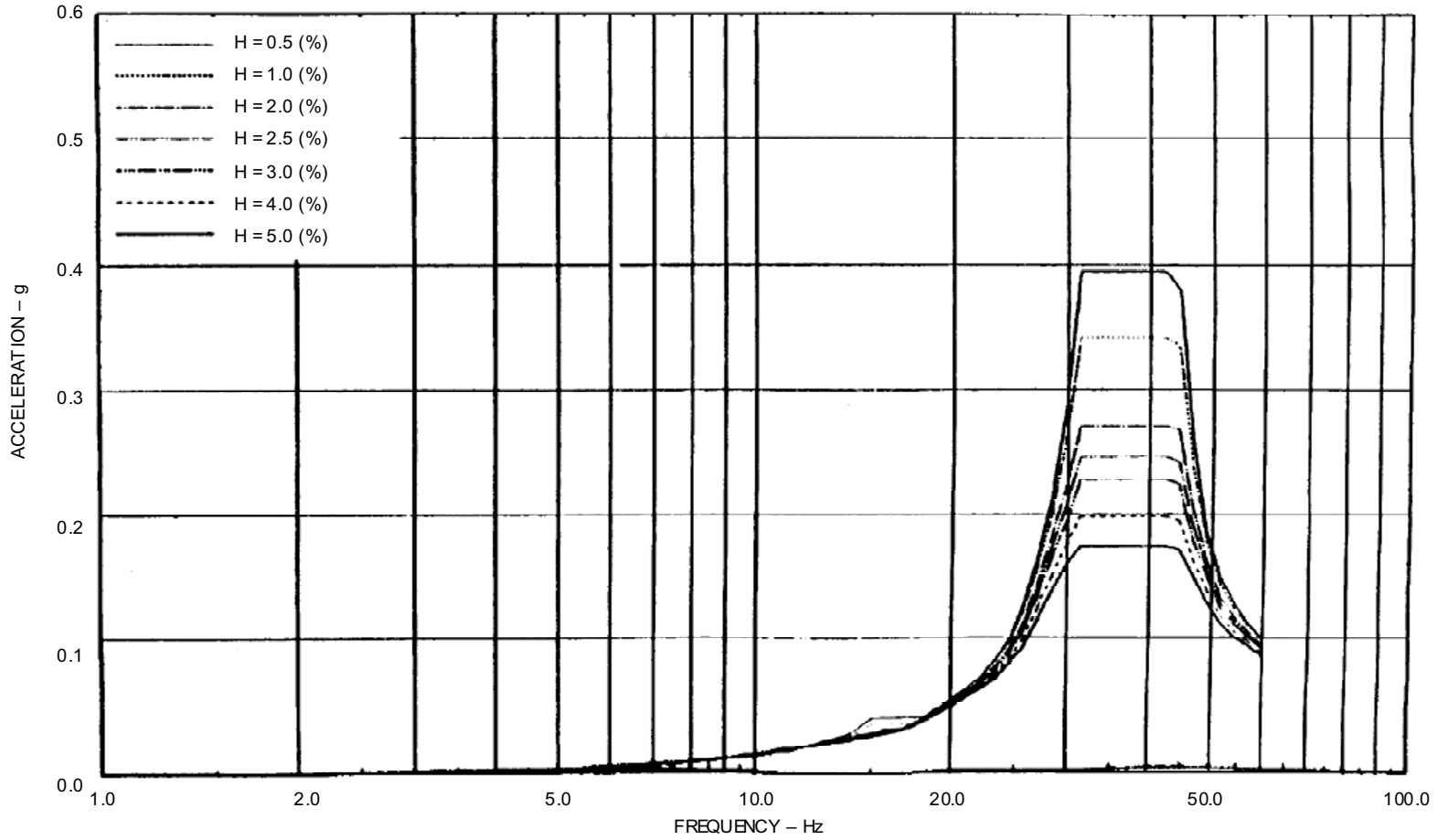


**Figure 3G-57 Floor Response Spectrum—Case: CHV1, Node: 157, Vertical**

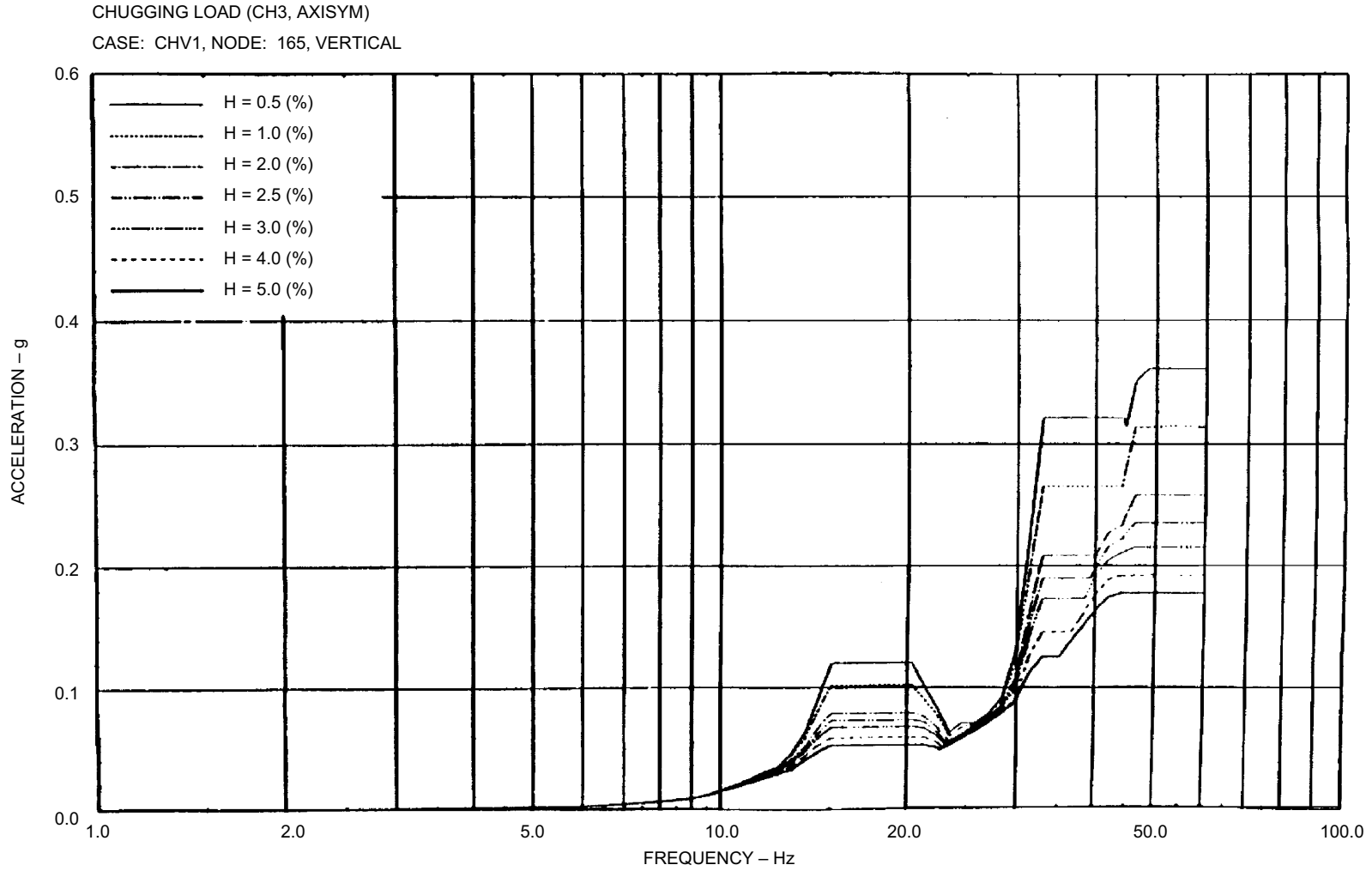


**Figure 3G-58 Floor Response Spectrum—Case: CHV1, Node: 165, Vertical**

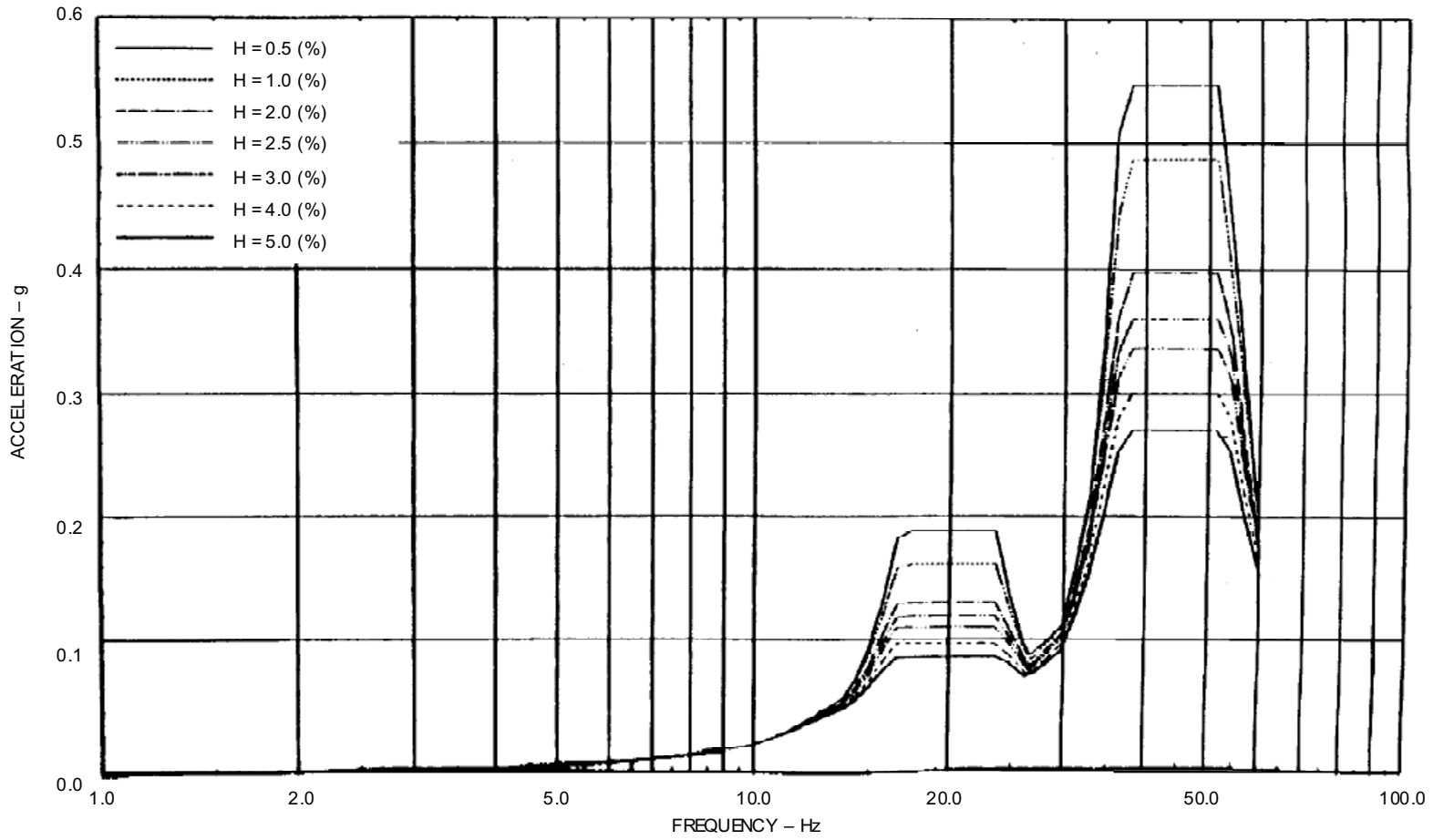


**Figure 3G-59 Floor Response Spectrum—Case: CHV2, Node: 7, Vertical**

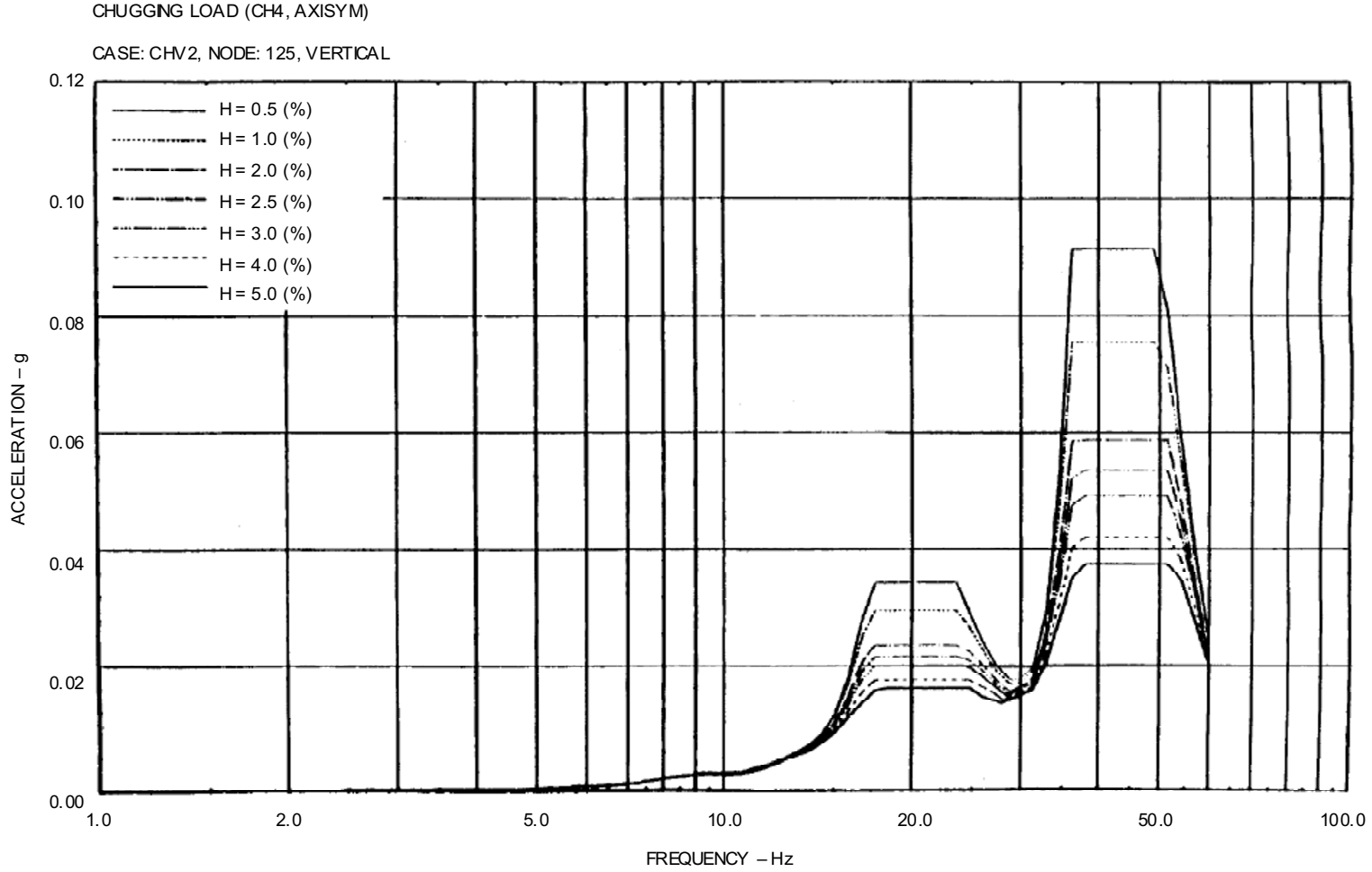


**Figure 3G-60 Floor Response Spectrum—Case: CHV2, Node: 125, Vertical**

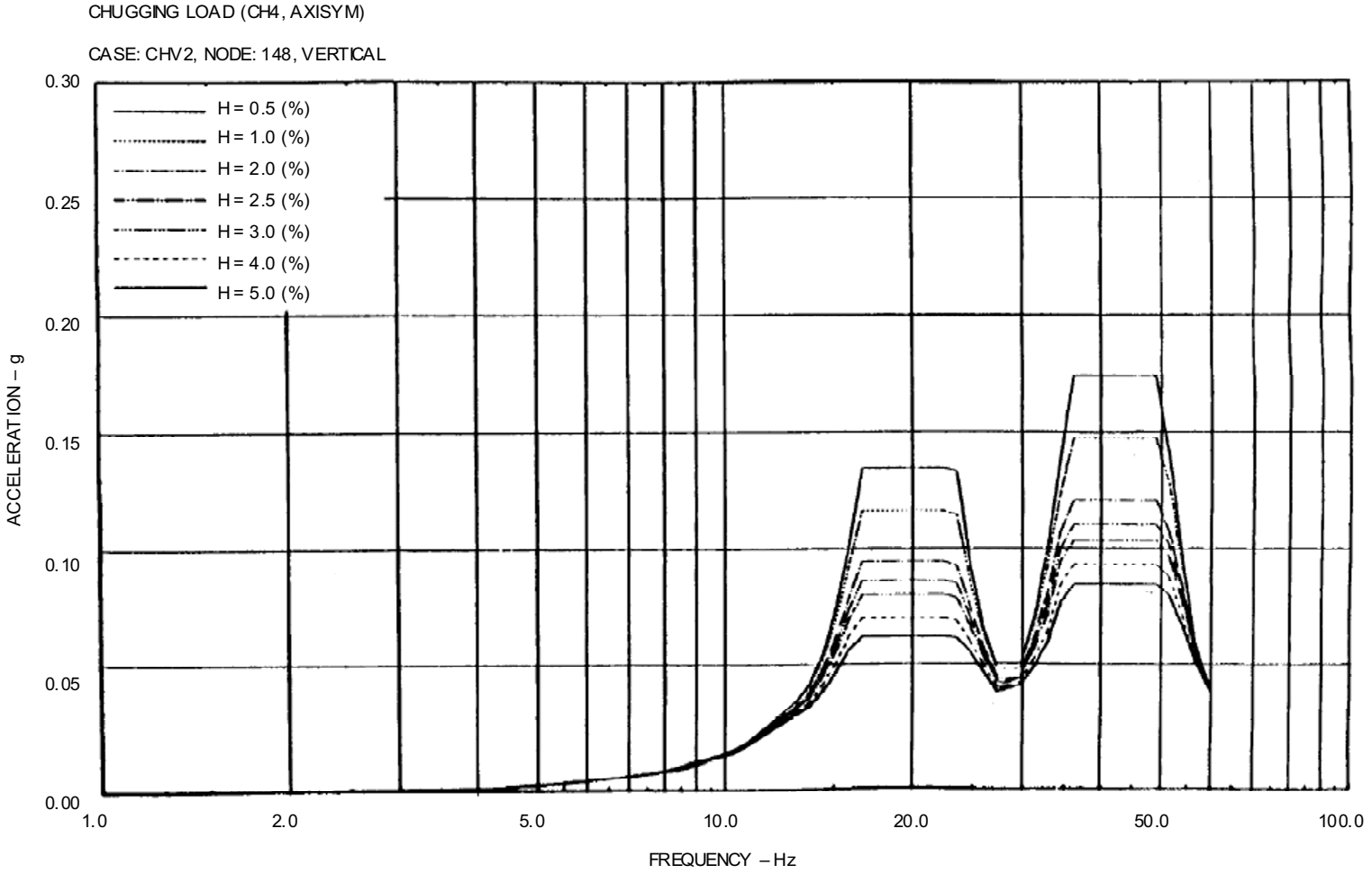


**Figure 3G-61 Floor Response Spectrum—Case: CHV2, Node: 148, Vertical**

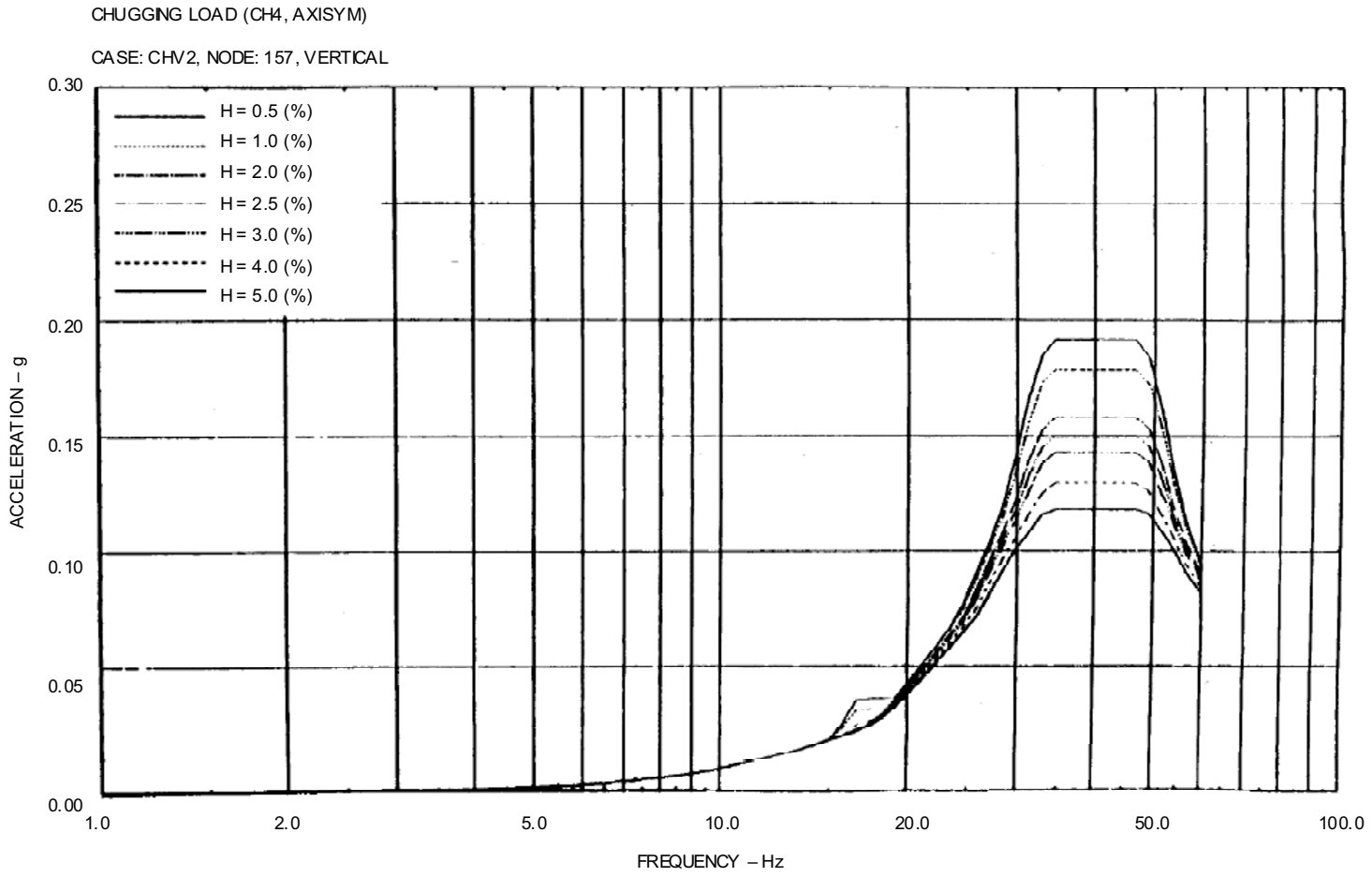


**Figure 3G-62 Floor Response Spectrum—Case: CHV2, Node: 157, Vertical**

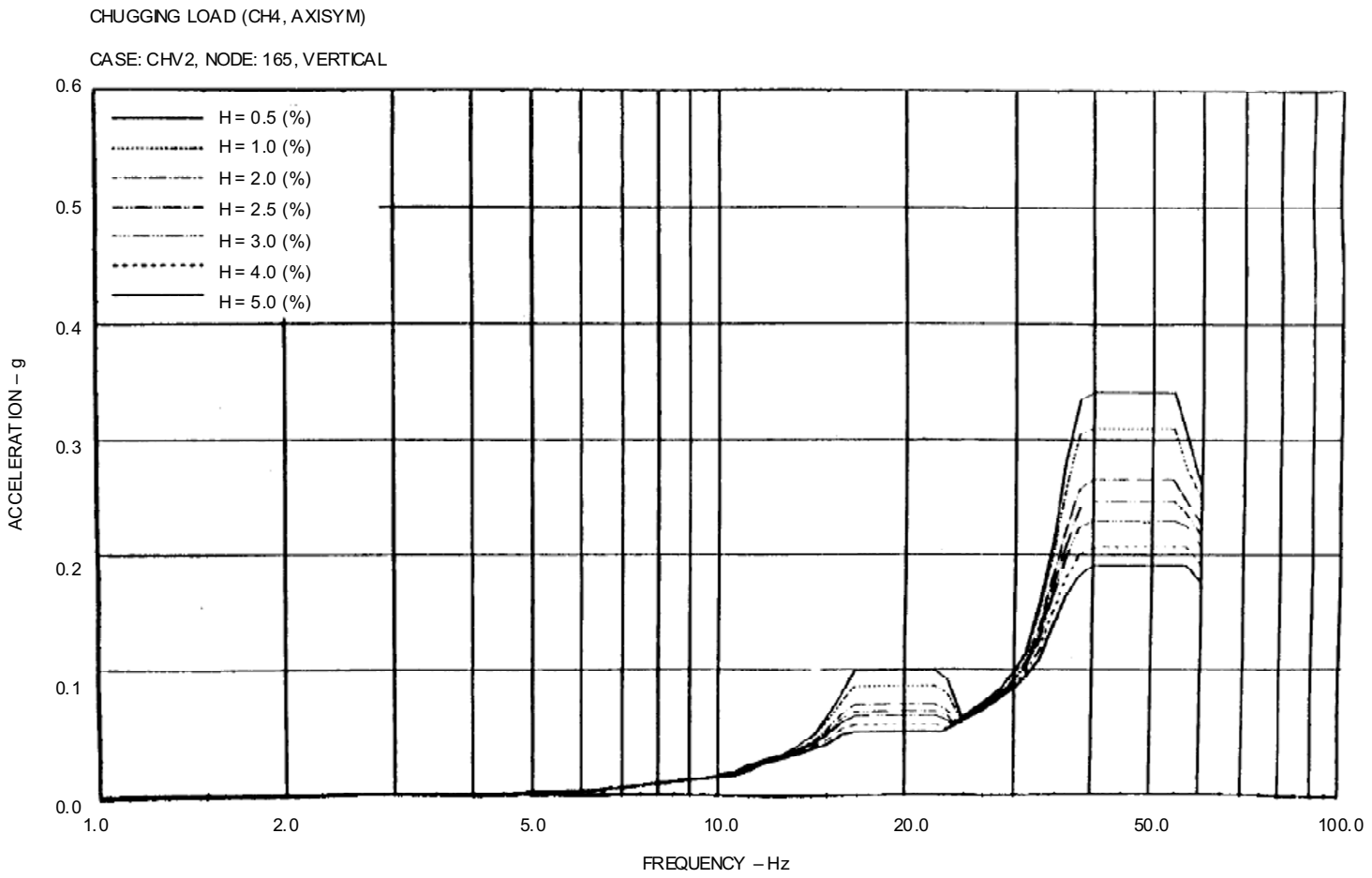


**Figure 3G-63 Floor Response Spectrum—Case: CHV2, Node: 165, Vertical**

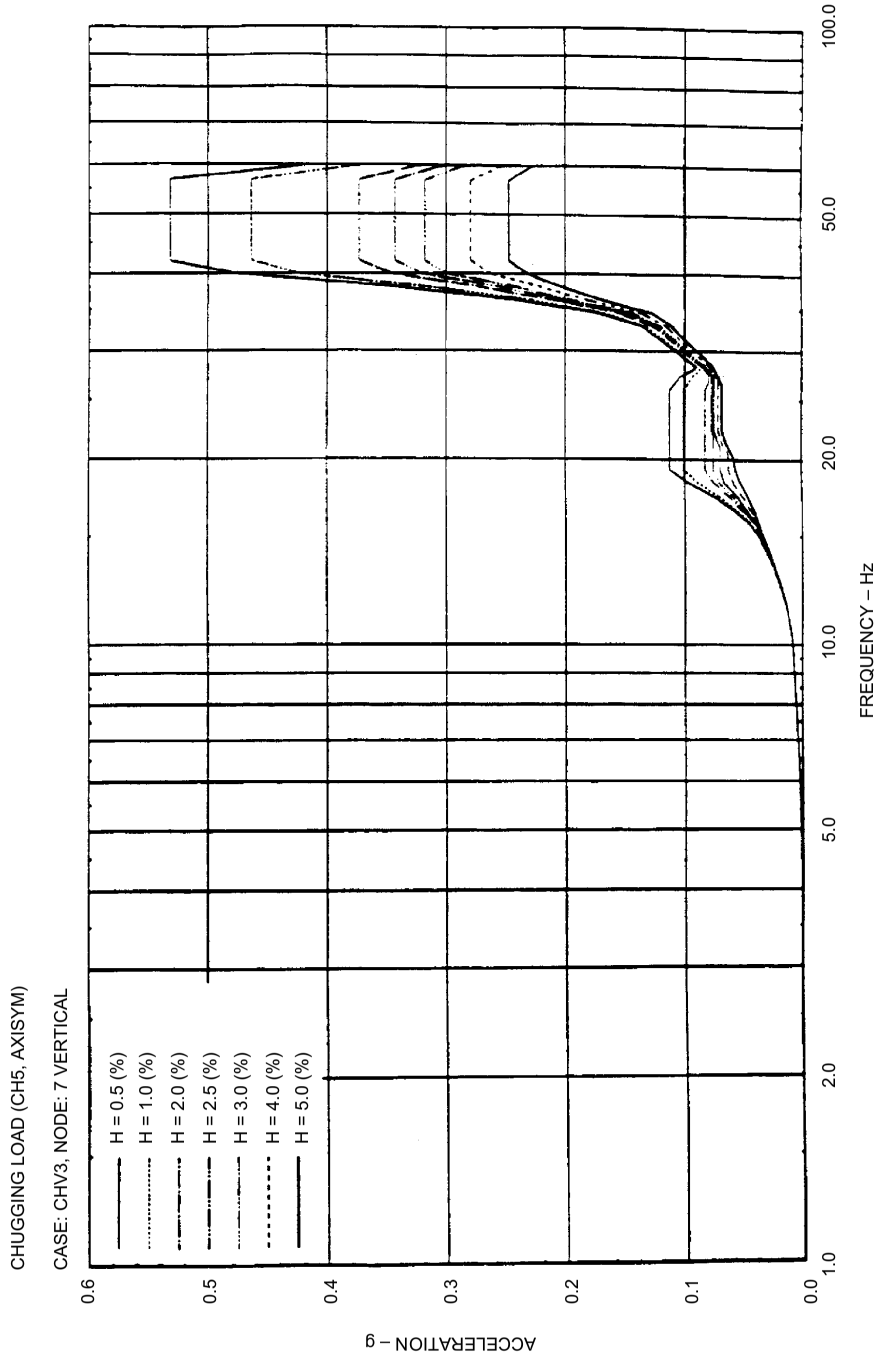


**Figure 3G-64 Floor Response Spectrum—Case: CHV3, Node: 7, Vertical**

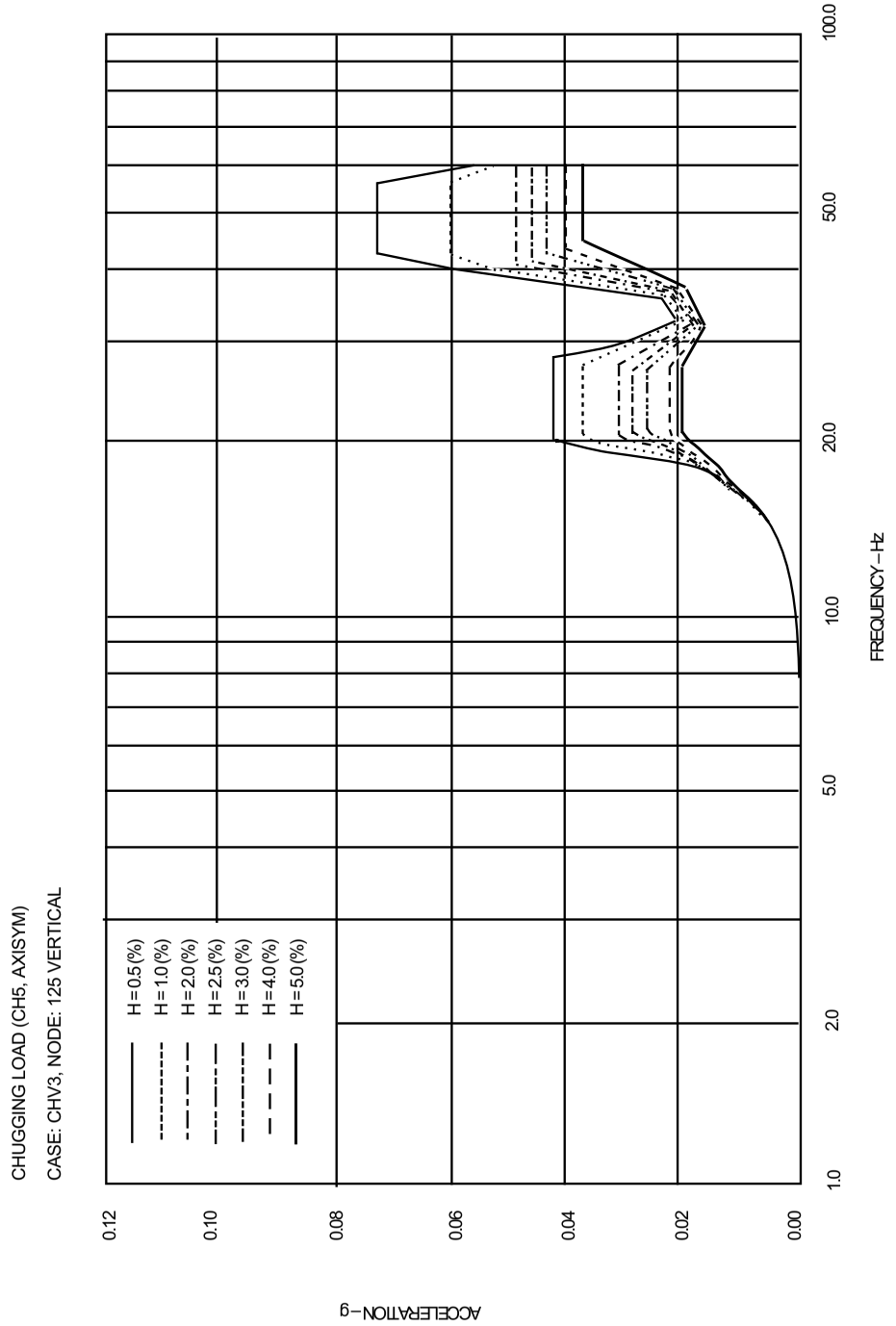


**Figure 3G-65 Floor Response Spectrum—Case: CHV3, Node: 125, Vertical**

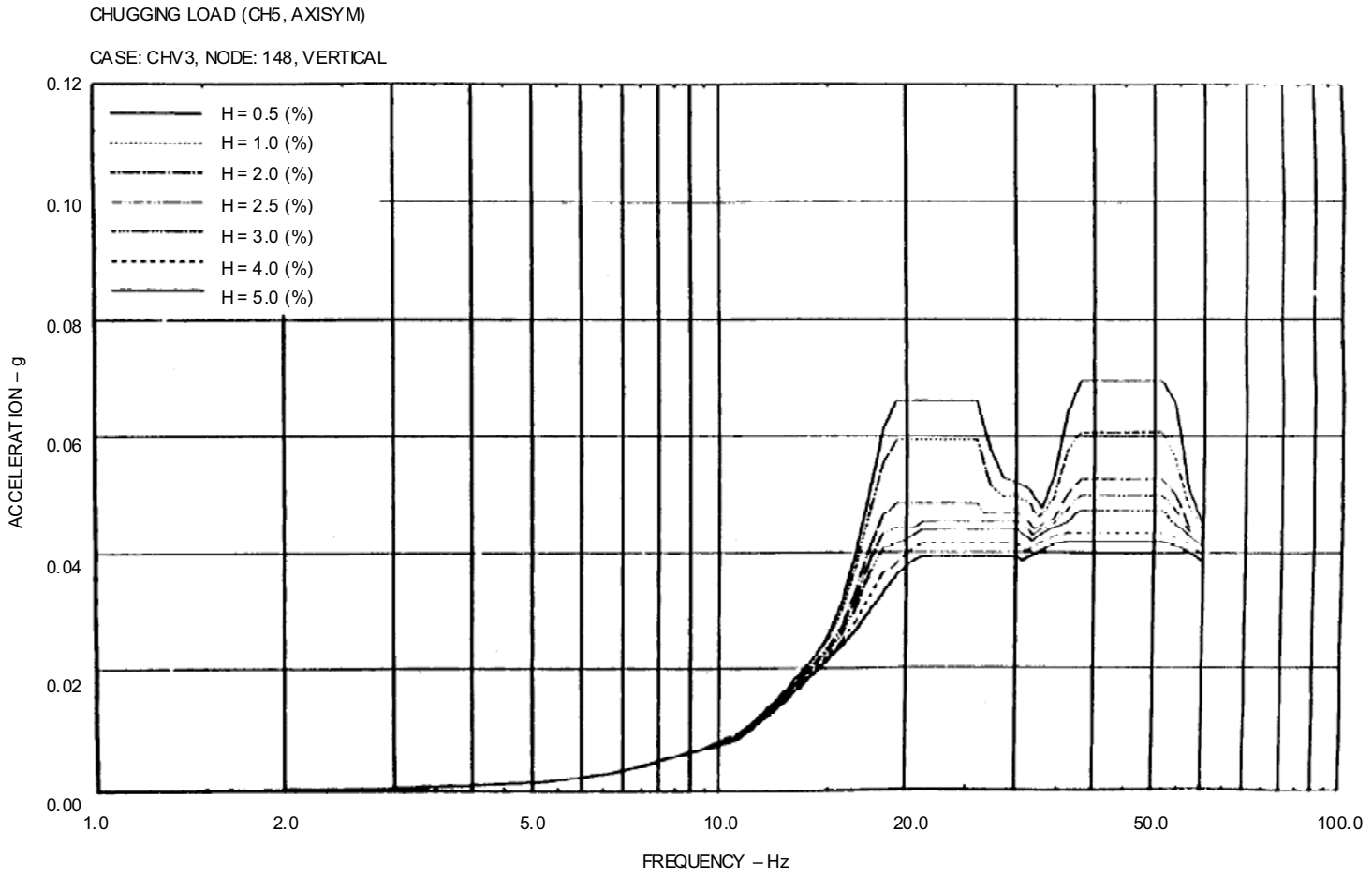


**Figure 3G-66 Floor Response Spectrum—Case: CHV3, Node: 148, Vertical**

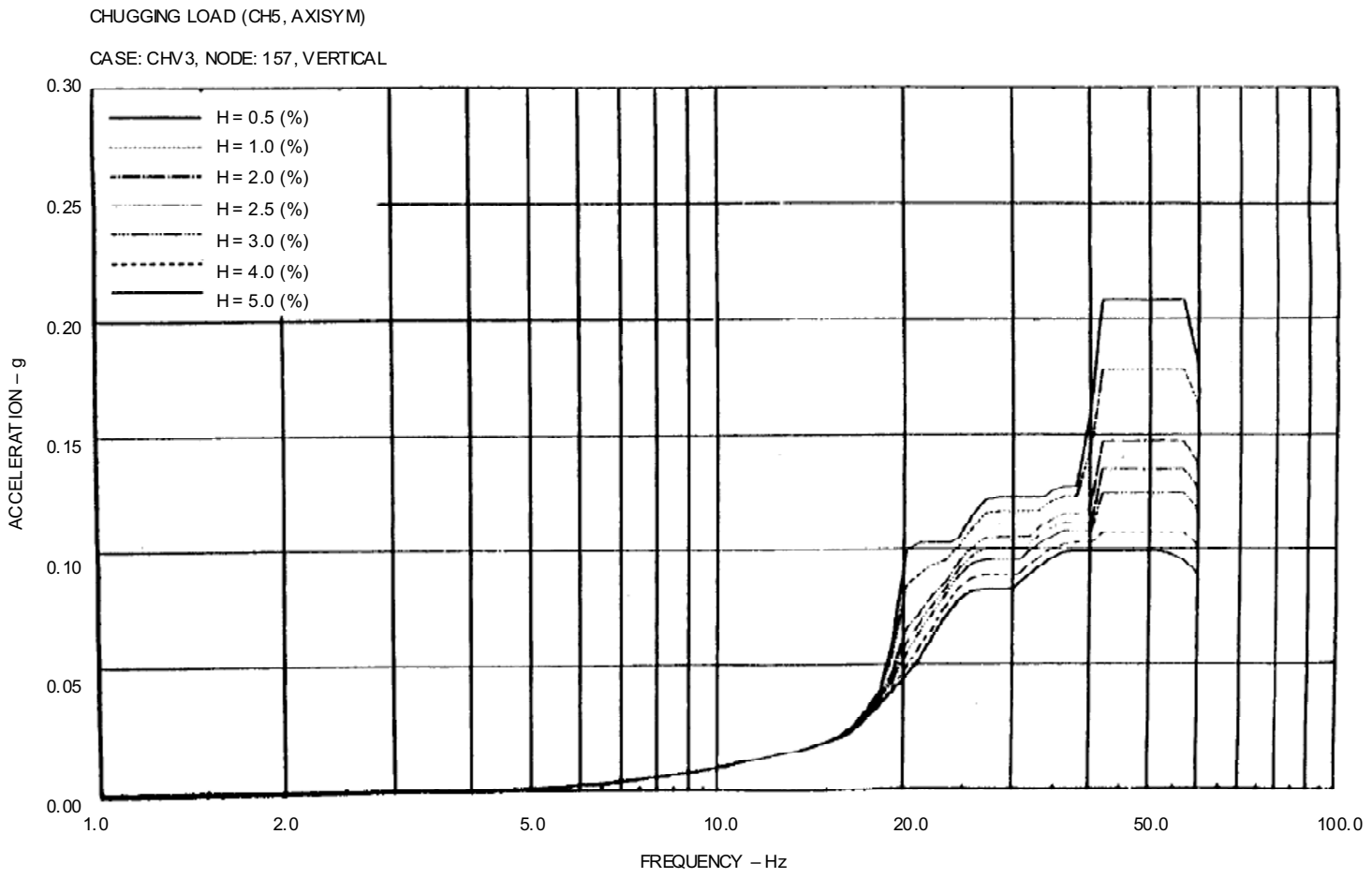


**Figure 3G-67 Floor Response Spectrum—Case: CHV3, Node: 157, Vertical**

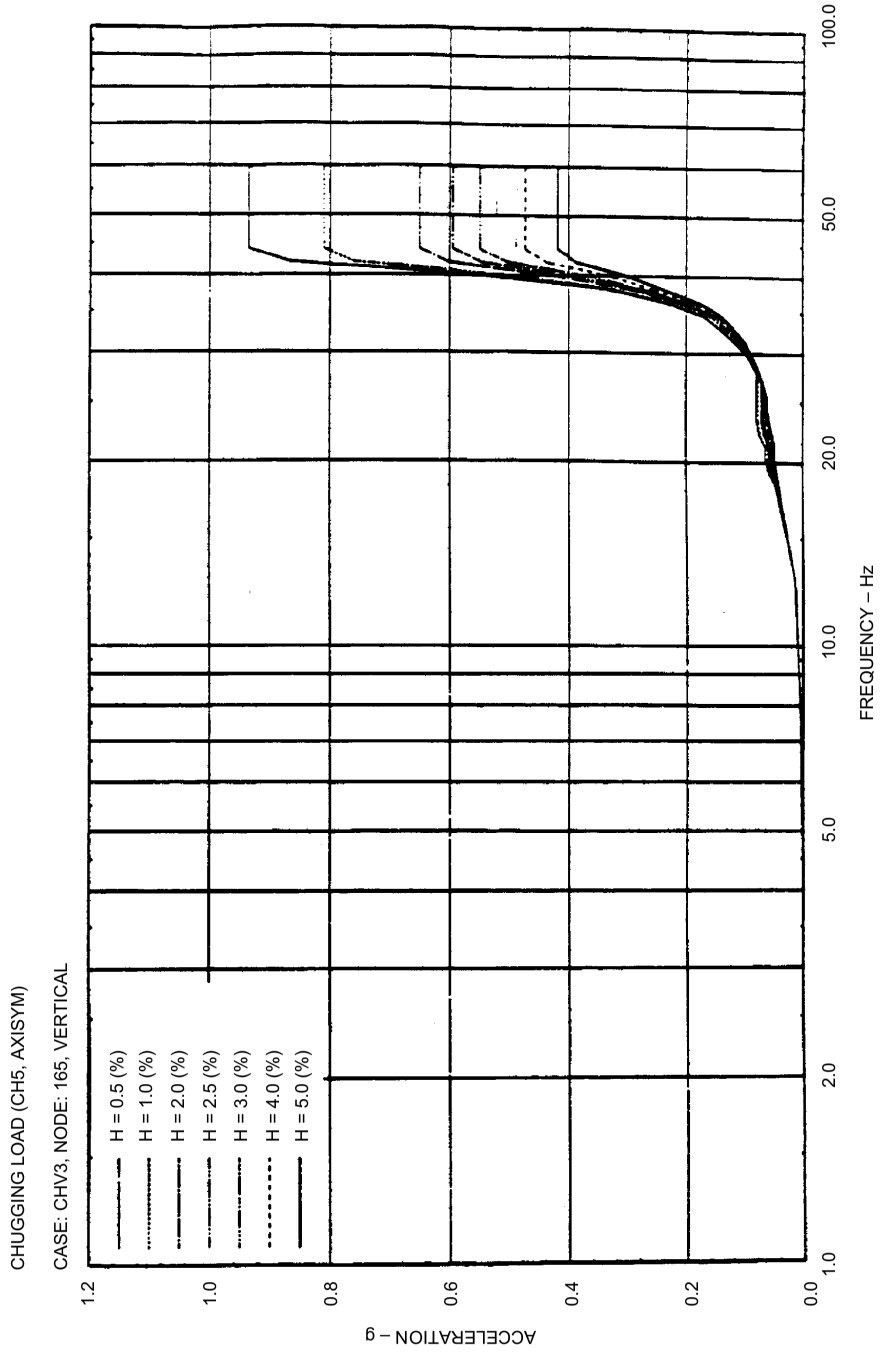


**Figure 3G-68 Floor Response Spectrum—Case: CHV3, Node: 165, Vertical**

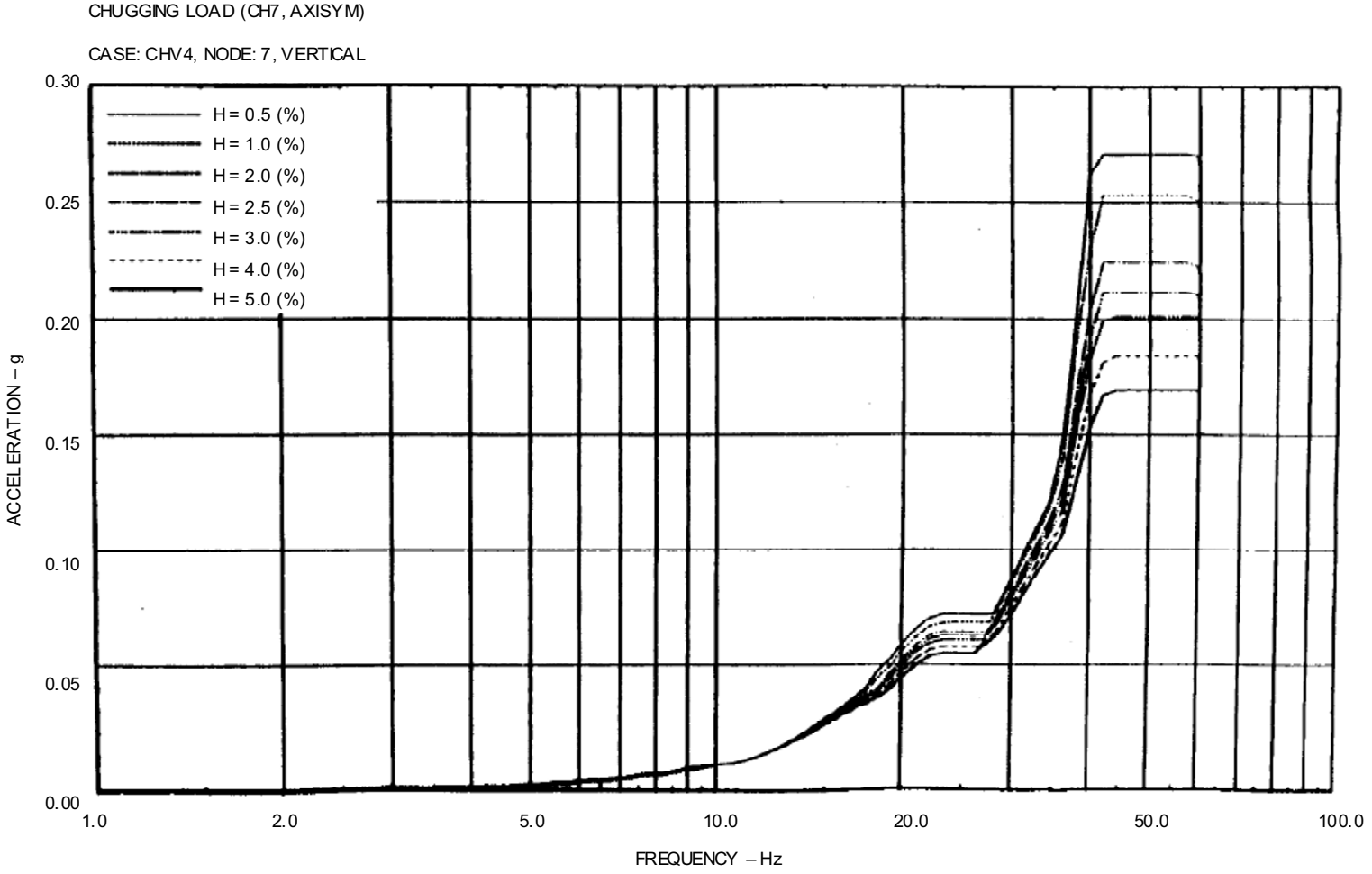


**Figure 3G-69 Floor Response Spectrum—Case: CHV4, Node: 7, Vertical**

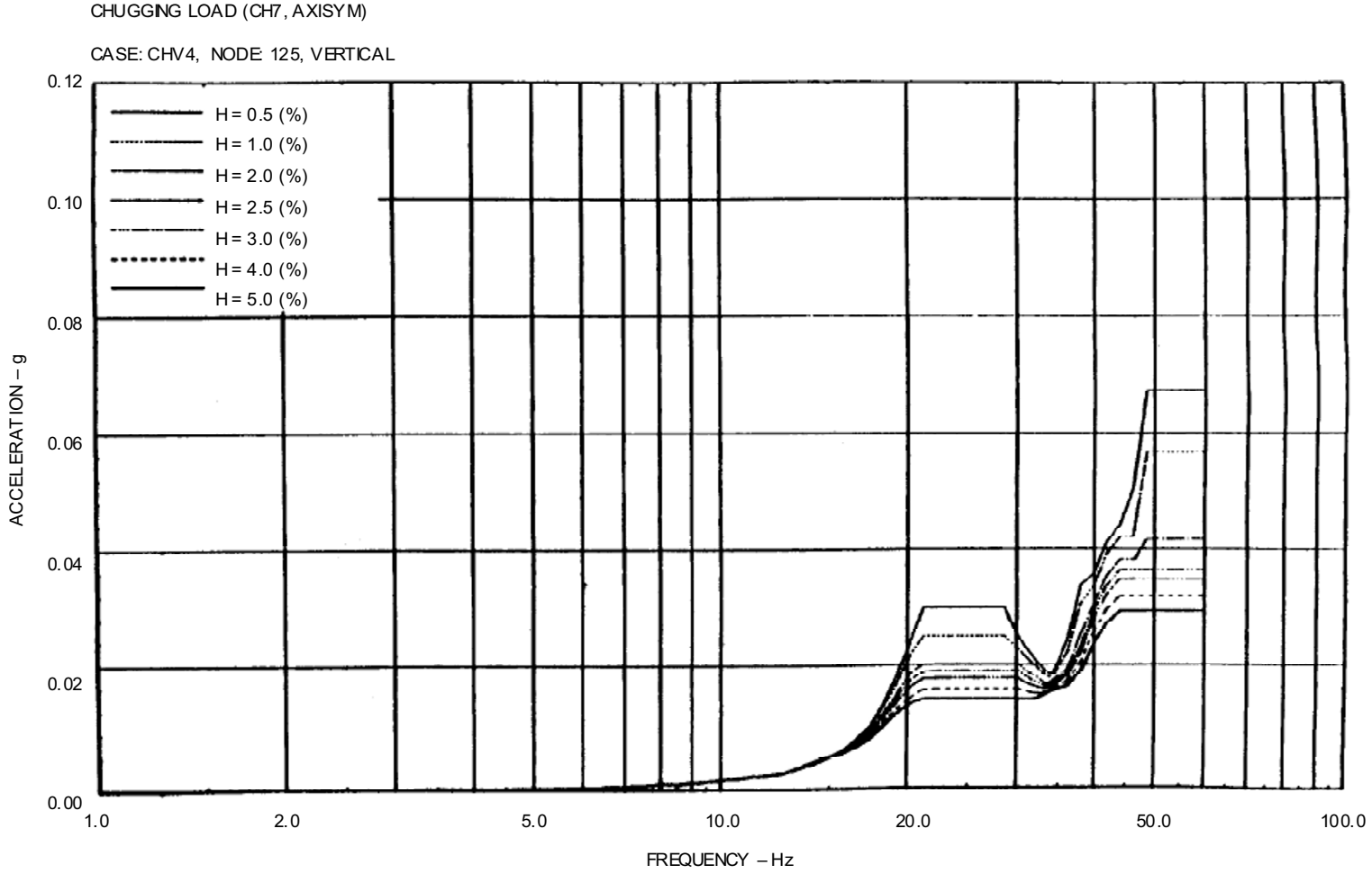


**Figure 3G-70 Floor Response Spectrum—Case: CHV4, Node: 125, Vertical**

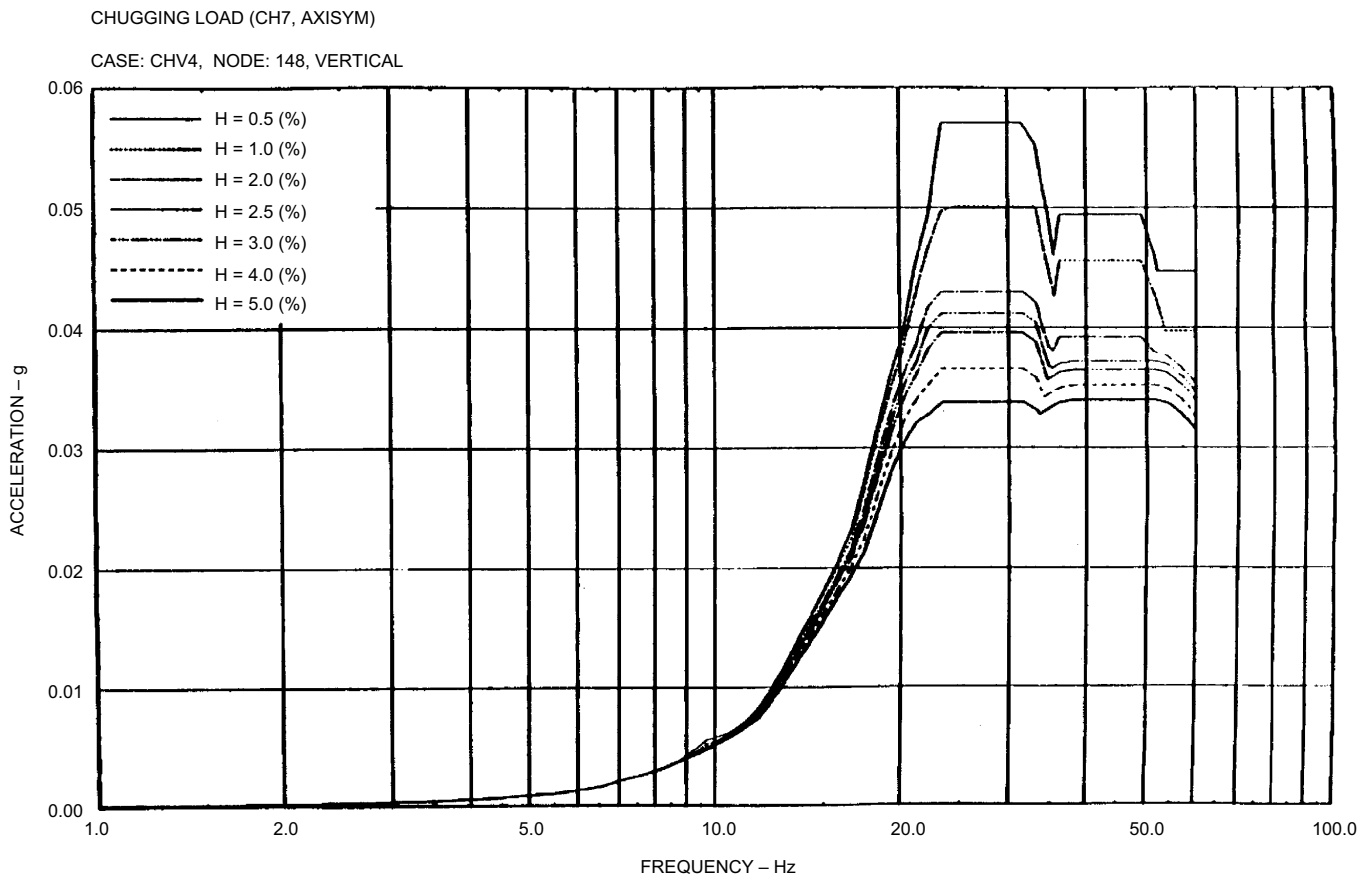


**Figure 3G-71 Floor Response Spectrum—Case: CHV4, Node: 148, Vertical**

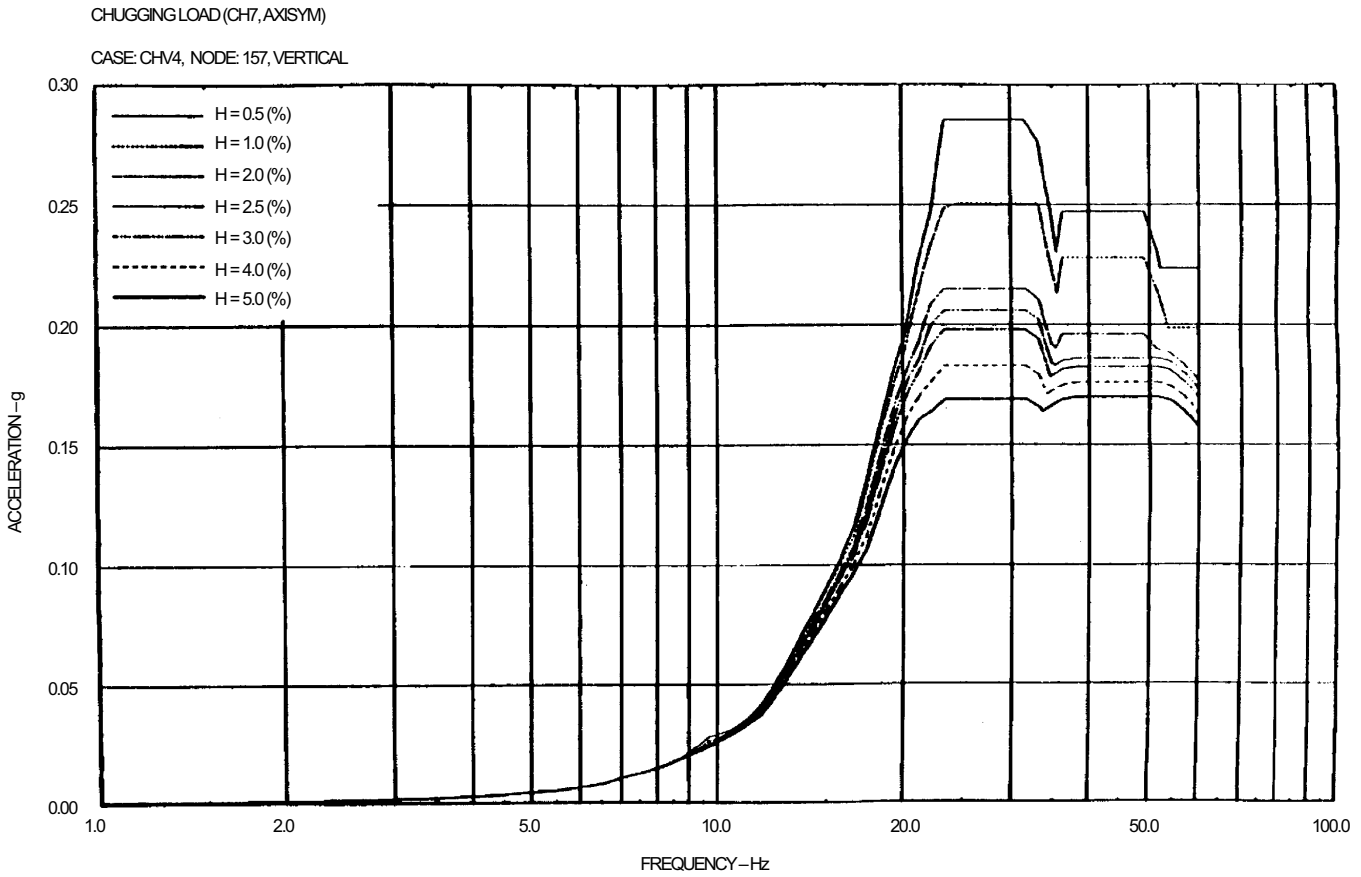


**Figure 3G-72 Floor Response Spectrum—Case: CHV4, Node: 157, Vertical**

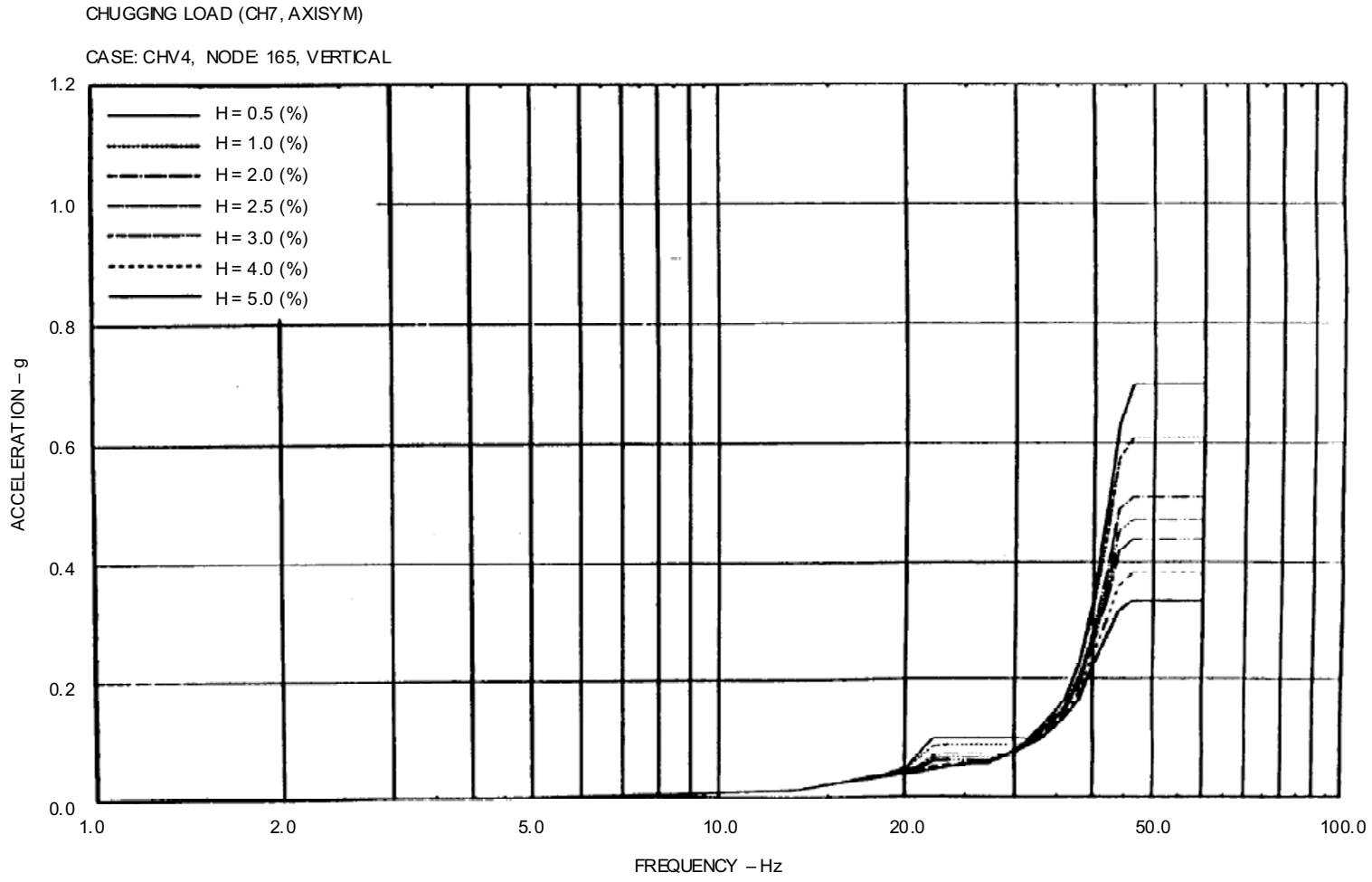


**Figure 3G-73 Floor Response Spectrum—Case: CHV4, Node: 165, Vertical**

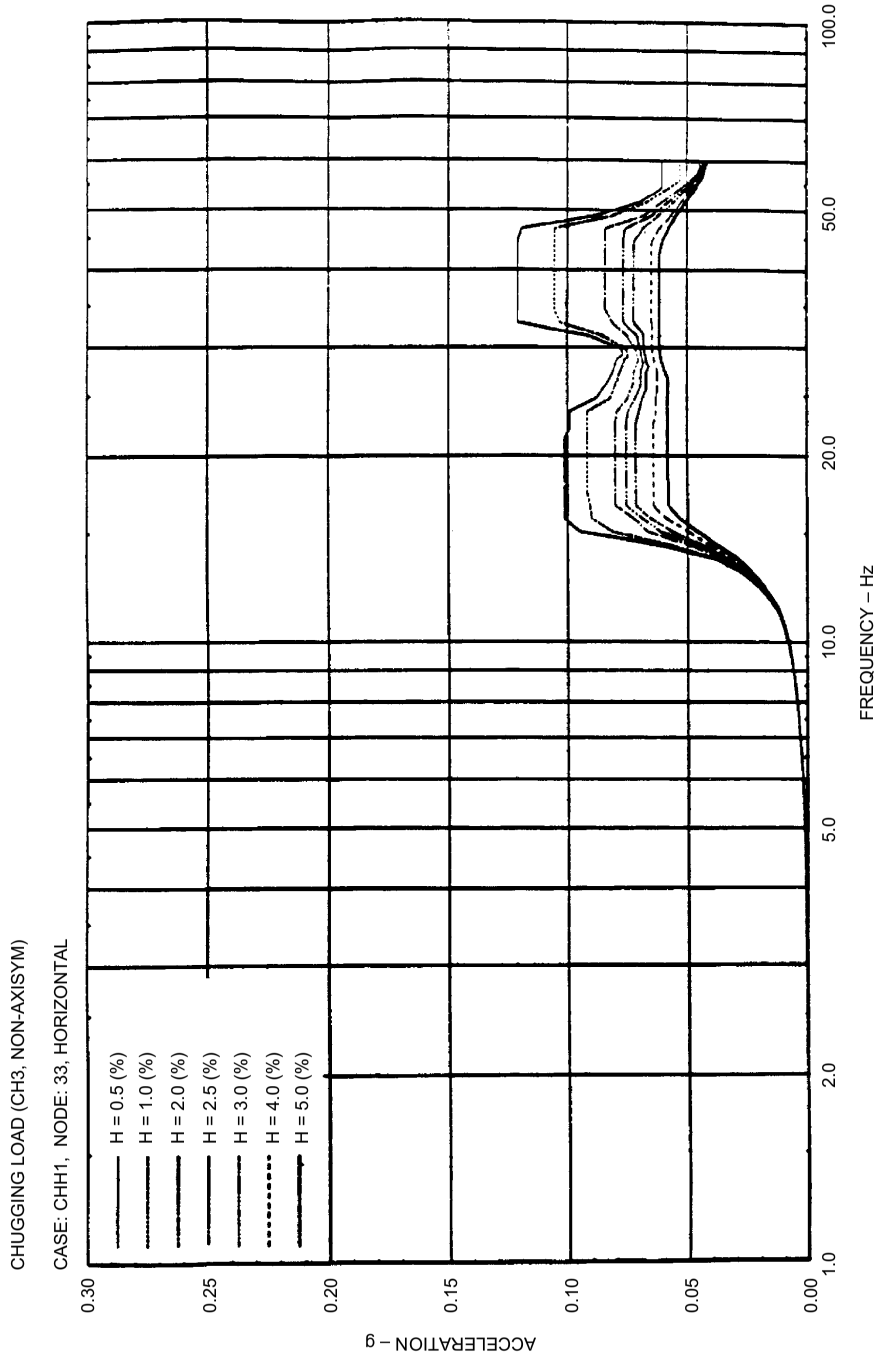


**Figure 3G-74 Floor Response Spectrum—Case: CHH1, Node: 33, Horizontal**

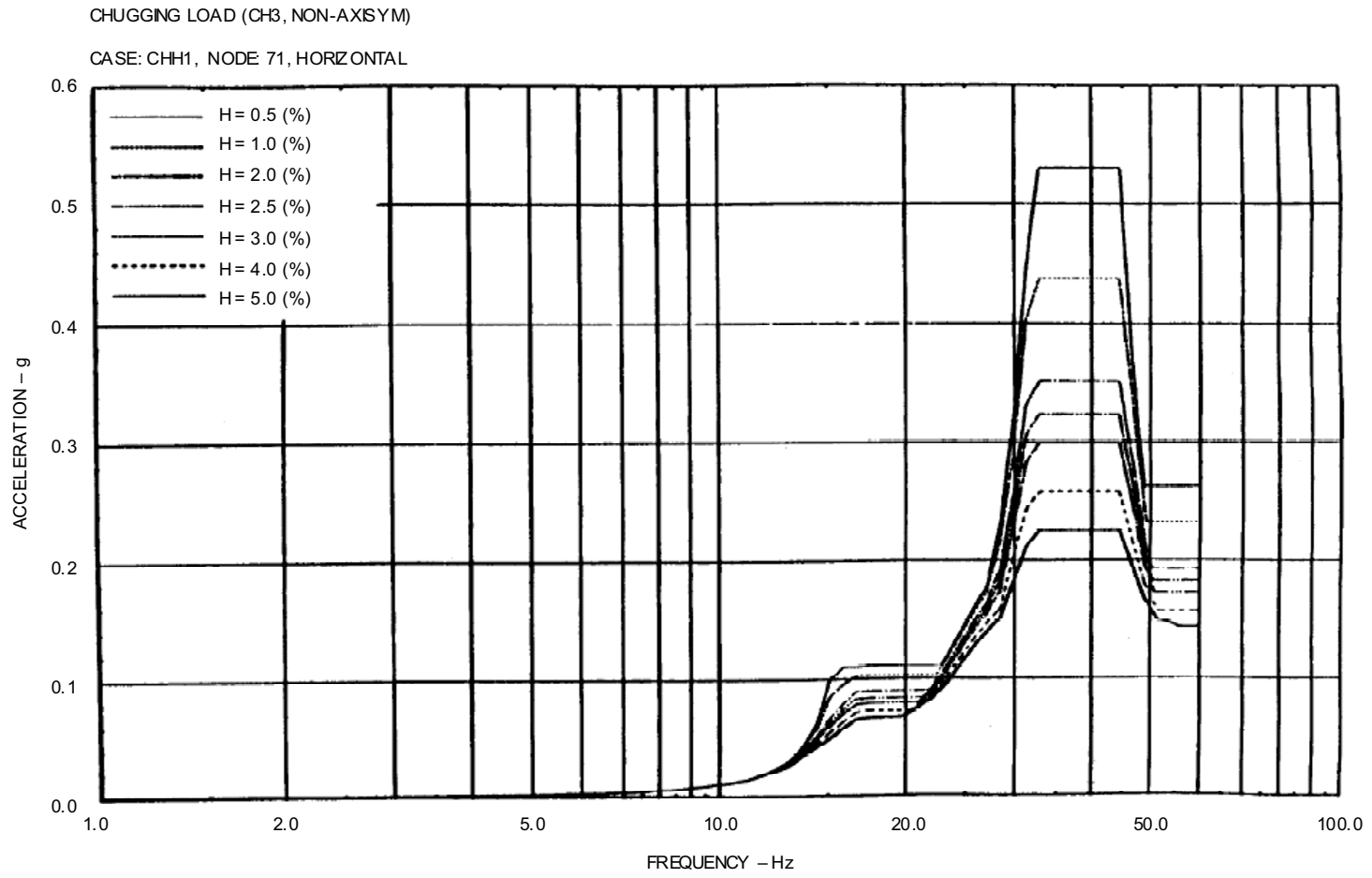


**Figure 3G-75 Floor Response Spectrum—Case: CHH1, Node: 71, Horizontal**

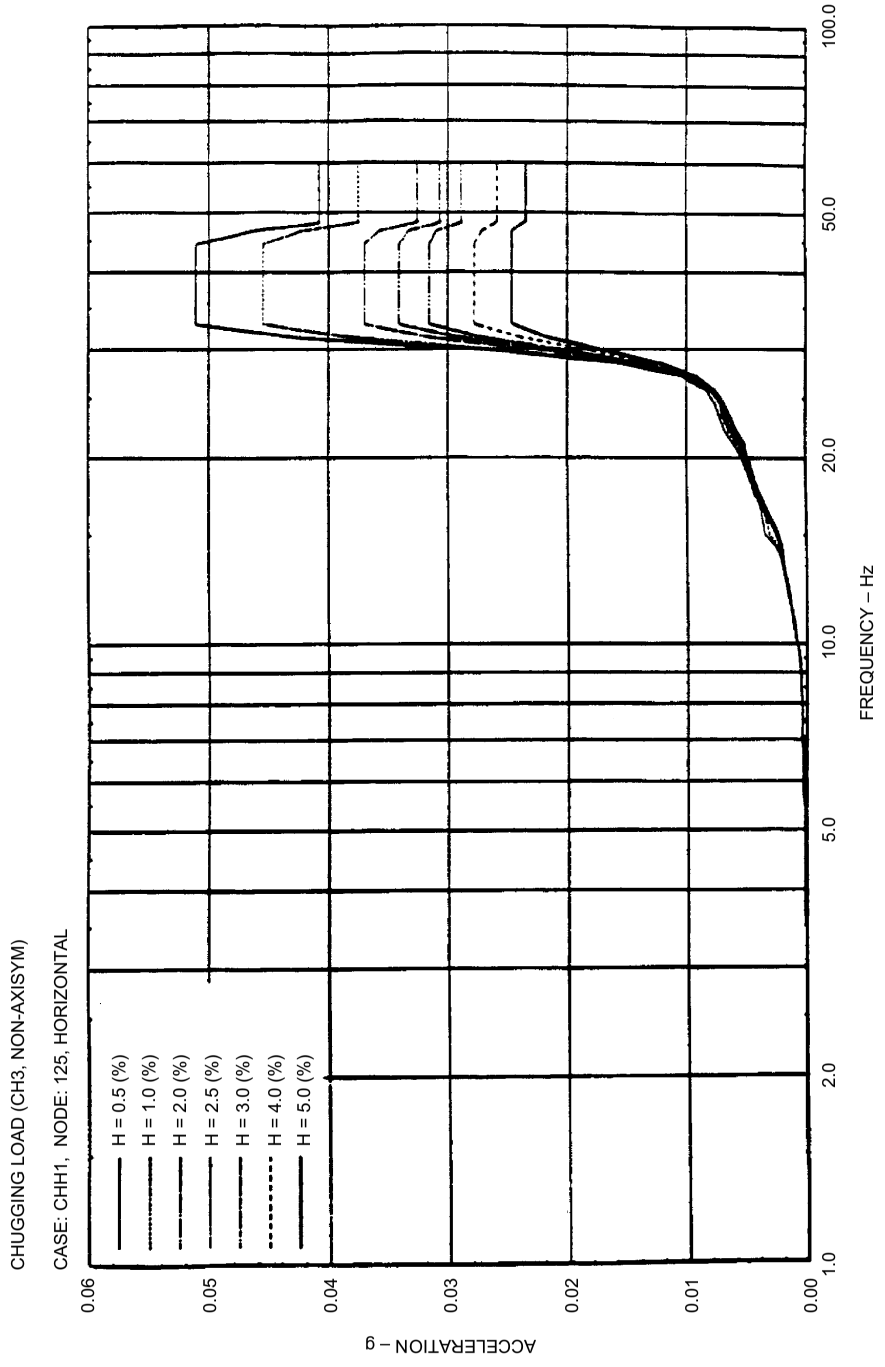


**Figure 3G-76 Floor Response Spectrum—Case: CHH1, Node: 125, Horizontal**

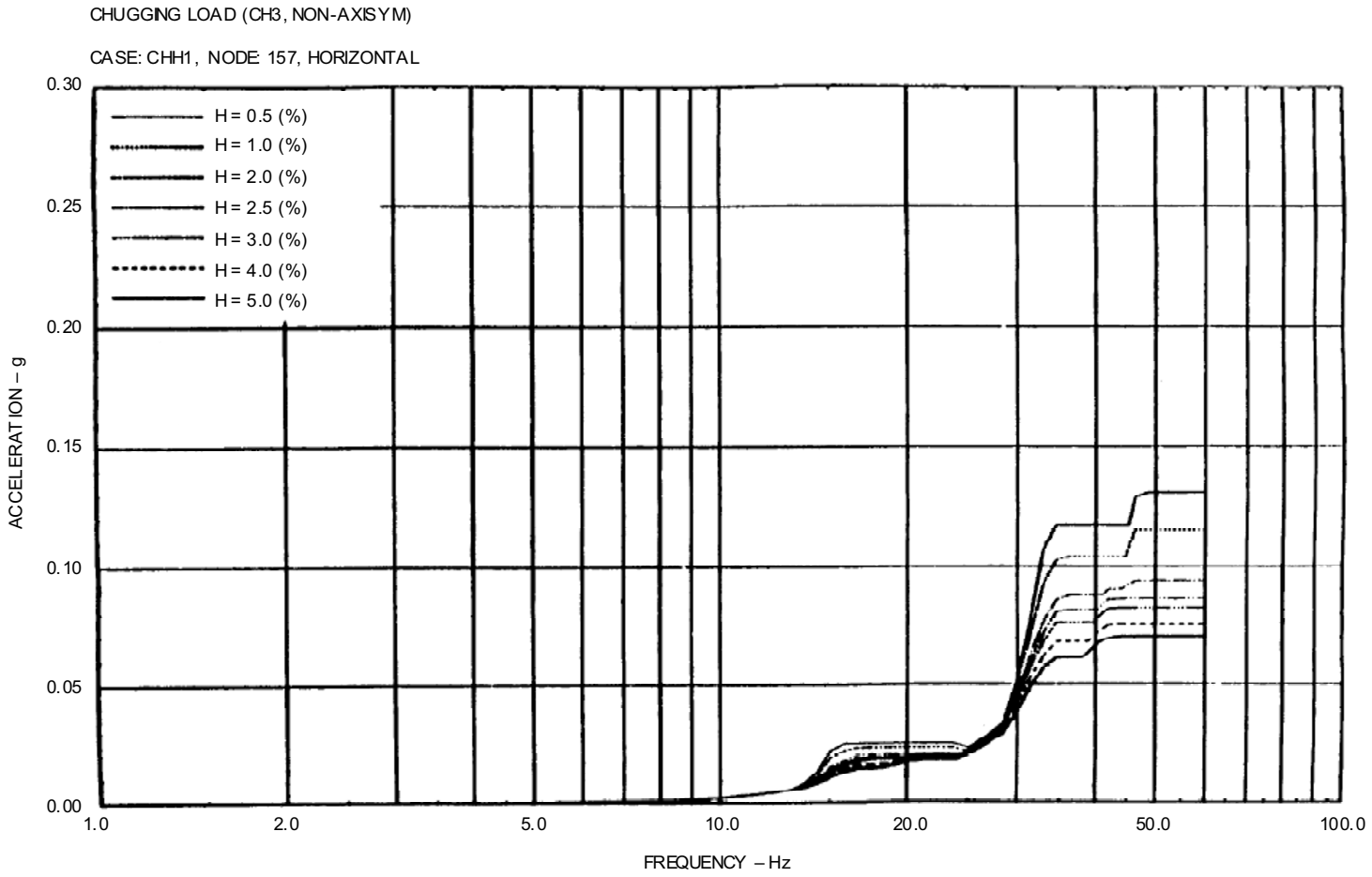


**Figure 3G-77 Floor Response Spectrum—Case: CHH1, Node: 157, Horizontal**

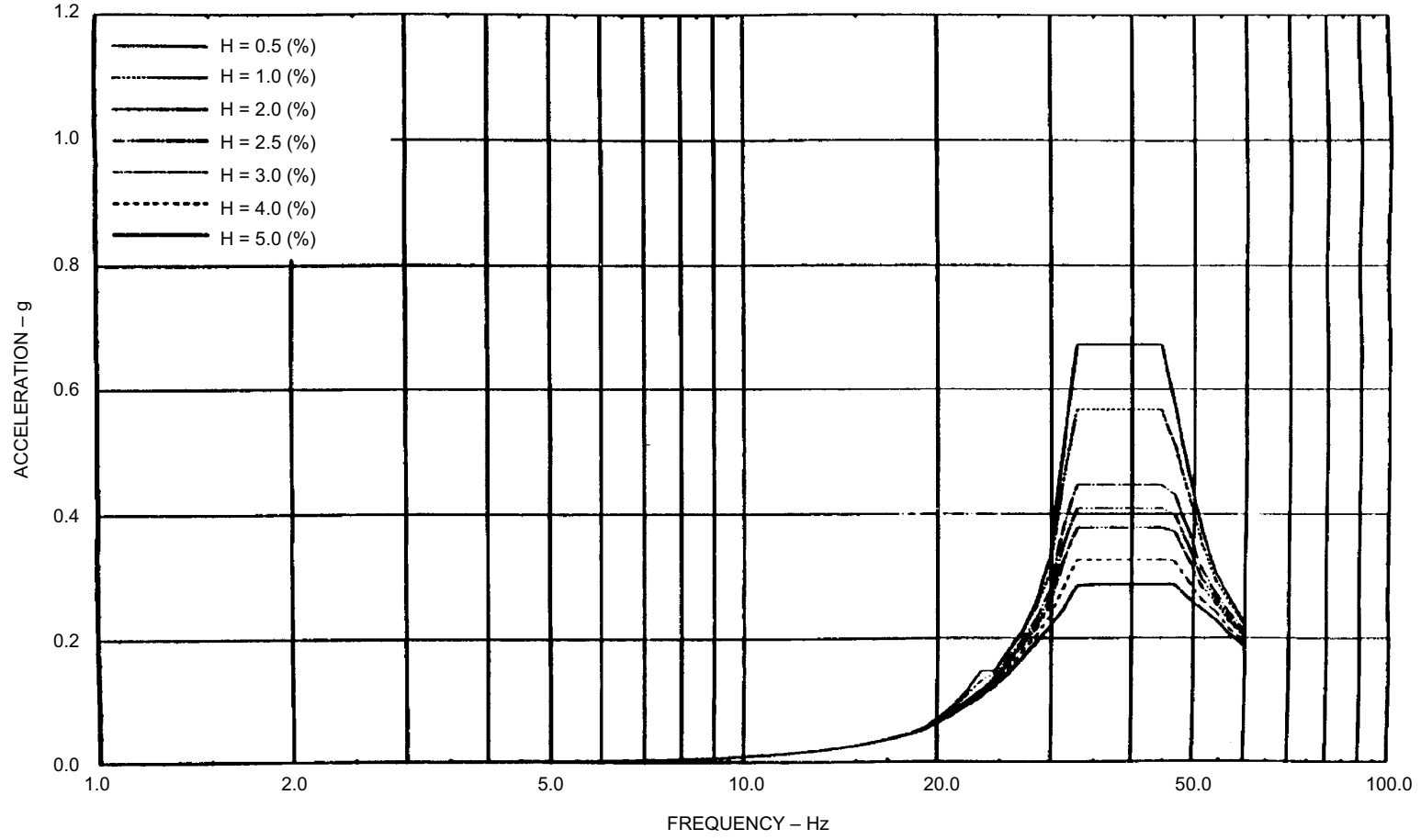


**Figure 3G-78 Floor Response Spectrum—Case: CHH1, Node: 165, Horizontal**

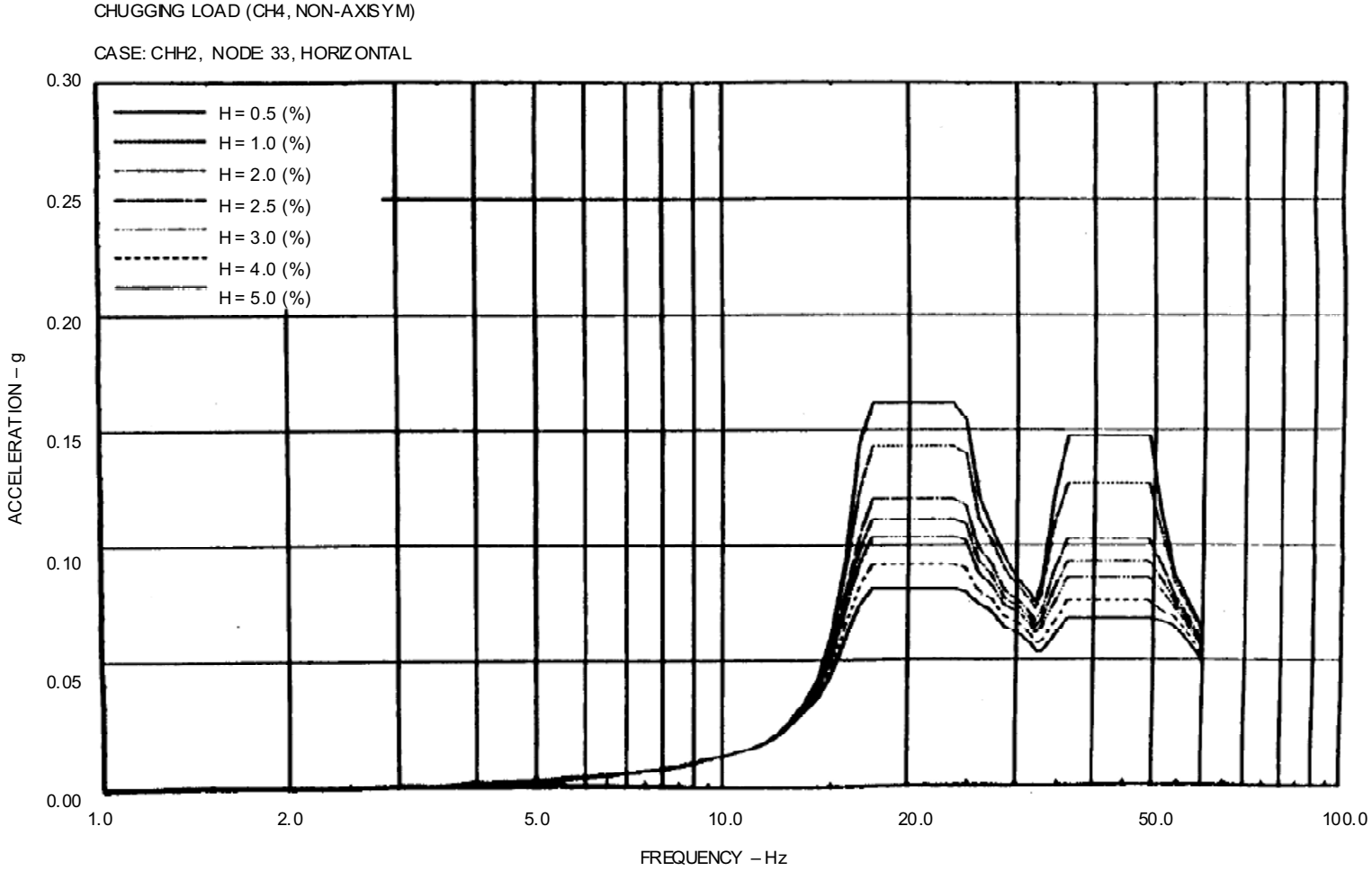


**Figure 3G-79 Floor Response Spectrum—Case: CHH2, Node: 33, Horizontal**

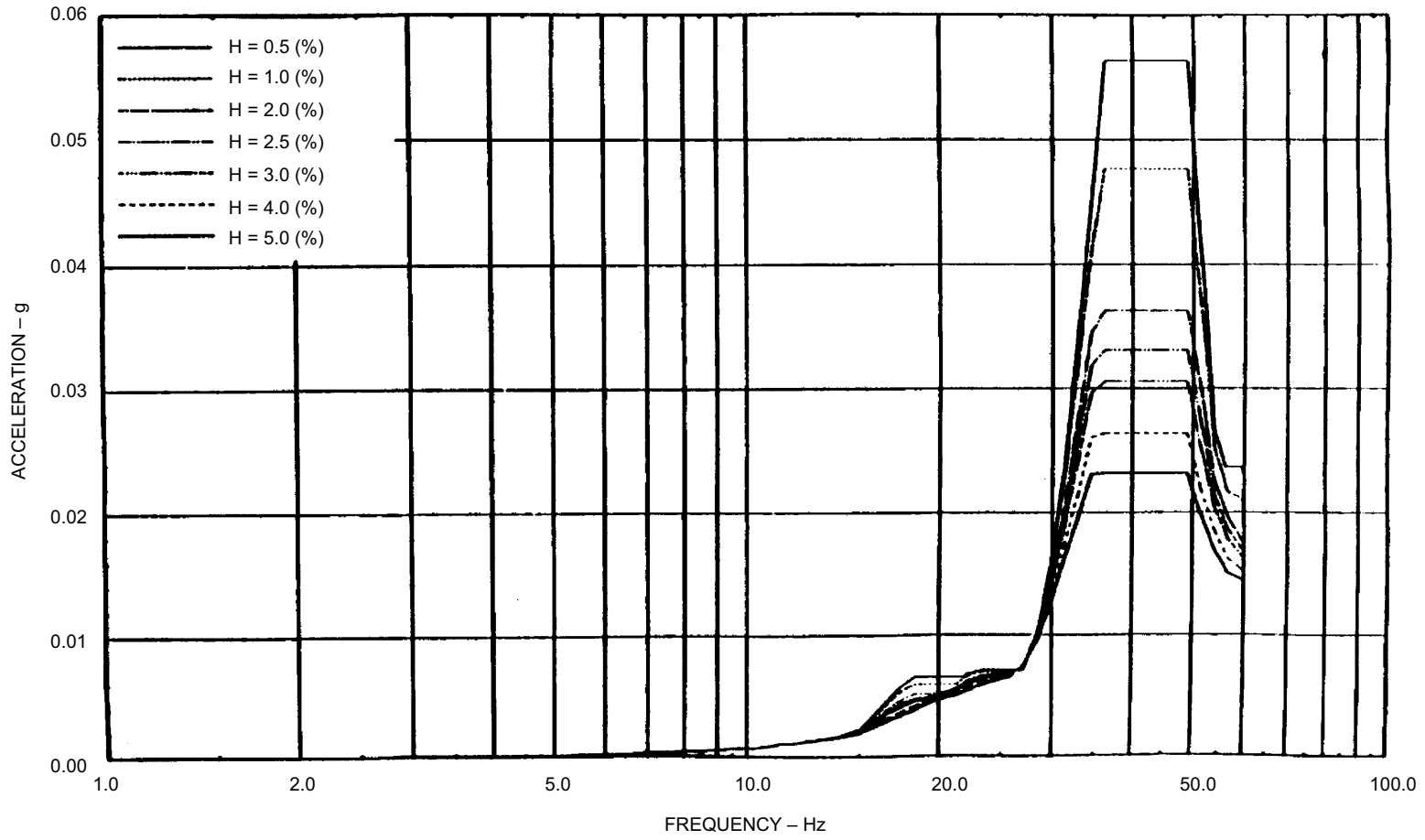


**Figure 3G-80 Floor Response Spectrum—Case: CHH2, Node: 125, Horizontal**

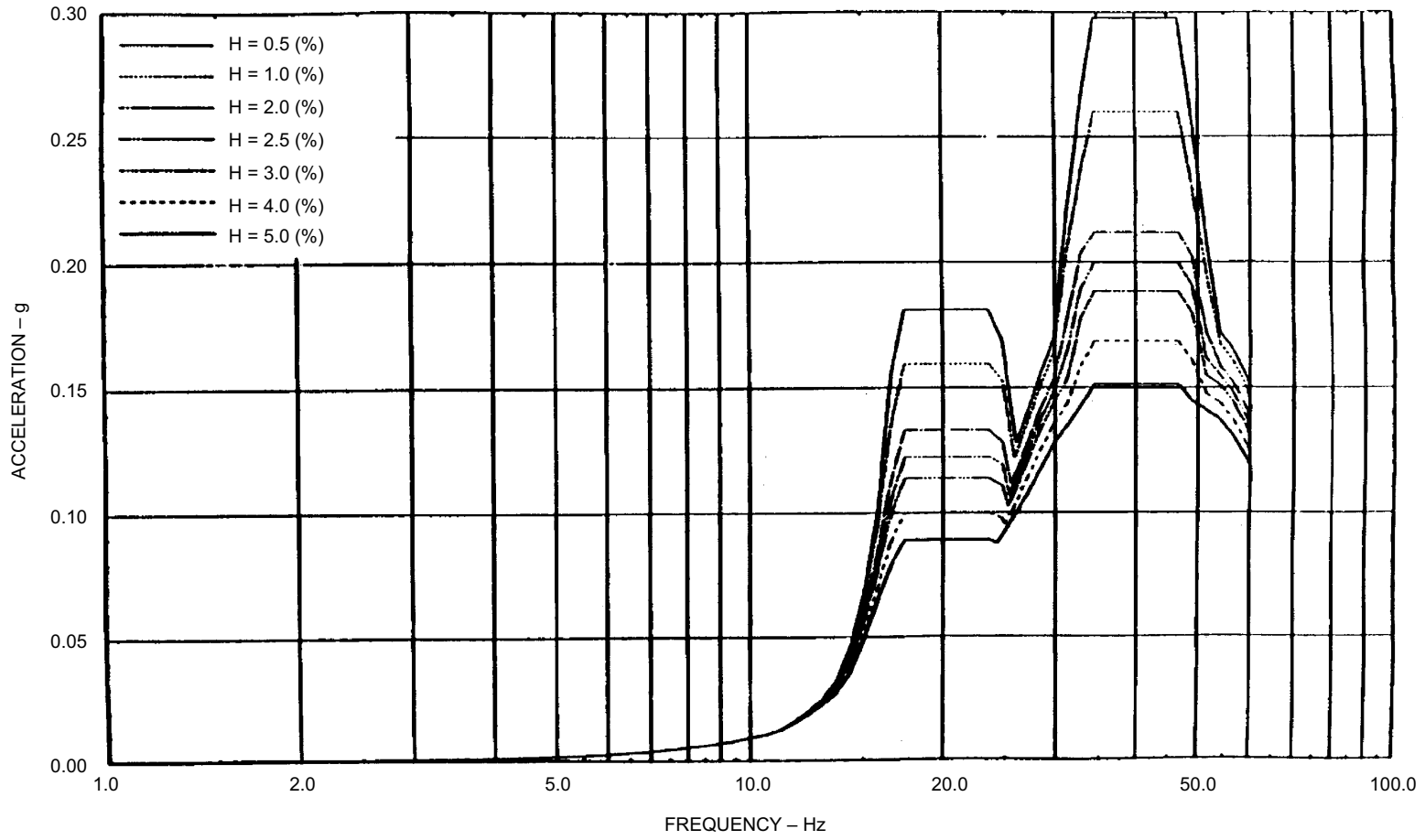


**Figure 3G-81 Floor Response Spectrum—Case: CHH2, Node: 71, Horizontal**

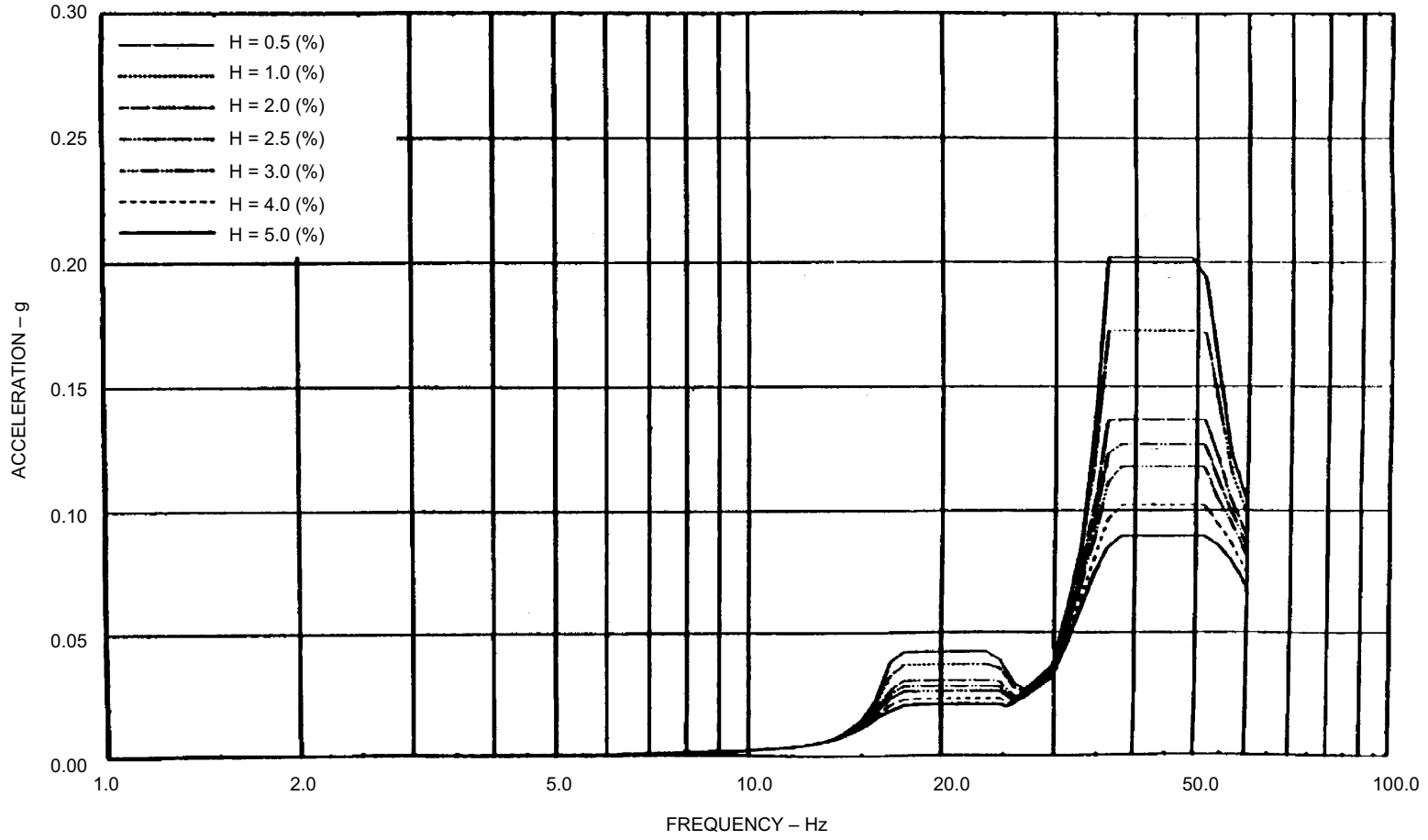


**Figure 3G-82 Floor Response Spectrum—Case: CHH2, Node: 157, Horizontal**

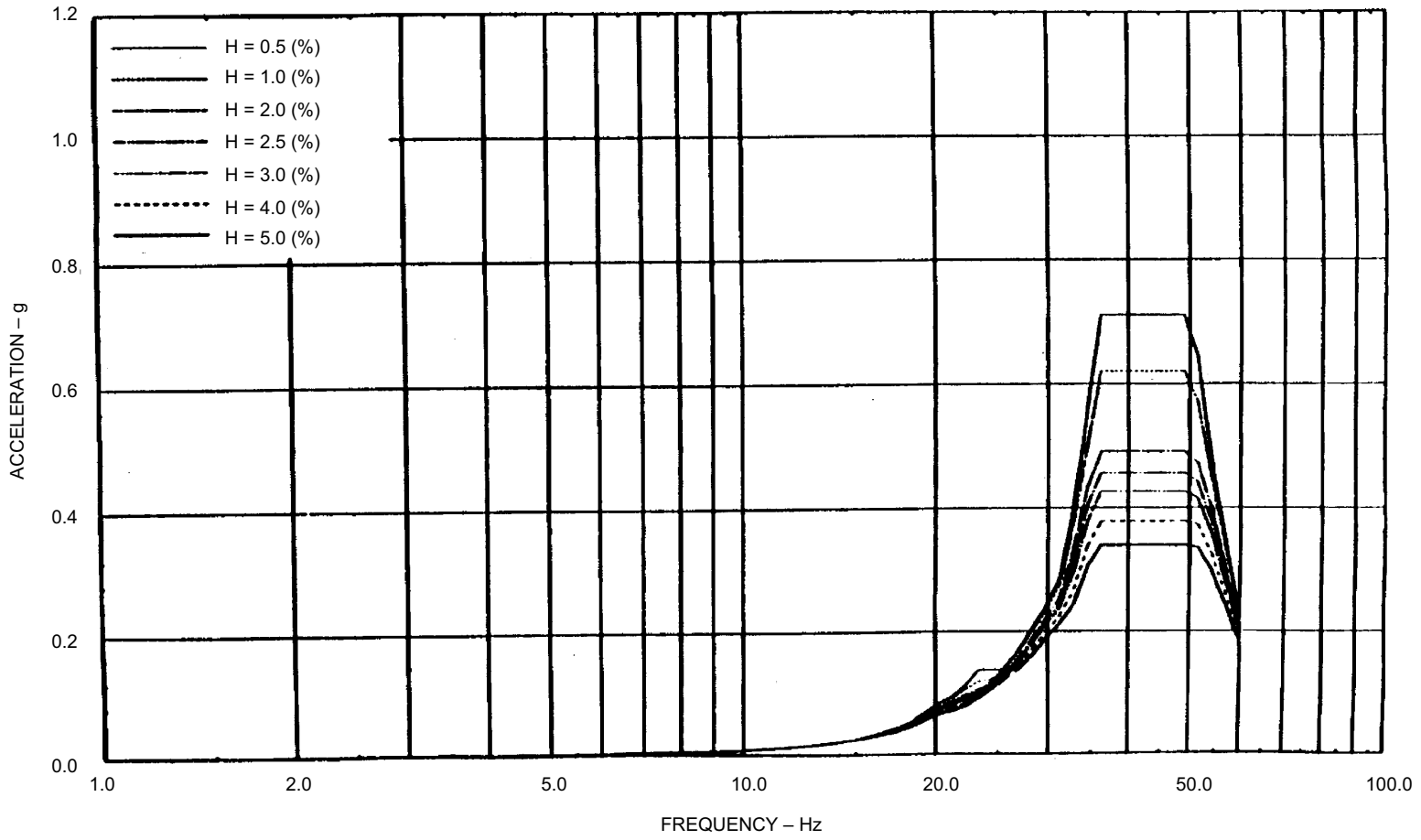


**Figure 3G-83 Floor Response Spectrum—Case: CHH2, Node: 165, Horizontal**

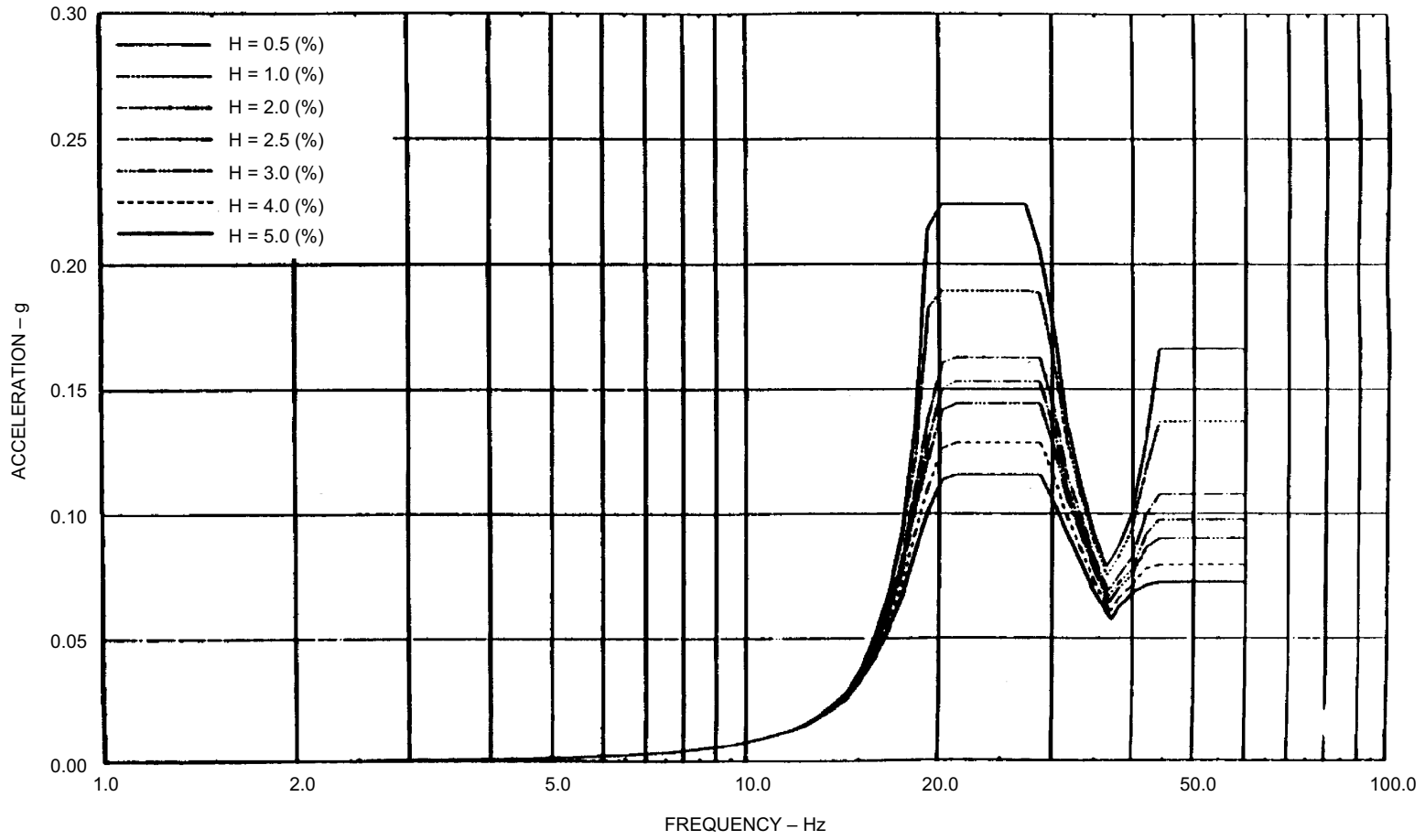


**Figure 3G-84 Floor Response Spectrum—Case: CHH3, Node: 33, Horizontal**

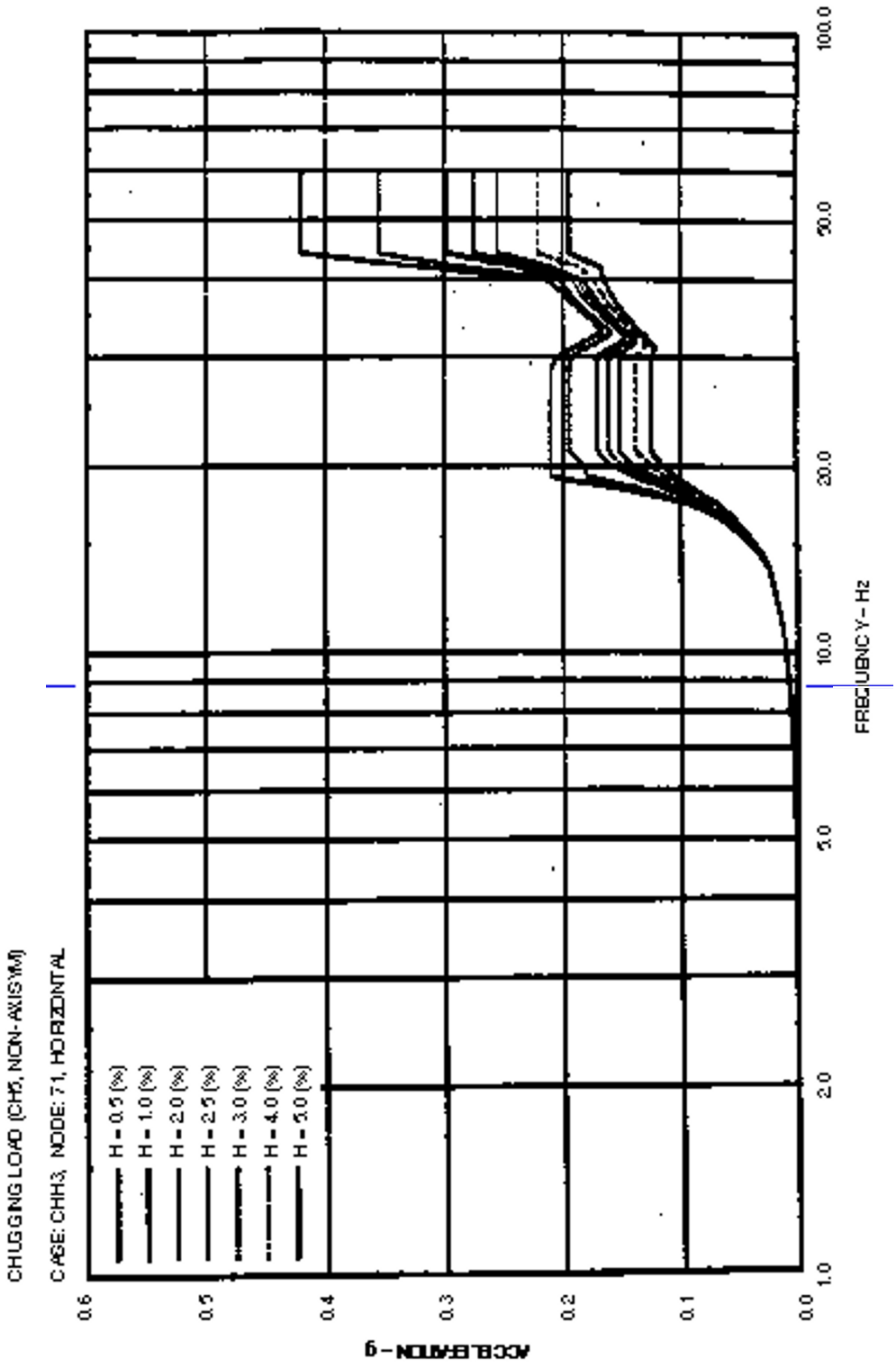


**Figure 3G-85 Floor Response Spectrum—Case: CHH3, Node: 71, Horizontal**

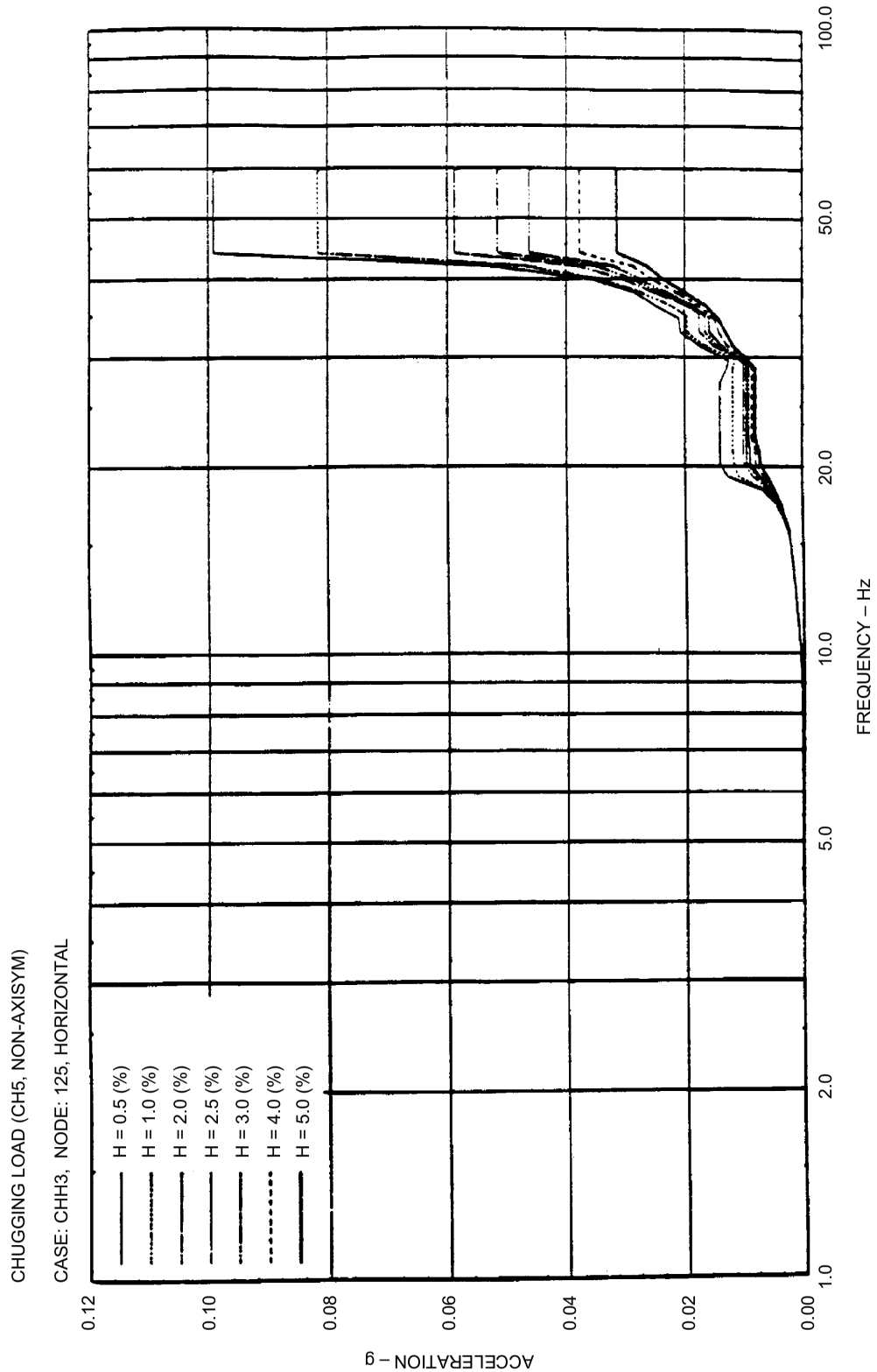


**Figure 3G-86 Floor Response Spectrum—Case: CHH3, Node: 125, Horizontal**

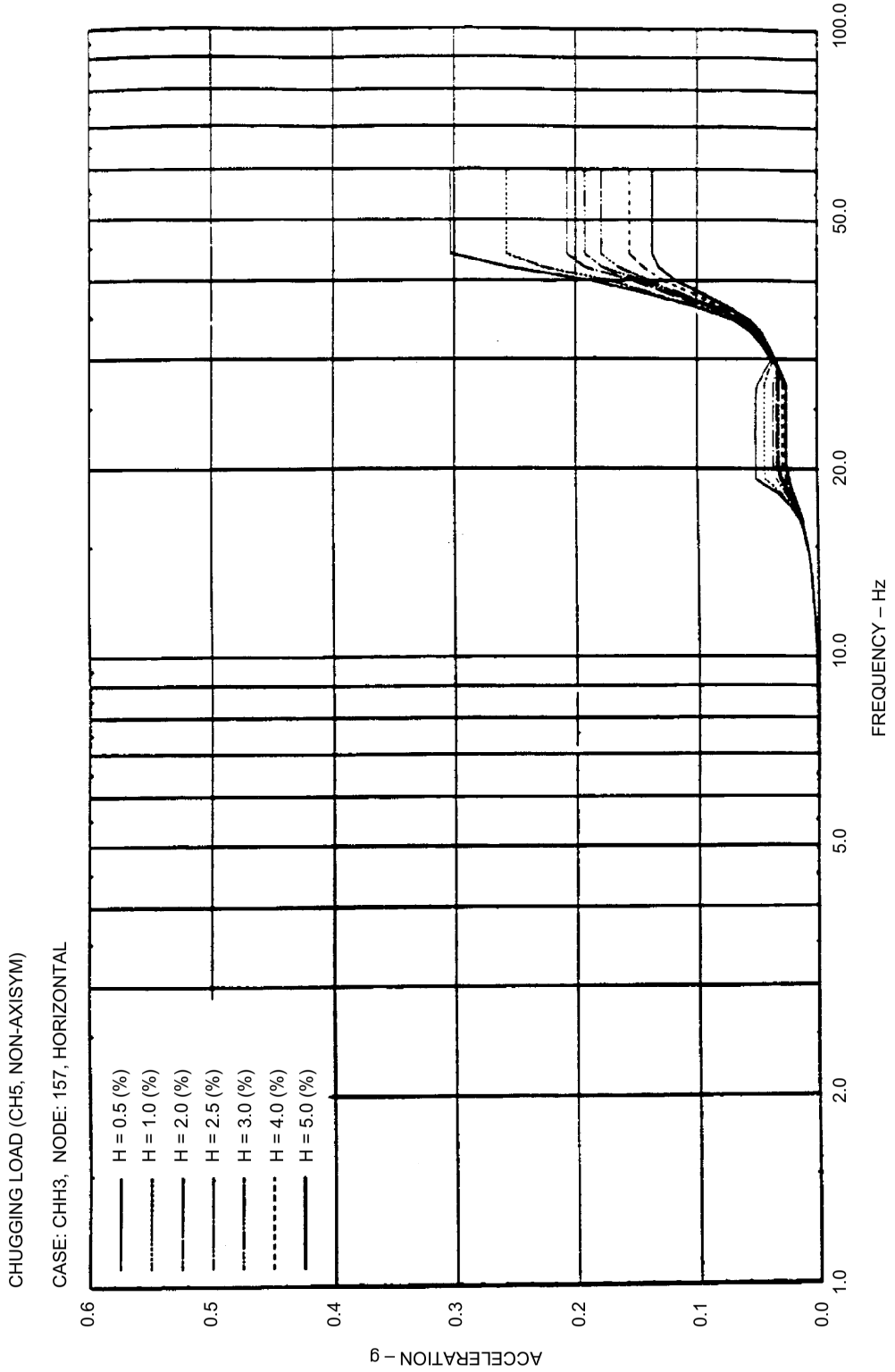


**Figure 3G-87 Floor Response Spectrum—Case: CHH3, Node: 157, Horizontal**

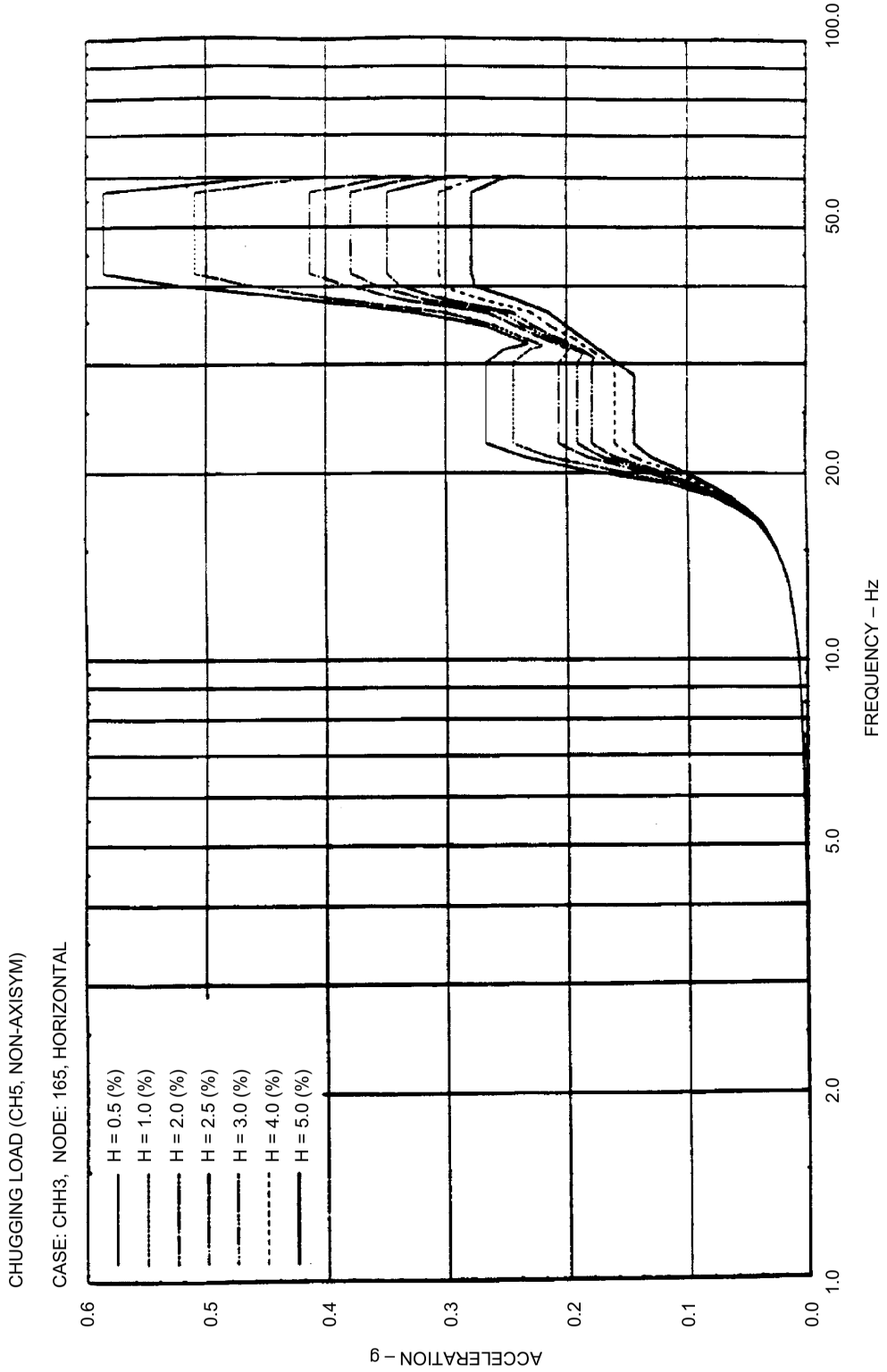


**Figure 3G-88 Floor Response Spectrum—Case: CHH3, Node: 165, Horizontal**

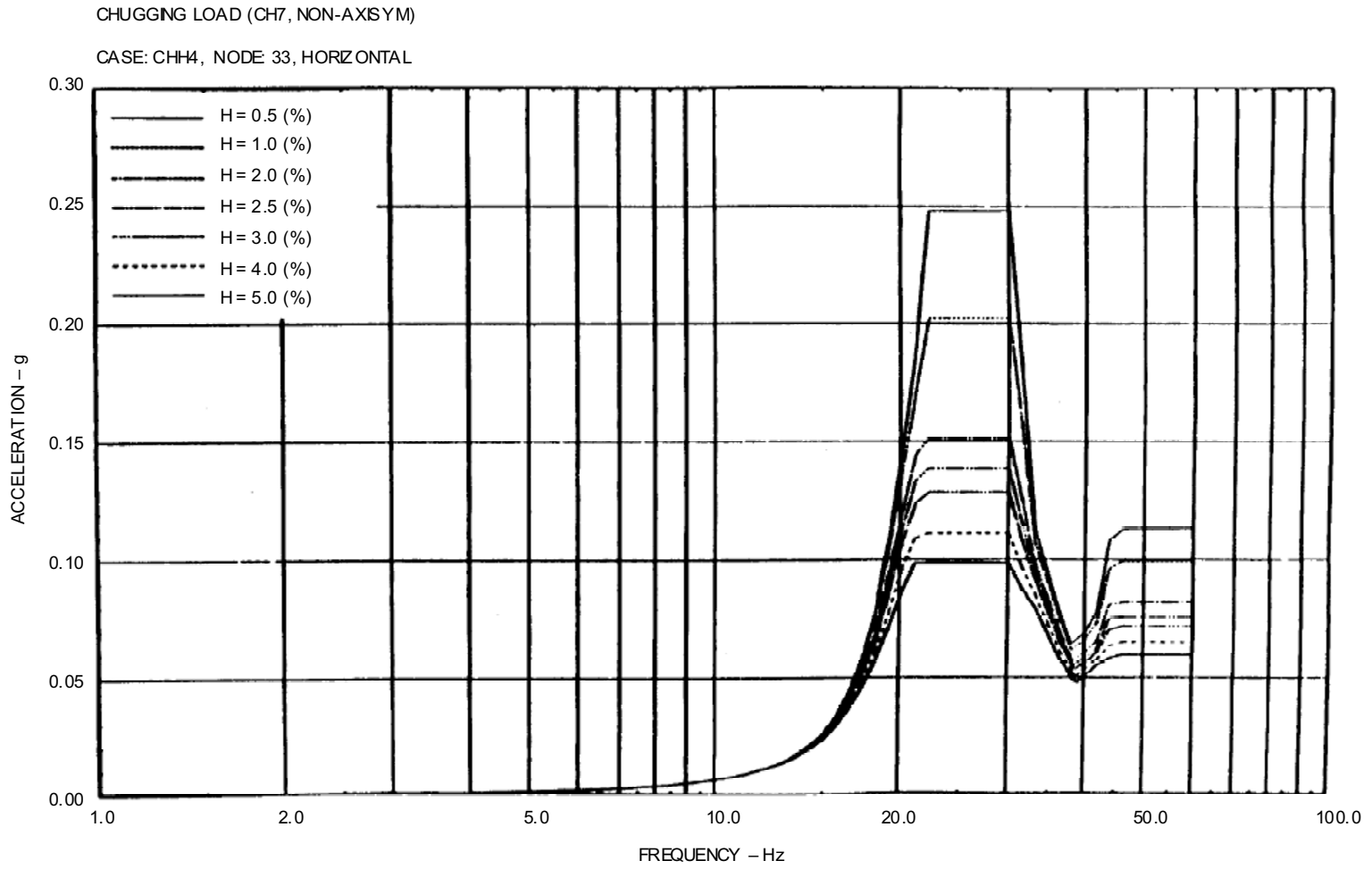


**Figure 3G-89 Floor Response Spectrum—Case: CHH4, Node: 33, Horizontal**

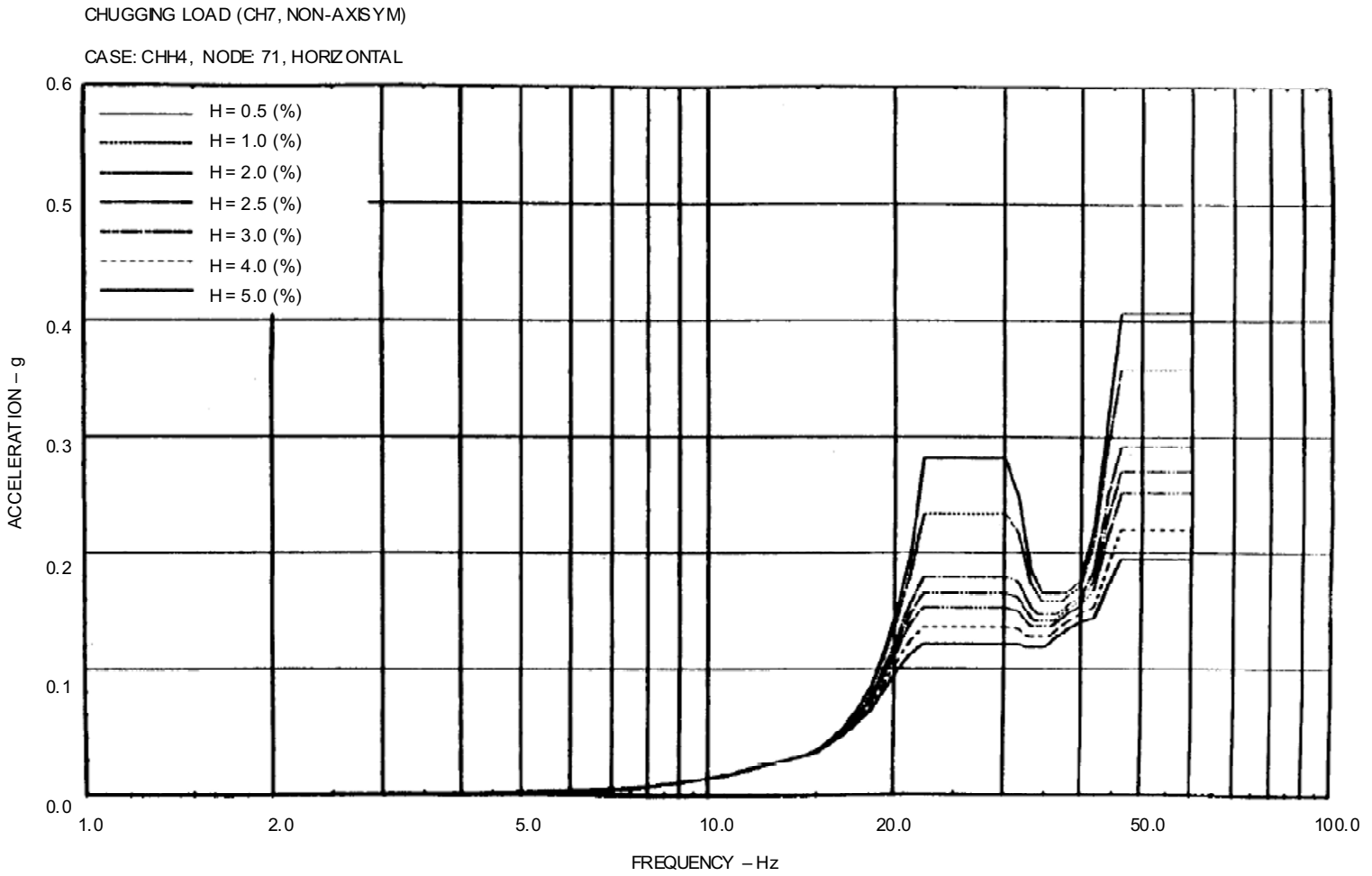


**Figure 3G-90 Floor Response Spectrum—Case: CHH4, Node: 71, Horizontal**

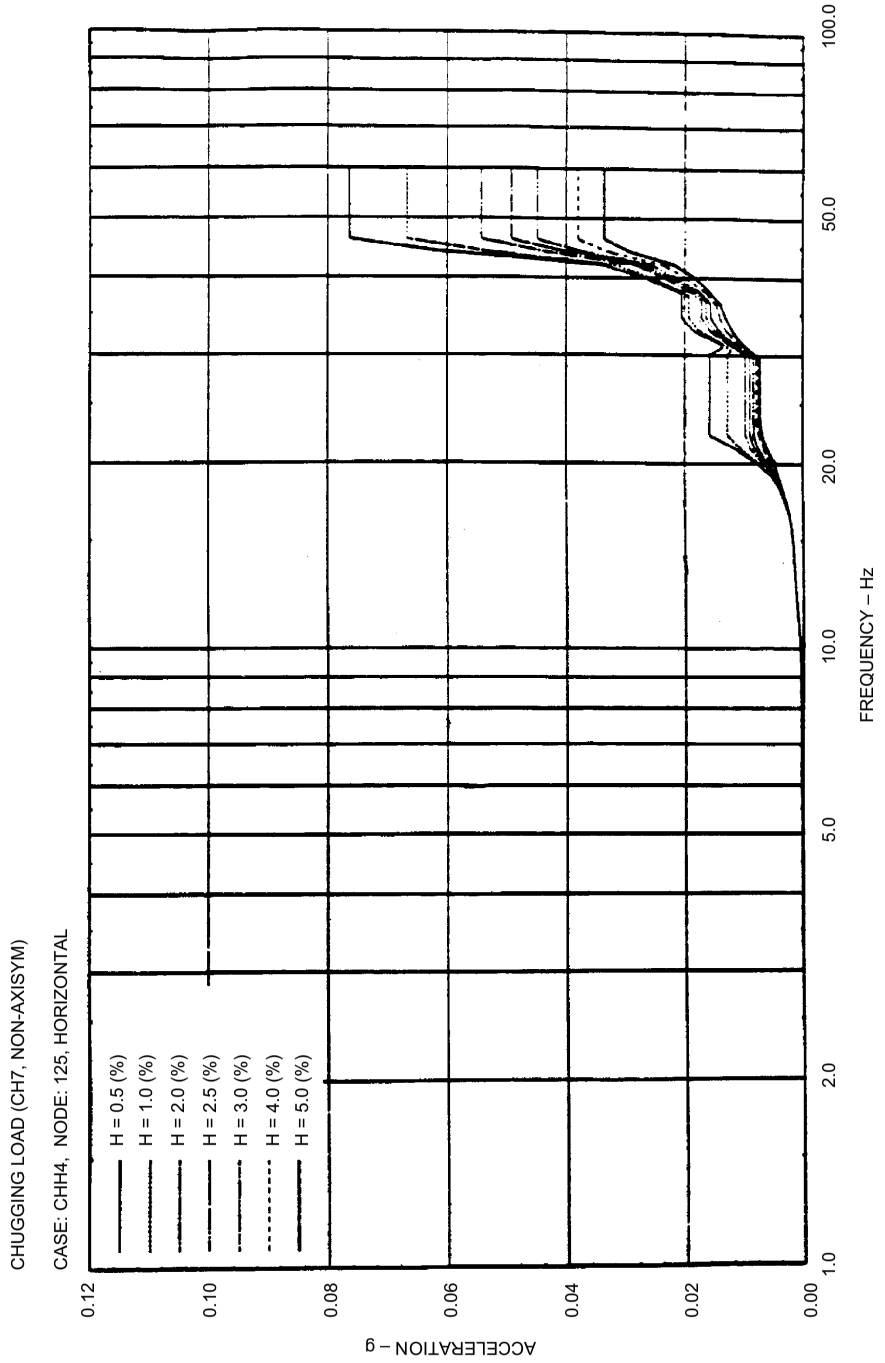


**Figure 3G-91 Floor Response Spectrum—Case: CHH4, Node: 125, Horizontal**

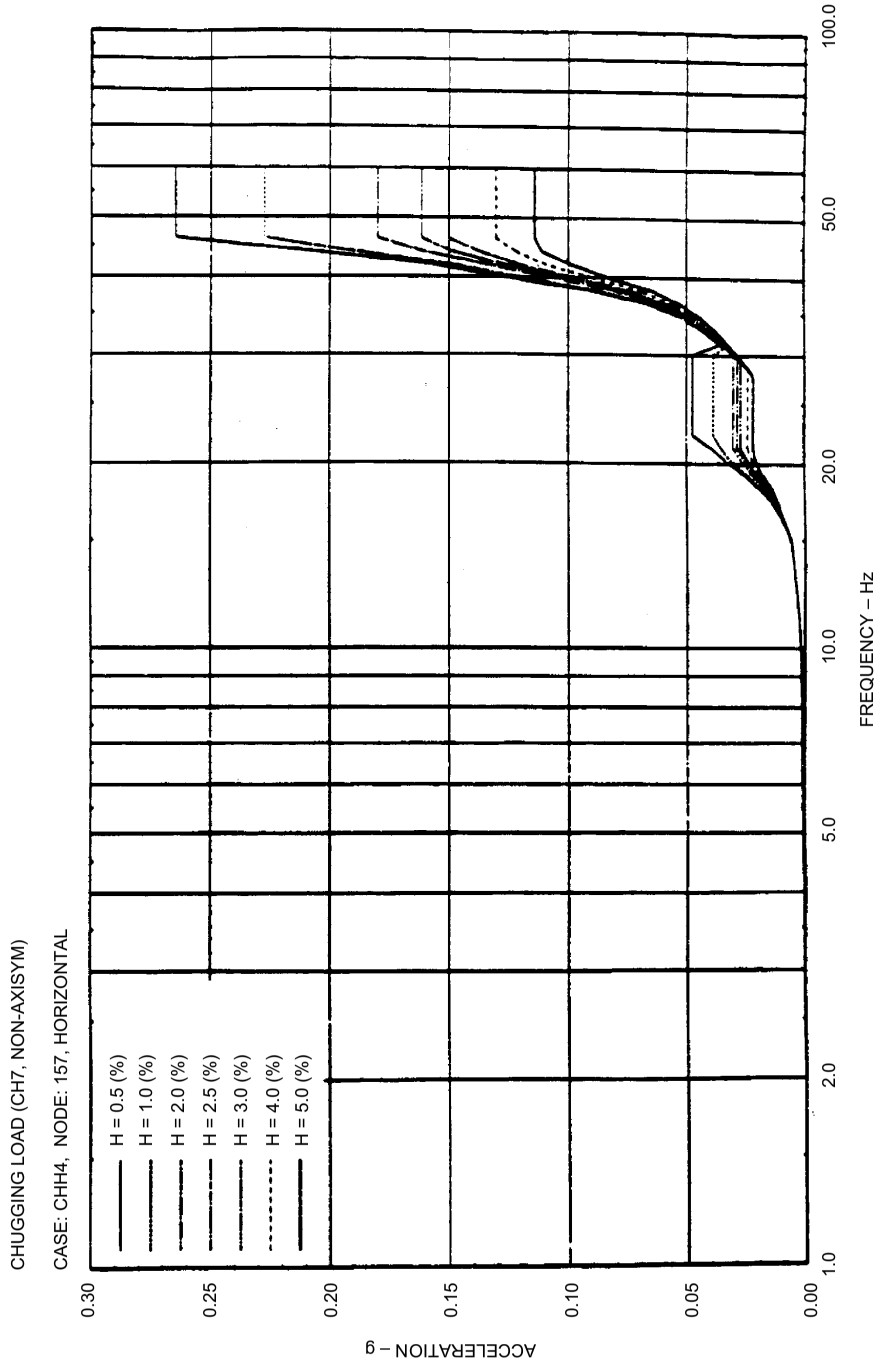


**Figure 3G-92 Floor Response Spectrum—Case: CHH4, Node: 157, Horizontal**

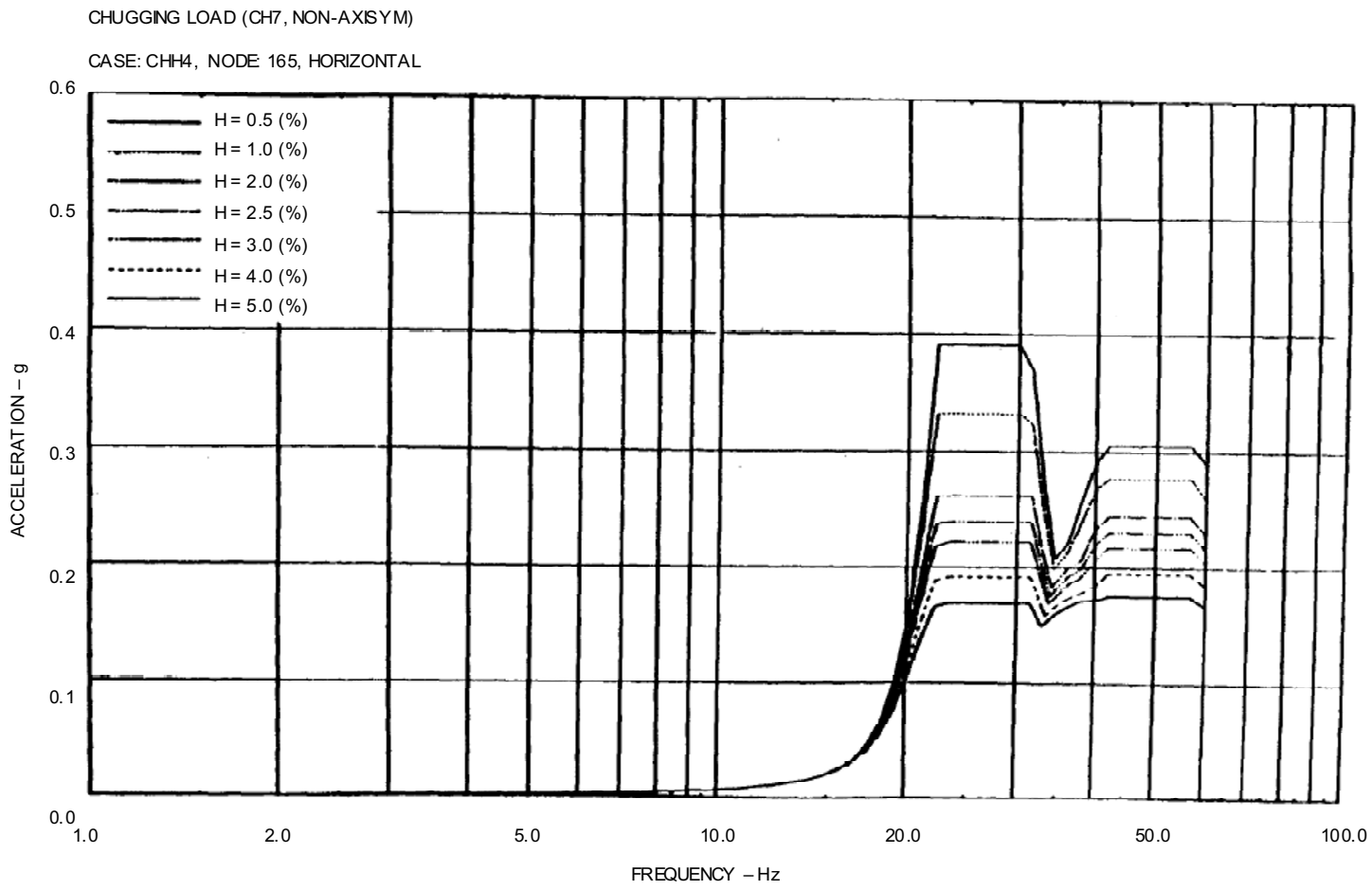


**Figure 3G-93 Floor Response Spectrum—Case: CHH4, Node: 165, Horizontal**

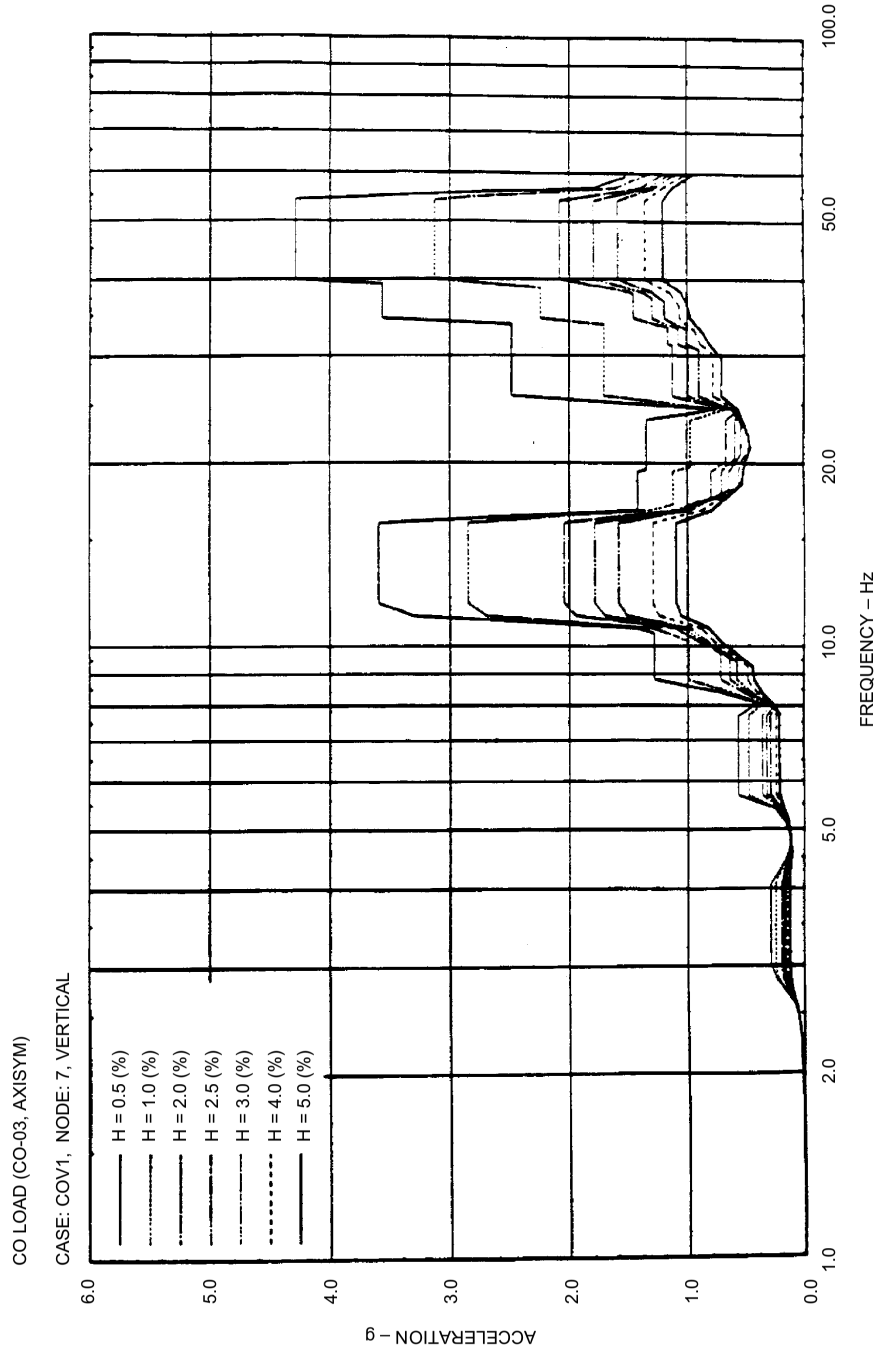


**Figure 3G-94 Floor Response Spectrum—Case: COV1, Node: 7, Vertical**

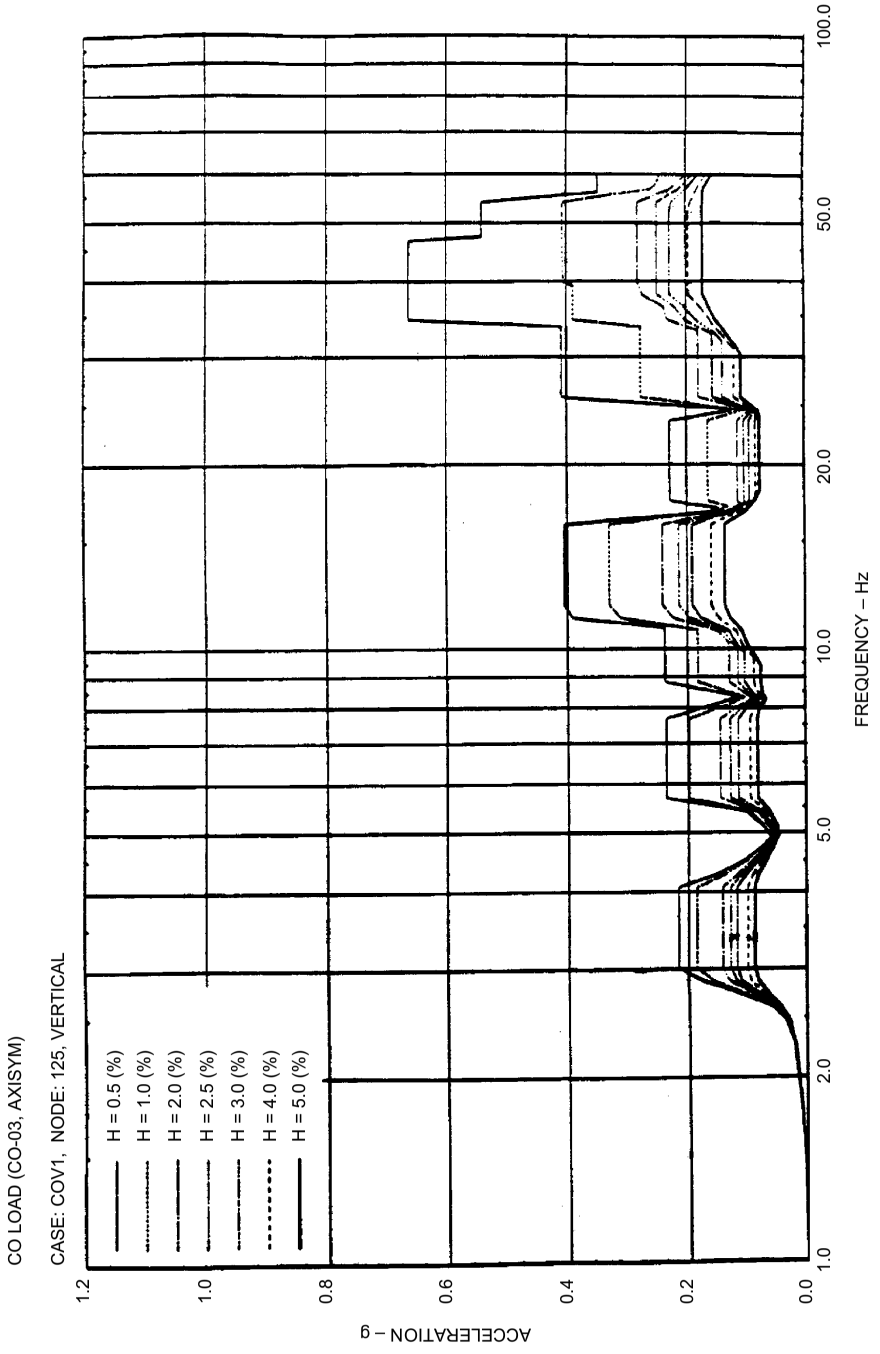


**Figure 3G-95 Floor Response Spectrum—Case: COV1, Node: 125, Vertical**

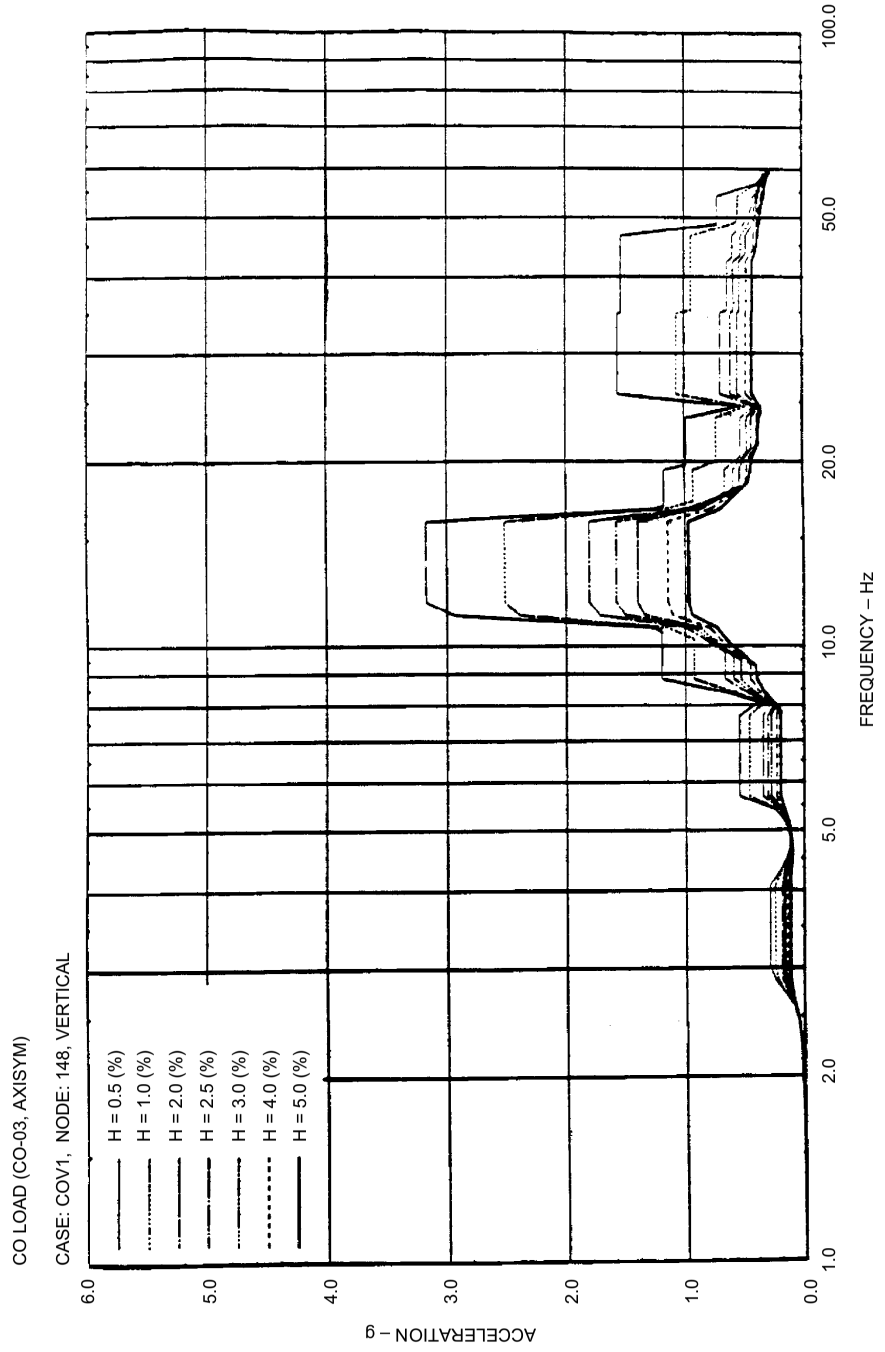


**Figure 3G-96 Floor Response Spectrum—Case: COV1, Node: 148, Vertical**

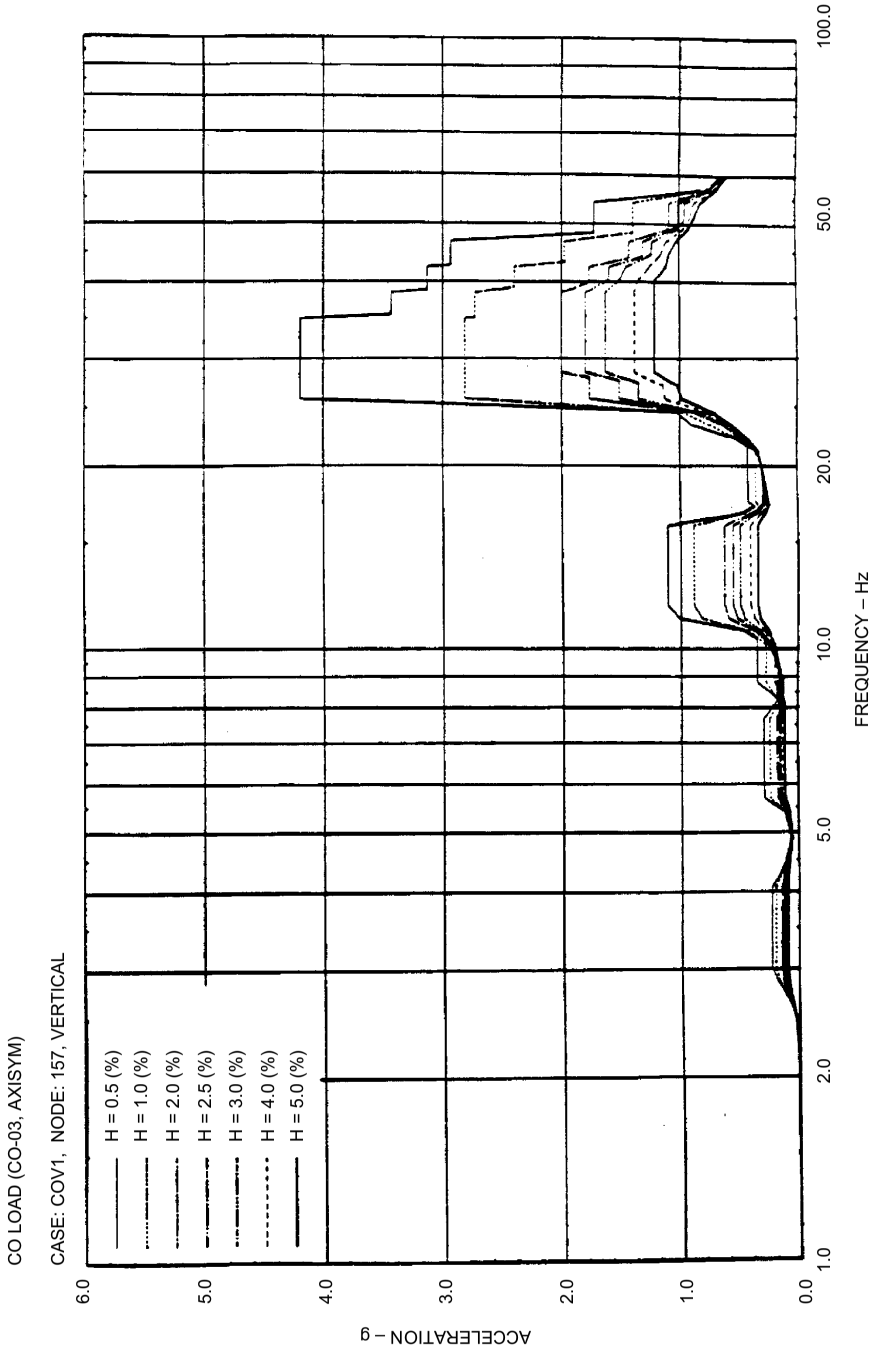


**Figure 3G-97 Floor Response Spectrum—Case: COV1, Node: 157, Vertical**

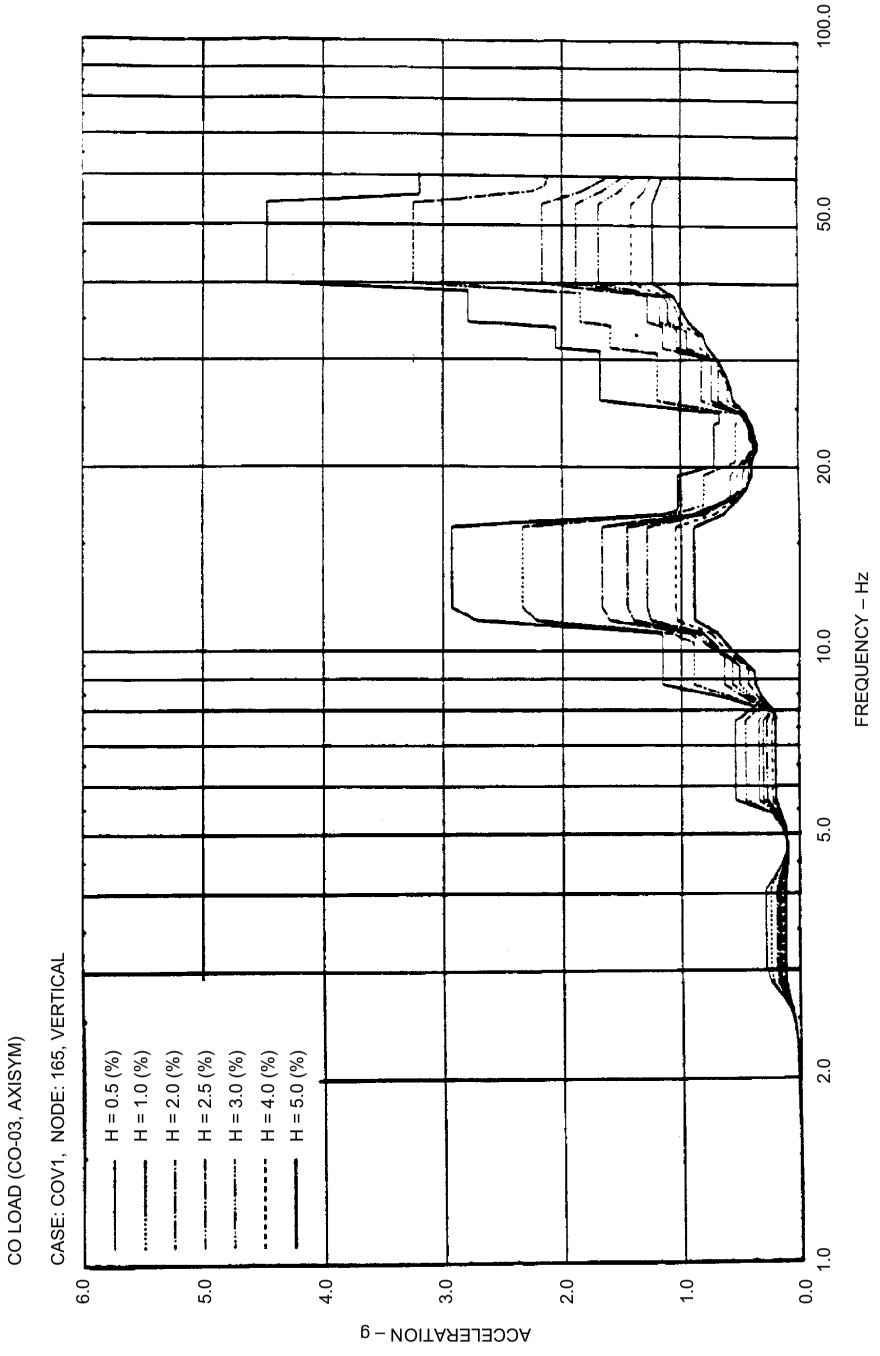


**Figure 3G-98 Floor Response Spectrum—Case: COV1, Node: 165, Vertical**

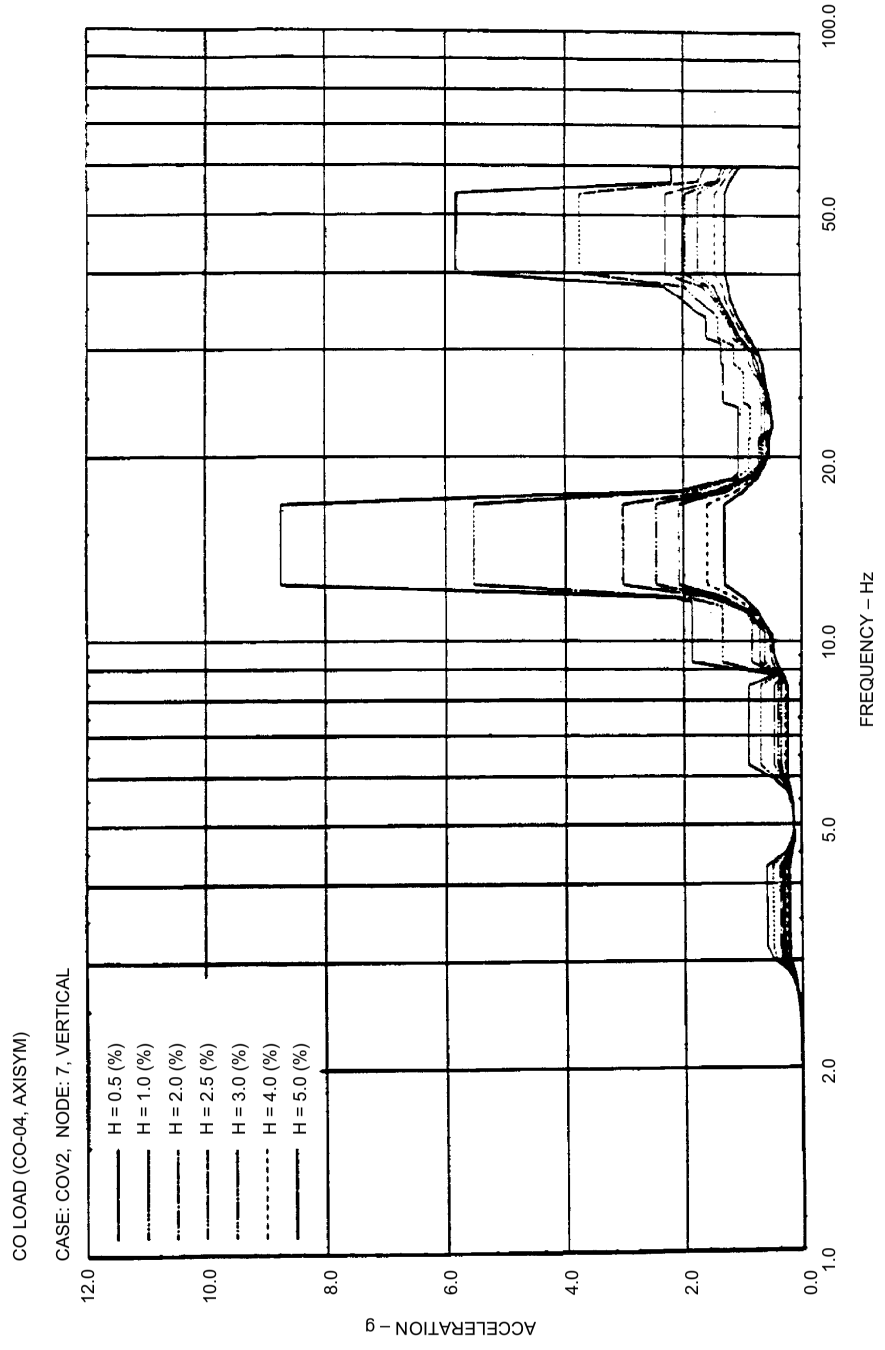


**Figure 3G-99 Floor Response Spectrum—Case: COV2, Node: 7, Vertical**

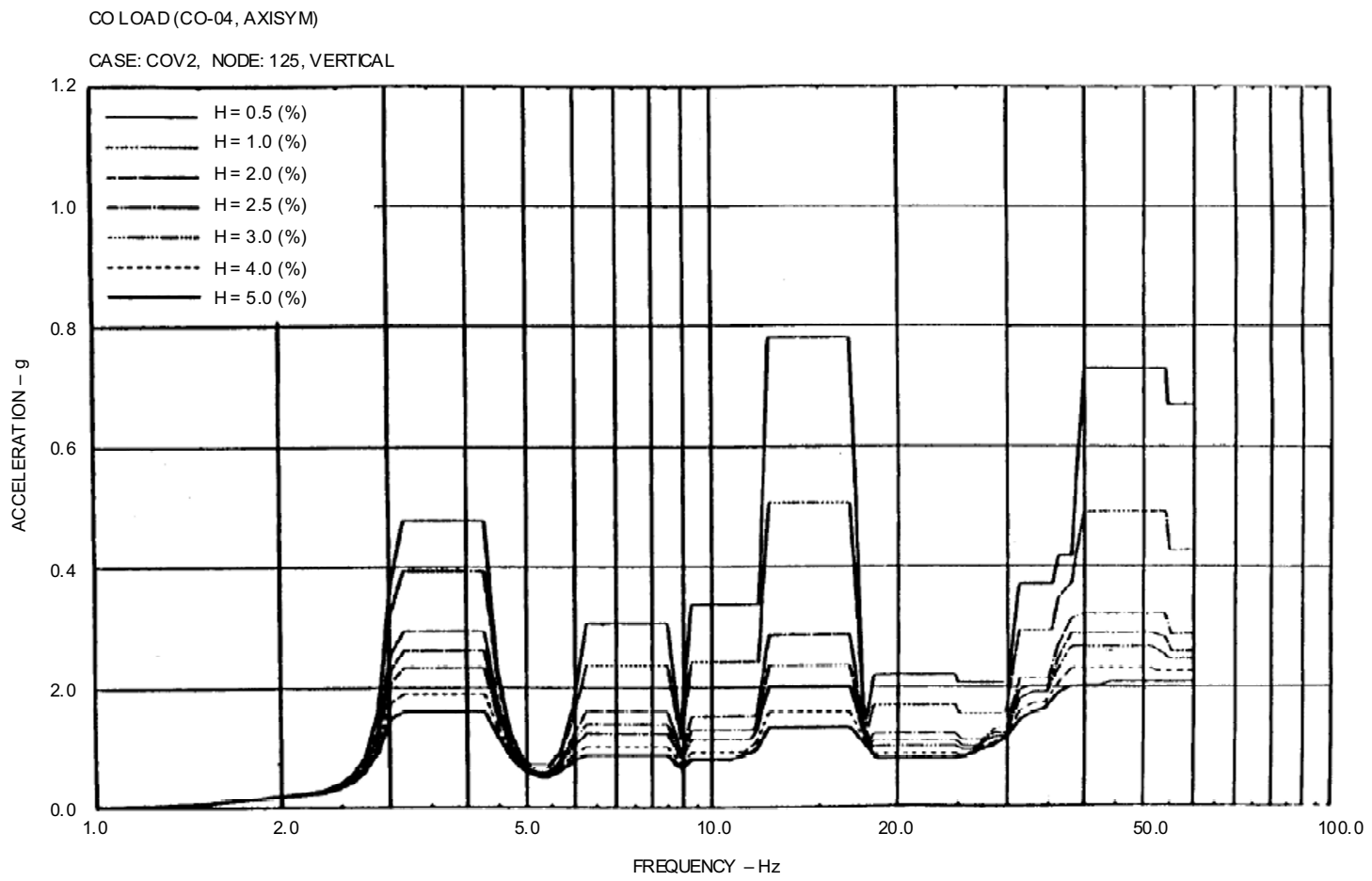


**Figure 3G-100 Floor Response Spectrum—Case: COV2, Node: 125, Vertical**

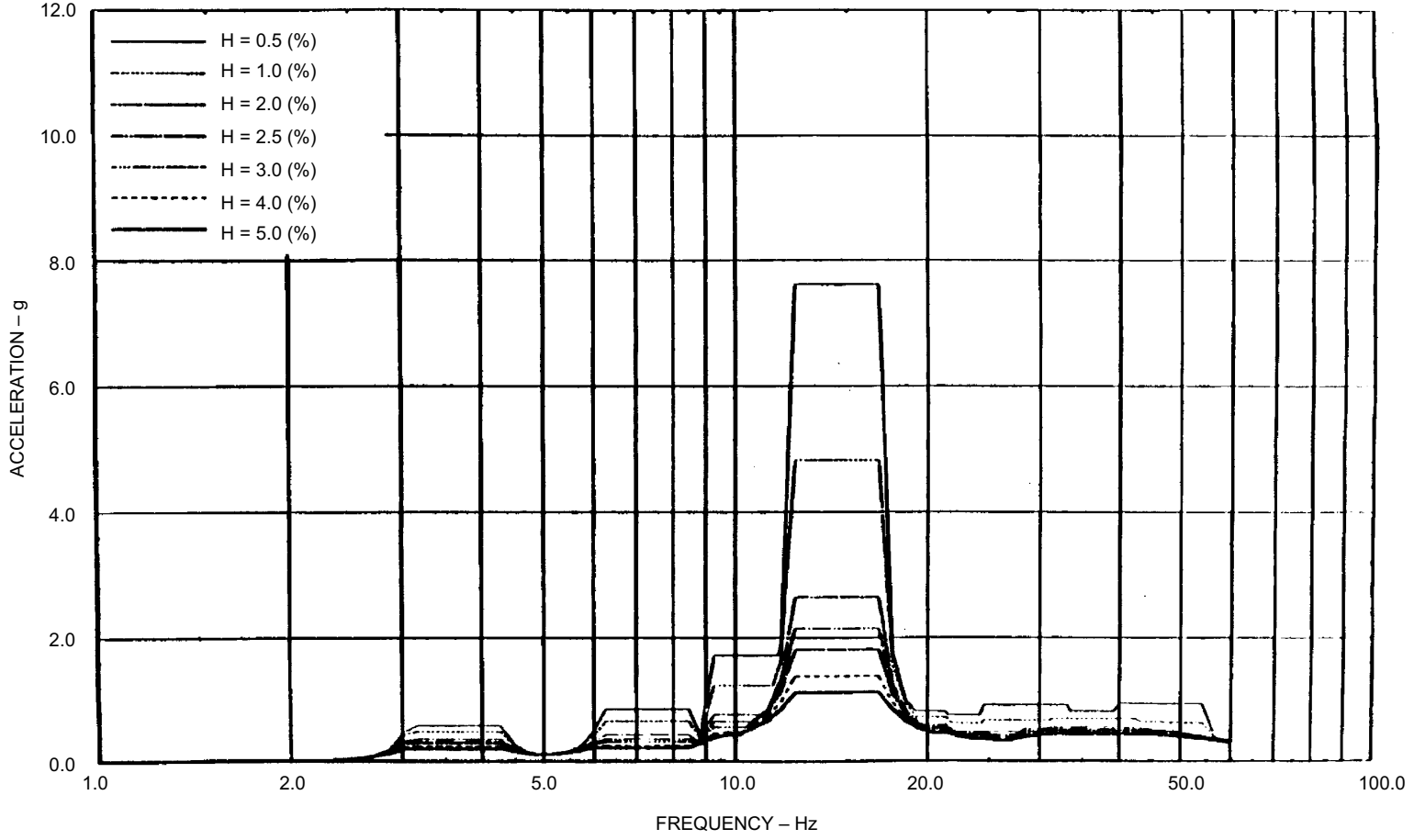


**Figure 3G-101 Floor Response Spectrum—Case: COV2, Node: 148, Vertical**

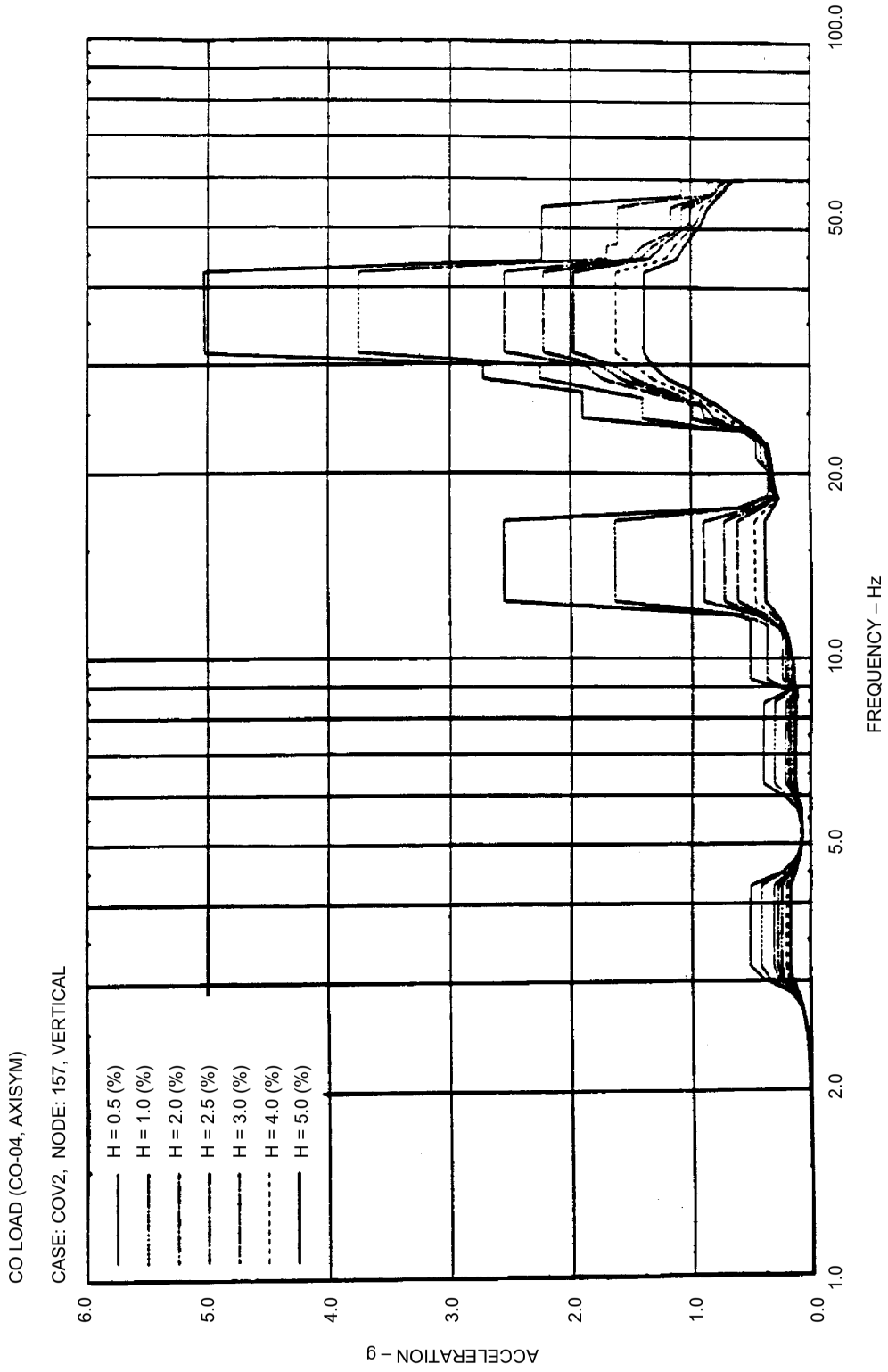


**Figure 3G-102 Floor Response Spectrum—Case: COV2, Node: 157, Vertical**

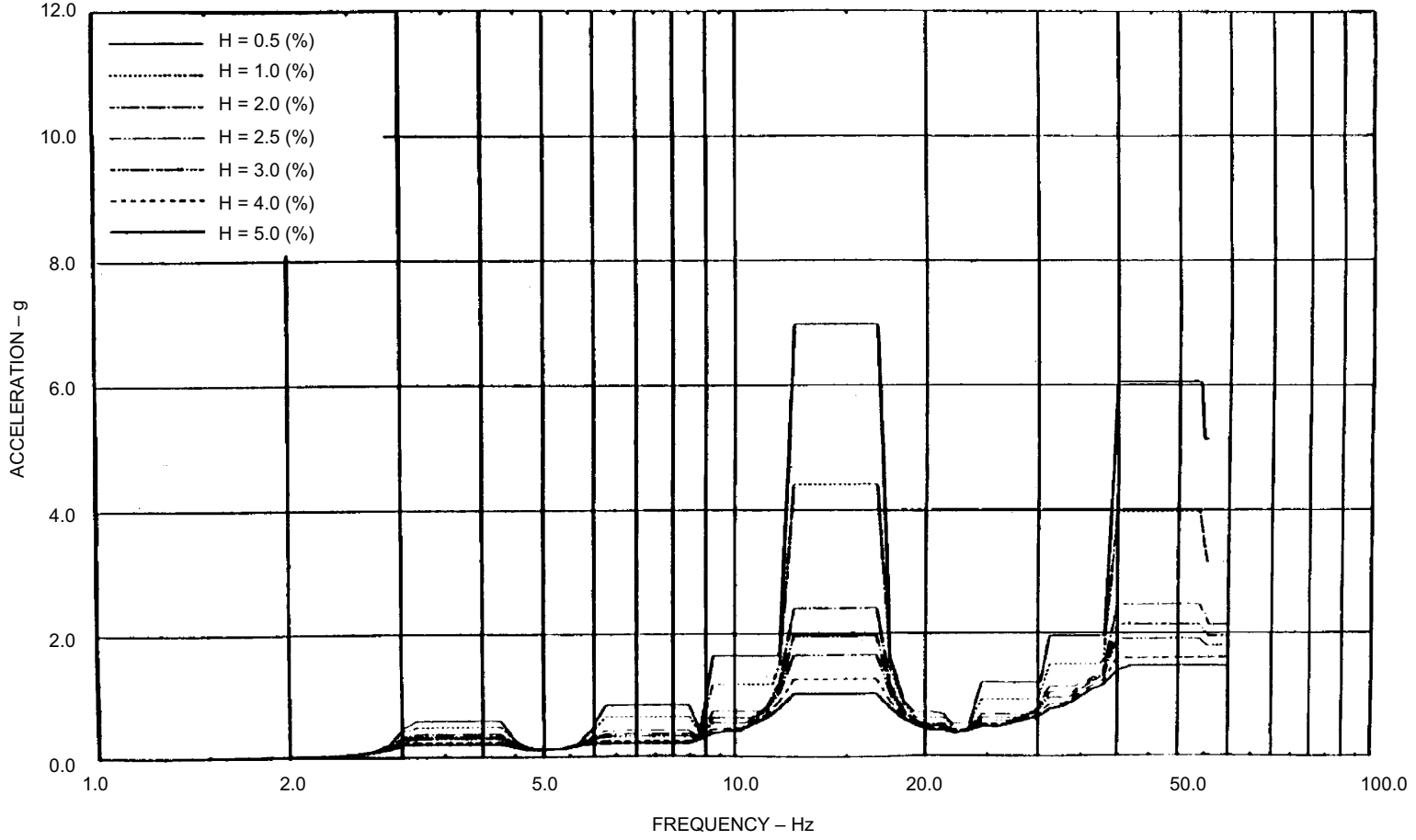


**Figure 3G-103 Floor Response Spectrum—Case: COV2, Node: 165, Vertical**

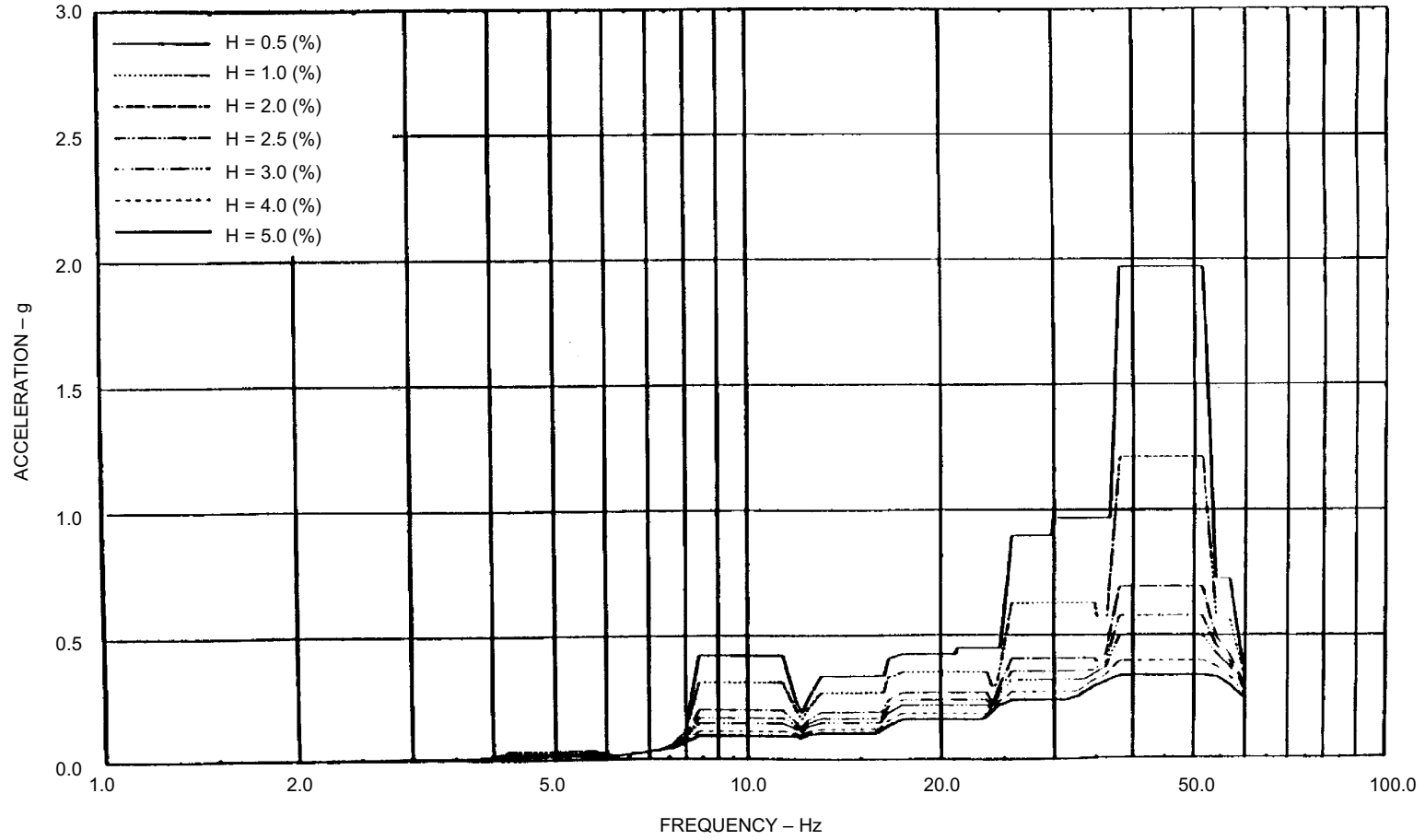


**Figure 3G-104 Floor Response Spectrum—Case: COV3, Node: 7, Vertical**

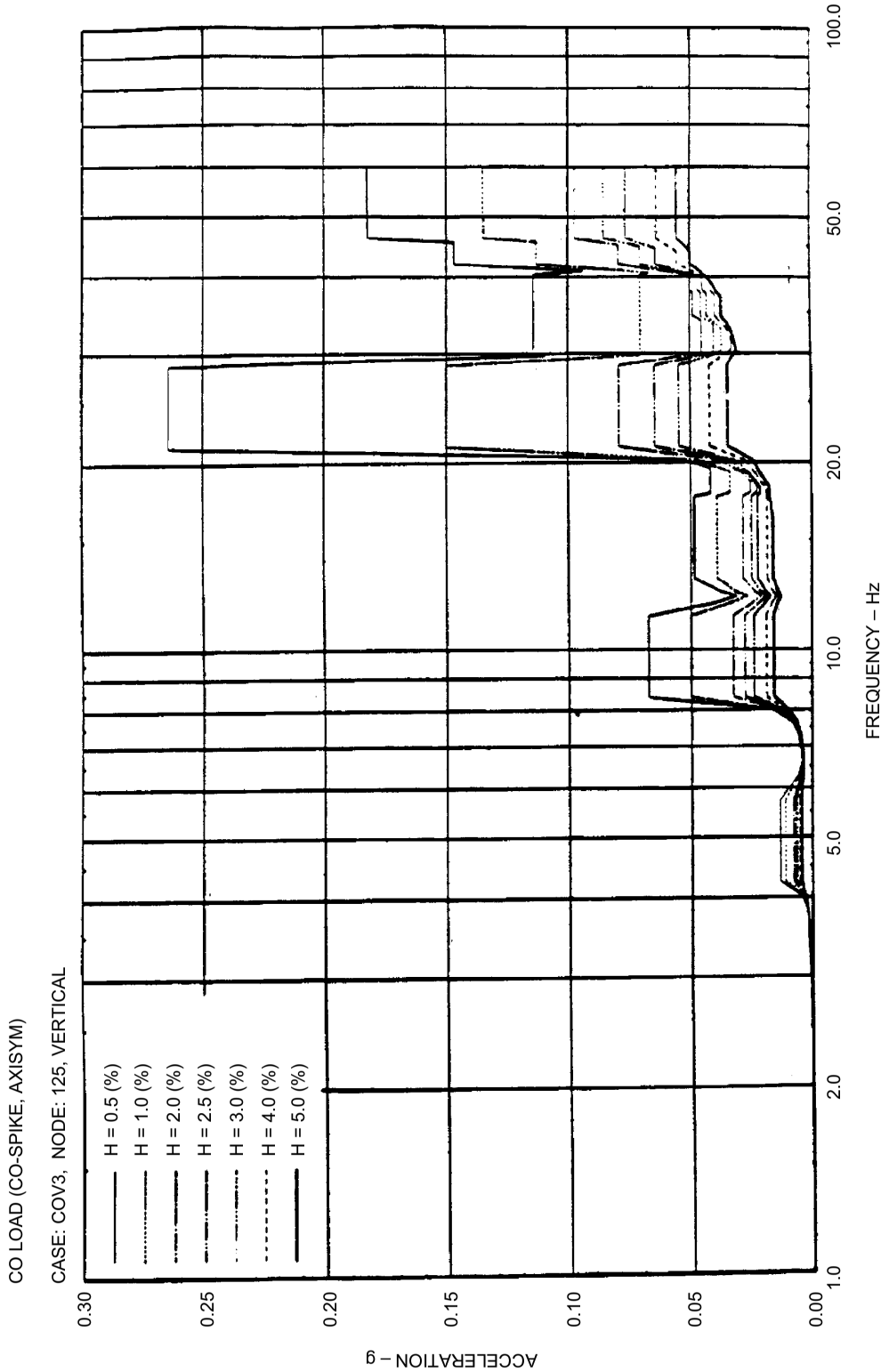


**Figure 3G-105 Floor Response Spectrum—Case: COV3, Node: 125, Vertical**

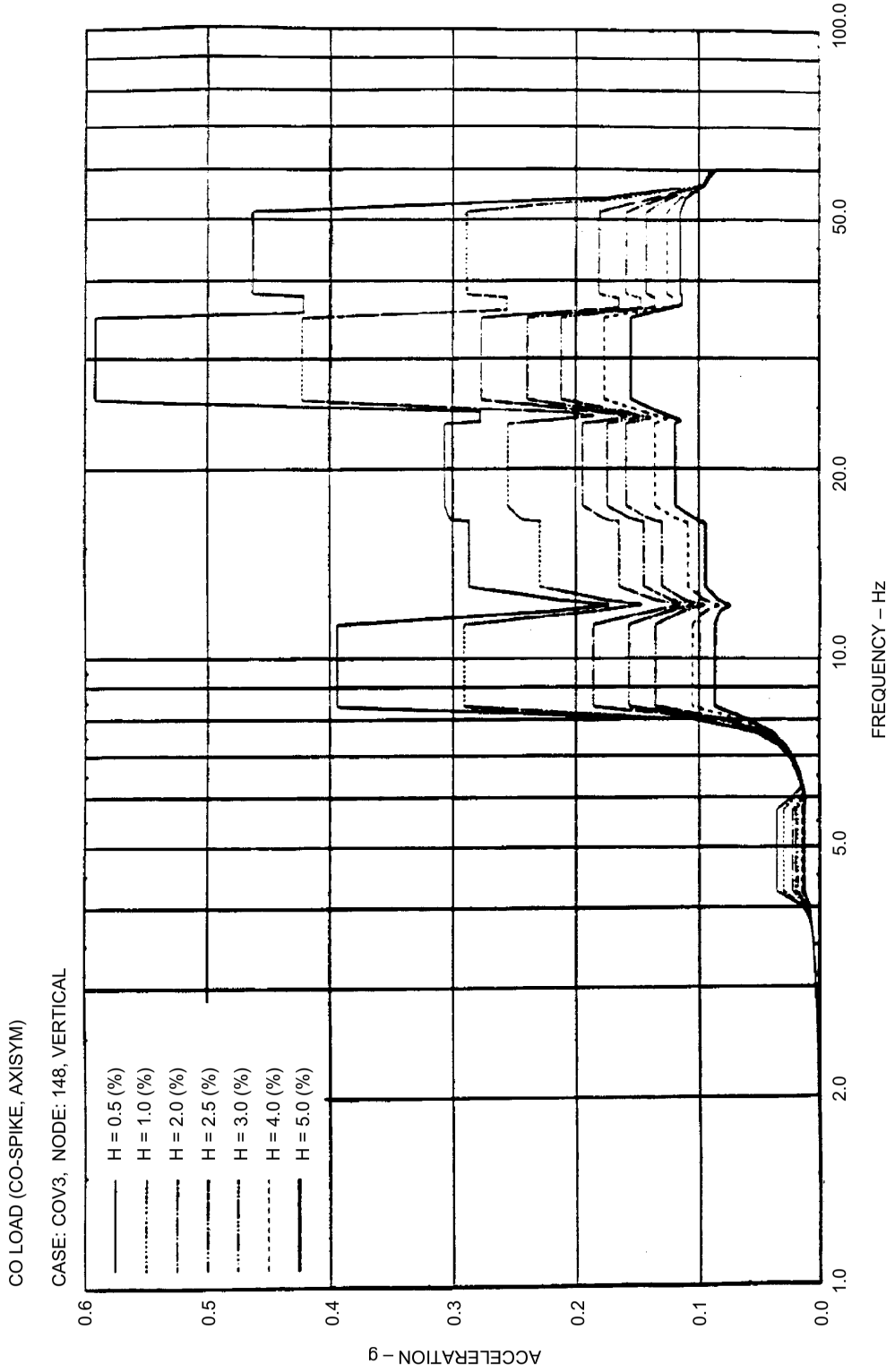


**Figure 3G-106 Floor Response Spectrum—Case: COV3, Node: 148, Vertical**

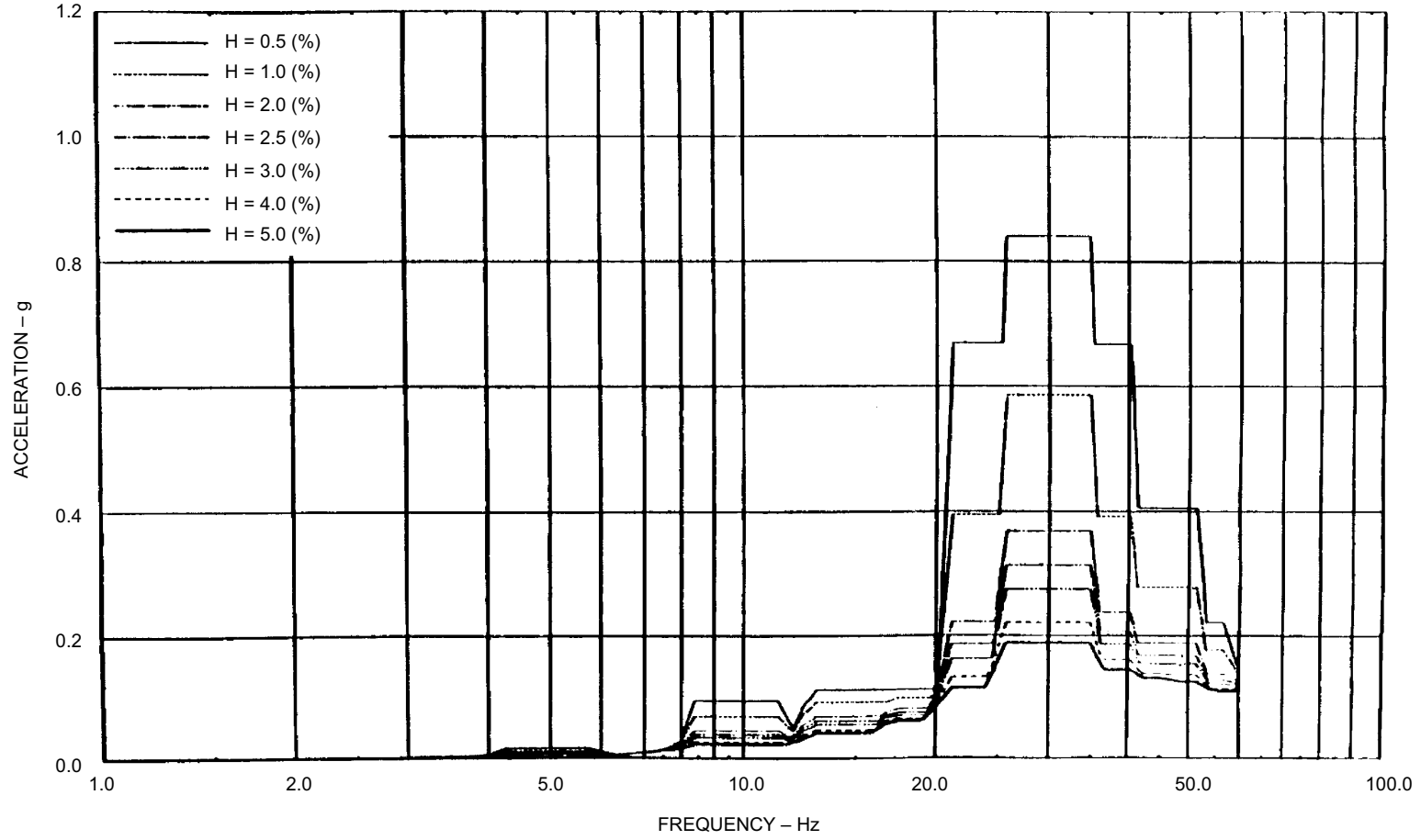


**Figure 3G-107 Floor Response Spectrum—Case: COV3, Node: 157, Vertical**

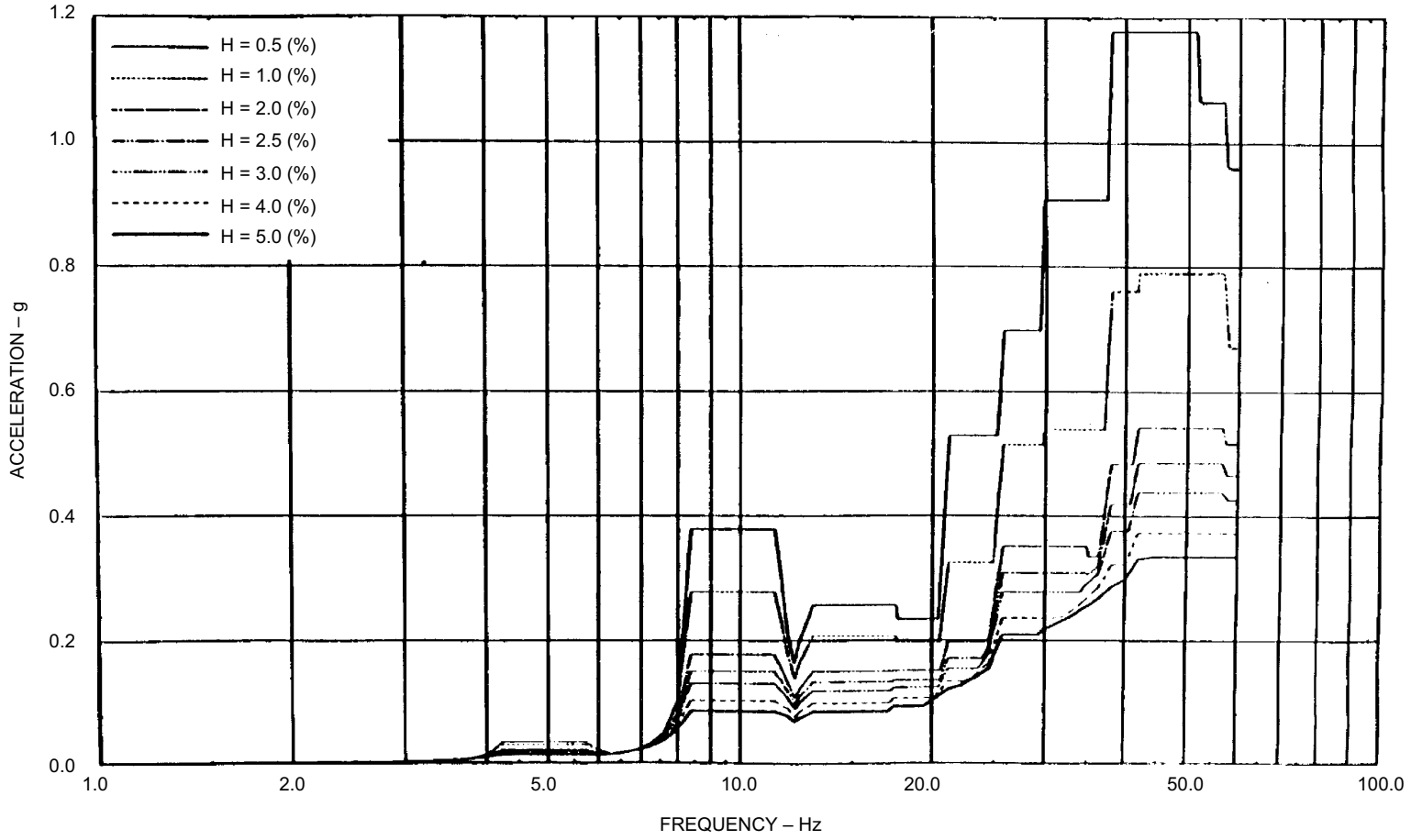


**Figure 3G-108 Floor Response Spectrum—Case: COV3, Node: 165, Vertical**