TS 1170.5 Seismic Demand Parameters

Digital supplements for Tables 3.4, 3.5, and 3.2

This webpage provides access to the digital supplements associated with the Seismic Demand Parameter (SDP) tables provided in TS 1170.5 (insert link).

The parameter values vary by location, annual probability of exceedance (APOE), and Site Class.

The spectral shape-related parameters are defined in Section 3.1.2, copied below.

3.1.2 Spectral acceleration

The spectral acceleration, $S_a(T)$, at a period of vibration T, shall be calculated using Equations 3.2 to 3.5. $S_a(T)$ is illustrated in Figure 3.1 as a function of the site class, defined in 3.1.3, and the annual probability of exceedance appropriate for the limit state under consideration that is prescribed in Table 3.3 of AS/NZS 1170.0.

$S_a(T) = PGA$ for $T = 0$ s ..... (Eq. 3.2)

$S_a(T) = S_{a,s}$ for $0.1\text{s} < T < T_c$ ..... (Eq. 3.3)

$S_a(T) = S_{a,s}\frac{T_c}{T}$ for $T_c < T < T_d$ ..... (Eq. 3.4)

$S_a(T) = S_{a,s}\frac{T_c}{T}\left(\frac{T_d}{T}\right)^{0.5}$ for $T_d < T$ ..... (Eq. 3.5)

to be updated for new TS document

where

PGA	=	peak ground acceleration, determined from 3.3.1
$S_{a,s}$	=	short-period spectral acceleration, determined from Table 3.4 or Table 3.5, for the building location and annual probability of exceedance appropriate for the limit state under consideration
T_c	=	spectral-acceleration-plateau corner period, determined from Table 3.4 or Table 3.5, for the building location and annual probability of exceedance appropriate for the limit state under consideration
T_d	=	the spectral-velocity-plateau corner period, taken as 3 s

Additional parameters include:

M	Earthquake magnitude (see 3.3.2)
D	Shortest distance from a site to the nearest fault (km) (see 3.1.4)

The TS 1170.5 provides two sets of SDP tables, one table for named urban and rural settlements (Table 3.4) and another table for a 0.1 x 0.1 degree grid of latitudes and longitudes (Table 3.5). The tables are provided in three file formats (PDF, JSON, and CSV), along with geospatial data used in deriving the parameter values.

The relevant metadata for each format and links to the files are provided below. The following tools provide additional support for accessing the data:

- a python package (provided by GNS Science) for dynamically querying the parameter tables (insert link)

- a webtool (provided by SESOC) for visualising and downloading parameters on a location-by-location basis (insert link)

File format metadata

SDP tables

The difference between Tables 3.4 and 3.5 is the type of location specified in the location groupings (where each location group includes six APOEs).

Table	Location type	Example
3.4	named settlement	*Wellington*
3.5	lat/lon grid point	*-42.3~174.8* (with 0.1 degree precision)

PDF files

Formatted, searchable files, as included in the TS 1170.5 document. Settlement names with macrons are supplemented with a plain text version, for flexible searchability.

				Site Class I				Site Class II				Site Class III				Site Class IV				Site Class V				Site Class VI			
Settlement	**APOE**	**M**	**D**	***PGA***	***Sa,s***	***Tc***	***Td***	***PGA***	***Sa,s***	***Tc***	***Td***	***PGA***	***Sa,s***	***Tc***	***Td***	***PGA***	***Sa,s***	***Tc***	***Td***	***PGA***	***Sa,s***	***Tc***	***Td***	***PGA***	***Sa,s***	***Tc***	***Td***
Whangārei, "Whangarei"	1/25	6.2	n/a	0.02	0.03	0.39	1.6	0.02	0.04	0.42	1.6	0.02	0.05	0.47	1.6	0.03	0.06	0.53	1.6	0.03	0.07	0.56	1.6	0.03	0.09	0.56	1.6
	1/50	6.2	n/a	0.03	0.06	0.37	2.2	0.03	0.07	0.45	2.1	0.04	0.09	0.49	2.0	0.05	0.11	0.55	2.0	0.05	0.12	0.62	1.9	0.06	0.15	0.63	1.9
	1/100	6.2	n/a	0.05	0.1	0.38	2.6	0.06	0.12	0.45	2.4	0.07	0.14	0.54	2.3	0.08	0.18	0.57	2.2	0.08	0.2	0.62	2.3	0.09	0.23	0.7	2.2
	1/250	6.2	n/a	0.09	0.19	0.36	3.0	0.11	0.22	0.44	2.8	0.12	0.26	0.52	2.6	0.13	0.3	0.61	2.6	0.14	0.34	0.65	2.6	0.15	0.39	0.73	2.5
	1/500	6.3	>20	0.13	0.29	0.35	3.1	0.16	0.33	0.43	3.0	0.18	0.38	0.52	2.8	0.2	0.44	0.6	2.8	0.19	0.48	0.68	2.7	0.2	0.53	0.79	2.6
	1/1000	6.3	>20	0.19	0.42	0.34	3.5	0.22	0.48	0.42	3.2	0.25	0.55	0.5	3.1	0.26	0.61	0.62	2.9	0.25	0.65	0.71	2.8	0.27	0.7	0.85	2.7
	1/2500	6.4	>20	0.29	0.65	0.33	4.2	0.34	0.74	0.4	3.9	0.38	0.82	0.51	3.4	0.37	0.88	0.64	3.2	0.35	0.92	0.75	3.1	0.36	0.96	0.92	3.1

CSV files

Unformatted, comma separated text files.

location	location_ascii	apoe	M	D	I-PGA	I-Sas	I-Tc	I-Td	II-PGA	II-Sas	II-Tc	II-Td	III-PGA	III-Sas	III-Tc	III-Td	IV-PGA	IV-Sas	IV-Tc	IV-Td	V-PGA	V-Sas	V-Tc	V-Td	VI-PGA	VI-Sas	VI-Tc	VI-Td
Whangārei	Whangarei	1/25	6.2	n/a	0.02	0.03	0.39	1.6	0.02	0.04	0.42	1.6	0.02	0.05	0.47	1.6	0.03	0.06	0.53	1.6	0.03	0.07	0.56	1.6	0.03	0.09	0.56	1.6
Whangārei	Whangarei	1/50	6.2	n/a	0.03	0.06	0.37	2.2	0.03	0.07	0.45	2.1	0.04	0.09	0.49	2	0.05	0.11	0.55	2	0.05	0.12	0.62	1.9	0.06	0.15	0.63	1.9
Whangārei	Whangarei	1/100	6.2	n/a	0.05	0.1	0.38	2.6	0.06	0.12	0.45	2.4	0.07	0.14	0.54	2.3	0.08	0.18	0.57	2.2	0.08	0.2	0.62	2.3	0.09	0.23	0.7	2.2
Whangārei	Whangarei	1/250	6.2	n/a	0.09	0.19	0.36	3	0.11	0.22	0.44	2.8	0.12	0.26	0.52	2.6	0.13	0.3	0.61	2.6	0.14	0.34	0.65	2.6	0.15	0.39	0.73	2.5
Whangārei	Whangarei	1/500	6.3	>20	0.13	0.29	0.35	3.1	0.16	0.33	0.43	3	0.18	0.38	0.52	2.8	0.2	0.44	0.6	2.8	0.19	0.48	0.68	2.7	0.2	0.53	0.79	2.6
Whangārei	Whangarei	1/1000	6.3	>20	0.19	0.42	0.34	3.5	0.22	0.48	0.42	3.2	0.25	0.55	0.5	3.1	0.26	0.61	0.62	2.9	0.25	0.65	0.71	2.8	0.27	0.7	0.85	2.7
Whangārei	Whangarei	1/2500	6.4	>20	0.29	0.65	0.33	4.2	0.34	0.74	0.4	3.9	0.38	0.82	0.51	3.4	0.37	0.88	0.64	3.2	0.35	0.92	0.75	3.1	0.36	0.96	0.92	3.1

JSON files

Python dictionaries including the SDP values and a schema defining the metadata. The dictionary can be read as a pandas table using:

```
pandas.read_json(filepath, orient="table",precise_float=True)
```

Geospatial files

Todo: finalise the file format and metadata of the .geojson files.

Links to files

Named settlements (Table 3.4)

The parameter values in Table 3.4 apply for all locations that fall within urban and rural settlement boundaries, as defined by the geospatial polygon data provided in the GEOJSON file.

- insert .pdf link
- insert .csv link
- insert .json link
- insert .geojson link

Grid locations (Table 3.5)

The parameter values in Table 3.5 apply for all other locations, by taking the nearest 0.1 x 0.1 degree latitude/longitude grid point.

- insert .pdf link
- insert .csv link
- insert .json link

Major faults (Table 3.2)

The geospatial data that defines the major faults named in Table 3.2.

- insert .geojson link