Ultrasonic Pulse Transmission Tests: Datasets — Test Series 1, Cement Paste at Early Stages

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Abstract

The test series was created to receive information about the material behaviour of cement pastes at early stages. The approach for this test series was to vary the parameters water-cement-ratio and distance-between-actuator-and-sensor. This results in a two-dimensional test parameter grid (water-cement-ratio versus distance-between-actuator-and-sensor). For each point of the parameter grid, tests were performed several times to check the stability of the testing method. The materials tested were blends from ordinary Portland cement and tap water. The test methods used were ultrasonic pulse transmission method with combined compression- and shear wave measurements, gravimetric density tests (fresh paste density, solid specimen density) and hydration temperature tests. All test data and metadata are summarized into datasets using GNU Octave's open binary file format.

1 Introduction

This document provides a technical description of the datasets of a series of ultrasonic pulse transmission tests (UPTT) performed in the course of the PhD thesis of the author of this document (see title page). This test series was performed to receive information about the behaviour of cement pastes at early stages (within the first 24 hours). The test series design is based on the variation of two different parameters. The water-cement-ratio $w/c = [0.40, 0.45, 0.50, 0.55, 0.60]$ and the distance between actuator and sensor $D = [25, 50, 70]mm$. This results in a two-dimensional parameter grid. For each grid point $(w/c, D)$, tests were carried out six times to gain information about the stability of the tests. The result is a collection of 90 datasets containing the measurement data of the UPTT's and additional subsidiary tests performed in the course of the UPTT's (fresh paste density, solid sample density, environment temperature, specimen temperature). Here it is to mention that not all subsidiary tests were carried out for each grid point (e.g. specimen hydration temperature and fresh paste density). The test device used for the UPTT's is the FreshCon[1] device (developed at the University of Stuttgart, Germany). The materials used for the cement paste blends are ordinary Portland cement[2] (CEM I 42.5 N) and tap water. An elaborate description of devices, materials, mixtures and test operation procedures is stored in the data set structure along with the measurement results. This record is published to allow other researchers to make use of it. In particular, those who have no access to the required laboratory facilities and test equipment. To allow others to make use of these datasets freely, an open license was chosen by the author (Creative Commons 4.0 Attribution, CC-BY-4.0).

2 Record content

The repository record consists of the following three files:

- **ts1_techdescr.pdf** contains the technical description (this file).
- **ts1_rawdata.tar.xz** contains the raw measurement data. This compressed TAR archive consists of a set of ZIP archives enlisted in table 8 in section **Appendix - Tables**. The content of the ZIP archives is described in section 3.
- **ts1_datasets.tar.xz** contains the datasets compiled from the raw measurement data. This compressed TAR archive consists of a set of binary files (*.oct, open GNU Octave binary format) enlisted in table 9 in section **Appendix - Tables**. The structure of the content of each data set is described in section 4 in detail.

Extracting data set files from compressed TAR archives: Under Linux the content of the compressed TAR archives can easily be extracted with the command line tool "tar"[3] on the "bash"[4] command prompt. On Microsoft Windows one may use "7zip"[5] instead.

```
$ tar -xf <filename>.tar.xz
```

Data integrity: To ensure the integrity of the files contained in the compressed TAR archives, the SHA256 checksum is also provided along with the files. See second column in tables 8 and 9 in section **Tables**. Check the integrity of a file with "sha256sum"[6] at the "bash" command prompt.

```
$ echo "<sha256_checksum> <filename>" > checkfile.txt
$ sha256sum --check checkfile.txt
```

File name convention, data set code: The variation of the parameters w/c-ratio and distance is also reflected in the file names. The file names are a concatenation of the test series id <T>, the water-cement-ratio <W>, the distance between the actuator and sensor <D> in millimetres and the repetition number <R>. Filename structure: **<T>_wc<W>_d<D>_<R>.oct**. As example, a test performed on a cement paste with a water-cement ratio of 0.40, a distance between actuator and sensor of 50mm and a repetition number of 6 is stored in **ts1_wc040_d50_6.oct**. The name of the corresponding raw data archive is **ts1_wc040_d50_6.zip**.

3 Raw data archive structure

Each data set in the raw data archive **ts1_rawdata.tar.xz** is represented by a ZIP archive. The directories and files contained in the archive files are enlisted in table 1.

L	C	Path	Type	Description
0	1	<datasetcode>	directory	data set directory
1	1	projinfo.txt	plain text file	metadata and information about additional tests
1	1	Channel 1	directory	compression wave measurement data
2	1	../measurements.txt	plain text file	list of signal filenames and recording timestamp
2	1	../settings.txt	plain text file	device and measurement settings
2	1	../tst.tem	plain text file	temperature data (if exists)
2	N	../tst<num>.dat	plain text files	signal data of compression wave measurements
1	1	Channel 2	directory	shear wave measurement data
2	1	../measurements.txt	plain text file	list of signal filenames and recording timestamp
2	1	../settings.txt	plain text file	device and measurement settings
2	1	../tst.tem	plain text file	temperature data (if exists)
2	N	../tst<num>.dat	plain text files	signal data of shear wave measurements

Table 1: Raw data directory- and file structure (ZIP archives). L . . . directory level; C . . . cardinality.

4 Data set binary file structure

Each data set in the data set archive **ts1_datasets.tar.xz** is represented by a OCT file (<filename>.oct). They were generated from raw data consisting of plain text files (see also 3). Therefore, GNU Octave 6.2.0[7] command scripts were used. The result of the conversion process are datasets available in GNU Octave's open binary file format. The data in the datasets is organized in a C-like hierarchical data structure. That structure consists of several structural levels. The top structural level serves to classify the data according to individual thematic areas. The metadata and data of the measurement results are stored in the lower structure levels. To be able to display the data and metadata as simply as possible, sub-structures are used, which are referred to here as "atomic elements" and represent the lowest structural level of the data. There are three defined types

of atomic elements: the atomic reference element (ARE), the atomic attribute element (AAE) and the atomic data element (ADE). All atomic elements consist of simple structure fields that hold the data.

4.1 Atomic elements

Atomic reference element (ARE): Atomic reference elements are used to link objects to each other. This is to avoid copies of recurring content (e.g. for a specimen used in several subsidiary tests). They consist of a set of fields enlisted in table 2.

Field	Description	Data type
obj	object type (always "ARE")	string
ver	version number [major, minor]	uint16
t	tag, a descriptive name	string
i	referenced id	uint, [uint]
r	referenced object name	{string}
d	description	string

Table 2: Field list of atomic reference elements (ARE)

Atomic attribute element (AAE): Atomic attribute elements are used to store text only (e.g. additional description of the parent data structure). They consist of a set of fields enlisted in table 3.

Field	Description	Data type
obj	object type (always "AAE")	string
ver	version number [Major, Minor]	[uint16]
t	tag, a descriptive name	string
v	value, text	string, {string}
d	description	string

Table 3: Field list of atomic attribute elements (AAE)

Atomic data element (AAE): Atomic data elements are used to store values in combination with value type and physical unit (e.g. measurement data). They consist of a set of fields enlisted in table 4. The value type enumerators stored in field “vt” are enlisted in table 6 in section **Appendix - Tables**.

Field	Description	Data type
obj	object type (always "ADE")	string
ver	version number [Major, Minor]	[uint16]
t	tag, a descriptive name	string
vt	value type enumerator	string
v	value of given value type	depends on value type
u	unit	string
d	description	string

Table 4: Field list of atomic data elements (ADE)

4.2 Data set structure hierarchy

The hierarchy of the data structure consists of top-level substructures containing various atomic elements or other lower-level substructures (e.g. ds.tst, test collection). A list of main substructures is shown in table 5. A more detailed description of the structure hierarchy is shown in table 7 in section **Appendix - Tables**.

L	C	Path	Description
0	1	ds	structure root
1	1	ds.meta_ser	test series metadata
1	1	ds.meta_set	data set metadata
1	N	ds.loc	geo-location information, GPS coordinates
1	1	ds.lic	license information
1	N	ds.aut	author information
1	N	ds.dev	test device information
1	N	ds.mat	test material information
1	1	ds.rec	mixture/blend recipe definition
1	1	ds.mix	mixture component information
1	N	ds.spm	test specimen information, specimen I and II
1	1	ds.tst	test collection
2	1	ds.tst.s01	fresh paste density
2	1	ds.tst.s02	solid specimen density, specimen I
2	1	ds.tst.s03	solid specimen density, specimen II
2	1	ds.tst.s04	ultrasonic measurement distance, specimen I
2	1	ds.tst.s05	ultrasonic measurement distance, specimen II
2	1	ds.tst.s06	ultrasonic pulse transmission test (compression wave), specimen I
2	1	ds.tst.s07	ultrasonic pulse transmission test (shear wave), specimen II
2	1	ds.tst.s08	specimen temperature, specimen II
2	1	ds.tst.s09	environment temperature

Table 5: Main substructures. L . . . hierarchy level; C . . . cardinality.

4.3 Accessing items of the hierarchical data structure

To access the data and metadata in the hierarchical data structure, the file need to be loaded into memory first. Then, the structure handling commands of GNU Octave can be used to access single items. To illustrate the process, some typical application examples using the GNU Octave command line interface are given below.

Load data set: Load data set and store the result in variable `ds`.

```
octave: >>> ds = load('/path/to/dataset/file.oct', 'dataset').dataset;
```

Accessing items: The following commands store the signal data of all compression wave signals in variable `s1` and all shear wave signals in variable `s2`. All other elements can be accessed in the same way. A detailed list of available structure elements is shown in table 7 in section **Appendix - Tables**.

```
octave: >>> s1 = ds.tst.s06.d13.v;
octave: >>> s2 = ds.tst.s07.d13.v;
```

References

[1] Smartmote. *Smartmote - FreshCon*. July 14, 2023. URL: http://www.smartmote.de/joomla/de/produkte/~ultraschall/9-produkte/19-neptun-webservices-5.

[2] Vereinigung der österreichischen Zemetindustrie | VÖZ. *Zementtype*. July 14, 2023. URL: https://www.zement.at/der-baustoff/zement/zementtype.

[3] die.net. *tar(1) - Linux man page*. July 14, 2023. URL: https://linux.die.net/man/1/tar.

[4] die.net. *bash(1) - Linux man page*. July 14, 2023. URL: https://linux.die.net/man/1/bash.

[5] www.7 zip.org. *7zip download*. July 14, 2023. URL: https://www.7-zip.org/download.html.

[6] die.net. *sha256sum(1) - Linux man page*. July 14, 2023. URL: https://linux.die.net/man/1/sha256sum.

[7] John W. Eaton et.al. *GNU Octave - Scientific Programming Language*. July 14, 2023. URL: https://octave.org/.

Appendix - Tables

Data type	Description
string	character array, character = 8 bit
string_arr	1D cell array (vector) of strings
string_mat	2D cell array (matrix) of string
boolean	unsigned integer, 8 bit
boolean_arr	1D array (vector) of type boolean
boolean_mat	2D array (matrix) of type boolean
uint	unsigned integer
uint_arr	1D array (vector) of type uint
uint_mat	2D array (matrix) of type uint
int	signed integer
int_arr	1D array (vector) of type int
int_mat	2D array (matrix) of type int
single	single precision floating point number, 32 bit
single_arr	1D array (vector) of type single
single_mat	2D array (matrix) of type single
double	double precision floating point value, 64 bit
double_arr	1D array (vector) of type double
double_mat	2D array (matrix) of type double

Table 6: Value types for atomic data elements (ADE)

Table 7: Detailed overview of the hierarchical structure of the datasets (*.oct files).

Path	Type	Tag	Description
ds	struct_dataset	—	**structure root**
ds.meta_ser	struct_metaser	—	**substructure**
ds.meta_ser.r01	ARE	author	author reference
ds.meta_ser.r02	ARE	license	license reference
ds.meta_ser.d01	ADE	series_id	test series id
ds.meta_ser.a01	AAE	series_code	test series code
ds.meta_ser.a02	AAE	series_name	test series name
ds.meta_ser.a03	AAE	description	test series description
ds.meta_ser.a04	AAE	abstract	test series abstract
ds.meta_ser.a05	AAE	context	test series context
ds.meta_ser.a06	AAE	date_start	test series start date
ds.meta_ser.a07	AAE	date_end	test series end date
ds.meta_set	struct_metaset	—	**substructure**
ds.meta_set.r01	ARE	author	author reference
ds.meta_set.r02	ARE	series	test series reference
ds.meta_set.r03	ARE	location	location reference
ds.meta_set.r04	ARE	license	license reference
ds.meta_set.d01	ADE	dataset_id	data set id
ds.meta_set.a01	AAE	dataset_code	data set code
ds.meta_set.a02	AAE	dataset_name	data set name
ds.meta_set.a03	AAE	description	description, general
ds.meta_set.a04	AAE	description_abstract	description, abstract
ds.meta_set.a05	AAE	description_methods	description, methods
ds.meta_set.a06	AAE	description_tableofcontents	description, tableofcontents
ds.meta_set.a07	AAE	created_by	data set creator name
ds.meta_set.a08	AAE	collected_by	data set collector name
ds.meta_set.a09	AAE	copyrighted_by	data set copyrighter name
ds.meta_set.a10	AAE	date_created	date created

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Path	Type	Tag	Description
ds.meta_set.a11	AAE	date_collected	date collected
ds.meta_set.a12	AAE	date_copyrighted	date copyrighted
ds.meta_set.a13	AAE	size	data set size, number of files
ds.meta_set.a14	AAE	format	data set file format
ds.meta_set.a15	AAE	version	data set version
ds.meta_set.a16	AAE	context	data set context
ds.meta_set.a17	AAE	rawdata_directory	data set rawdata directory
ds.meta_set.a18	AAE	rawdata_archive	data set rawdata archive
ds.loc	struct_loc	—	**substructure array**
ds.loc.d01	ADE	location_id	location id
ds.loc.d02	ADE	geolocation	geo location, latitude, longitude
ds.loc.a01	AAE	country	country
ds.loc.a02	AAE	state_province	state or province
ds.loc.a03	AAE	city	city
ds.loc.a04	AAE	zipcode	zip code, postal code
ds.loc.a05	AAE	street	street name
ds.loc.a06	AAE	housenumber	house number
ds.loc.a07	AAE	description	location description
ds.lic	struct_lic	—	**substructure**
ds.lic.r01	ARE	author	author reference
ds.lic.d01	ADE	license_id	license id
ds.lic.a01	AAE	license_code	license code
ds.lic.a02	AAE	rightsholder	rights holder
ds.lic.a03	AAE	rights	rights description, e.g. Creative Commons Attribution 4.0 International
ds.lic.a04	AAE	rights_uri	rights URI, e.g. https://spdx.org/licenses/CC-BY-4.0.html
ds.lic.a05	AAE	rights_identifier_scheme	rights identifier scheme, e.g. SPDX
ds.lic.a06	AAE	rights_identifier_scheme_uri	rights identifier scheme URI, e.g. https://spdx.org/licenses/
ds.lic.a07	AAE	license_description	license description
ds.lic.a08	AAE	spdx_icon	license icon (spdx)
ds.lic.a09	AAE	spdx_id	license id (spdx)

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Path	Type	Tag	Description
ds.aut	struct_aut	—	**substructure**
ds.aut.d01	ADE	author_id	author id
ds.aut.a01	AAE	name	full name
ds.aut.a02	AAE	givenname	given name, first name
ds.aut.a03	AAE	familyname	family name, surname
ds.aut.a04	AAE	initials	initials
ds.aut.a05	AAE	title_pfx	title before the name (prefix)
ds.aut.a06	AAE	title_sfx	title behind the name (suffix)
ds.aut.a07	AAE	organization	organization name
ds.aut.a08	AAE	department	department name
ds.aut.a09	AAE	role	role in organization/department
ds.aut.a10	AAE	country	country
ds.aut.a11	AAE	state_province	state or province
ds.aut.a12	AAE	city	city name
ds.aut.a13	AAE	zipcode	zip code, postal code
ds.aut.a14	AAE	street	street name
ds.aut.a15	AAE	email	email address
ds.aut.a16	AAE	name_identifier_type	name identifier type, e.g. ORCID
ds.aut.a17	AAE	name_identifier_type_uri	name identifier type uri, e.g. https://orcid.org/
ds.aut.a18	AAE	name_identifier	name identifier, e.g. ORCID id
ds.aut.a19	AAE	description	author description
ds.dev	struct_dev	—	**substructure array**
ds.dev.d01	ADE	device_id	device id
ds.dev.a01	AAE	name	device name
ds.dev.a02	AAE	vendor	vendor name
ds.dev.a03	AAE	product	product name
ds.dev.a04	AAE	category	device category
ds.dev.a05	AAE	usage	device usage
ds.dev.a06	AAE	description	device description
ds.dev.s01	ADE	data_array	device properties

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Path	Type	Tag	Description
ds.mat	struct_mat	—	**substructure array**
ds.mat.d01	ADE	material_id	material id
ds.mat.a01	AAE	name	material name
ds.mat.a02	AAE	vendor	vendor name
ds.mat.a03	AAE	product	product name
ds.mat.a04	AAE	category	material category
ds.mat.a05	AAE	description	material description
ds.mat.a06	AAE	storage_place	material storage place
ds.mat.a07	AAE	storage_condition	material storage condition
ds.rec	struct_rec	—	**substructure**
ds.rec.d01	ADE	recipe_id	recipe id
ds.rec.a01	AAE	recipe_code	recipe code
ds.rec.s01	struct_mix_component	—	mix components
ds.rec.s02	ADE	w/c-ratio	water-cement-ratio, mass of water divided by mass of cement
ds.mix	struct_mix	—	**substructure**
ds.mix.r01	ARE	author	author reference
ds.mix.r02	ARE	device	device reference
ds.mix.r03	ARE	recipe	recipe reference
ds.mix.r04	ARE	location	location reference
ds.mix.d01	ADE	mixture_id	mixture id
ds.mix.d02	ADE	datetime	date and time, seconds since epoch (UTC)
ds.mix.d03	ADE	mixing_time	mixing/blending time
ds.mix.d04	ADE	speed_level	mixer speed level
ds.mix.d05	ADE	agitator_speed	mixer agitator speed
ds.mix.d06	ADE	attachment_speed	mixer attachment speed
ds.mix.a01	AAE	operator	operator name
ds.mix.a02	AAE	procedure	procedure description
ds.mix.a03	AAE	description	general description
ds.spm	struct_spm_paste	—	**substructure array**
ds.spm.r01	ARE	author	author reference

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Path	Type	Tag	Description
ds.spm.r02	ARE	mixture	mixture reference
ds.spm.r03	ARE	device	device reference
ds.spm.r04	ARE	location	location reference
ds.spm.d01	ADE	specimen_id	specimen id
ds.spm.d02	ADE	datetime	date and time, seconds since epoch (UTC)
ds.spm.a01	AAE	specimen_code	specimen code
ds.spm.a02	AAE	operator	operator name
ds.spm.a03	AAE	procedure	procedure description
ds.spm.a04	AAE	description	general description
ds.tst	struct_test	—	**substructure**
ds.tst.s01	struct_test_fpd	—	**substructure**
ds.tst.s01.r01	ARE	author	author reference
ds.tst.s01.r02	ARE	mixture	mixture reference
ds.tst.s01.r03	ARE	device	device reference
ds.tst.s01.r04	ARE	location	location reference
ds.tst.s01.d01	ADE	datetime	date and time, seconds since epoch (UTC)
ds.tst.s01.d02	ADE	beaker_volume	beaker volume
ds.tst.s01.d03	ADE	gross_weight	gross weight, measurement result
ds.tst.s01.d04	ADE	beaker_weight	beaker weight, net weight, measurement result
ds.tst.s01.d05	ADE	specimen_weight	specimen weight, calculated value
ds.tst.s01.d06	ADE	specimen_density	specimen density, calculated value
ds.tst.s01.a01	AAE	testname	test name
ds.tst.s01.a02	AAE	operator	operator name
ds.tst.s01.a03	AAE	procedure	procedure description
ds.tst.s01.a04	AAE	calculation	calculation description, formula
ds.tst.s01.a05	AAE	description	general description
ds.tst.s02	struct_test_ssd1	—	**substructure**
ds.tst.s02.r01	ARE	author	author reference
ds.tst.s02.r02	ARE	specimen	specimen reference
ds.tst.s02.r03	ARE	device	device reference

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Path	Type	Tag	Description
ds.tst.s02.r04	ARE	location	location reference
ds.tst.s02.d01	ADE	datetime	date and time, seconds since epoch (UTC)
ds.tst.s02.d02	ADE	specimen_weight	specimen weight, measurement result
ds.tst.s02.d03	ADE	floating_specimen_weight	floating specimen weight, measurement result
ds.tst.s02.d04	ADE	water_temperature	water temperature of water basin, measurement result or estimation based on environment temperature
ds.tst.s02.d05	ADE	water_density	density of water in basin, calculated value
ds.tst.s02.d06	ADE	water_weight_displaced	weight of displaced water, calculated value
ds.tst.s02.d07	ADE	specimen_volume	specimen volume, calculated value
ds.tst.s02.d08	ADE	specimen_density	specimen density, calculated value
ds.tst.s02.a01	AAE	testname	test name
ds.tst.s02.a02	AAE	operator	operator name
ds.tst.s02.a03	AAE	procedure	procedure description
ds.tst.s02.a04	AAE	calculation	calculation description, formula
ds.tst.s02.a05	AAE	description	general description
ds.tst.s03	struct_test_ssd1	—	**substructure**
ds.tst.s03.r01	ARE	author	author reference
ds.tst.s03.r02	ARE	specimen	specimen reference
ds.tst.s03.r03	ARE	device	device reference
ds.tst.s03.r04	ARE	location	location reference
ds.tst.s03.d01	ADE	datetime	date and time, seconds since epoch (UTC)
ds.tst.s03.d02	ADE	specimen_weight	specimen weight, measurement result
ds.tst.s03.d03	ADE	floating_specimen_weight	floating specimen weight, measurement result
ds.tst.s03.d04	ADE	water_temperature	water temperature of water basin, measurement result or estimation based on environment temperature
ds.tst.s03.d05	ADE	water_density	density of water in basin, calculated value
ds.tst.s03.d06	ADE	water_weight_displaced	weight of displaced water, calculated value
ds.tst.s03.d07	ADE	specimen_volume	specimen volume, calculated value
ds.tst.s03.d08	ADE	specimen_density	specimen density, calculated value
ds.tst.s03.a01	AAE	testname	test name
ds.tst.s03.a02	AAE	operator	operator name

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Path	Type	Tag	Description
ds.tst.s03.a03	AAE	procedure	procedure description
ds.tst.s03.a04	AAE	calculation	calculation description, formula
ds.tst.s03.a05	AAE	description	general description
ds.tst.s04	struct_test_umd1	—	**substructure**
ds.tst.s04.r01	ARE	author	author reference
ds.tst.s04.r02	ARE	specimen	specimen reference
ds.tst.s04.r03	ARE	device	device reference
ds.tst.s04.r04	ARE	location	location reference
ds.tst.s04.d01	ADE	datetime	date and time, seconds since epoch (UTC)
ds.tst.s04.d02	ADE	total_distance	total distance, measurement result
ds.tst.s04.d03	ADE	spacer_thickness	thickness of spacer disks, steel washer, measurement result
ds.tst.s04.d04	ADE	specimen_thickness	distance between actuator and sensor, calculated value
ds.tst.s04.a01	AAE	testname	test name
ds.tst.s04.a02	AAE	operator	operator name
ds.tst.s04.a03	AAE	procedure	procedure description
ds.tst.s04.a04	AAE	calculation	calculation description, formula
ds.tst.s04.a05	AAE	description	general description
ds.tst.s05	struct_test_umd1	—	**substructure**
ds.tst.s05.r01	ARE	author	author reference
ds.tst.s05.r02	ARE	specimen	specimen reference
ds.tst.s05.r03	ARE	device	device reference
ds.tst.s05.r04	ARE	location	location reference
ds.tst.s05.d01	ADE	datetime	date and time, seconds since epoch (UTC)
ds.tst.s05.d02	ADE	total_distance	total distance, measurement result
ds.tst.s05.d03	ADE	spacer_thickness	thickness of spacer disks, steel washer, measurement result
ds.tst.s05.d04	ADE	specimen_thickness	distance between actuator and sensor, calculated value
ds.tst.s05.a01	AAE	testname	test name
ds.tst.s05.a02	AAE	operator	operator name
ds.tst.s05.a03	AAE	procedure	procedure description
ds.tst.s05.a04	AAE	calculation	calculation description, formula

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Path	Type	Tag	Description
ds.tst.s05.a05	AAE	description	general description
ds.tst.s06	struct_test_utt	—	**substructure**
ds.tst.s06.r01	ARE	author	author reference
ds.tst.s06.r02	ARE	specimen	specimen reference
ds.tst.s06.r03	ARE	device	device reference
ds.tst.s06.r04	ARE	location	location reference
ds.tst.s06.d01	ADE	datetime	date and time, seconds since epoch (UTC)
ds.tst.s06.d02	ADE	zerotime	time span between adding water to cement and test start
ds.tst.s06.d03	ADE	interval_steps	number of interval steps, number of measurements
ds.tst.s06.d04	ADE	interval_length	interval length, time span between measurements
ds.tst.s06.d05	ADE	pulse_voltage	device setting, pulse generator voltage
ds.tst.s06.d06	ADE	pulse_width	device setting, pulse generator pulse width
ds.tst.s06.d07	ADE	sampling_rate	device setting, oscilloscope sampling rate
ds.tst.s06.d08	ADE	recorded_block_size	recording block size, number of recorded samples
ds.tst.s06.d09	ADE	num_init_samples	number of initial samples before trigger point
ds.tst.s06.d10	ADE	num_signals	number of recorded signals
ds.tst.s06.d11	ADE	sig_maturity	signal/specimen maturity array [num_signals x 1]
ds.tst.s06.d12	ADE	sig_times	signal sample time array [num_samples x 1]
ds.tst.s06.d13	ADE	sig_magnitudes	signal magnitude matrix [num_samples x num_signals]
ds.tst.s06.a01	AAE	testname	test name
ds.tst.s06.a02	AAE	operator	operator name
ds.tst.s06.a03	AAE	procedure	procedure description
ds.tst.s06.a04	AAE	calculation	calculation description, formula
ds.tst.s06.a05	AAE	description	general description
ds.tst.s06.a06	AAE	ss_filepath	settings file path, full qualified path
ds.tst.s06.a07	AAE	ss_filename	settings file name
ds.tst.s06.a08	AAE	ss_filehash	settings file hash, sha-256
ds.tst.s06.a09	AAE	mm_filepath	measurements file path, full qualified path
ds.tst.s06.a10	AAE	mm_filename	measurements file name
ds.tst.s06.a11	AAE	mm_filehash	measurements file hash, sha-256

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Path	Type	Tag	Description
ds.tst.s06.a12	AAE	data_dirpath	signal data directory path, full qualified path
ds.tst.s06.a13	AAE	data_filepath	signal data file path list, full qualified paths num_signals x 1
ds.tst.s06.a14	AAE	data_filename	signal data file name list num_signals x 1
ds.tst.s06.a15	AAE	data_filehash	signal data file hash list, sha-256 num_signals x 1
ds.tst.s07	struct_test_utt	—	**substructure**
ds.tst.s07.r01	ARE	author	author reference
ds.tst.s07.r02	ARE	specimen	specimen reference
ds.tst.s07.r03	ARE	device	device reference
ds.tst.s07.r04	ARE	location	location reference
ds.tst.s07.d01	ADE	datetime	date and time, seconds since epoch (UTC)
ds.tst.s07.d02	ADE	zerotime	time span between adding water to cement and test start
ds.tst.s07.d03	ADE	interval_steps	number of interval steps, number of measurements
ds.tst.s07.d04	ADE	interval_length	interval length, time span between measurements
ds.tst.s07.d05	ADE	pulse_voltage	device setting, pulse generator voltage
ds.tst.s07.d06	ADE	pulse_width	device setting, pulse generator pulse width
ds.tst.s07.d07	ADE	sampling_rate	device setting, oscilloscope sampling rate
ds.tst.s07.d08	ADE	recorded_block_size	recording block size, number of recorded samples
ds.tst.s07.d09	ADE	num_init_samples	number of initial samples before trigger point
ds.tst.s07.d10	ADE	num_signals	number of recorded signals
ds.tst.s07.d11	ADE	sig_maturity	signal/specimen maturity array [num_signals x 1]
ds.tst.s07.d12	ADE	sig_times	signal sample time array [num_samples x 1]
ds.tst.s07.d13	ADE	sig_magnitudes	signal magnitude matrix [num_samples x num_signals]
ds.tst.s07.a01	AAE	testname	test name
ds.tst.s07.a02	AAE	operator	operator name
ds.tst.s07.a03	AAE	procedure	procedure description
ds.tst.s07.a04	AAE	calculation	calculation description, formula
ds.tst.s07.a05	AAE	description	general description
ds.tst.s07.a06	AAE	ss_filepath	settings file path, full qualified path
ds.tst.s07.a07	AAE	ss_filename	settings file name
ds.tst.s07.a08	AAE	ss_filehash	settings file hash, sha-256

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Path	Type	Tag	Description
ds.tst.s07.a09	AAE	mm_filepath	measurements file path, full qualified path
ds.tst.s07.a10	AAE	mm_filename	measurements file name
ds.tst.s07.a11	AAE	mm_filehash	measurements file hash, sha-256
ds.tst.s07.a12	AAE	data_dirpath	signal data directory path, full qualified path
ds.tst.s07.a13	AAE	data_filepath	signal data file path list, full qualified paths num_signals x 1
ds.tst.s07.a14	AAE	data_filename	signal data file name list num_signals x 1
ds.tst.s07.a15	AAE	data_filehash	signal data file hash list, sha-256 num_signals x 1
ds.tst.s08	struct_test_tem	—	**substructure**
ds.tst.s08.r01	ARE	author	author reference
ds.tst.s08.r02	ARE	specimen	specimen reference
ds.tst.s08.r03	ARE	device	device reference
ds.tst.s08.r04	ARE	location	location reference
ds.tst.s08.d01	ADE	datetime	date and time, seconds since epoch (UTC)
ds.tst.s08.d02	ADE	tem_maturity	temperature measurement time array, specimen maturity [num_signals x 1]
ds.tst.s08.d03	ADE	tem_tcpl1	thermocouple-1, temperature magnitude array [num_signals x 1]
ds.tst.s08.d04	ADE	tem_tcpl2	thermocouple-2, temperature magnitude array [num_signals x 1]
ds.tst.s08.d05	ADE	tem_tcpl3	thermocouple-3, temperature magnitude array [num_signals x 1]
ds.tst.s08.d06	ADE	tem_tcpl4	thermocouple-4, temperature magnitude array [num_signals x 1]
ds.tst.s08.a01	AAE	testname	test name
ds.tst.s08.a02	AAE	operator	operator name
ds.tst.s08.a03	AAE	procedure	procedure description
ds.tst.s08.a04	AAE	calculation	calculation description, formula
ds.tst.s08.a05	AAE	description	general description
ds.tst.s08.a06	AAE	placement_tcpl1	placement of thermocouple 1
ds.tst.s08.a07	AAE	placement_tcpl2	placement of thermocouple 2
ds.tst.s08.a08	AAE	placement_tcpl3	placement of thermocouple 3
ds.tst.s08.a09	AAE	placement_tcpl4	placement of thermocouple 4
ds.tst.s08.a10	AAE	data_dirpath	temperature data directory path, full qualified path
ds.tst.s08.a11	AAE	data_filepath	temperature data file path
ds.tst.s08.a12	AAE	data_filename	temperature data file name

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Path	Type	Tag	Description
ds.tst.s08.a13	AAE	data_filehash	temperature data file hash, sha-256
ds.tst.s09	struct_test_env1	—	**substructure**
ds.tst.s09.r01	ARE	author	author reference
ds.tst.s09.r02	ARE	device	device reference
ds.tst.s09.r03	ARE	location	location reference
ds.tst.s09.d01	ADE	datetime	date and time, seconds since epoch (UTC)
ds.tst.s09.d02	ADE	temperature	environment temperature at test start
ds.tst.s09.a01	AAE	testname	test name
ds.tst.s09.a02	AAE	operator	operator name
ds.tst.s09.a03	AAE	procedure	procedure description
ds.tst.s09.a04	AAE	calculation	calculation description, formula
ds.tst.s09.a05	AAE	description	general description

Table 8: Raw data archive listing (content of **ts1_rawdata.tar.xz**).

File name	SHA256 checksum
ts1_wc040_d25_1.zip	c19d00b98d248ae9e8db5d753f8342a4f9417504c7a74d158016563653a9b251
ts1_wc040_d25_2.zip	f9601c56f75da4820b980c15b38335a9c3785217247274c5b9e6cc65066e157b
ts1_wc040_d25_3.zip	886939c8246332758014d26a16d38df9c9b128760be957cb548405c32e0b2e16
ts1_wc040_d25_4.zip	7ad6847ae97041640642288a970b911d3a441a0fa7e51456d8891ed79d86b3b2
ts1_wc040_d25_5.zip	b9a7e27610913df90cd3e4472bb326856f5450e1dbaa93d30a15c8ce38e95bd3
ts1_wc040_d25_6.zip	8ab2f1271b5da60b5a6ddd40ff8fd870286ad790360510f9d73d4a2f8860146b
ts1_wc040_d50_1.zip	14831c32728f13bea2d30edf749bc65ac4b4b95c00ab97fb5169014f833409db
ts1_wc040_d50_2.zip	bc3be5412c43d0370ad9d029d04055e2b1e61ac4d3ed67f83eb7bcb063c9da64
ts1_wc040_d50_3.zip	6d454b2e072b820ecc79d6f074a65f737f66d3608b36e4e810e570d24f519a19
ts1_wc040_d50_4.zip	b2b716cc441ee95bb999f07294f26dea8253d085451bea037b000f191a31b866
ts1_wc040_d50_5.zip	6fd063ee83d986b552e080e3372c30b335654f8914623debbfc2dd414e8ee873
ts1_wc040_d50_6.zip	5d4cc4a871e8cc58ac4e705b8f7073247e30169e4f4109862572fdd4f8e10aee
ts1_wc040_d70_1.zip	323fe5a691026a2c077622d05e1e201ec8bc0357cad9ee3e0c3a12b5122e988c
ts1_wc040_d70_2.zip	63d7a38a638e75cb053ba59e2007d0176e12ecc780dbd336441653763725dd88
ts1_wc040_d70_3.zip	12cba553ac238fdd1336e7ca6b060c44b2ecf8a9eaacdb9dee9f1acc67bd1fd7
ts1_wc040_d70_4.zip	ce670d85ca3b391e8fe46a3c240b29b36bec47a47c1c3d5d87bc5c70037d97f4
ts1_wc040_d70_5.zip	00d6a7a0c95add7814e80e691f7171f17ab0121437a7a1e1a2bfb966e9ae18e2
ts1_wc040_d70_6.zip	dafa001da9f513ea0dccfff3425fc6a481d051947f7b21293967281b9980c9ef
ts1_wc045_d25_1.zip	2be668b11f637f5b3fe8d26413f9e0cc8d6e5875ebef2847e36188ae71e9eb62
ts1_wc045_d25_2.zip	5877604a58c088a892040137ef75617c01c91e52c16debf6fb3eadd3c3c35e13
ts1_wc045_d25_3.zip	4100a2767b80af11180a72e917c27d6fcb4d5f071c5ce0f4845bd28adc0da179
ts1_wc045_d25_4.zip	62766f35d8c8a2a64b0ac24261eec6799d0dcaa21749da9bfe383391a0d71214
ts1_wc045_d25_5.zip	26b74cd4ee4228f42108273568fb14e6ada2e05f201fac4b3962a6cfdc016570
ts1_wc045_d25_6.zip	f4e75570410d3ee56810f28343f7c73c636856c53bd66c7a5dba0cfece85755b
ts1_wc045_d50_1.zip	3dcba7d841ab4ea27eb4c33fe5e7227211ae852e6fb8fd50c573d903b474a66d
ts1_wc045_d50_2.zip	6810bd0c99025bc628d913851cc03cf49658a342f03e27b9317183d6d7b3e591
ts1_wc045_d50_3.zip	3a151b172c39dd4f30fa1e5c59ed47aa4e251f6729b3e6561c4313625cf29bcd
ts1_wc045_d50_4.zip	f0a0be23f37106be1713dd356df3877d0e4dab46157a1c0411f87dcc9386367f
ts1_wc045_d50_5.zip	ef3627f92873c3abc168b57464006fce69ed19b7f7cb7d5c8edc5abefb59e20d
ts1_wc045_d50_6.zip	e3bae942be542ea6580e8194628823ace7d79423e2b965b03113a6c8f6b56968
ts1_wc045_d70_1.zip	e3c205ae37d889cb88f8d8d774926e401bfea34b1aab014f6940862ac8291089
ts1_wc045_d70_2.zip	a43e9574694f70f8fdb255cc30e44ba89e9abe72ccb9fc68698e030bbc37bfc5
ts1_wc045_d70_3.zip	42c0708cf3a86a0c8054ac2c8a7ec373670cc22a764d6ee1c25b40667af07a0a
ts1_wc045_d70_4.zip	25f68165b755d07f457e2a451e0519770dfb3ef53556e45ca791e545afef17cf
ts1_wc045_d70_5.zip	3b5f3346f472150e89be7a4d040b9b43b5fcd39ce2783e32b22a5f223e65cdd5
ts1_wc045_d70_6.zip	37349509155eba1ce850b915767eaf8167b117cf93ef70cf1b9a2ca6fcf1b86b
ts1_wc050_d25_1.zip	b28055d96cfdfe6250f583e7807fcf19c9ba8f7897243bad18ef4fbed95b1143
ts1_wc050_d25_2.zip	e903c228285a328c2e568523a04a8d0cf74d86a1225a41820a475dd52ef370dc
ts1_wc050_d25_3.zip	155422d9cf36b3c68029b1a672e802cbacdbde4e902c76cef406c703e99a389a
ts1_wc050_d25_4.zip	0101990e1872cf448de175a0c02870ac8dd89f7797510806466ec35303c05c69
ts1_wc050_d25_5.zip	e1bc1de5647130c591b9de8f095f5b2714c873b6da5f6983dbf7493657be03fe
ts1_wc050_d25_6.zip	eab8414858d4874af626b27b2eb4c5982049a2ec34a151d82a7c9692ae629edf
ts1_wc050_d50_1.zip	11ebbab3979c7cefe3c590e8a14aea42c102c5ebdc540d0f47cee46adc649c2f
ts1_wc050_d50_2.zip	5e792521265bc9749f6e6af35224a328e8719d7d36f16afce361fab57bf40ca7
ts1_wc050_d50_3.zip	06850ef58a3a00c4c4368eb0c4357d6ebdff02aaa3323cab3633125104f967a7
ts1_wc050_d50_4.zip	9d92a0f6dbfc2abae93d86f8a23557833f101f9caf0142ec89c42fc83a6cbf27

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File name	SHA256 checksum
ts1_wc050_d50_5.zip	fd9967c8176ba9e99600a707b6c7587a8edaebdc51993fe9c300d9391244be82
ts1_wc050_d50_6.zip	46898320e4b67a6e45bd67983b4424617ac43298d4e8cb495de6f0bb7fc13313
ts1_wc050_d70_1.zip	b8af9c0c133ea5487a6ae76a69206605e8d2ebd20c9b25feb1dd948c32966d10
ts1_wc050_d70_2.zip	b64fe737b9a5f8e5a9dd86ccde9cbebef65e000cc0fd946b9e0f2751f56b0cff
ts1_wc050_d70_3.zip	d5e759b619fd0f50dfa5da78646be56cfe1ae44832fdcf6b7ba455e130b6e94c
ts1_wc050_d70_4.zip	ae29d5a823968ab40c322311a49ff0a9f66ba9ebd9a6b728d059075506a60a68
ts1_wc050_d70_5.zip	869fe278d83f3b424762a8006b638e8aeeb7dc2feb5ac1b211847241883c43a4
ts1_wc050_d70_6.zip	81c22b8446d2304d72f56753cfdd27e65419a7d5b3e81495e9d918232403ea8e
ts1_wc055_d25_1.zip	0d495067f4e2f3cf0b59c169f33cfb7ed08113e3bdbe074b19890e1c3c92e890
ts1_wc055_d25_2.zip	a898b3499b953bb7183a36063ec7dd34c261dc054ea9a637d7a534f63abd61d0
ts1_wc055_d25_3.zip	d632b9fed1ab15ab54c43b55e12a63e6354214d3bc2bcfa019df69ad0f787267
ts1_wc055_d25_4.zip	2cd511f44cdfec13d8b99bda913eb4c30c9123a1daebf9fdad8c86197f83533d
ts1_wc055_d25_5.zip	61edfefbbb4b11c9df17d2a2370620ba10696d88dac7f89f4475b4440596cd4b
ts1_wc055_d25_6.zip	4d0e46da1fec1678d8ecb86b49f85e17b7a6c69e726b20b9f2225865e900b728
ts1_wc055_d50_1.zip	3ebf3578d3feab1526351e5ff93b6167dc818e195c0c5707cf7778b5df3d9cd0
ts1_wc055_d50_2.zip	ea80c869854db7867ec8d6132f4f997048753ec99b84f0994a08530e50ab0e3d
ts1_wc055_d50_3.zip	f91e241c9657391c4c5c71841d76c9acca1a75185634e8ea596c135a989857d5
ts1_wc055_d50_4.zip	d3fe290b03d77d31eec0495cc161b109a5614e13a5d1cf57fb12320ded01a744
ts1_wc055_d50_5.zip	ab71c38570ff4aa4ebbefe938c3ab70885b2999128e34c9fde30a4e351e91458
ts1_wc055_d50_6.zip	c357ae5632b987dba56fd555155c0157d06e3f1641ecff0738cc0cdd3231ddae
ts1_wc055_d70_1.zip	d9e63e6e84a2a1337c69f8b6febe135cfe20a16487b924cc1fd43cae17786973
ts1_wc055_d70_2.zip	1cf8366be4d59b59ddae4b9a048117499ba840c1ee5a10bc41972aedc91f1120
ts1_wc055_d70_3.zip	500833bf8a4697d1fec4e13ce0b82c946d75bf2e8eae03e209d3005453365032
ts1_wc055_d70_4.zip	d64f58fe2bb52a670863f878b43b19b48de632200017d4f9b94cf0272d299458
ts1_wc055_d70_5.zip	b1e19df04089a5fc3bc3256033bc942441c458fb747356cd598853692196a6f4
ts1_wc055_d70_6.zip	e72450679411d91c0e9fa14738c21650041bbe98b94a9871dcaece8c6e995719
ts1_wc060_d25_1.zip	1d0a2cf8c3e82cb9bc6b3a74cdc0a2bd098c17cd62d416da1ae04b7bbc498442
ts1_wc060_d25_2.zip	1d7dc9172d41c528208cb3ec2ca188c9bdbd599d25d5256b357fc9b84afb6e44
ts1_wc060_d25_3.zip	4be285f49971dc1c2d72759fe4fa2b57829f4da800bab86c5d3106bb40c815bf
ts1_wc060_d25_4.zip	fb08aa0be7aae56ce3c66e32bca5f559cd979024ccc3ee8f921cb2540a372bff
ts1_wc060_d25_5.zip	7f72106f7e357ae023d56b8391bbe54012f5c6f86a915ae2a921ff2c3569aae7
ts1_wc060_d25_6.zip	e512e85dba6020a1b2d47c059d56065cbe22402279b1bf1895e01aac1a1495d4
ts1_wc060_d50_1.zip	a7c3adebe45e18ecec5b179a79ede969710e37bba5af3b1abd10b16f130547d8
ts1_wc060_d50_2.zip	359a099c684c651ab8f39c806153f18b300d68447394bc1af17b1bb7e41b376c
ts1_wc060_d50_3.zip	1d2806687e4a04ec2739ea5a23f84f2b078deafab03264b6012c91a179d6772c
ts1_wc060_d50_4.zip	235b000b3cb089ee8f1a71f8fc197df4dc6108553ee572b2e8cb2e457f6c26f2
ts1_wc060_d50_5.zip	e7411929d2d7da8ef41c32420260604706f4c3f87ef605036949ff0adb3bdf9c
ts1_wc060_d50_6.zip	42dc008c3dc20bdf98f7a2bfadc026092c488c740d0c92c58a23899e6d73fee8
ts1_wc060_d70_1.zip	df5d180211a1ea517f648e1425582dee8d516791971eb81f46eb19ab4a49f5a6
ts1_wc060_d70_2.zip	6194465484c9a86343252a77cd325e7879dcf43892c342d708bafa2f91f425f0
ts1_wc060_d70_3.zip	ee49ff4415804fbf45f1a3d96669bde86a562187237f5e8360e536cd7b69e3fc
ts1_wc060_d70_4.zip	2bbc78a465c14ce61c834975bc5c4656ecd56b6dd2ae155cb45cbdd45e6ba006
ts1_wc060_d70_5.zip	e552aaedee5630a4fb1dd70d830c884704a0d6ba06da9363da42c673dc3cf508
ts1_wc060_d70_6.zip	6e86e84b2fd08fb33afc4644e595d2a016707891fa8b31ca78f3871fe0648e19

Table 9: Data set file listing (content of **ts1_datasets.tar.xz**).

File name	SHA256 checksum
ts1_wc040_d25_1.oct	fa5a3453290494ee24a461a9aba5a9b5d5a5447c818e6c0fa270dda28c53f4f9
ts1_wc040_d25_2.oct	c09c21132f993364fbd26fa63149479a33e8a2755967b586a331cac92e0ac799
ts1_wc040_d25_3.oct	f325daa25d40d4a64ee17cb9658fc19557fbbdd0af80e98869e0bc87c59b5860
ts1_wc040_d25_4.oct	3ea7294a700d0f1944fff747b3e7a602a1f7aa5b18ad2c8e5014994768cf3f13
ts1_wc040_d25_5.oct	7e8e7ce39e7621e7f40ee7b2d45d3511f81ae0684f75798e58387a0d81451d74
ts1_wc040_d25_6.oct	38d87e491d31d22636ff3f6562c1548ef38b9db95c881f8fd4a5eee0b59c7507
ts1_wc040_d50_1.oct	db535f802682ccfcdce40012f09aa8496072d2bd885ee58df5e55fa50dffdc28
ts1_wc040_d50_2.oct	02206fe8320420a21aad815c3d1aa6b975492eb2d63ff3e9fd43edc5138295c1
ts1_wc040_d50_3.oct	26ae0b4d8092484c3c5590645b9000fab229ffff4e064a8569e621f4722b4639
ts1_wc040_d50_4.oct	761e4b76f1db910fe6d62473f5d0013571ed899f5290b230c82ffafd17f9826d
ts1_wc040_d50_5.oct	43fa015984b38dea8bbd405dc3708fecf27fcf0d249ef7f2e21d91fe34b790cf
ts1_wc040_d50_6.oct	7c22795b7cc49703be75a4297aef1f2cf3b717f7680f13dac0e4c4fb3c7693a0
ts1_wc040_d70_1.oct	de7f5bfd632e161870d4c0d6c6b5b76ba733eeacfc6a6f5c4c1ce72efa104bc1
ts1_wc040_d70_2.oct	13ba82bb7c89ac8e701f35a7f93bf8d0150e09568ce56255c233ab37fb904b68
ts1_wc040_d70_3.oct	4f4e5cf54791f6c9562d198c8f01719c33017c03fdb1428bbfa93d4cc25cf9a8
ts1_wc040_d70_4.oct	05cc97340ba3f0cd3ab3bc8d2652333aa5b596ff8f71587241938b4434bb78e3
ts1_wc040_d70_5.oct	b4d473ca97572207449fa4f330b409cf2901002837af9ba204ab212eb6786d0d
ts1_wc040_d70_6.oct	111d779a34db2de7a33ec0ca132b24d5250271d8edcb98800b37c8b0c7aa55f2
ts1_wc045_d25_1.oct	d5a6a84145d541e0fa3cdbc97e99e29fbe3af7d9ea8b1a6eac39b9b35b661f70
ts1_wc045_d25_2.oct	f992e347611cbc929a22843459143c12cfeffb9e77fff55c21174c4de3d31c78
ts1_wc045_d25_3.oct	2395498e721665d56c277a2e960f41104ee7420f87b3cd9ba946fb4486650cf9
ts1_wc045_d25_4.oct	7f2eae7ce63b71df78476dbd8577034a4df8f9a06525a79b9aa9aed8064edcb5
ts1_wc045_d25_5.oct	5a493f3d6961176857ffd436705de0dad16950f71db0b3b8e951d4a0075d5137
ts1_wc045_d25_6.oct	4214419a6ad5371c6524dc50619512a74fbdd1b208f7ea057bdd5658fba4742b
ts1_wc045_d50_1.oct	d557c0671acec93ff99e736bdf63f15cb5c928e3593d9103ae834f0d09295464
ts1_wc045_d50_2.oct	b6da4e255a7701bd30db8ebc85f9b315d0137457479b627e8c93491f65d9b58f
ts1_wc045_d50_3.oct	db4572d8e066547a1260c9df4a5ebc2d15bdf31453e3683d44e27b5f12d75e35
ts1_wc045_d50_4.oct	6106be10c0f2d17ed448a258237666590c7884140dd5bb1164dd815a9e85a846
ts1_wc045_d50_5.oct	f583eda3dc67b4a797faa9123d421c9e09bb24d67c5641b9c0f360165068a0ad
ts1_wc045_d50_6.oct	4ce66456235a39878ee5b85dd89ab577c5b07b5772c97833406719f25c26acc2
ts1_wc045_d70_1.oct	cf49306892b6191ca666db973a7ef94f622ffff587170fa4290a675a29aa1881
ts1_wc045_d70_2.oct	324c4a81724efabab1784e6941df63a98133a63dd273b087903aa0a1ce0ff27f
ts1_wc045_d70_3.oct	04a1eb3936e889e6f9bddfc8fdf8a16375ef3dc4ea0d5635c93eda9d4ea01d9d
ts1_wc045_d70_4.oct	edacffe1aac5f7bcbf929c16bfcfe8bf861fcff54a8dd50f67c9f3cc101779ee
ts1_wc045_d70_5.oct	ec44a243d4f6e303ae1b495006b6b325d92c610836b5b125ddf60c2187c5a838
ts1_wc045_d70_6.oct	f07bc937065b2e664ae84f93f924f5210d513f54b163632977c29964b40923da
ts1_wc050_d25_1.oct	a31e7c23cd804fe937edb7eac0d3cd1671d1468b281c3324466d7275067bfcc9
ts1_wc050_d25_2.oct	ce14700541ebead0e3c6238b3e5a9ed28f51eb2776aeaec45e2af91abc444c72
ts1_wc050_d25_3.oct	09b29bda1a6ae7586c8bca5e3d2ebb608053cd93ed15125c7025e6cc8210a561
ts1_wc050_d25_4.oct	34c0433747f7abe2dbea41c46acab6e24ffc95c659ae5fc66efa09cd6194f406
ts1_wc050_d25_5.oct	dae32c3179a236ffd41c518370d3dfe8afad63a8ca68051476c9a799ee0321d9
ts1_wc050_d25_6.oct	b883565975c5796fa8441303b1f338a7ac0a32d8acb20edc7ba13fef0c2d0a8b
ts1_wc050_d50_1.oct	ed6ec842ee4ad997aec8f585847fb74338a4bd876377f3046b6830ce5c7c7722
ts1_wc050_d50_2.oct	b8db84edd92e682b3ea64e131b03fd6b1a5d730f903897591321fadcf78a4afa
ts1_wc050_d50_3.oct	8440ff2f3ec420933e92e20c9dd933a5c78a9a3f3667eb6bc2876af81d50dc98
ts1_wc050_d50_4.oct	1d13adee2842d33c9f1c0aed8aab4bbeae2d5e29a54afd2045ffe8cc6210225a

Continued on next page

Table9 – continued from previous page

File name	SHA256 checksum
ts1_wc050_d50_5.oct	2cd5d6d0aa4698b4d4e4a2c94211e52ca9f3bbeff9d2388decde0703e8b02c2b
ts1_wc050_d50_6.oct	07e5d6ff7a3300192b122a42a3b167fa1428119ff76983aa82a0b9b0e5ba6669
ts1_wc050_d70_1.oct	7203c61f1b7d1d3f0eb2a13cd595428dcad92f71b6a61a0ad599470676c9c9c4
ts1_wc050_d70_2.oct	edd57fedf67d57232bd65b2e7f350e6b8205d1d1f625c229be9eae2c8cf5615c
ts1_wc050_d70_3.oct	aaec8994ea1671811c1f980159a3427f96be6dff55464719c54f37b6a98fd658
ts1_wc050_d70_4.oct	2f6c6a5b6c654b73bbf109b621ba12fced2064c249b966fefec3d07dfcdd5d3b
ts1_wc050_d70_5.oct	cbdc1ba24a32f6d298dcc20d33cd67d6911bf2fa101256fde601a89a6f837952
ts1_wc050_d70_6.oct	96c277564db4d57b699806636358484df5e8e29f7da4ab7303e58e02510bfa00
ts1_wc055_d25_1.oct	d3c851913fbd2da74972ea2f3da6129bb49d9e7a2dfcbc68f77b60d8405e2899
ts1_wc055_d25_2.oct	30a2f34ba1d48c96a6306b04d47d43216ab76a378c6cb2d6aa2237451e7c1cb0
ts1_wc055_d25_3.oct	a63d3a5dd5b731a4a09d3ce90f3073fa20f9f653f2bd375155851190edd5af7b
ts1_wc055_d25_4.oct	3b41cdecb743a2b5b70f07c964e9a48c9d385e1475cf4e550f4fa7bd85a41694
ts1_wc055_d25_5.oct	20475ed84e81d4fb514f3a69fc0377cea9b65c5ec78eee11dc3e4042a87b2757
ts1_wc055_d25_6.oct	2b13e01e26ef71eee2f3f0fe2f4a168dd44b193cbb04ba65217090e1da264595
ts1_wc055_d50_1.oct	1fb080d2a0bce5ccd0482a7364d03ac99499729b4e70c9983eeded2f15c8f6d5
ts1_wc055_d50_2.oct	4f7b60adb209aaf268858e888f2c192cac99808ac97025e7dd08ec0c4dfcc7cf
ts1_wc055_d50_3.oct	c57082ac705075b65717c3c667a71f4cddb55bf18a5cd09ed7a9d8b32fc2c890
ts1_wc055_d50_4.oct	f5ef9ff2aa3be1e863d570402a95b3426432ed70760e7f8ed212706f0270df96
ts1_wc055_d50_5.oct	4966a9d65a639144b3359126557823079d008e3a9f957cdbc557b5915c84e9b5
ts1_wc055_d50_6.oct	d93afa0266e4cb2d8d82c7ff4cc799f7cad7799e84993fe7e8c592b08909eae4
ts1_wc055_d70_1.oct	e1592ebca9c2fefe41f1b87db3a9b334efdd1744fb610e6896faff57c767793b
ts1_wc055_d70_2.oct	996d057a0bcf02eca69344203bcf6b9e463b0ea1a9cfa88ccb365cd062d3d72b
ts1_wc055_d70_3.oct	5fd88ad2366bbb69e2f4c4f1858cd68be1c975c74e0f78e0f99e9ae509563974
ts1_wc055_d70_4.oct	2e6f76289708ee49f6e5251cbba4cec01f9f1e446a460e5d79f6b16e9a31f6e7
ts1_wc055_d70_5.oct	683c80276b4fb906ef8762bfc49adf9fc5a646ef738cbe1c9a8d9c2968370e39
ts1_wc055_d70_6.oct	6e5ccf4170fae7847600d6424c14c2d5d4835979e5b069659ade5b47d1922d80
ts1_wc060_d25_1.oct	6867b0597ee8ff5beec5af9c2fa11867547abea9acf3f499cf6df3ae5fbcc4a5
ts1_wc060_d25_2.oct	f1fbc5dc199c74430c5ae7078820bdec5f1f60f541842c53f6c1d33376e19fdf
ts1_wc060_d25_3.oct	1f06009c5660d4da1121f50a85743c58dc4d32633f3aba7b24f1d639f4577307
ts1_wc060_d25_4.oct	f37de57d0c955bb90f36bb271ae94a890c1b5ade77546b4caf7b92d9bee2a16e
ts1_wc060_d25_5.oct	8be25f7b7b9902ea03d9676d8a739b865a8393810e8c8c99464a5cced4adbaa9
ts1_wc060_d25_6.oct	7ec4da24f1b0c5c430668067dae762d95bca4b3324c6af8e90d6dcff6b6bb8c5
ts1_wc060_d50_1.oct	0c02e40891f929f97c7b0d9c7c99b6fdaf7abdf20b6f77798ec05dfafdaef053
ts1_wc060_d50_2.oct	85b17124db1fb8c5cb25df00f388b6e6e2a684240c112b412ed05a7e89daf046
ts1_wc060_d50_3.oct	a9a8bc0aee6e812ec45b51fec8b8eed4debed9a3681a619a19e52593be0a92c6
ts1_wc060_d50_4.oct	b06f1bf43f623012051ef1da4d6ed9a939a945fec7551574e63a5e36656a195e
ts1_wc060_d50_5.oct	4853d9a10cb86eda1bdbf8f892bdd94dbc4cc898c9fa0b5f1d032c5debd6a12e
ts1_wc060_d50_6.oct	a8852439f82819a1084cb266e05eff642c09a8d55409c8639ef51b03db44fe95
ts1_wc060_d70_1.oct	8b933701d92d79d62649724179eef087b00718c04c448cb4d6f9ea7862b03608
ts1_wc060_d70_2.oct	04b0549dc8313cda01b4b6fe38ef3c161fd546fd900c7e0eed2ef7a11eca49d9
ts1_wc060_d70_3.oct	d3c308eea72fe55242db5126431351ebc09e468528048de1310e0035961963ce
ts1_wc060_d70_4.oct	e402ca6cba3e9d5355b1a41f00cd604ccbb9f97263b475dd2985d523dfd1c24a
ts1_wc060_d70_5.oct	a0b66e2b68526dcde440c0a4a8ae9198edc510461ebeb16082ac9520c81e2c88
ts1_wc060_d70_6.oct	ac2db9b8b3cf45a5dee0d7129b5a7654202bfd03aefd82671974db9c0705ec2c