Ultrasonic Pulse Transmission Tests: Datasets — Test Series 3, Reference Tests on Air

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Abstract

The test series was created to receive information about the impact of the behaviour of two different piezoelectric shear wave sensors on the measurement results of ultrasonic pulse transmission tests. The approach for the test series was to vary the parameters pulse-width and the shear-wave-sensor-type. This results in a two-dimensional test parameter grid (pulse-width versus shear-wave-sensor-type). Tests were performed for each grid point in order to receive information needed to optimize the pulse width but also a possible dependency between material and sensor behaviour. The material tested was the air of the laboratory environment. The test method used was the ultrasonic pulse transmission method with combined compression- and shear wave measurements. 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 create a data reference for aeriform materials (air). The test series design is based on the variation of three different parameters. The pulse-width $W = [2.5, 5.0, 7.5, 1.0, 1.25, 1.5]$ μsec, the distance-between-actuator-and-sensor $D = [0, 20, 50]$ millimetres and the shear-wave-sensor-type $T =$ [V150-RB, V1548-RB] (resonance frequencies: V150-RB, f_r = 500 kHz; V1548-RB, f_r = 110 kHz). Both sensors manufactured by Olympus IMS[1]. This results in a three-dimensional test parameter grid. For each grid point (W, D, T), tests were carried out several times to receive statistical information about the stability of the tests. The result is a collection of 36 datasets containing the measurement data of the UPTTs. The test device used for the UPTTs is the FreshCon[2] device (developed at the University of Stuttgart, Germany). Beside the measurement results, an elaborate description of devices, materials, mixtures and test operation procedures is available in the data set structure. This record is published to allow other researchers to make use of it. In particular, those not having 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:

- **ts3_techdescr.pdf** contains the technical description (this file).
- **ts3_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.
- **ts3_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 **Appendix - 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 test series parameters is also reflected in the file names. The file names are a concatenation of the test-series-id <T>, the distance-between-actuator-and-sensor <D> in millimetres, the number-of-samples-recorded (recording block size) <N> in kilo-samples and the pulse voltage <V> in Volts. Filename structure: **<T>_d<D>_b<N>_v<V>.oct**. As example, a test performed with $D = 50$ mm, $N = 16k$ samples and $V = 800$ Volts is stored in **ts3_d50_f110_w025.oct**. The name of the corresponding raw data archive is **ts3_d50_f110_w025.zip**.

3 Raw data archive structure

Each data set in the raw data archive **ts3_rawdata.tar.xz** is represented by a ZIP archive. The directories and files contained in the archive files are enlisted in table 3.

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	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	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 **ts3_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	N	ds.spm	test specimen information, specimen I and II
1	1	ds.tst	test collection
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.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] Evident. *Contact Transducers.* July 14, 2023. URL: https://www.olympus-ims.com/en/ultrasonic-transducers/contact-transducers/#!cms[focus]=cmsContent10862.

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

[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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Table7 – continued from previous page

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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Table7 – continued from previous page

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.spm	struct_spm_ref	—	**substructure array**
ds.spm.r01	ARE	author	author reference
ds.spm.r02	ARE	material	material 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.s04	struct_test_umd2	—	**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.d04	ADE	specimen_thickness	distance between actuator and sensor
ds.tst.s04.a01	AAE	testname	test name
ds.tst.s04.a02	AAE	operator	operator name

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Table7 – continued from previous page

Path	Type	Tag	Description
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_umd2	—	**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.d04	ADE	specimen_thickness	distance between actuator and sensor
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
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

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Path	Type	Tag	Description
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
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

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Path	Type	Tag	Description
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
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.s09	struct_test_env2	—	**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.d03	ADE	humidity	environment humidity at test start
ds.tst.s09.a01	AAE	testname	test name
ds.tst.s09.a02	AAE	operator	operator name

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Table7 – continued from previous page

Path	**Type**	**Tag**	**Description**
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 **ts3_rawdata.tar.xz**).

File name	**SHA256 checksum**
ts3_d00_f110_w025.zip	b79c6eae168e83c0a0c5a7c0a345790f057f32b47c3b640e6e2ae7c38c02149d
ts3_d00_f110_w050.zip	43e243244d497ce88847da4d17a01e3bd3f51f1560821ab5a251023fed318e24
ts3_d00_f110_w075.zip	483507b16a246096baacaae6e943f482d116de935bd6ea97c318d1d7fed4513e
ts3_d00_f110_w100.zip	e317ce6f007472541ed8fc5d3c376e795f065f63c02379c4e8691a2849a8e776
ts3_d00_f110_w125.zip	70c724d75856e26f30675777b2532330fcb6913cd783feed8a149f20496c8d43
ts3_d00_f110_w150.zip	ef0a58bf935926a23da0310c78eed697c963200bf46ce76071a372bd3b89d52b
ts3_d00_f500_w025.zip	3ecf46f6dc4c2551a69b7230e8964f5361baf3356954dfbc0e623a2233cc80d8
ts3_d00_f500_w050.zip	625d9627b9ec837796ee041fe16f4e40280cbf53ff190744115d981c8df8cb91
ts3_d00_f500_w075.zip	414907bb27fe6fabb595ce06bc792c6306b645a9c2c28eb8dddcc93af32da19d
ts3_d00_f500_w100.zip	44c84528421dbebc3e667bc4feee86e843de7ac5bc17a1f86adf013ae518edcc
ts3_d00_f500_w125.zip	019ea1e3843a338769fb8bdffd2d7816a9c321d7c7d1b40a83f316981e7448a4
ts3_d00_f500_w150.zip	952483dfb8f9178f897eeef52d8ccbc8649aca6b47f2a6eb3ffd80cdef833a14
ts3_d20_f110_w025.zip	92ae0aacee8b5eda7782a0e50c7e51dd6d1c76dd69eb68182f41a3027795d5fd
ts3_d20_f110_w050.zip	f0359c66d273f34c3beeb67cbfcfe1c5c9c1377281156b8ab104f73b5b6ccc65
ts3_d20_f110_w075.zip	b9cf28b98fa27d1f05103f5090d0c1cebe975e706961037a466fce04149ebb39
ts3_d20_f110_w100.zip	0c15382dc18cd8235b157bd8ba3d3d9f18b3a8a17b97d0ea018a3bfdbb768d7d
ts3_d20_f110_w125.zip	4b92b2b09341bc756f67f629849e192c445b957f8d3bea9e77e1fa7008b8ee69
ts3_d20_f110_w150.zip	9a680589413f607f8eee4438c46d3f701a5b98b37b4393e8529bffebfd13ed52
ts3_d20_f500_w025.zip	06c7d9e844fc6a1ca4b1400502c2c40e7056f9fddfe3b98eecc3289bdf59d369
ts3_d20_f500_w050.zip	c7b76fbc2d44b6ab910ac893141339b5c67a8833ac5f4ea2d39a1b8f8cc05d13
ts3_d20_f500_w075.zip	ebeb143b6d53b83e07dbd5d9c8633bcbb77723a2dd852572ea72b0c8c6a86b32
ts3_d20_f500_w100.zip	6e23e2e426a93bf929cb6e76f1d21efeaccfe8bd6b0867da7a8af1dd4837f4af
ts3_d20_f500_w125.zip	29ee496bc95d5ef0d073c011785518c462310014b6edd75f9d282ed441c12b4e
ts3_d20_f500_w150.zip	e18b8454766e82695b6194e0a07697b84ccacec9262ff1f58f4ef45a70219cf2
ts3_d50_f110_w025.zip	4109c0af1b101d68884569c5ac72c6fe0722f4fb3904ba49d16762aee946431c
ts3_d50_f110_w050.zip	9692124e507df385cc7b40f732707b0ea0370ae6b6cd0b61ec6329542ac710b1
ts3_d50_f110_w075.zip	a6291c719d18e0e8e127055568376bf9d00d4502db0cef2c90b225aece04f0b9
ts3_d50_f110_w100.zip	d2428c8b6667f3d603504974708ba0e3ba7ff1aa373f2b3b3d4bde700bb1d92b
ts3_d50_f110_w125.zip	b10c3a1e6703ac3f4083a9c8d831817c81f76b4f0ad845dac459631fcd025fd1
ts3_d50_f110_w150.zip	1c90ad182805793455095f3a40da88089f25037d4bd597fe9f2f989d2a77f983
ts3_d50_f500_w025.zip	a4fce5b5ed043fb2c54749e71f0c4ab4f4cbe10b0a15a8c5ce065a74d7d6e911
ts3_d50_f500_w050.zip	da6188a0f9c49cd20599956e87d423659b40f40cf08de89e34c19fc23f89ce49
ts3_d50_f500_w075.zip	3c3140f703790158f80e5e09ad5285aeb6d54dfbea1eb498a670ec112fde814d
ts3_d50_f500_w100.zip	4267f5a6d0c842544f77e2d7e7d15acce27f62397fbf657c8365f809f3974710
ts3_d50_f500_w125.zip	e5fdbb772239bfa87e2de046179d0d8cf13594cd680f3cad320d5b92eebe1133
ts3_d50_f500_w150.zip	bc91341bfda15eb13ea6d76154549952c0825bc959d5d250fcefa583e0d27d97

Table 9: Data set file listing (content of **ts3_datasets.tar.xz**).

File name	**SHA256 checksum**
ts3_d00_f110_w025.oct	aec312d51fc4c4f2261a8572db531403996532bd91085d102278131421fb8062
ts3_d00_f110_w050.oct	3d22c68cd21456d5f316768111cfb54a6161714f36e181e4167860615ab45395
ts3_d00_f110_w075.oct	5bf3116f450bb6bed9e1babec1c35f1ef896d4c8d4ccfbf006dbad9eb6888797
ts3_d00_f110_w100.oct	bdb2e753f9d81dcebdfa92bc5c641db51ff7ddecbfc95e7ca69a3aa960b364e7
ts3_d00_f110_w125.oct	b544f77bc2f50d5902fe38bef453bfa771ec5b6637317c10f8ff91d3edb9927e
ts3_d00_f110_w150.oct	53c8fdafe9f8dde894b8b76fc34811fdf79334d40fb2bc07f44b8f0375c215f4

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Table9 – continued from previous page

File name	**SHA256 checksum**
ts3_d00_f500_w025.oct	b7be527d95cd2c661794df57aa6f162ccd5b65aea422ffe8bdb6105df38e48ef
ts3_d00_f500_w050.oct	843f066a51ecfaab8f02817cba85a458f4096408b8d13daf78714777a048b566
ts3_d00_f500_w075.oct	c778a23695c3366abb684c336af8f6aac21cc4ed152f005673b470b09c493d12
ts3_d00_f500_w100.oct	4b33078a1c0142bf6e0b0fad151aec1eb267997a83892fc6e135e9d180069eee
ts3_d00_f500_w125.oct	3411be84b67762846c08f0df2abc086408f6d963cb8a2be8a04f65d2dbbc69e7
ts3_d00_f500_w150.oct	325b9600389f049d0543e1d28ca27b294e8b8c47e4b5c7a0d02f41fcd5d62d75
ts3_d20_f110_w025.oct	fe4f7a874e20e650819fdd57fc4e7ac315f65bb4cf9984e98443cea2cd0a1f22
ts3_d20_f110_w050.oct	d81f32ad9992598aad138b32e2bf8252f06f408ffdf4ecb65f17cacbb47108bf
ts3_d20_f110_w075.oct	a0147acbd8c78b80102a341358380646cd266287e003dea399ef04952550026d
ts3_d20_f110_w100.oct	725c67900e146e4e9039f1c0e5c20ba64f1bde16265370a30223c5d21ff9bc76
ts3_d20_f110_w125.oct	7f8f65dd471b184b64f8f4e1f6b757a59a1bce18b37709ff3f9c00de26dbadb4
ts3_d20_f110_w150.oct	087c5ae182ee76851625b688864a9a1232f28603a659340918e6dee317dc5215
ts3_d20_f500_w025.oct	521124b93898bcf4d7745e134b840c3274440df8c0080e679c0d54e702bae0b1
ts3_d20_f500_w050.oct	ca30709c872a6128457389f88080db077cca103327a28088329ee075a6413ec1
ts3_d20_f500_w075.oct	f075c432bb147bce3ea71eb54892b33703f7a28d65f229034f40682128b47a90
ts3_d20_f500_w100.oct	8c94415efc3674bc94e228033df10bfba6f8acaa96bb31791f3dfdacacffc74a
ts3_d20_f500_w125.oct	b82841419b5e7bf1fa2e5ce3e53d0811eaec00b87d3367a60dae0049b2a5ebfa
ts3_d20_f500_w150.oct	b30f41db932b5b9d9257f34b731a45103ac189a3a1eb132ff393806876d97db1
ts3_d50_f110_w025.oct	15622197861d8a47b0384c15f606d5a119e3dfe4908d13649833e5f863f2542d
ts3_d50_f110_w050.oct	1992b71922121bcdea36db5c10afefca169bc08132eb0dcf36c6792fd1b22077
ts3_d50_f110_w075.oct	368db2635b017f7c314eb2e9c52d70464361f7e8e8e210483480ef6a2c373932
ts3_d50_f110_w100.oct	72d1386e9c990486f58f89112252211723d207ab7b8447365393f7861f33ea44
ts3_d50_f110_w125.oct	8ad8d5fac3d93855874a0d6a104a5eee194614808e051b42d9fb4b8687bd5e41
ts3_d50_f110_w150.oct	eb8ec73664a1fd6f6d03219b51cd3810e67a00e9fe57b8023d3e4671f85faf2d
ts3_d50_f500_w025.oct	a6f8fd137fbc888f0ef85e0cec7d9c5f3ff071385027ce79fdfd355dfd2d4838
ts3_d50_f500_w050.oct	bf9f459af0f56ed2a4895d670906c6fefad731d5c9b09272bf0a1a01f886f32f
ts3_d50_f500_w075.oct	00872d1bb34df7b3e66854a09d61b99bb73ccf8faca747ed6f06d109b5761b82
ts3_d50_f500_w100.oct	cdc219194af508d8b04780a1a07ec0b9ecc488f064edfbd79b3f92b76febfc62
ts3_d50_f500_w125.oct	7248b35329af72810612abbf987135a72706110c1bcabca6f8e15531d31fc508
ts3_d50_f500_w150.oct	a64266f868da128ece7b2419f454aa9adfa4142854e27a8fda0222939de5a43d