

# WITSML Product Certification Testing Tool: Installation and User Guide

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WITSML Overview	Data-object definitions and a Web services specification for the right-time seamless flow of well data between operators and service companies to speed and enhance decision making.
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Prepared by	Energistics and The Open Group
Abstract	<p>This guide describes how to install, setup, and run the WITSML Product Certification Testing Tool software (the Testing Tool) that runs automated tests to determine if a WITSML server conforms to mandatory behaviors as defined in the WITSML API specification and schemas, for WITSML v1.4.1.</p> <p>This process was developed so that vendors can first self-test their WITSML servers, in their own environments, before submitting to the Energistics-accredited testing and certification process. This self-test-first option provides transparency for the Testing Tool and the process, and it will help streamline the official testing and certification conducted by Energistics.</p>
Document type	Installation and user guide
Language	U.S. English



## Acknowledgements

The WITSML Product Certification Program, which features automated software testing, is the result of an extended effort by many individuals and companies over several years. The Certification Testing Team of the WITSML Special Interest Group (SIG) (of the former Energistics organization) did the initial development of the test scripts and testing tool. Thank you to all companies involved in the process and especially those involved in the efforts in developing and implementing the certification Testing Tool and associated tests. The Testing Tool was initially developed and provided by Pason. The process and procedures—as well as the actual work—for developing, reviewing, and finalizing the test scripts has been done by dedicated, core team members from SIG-member companies Pason, Halliburton, Schlumberger, PetroDAQ, Petrolink, Statoil, and TeyTech. Additional thanks to Statoil for making available the data used as part of the certification test data set.

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<b>Amendment History</b>			
<b>Tool Version</b>	<b>Document Version</b>	<b>Date</b>	<b>Comment</b>
1.0	1.0	Dec 2014	First publication for version 1.0 of the WITSML Product Certification Testing Tool and Certification Program
1.0	1.1	Jan 2016	Energistics logo and the WITSML Certification mark have been updated
1.0	1.2	Sept 2021	Updated logo, WITSML Certification mark, URLs and steps. Applied latest Energistics document template. Deleted Appendix A Certification Review Team; no longer applicable.
1.0	1.3	Aug 2023	<p>In January 2022, Energistics became a consortium under The Open Group. This move resulted in changes to the WITSML v1.4.1 Certification Program, mostly around roles and responsibilities which have been updated in the <i>WITSML Product Certification Program: Overview and Process Guide</i>.</p> <p>Email addresses and website links have been updated to reflect change to The Open Group.</p> <p>Appendix A; issues with the Testing Tools or Test Scripts may now be reported only by email.</p>

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# 1 Introduction

For WITSML v1.4.1, Energistics and the WITSML Working Group have developed the WITSML Product Certification Testing Tool (the Testing Tool), software that is used to run tests to determine if a WITSML v1.4.1 server conforms to behaviors specified in the *WITSML Store Application Program Interface (API)* and the WITSML schemas.

If a server passes all relevant tests based on the published capabilities of the server, then it is designated as WITSML certified by Energistics. Products that have been certified can use the following logo (**Figure 1**) on their marketing materials and are listed on the Energistics website as a WITSML-certified product.



**Figure 1** Energistics WITSML certified product logo.

This manual explains how to download, install, configure, and use the WITSML Product Certification Testing Tool (Testing Tool), so that a company can first test its WITSML server product locally, before submitting its server to the current Energistics-accredited WITSML testing and certification program. This self-test-first approach provides transparency for the Testing Tool and the certification process, and it will help streamline the official testing and certification conducted by Energistics.

For more information about WITSML product certification and the processes in which the Testing Tool is used, see the *WITSML Product Certification Program: Overview and Process Guide*.

## 1.1 Context for Certification

In WITSML v1.3.1, interpretation of parts of the API document could be ambiguous. This ambiguity led to what have commonly been referred to as “dialects” in WITSML servers. These dialects are effectively different server behaviors for the same task and they impede the server’s ability to communicate and exchange data consistently with other WITSML servers or clients.

One of the main goals of WITSML 1.4.1 was to eliminate or reduce this ambiguity by clearly specifying deterministic behavior. Part of this process includes the introduction of standard queries with clearly defined expected responses thereby defining expected behavior from a server.

These standard queries play an important role in the certification test procedures. Where possible they are used either singularly or in groups to test elements of the schema and behavior that are defined by “MUST” statements in the API document. In some tests, these standard queries are combined with known defined (or in the case of GetFromStore-only servers, server specified) data sets to test both the prescribed behavior and the ability of the server to correctly pass actual real-world data.

With the specification of clear behaviors, the SIG is focusing on validating behavior of servers per the 1.4.1 specification. This new automated testing and certification process completely replaces any former certification programs.

## 1.2 Benefits of Testing and Certification

Testing and certification have several benefits both to the vendor companies developing server (and client) products and to the consumer companies (both energy and service companies) that depend on those products to provide reliable data-delivery solutions from and across their drilling operations.

In general, the new certification program eliminates the variable nature of previous self-certification programs by bringing consistency and objectivity to the certification process.

### For energy companies and end-users, benefits include:

- **Enhanced interoperability between deployed solutions.** WITSML Version 1.4.1 has been streamlined and “tightened” to specifically enhance interoperability.
- **Ability to more accurately compare server products, feature by feature.** Consumers of WITSML server products can effectively and confidently compare the advertised functionality and capabilities of those products. Consumers can expect an appropriate level of compliance to the WITSML standard from vendor products that have been certified.

### For vendors of WITSML servers:

- **Demonstrates compliance.** Passing the certification tests demonstrates that a server complies with a subset of behaviors of the specification and is capable of the enhanced interoperability of WITSML v1.4.1.
- **Potential to provide a competitive advantage in the market place** because it is anticipated that, for many consumer companies, certification by Energistics will become a prerequisite for provisioning (purchasing or leasing) a WITSML server.
- **Streamline development of compliant solutions**, especially for WITSML SIG members. SIG member companies can test their products during the development/implementation phase of WITSML to maintain an appropriate level of compliance with the specification from early in the life cycle of a server product.

## 1.3 Audience, Purpose, and Scope

This guide was developed for IT people, such as software developers and product architects, who develop WITSML-enabled products and need to understand the details of the testing process and available tools.

The goal is for applicants (any company that wants to have its WITSML v1.4.1 server tested) to install and run the WITSML Product Certification Testing Tool—the exact same tool used in the Energistics-accredited testing—in their own environments. These companies can test their servers internally first, before submitting to Energistics-accredited testing.

This self-test-first approach increases transparency of the Testing Tool and the process and will help companies troubleshoot their server products BEFORE submitting to Energistics for official testing. Having applicants run tests first should increase their confidence that their product passes the required tests and should streamline the testing conducted by Energistics.

## 1.4 Documentation Conventions

This document observes the following conventions.

Convention	Description
Document Hyperlinks: Internal	Though no special text-formatting convention is used, all section numbers and page numbers in this and related documents are hyperlinks.

## 1.5 Resource Set

The table below lists available resources for the WITSML Certification Program. For additional information see these pages on the Energistics website:

- More information about the Certification Program, <https://www.energistics.org/standards-certification/>
- To download the WITSML API and schemas and the Testing Tool, <https://publications.opengroup.org/standards/energistics-standards>

	Document/Resource	Description
1.	<i>WITSML Store Application Program Interface (API) v1.4.1</i>	The document that specifies the server behavior that the Certification Program is attempting to test and confirm.
2.	WITSML Schemas v1.4.1	The schemas produced by the WITSML Special Interest Group (SIG) and Energistics based on the WITSML API document.
3.	<i>WITSML Product Certification Program: Overview and Process Guide</i>  <i>PDF is available at</i> <a href="https://www.energistics.org/standards-certification">https://www.energistics.org/standards-certification</a>	Describes the business case for certification, all necessary background, and the process for how companies submit their servers to Energistics for testing and certification.
4.	<i>WITSML Product Certification Testing Tool: Installation and Usage Guide</i> (this document)	Explains how to download, install, configure and use the Testing Tool, the software used to conduct tests.
5.	WITSML Product Certification Testing Tool	The software that is used—both by candidates seeking WITSML certification and Energistics— to conduct tests to determine if a particular server product conforms to behaviors as specified in the WITSML API document.
6.	Certified WITSML v1.4.1 Products Web page <a href="https://www.energistics.org/witsml-v1411-certified-products">https://www.energistics.org/witsml-v1411-certified-products</a>	Web page listing WITSML v1.4.1 certified products. That is, the products listed have completed and passed the testing and certification process described here.
7.	Problem-Reporting Process	If you discover an issue or bug with any component of the tests or the Testing Tool, please report it using one of the methods described in Appendix A (page 18).

## 2 How to Download, Install, Setup, and Run the Testing Tool

This chapter provides:

- An overview of the WITSML Product Certification Testing Tool (Testing Tool) and related components that comprise the testing environment.
- Instructions for how to download, install, and configure the Testing Tool and how to conduct certification testing against a server using the Testing Tool.

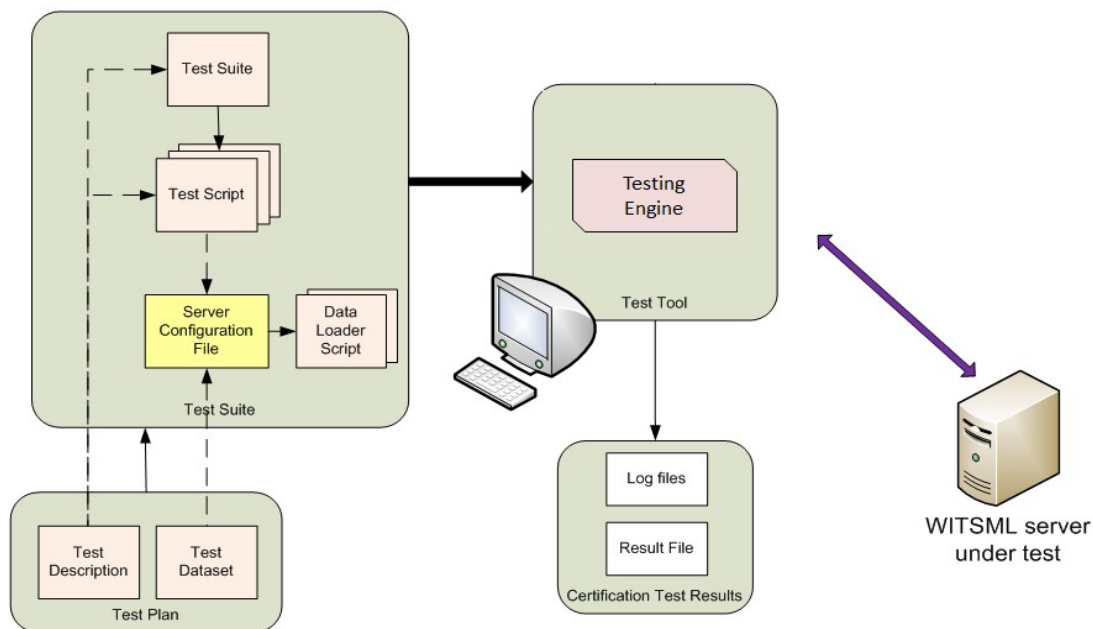
**IMPORTANT:** If you encounter any issues, problems or bugs with any aspect of the components discussed in this guide, please report them to Energistics as described in Appendix A (page 18).

### 2.1 Testing Technology Overview

Applicants who are conducting testing (users) use the Testing Tool, which runs a specific version of the Testing Engine and Test Suite. Key technology components are listed and defined below (**Figure 2**). All the information you need to run the Testing Tool is in this guide.

As background, during development the WITSML Certification Testing Team first developed the Testing Engine and Test Scripts. This modular design made development and related troubleshooting easier. For ease of use for conducting certification testing, these components have been bundled together with a graphical user interface (GUI) into the Testing Tool. Additionally, all components—such as Test Scripts, Testing Engine, etc.—are maintained in a version control system. When possible, technology used is open source.

**NOTE:** If you want more information about the underlying components, you can contact Energistics at [energistics-cert-auth@opengroup.org](mailto:energistics-cert-auth@opengroup.org).



**Figure 2.** The Testing Tool installs and runs a version of the Testing Engine and the Test Suite.



The following table lists and describes components of the Testing Tool. When you download and install the Testing Tool, all required components are included.

Certification Testing Component	Description/Link to More Information
Testing Tool	The software that testers use to conduct tests against a WITSML server for the Energistics Product Certification Program. Testers can conduct all tasks from the Testing Tool. Underlying components are explained below.
Test Plan	<p>A matrix of all tests available by WITSML function (as defined in the API). The Testing Tool only executes tests for servers that meet the minimum requirements for each test. (That is, a server is not tested for things it does not support.)</p> <p>Currently an Excel spreadsheet.</p> <p>The Test Plan is included in the downloaded of the Testing Tool.</p>
Testing Engine	The program that executes the individual Test Scripts (or the Test Suite) to be run against a specific server being tested. A version of the Testing Engine is part of the Testing Tool download.
Test Scripts	<p>The scripts that are run to test a server. Each test (as defined in the Test Plan) has its own script and has minimum requirements for data contained within the server.</p> <p>For more information on Test Scripts and the Test Suite, see Section 2.1.2 (page 10).</p>
Test Suite	<p>The Test Suite is a versioned collection of all Test Scripts.</p> <p>For Energistics-accredited testing, the entire Test Suite is run; however, only the Test Scripts relevant for the server being tested (based on the server's capabilities object) are actually executed.</p> <p>Versioned and maintained in version control software and included in the Testing Tool download.</p> <p>For more information on Test Scripts and the Test Suite, see Section 2.1.2 (page 10).</p>
Test Dataset	<p>The Test Scripts require a minimal data set to be accessible from the server being tested.</p> <ul style="list-style-type: none"> <li>• For servers that support WMLS_AddToStore, the Testing Tool contains functionality to populate the server with the required data set.</li> <li>• For servers that do not support WMLS_AddToStore, the applicant must populate their server with data that meets the minimum requirements of all tests as specified in the Test Plan. In addition, on request for certification, the applicant must supply Energistics with a server configuration file that details the data set contained in their server.</li> </ul> <p>Test Data is downloaded with the Testing Tool. For more information, see Section 2.1.3 (page 10).</p> <p><b>NOTE:</b> For information on how to load test data for GetFromStore-only WITSML servers, contact the Recognized Testing Provider. For more information, see the <i>WITSML Product Certification Program: Overview and Process Guide</i>, which is available at <a href="https://www.energistics.org/standards-certification">https://www.energistics.org/standards-certification</a>.</p>
Certification Test Results	The output of the Testing Tool's execution of Test Scripts is captured in the Certification Test Results file. The Testing Tool has a default file name, which users may change when performing self-testing. For more information, see Section 2.4.4 (page 16).

Certification Testing Component	Description/Link to More Information
	For Energistics-accredited testing, the results are sent to the applicant after the server has been tested. When testing and certification have been successfully completed, the Certification Test Results are published on the Energistics WITSML Certified Products Web page, which can be accessed from the link in Section 1.5 (page 7).

### 2.1.1 Test Plan

The Test Plan comprises a tabulated list of the behavioral or data-based responses expected from a compliant WITSML 1.4.x server. Each test in the Test Plan comprises an English language description of these components:

- Test Purpose: Description of the behavior ("MUST" statement from the API document being tested).
- Tested Interface: For example applicable to the WMLS\_GetFromStore(), WMLS\_AddToStore(), WMLS\_DeleteFromStore() and WMLS\_UpdateToStore() interfaces.
- Prerequisites: Requirements (data or otherwise) for the server to undertake this test, for example, must contain a Trajectory data-object with at least one entry.
- Procedure: Detail of how the test is executed and if applicable, which standard queries are used.
- Expectation: Expected behavior/data delivered to constitute a pass of that test.

Updates to the Test Plan are versioned in version control software so that it is clear what components are included under each release of the certification testing workflow. For a link to an example of the Test Plan, see Section 1.5 (page 7).

### 2.1.2 Test Scripts/Test Suite

Each test in the Test Plan has a corresponding Test Script that allows the Testing Tool to execute the procedure (as detailed in the English language description in the Test Plan) associated with that particular test. The Test Suite is a versioned collection of all Test Scripts.

In many cases, the Test Script can include calling a particular standard query or queries (as defined in the *WITSML Store API*) to run against a particular data item or set of data items from the data model. The Test Scripts are written in the Python scripting language and correspond to the versions of the English language tests in the Test Plan.

Each individual script has been written by a member of the WITSML SIG's CTT and has undergone a formal review process including verification against at least 2 reference servers. The Test Scripts and Test Suite are also versioned in version control software.

### 2.1.3 Test Dataset/Data Model

The Test Dataset and data model include details of specific data-object-related data sets and the "data model" required to run non-object-specific "behavioral" tests.

For individual tests that ascertain the ability of the server to pass/deliver data of a particular type, the test requests a data-object from a pre-defined test data set. The Test Dataset is included in the Testing Tool download.

- For servers supporting AddToStore, the data can be loaded to the server by the Testing Tool.
- For Servers not supporting AddToStore, the server vendor must pre-populate the server with this data set in accordance with Test Plan's expected data model. An example data model is available as a tab on the Test Plan; for an example, see the link in Section 1.5 (page 7).

**NOTE:** For information on how to load test data for GetFromStore-only WITSML servers, contact your Recognized Testing Provider. (For more information, see

For more information about populating the datasets, see Section 2.4.2.1 (page 14).

## 2.2 Downloading, Installing and Starting the Testing Tool

To navigate to and download the Testing Tool, go to Section 1.5 (page 7) and click on the link (see below for more information on versions of the Testing Tool).

The Testing Tool has an installer that installs these components:

- The Testing Tool
- Testing Engine
- Test Suite
- Test Plan
- Test Data

Because the Testing Tool includes a specific released version of the Testing Engine and Test Suite, a separate installer is required for each version. The installer file has the following naming convention:

`WPCTTM.N-tX.Y-sA.B`

where

- WPCTT stands for WITSML Product Certification Testing Tool and *M.N* is the tool version
- *X.Y* is the version of the Testing Engine
- *A.B* is the version of the Test Suite

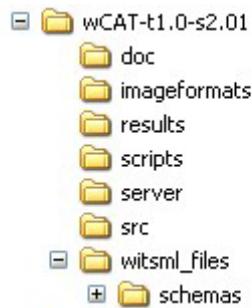
For example: WPCTT1.0-t1.0-s2.01 is version 1.0 of the Testing Tool that includes version 1.0 of the Testing Engine and version 2.01 of the Test Suite.

In most cases, you will want to install the latest version of the Testing Engine and Test Suite. First-time testers must use the latest versions.

To install the Testing Tool in Windows:

1. Download and run the installer and follow the instructions in the install program.

All the required files are copied into the directory you specified during the install. The resulting directory structure (under the specified directory) should look like **Figure 3**. The following sections provide details about the contents of each director (folder).



**Figure 3. The WITSML Product Certification Testing Tool installed directory (folder) structure.**

## 2.3 Testing Tool Overview

After you install the Testing Tool, find the application in the main Windows Run menu and launch it. The main Testing Tool window appears (**Figure 4**).

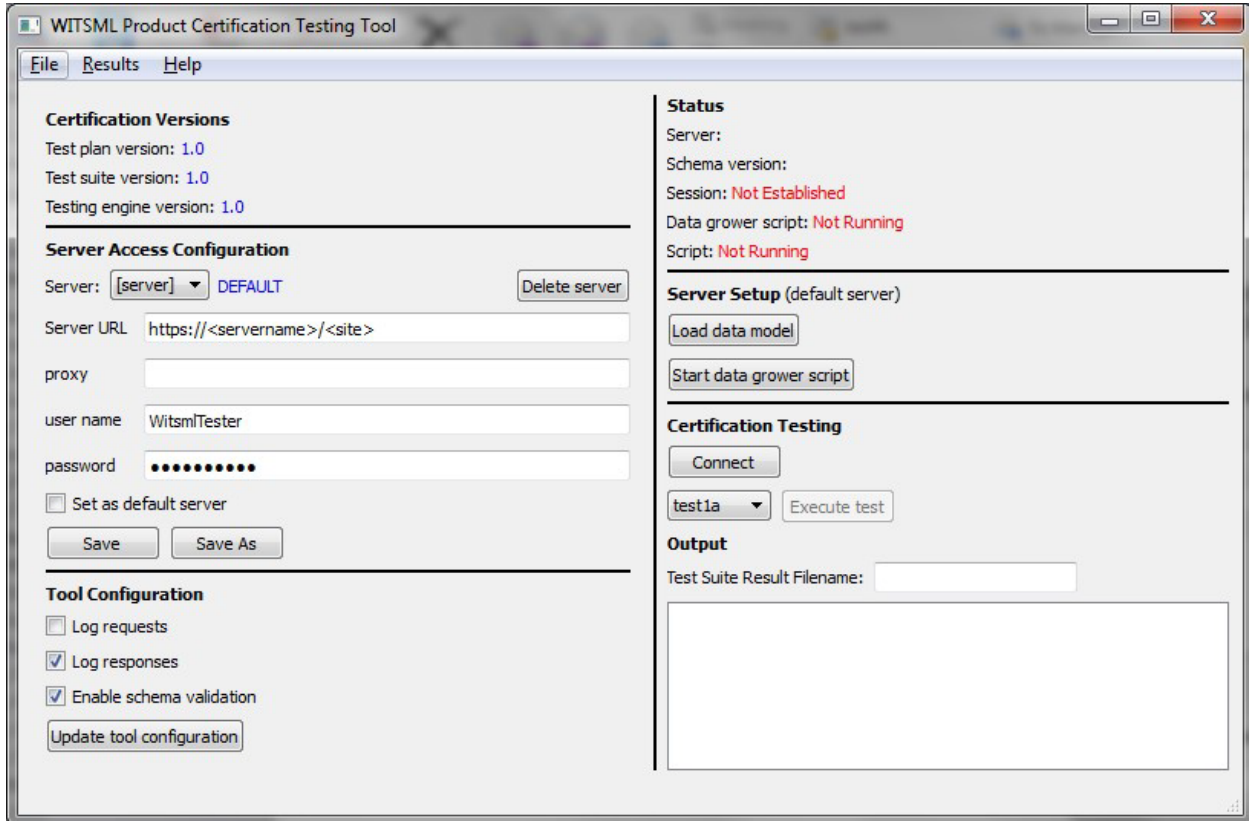


Figure 4. The Testing Tool window.

### 2.3.1 Version and Status Areas

The Certification Versions area (upper left corner) of the window shows the main component versions as described in Section 2.2 (page 11). The Status area (upper right corner) shows processes that may be running or if the tool is connected to a server.

Other parts of the window are explained in the context of the tasks described in the remainder of this chapter. Tool configuration options are explained in Section 2.3.2 below.

### 2.3.2 Tool Configuration Options

The following table describes tool configuration options and why and when you might want to use them. Each time you make changes (check or uncheck an option), you must save the updates by clicking the 'Update tool configuration' button.

Option	What it Does
Log request	Use to debug issues with failing tests. This option ensures that the WITSML requests for each test are logged to a file. (in the results folder, filename: log_yyyymmddxxxx.txt and log_yyyymmddxxxx_soap.txt.
Log response	Use to debug issues with failing tests. This option ensures that the responses from the WITSML server are logged to a file. (in the results folder, filename: log_yyyymmddxxxx.txt and log_yyyymmddxxxx_soap.txt.
Option	What it Does
Enable schema validation	Enable schema validation. For Energistics-accredited testing, this option will be enabled. During self-test and debugging, it can be turned off.

## 2.4 How to Run Certification Tests Against a Server

To run certification tests against a WITSML server using the Testing Tool, use it to perform these tasks:

Task No.	Task	Section for More Details
1.	Specify the server you want to test and set it as the default server.	Section 2.4.1 (page 13)
2.	Set up the server for testing, which includes installing the test data and (optionally) running the "data grower" script.	Section 2.4.2 (page 14).
3.	Connect to the server to be tested and run the tests.	Section 2.4.3 (page 15)
4.	Review the results.	Section 2.4.4 (page 16)

### 2.4.1 Specify the Server that You Want to Test in a Server Access Profile

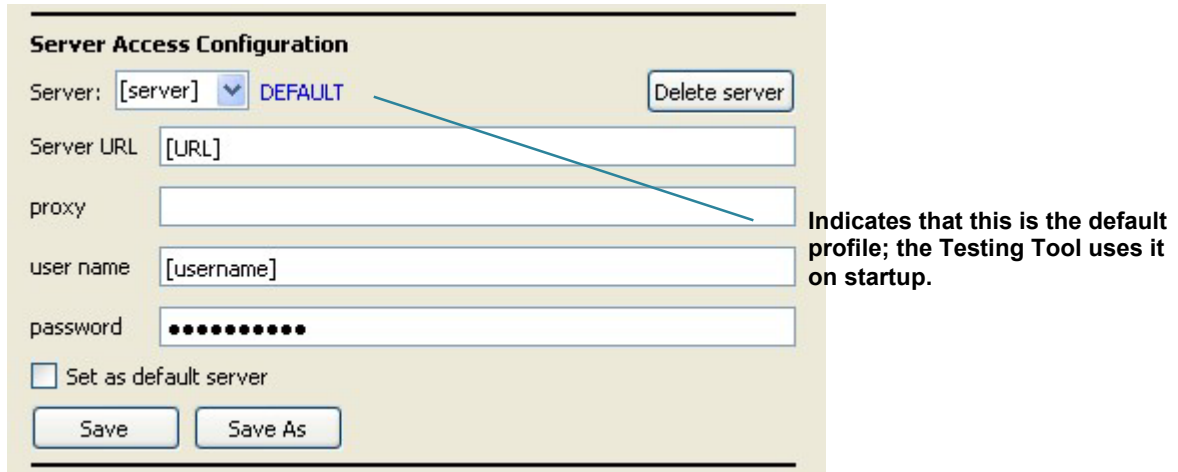
Before you can actually run certification tests against a server, you must specify the server that you want to test. To access a WITSML server, you need the following information:

- server URL
- username
- password
- proxy information to access the server

The Testing Tool groups these parameters as a server access profile and uses the server name to identify each profile.

#### 2.4.1.1 Creating a New Default Profile

The first time you run the Testing Tool after installation, it has "placeholders" for the required information to specify a default server access profile (Figure 5). You must enter information for your default profile—the server that you want to test.



**Figure 5. The first time you run the Testing Tool, it displays placeholders for server access parameters. You must specify these parameters for the server you want to test and designate it as the default profile.**

To specify server access configuration for the server that you want to test, follow these steps:

1. Replace all place holders with the access parameters for the server that you want to test and check the "Set as default server" option.
2. Save the configuration.

3. Delete the placeholder [server] access profile.

#### 2.4.1.2 Default Server Profile

**IMPORTANT:** All programs run from the Testing Tool act on the default server. It does not matter what the parameters in the 'Server Access Configuration' area or the 'Status' area show. Before running any programs or conducting any test, make sure you designate the server you want to work on or test as the default server, by checking the "Set as default server" box (see Figure 5).

**IMPORTANT:** If the default server access profile is deleted, it is removed from the current session. However, this profile name remains the default profile and is automatically added to the list of profiles, the next time the Testing Tool is run.

To remove the default profile, you must make a different server access profile the default profile, either before or after deleting the default profile.

- If the default profile name **does not** match one of the stored server profiles, the Testing Tool adds the default profile and, in the Status area, shows the message 'Default access configuration profile for '[server name]' created.'
- If the default profile **does** match one of the server profiles stored in 'server\_access\_profiles.ini', but at least one of the access parameters is different, the Testing Tool uses the default profile and shows the message 'Default access configuration profile for '[server name]' updated' in the Status area.

#### 2.4.1.3 Managing Server Access Profiles

From the main screen, you can create, edit, and delete multiple server access profiles. However, you can designate only one profile as the default; the Testing Tool loads the default profile on startup.

### 2.4.2 Set up the Server for Testing

Before you can test a WITSML server, use the Testing Tool to do the following:

- Designate the server you want to test as the default server (see above).
- **Load test data onto the server to be tested.** Each test (as specified in the Test Plan) requires specific data. This data was downloaded with the Testing Tool.
- **If testing logs and trajectory data-objects, run the "data grower" script.** Some of the mandatory tests require that the server has "actively growing" log and trajectory growing data-objects. This program grows data so that the Testing Tool can conduct related tests. (For definitions and more information on growing data-objects, see the WITSML API document.)

**IMPORTANT:** Before running these programs, make sure you designate the server you want to test as the default server. For more information see, Section 2.4.1.2 (above).

#### 2.4.2.1 Load the Test Data Set

**NOTE:** For information on how to load test data for GetFromStore-only WITSML servers, contact the Recognized Testing Provider.

- To run the data set loader, from the Testing Tool, click the 'Load data model' button.
- The Testing Tool launches a command window where the data loader runs. The Testing Tool waits
- for the program to complete (You cannot do other tasks in the Testing Tool.) When all data has been loaded, the Status area displays the message "SUCCESS."
- If you need to stop the script, press CTRL-C in the command window.
- To restart the program, click the "Load data model" button again.

#### 2.4.2.2 Running the Data Grower

As explained above, the Test Suite contains tests that require some of the data-objects to be actively growing during the test. The Testing Tool contains functionality that makes these data-objects grow, which is referred to as a 'data grower'. Each time tests related to growing data-objects need to be run, you must start the data grower and stop it when the tests are complete. The basic process is as follows:

1. When you are ready to run tests that involve growing log or trajectory data-objects, click the 'Start data grower script' button.

The data grower script runs as a separate process, which allows you to work in the Testing Tool while the grower script executes. The status appears in the Status area.

2. Run the Test Suite or Test Scripts related to growing data-objects.
3. When the test completes, stop the data grower script by clicking the button again.

When you have completed both of these tasks, you can now connect to the server and run the certification test.

### 2.4.3 Connect to the Server and Run the Tests

Before conducting tests, you must first connect to the WITSML server you want to test.

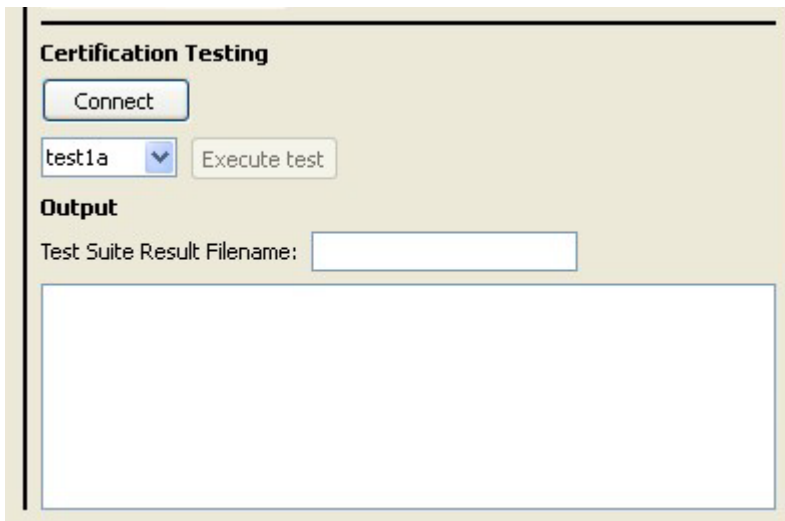
You must also have loaded the test data (see Section 2.4.1.2 above) and, if you are running Test Scripts that test growing data-objects, you must start the data grower script (see Section 2.4.2 above).

To establish the initial connection to the server, follow these steps:

1. Select the Server Access Profile for the server that you want to test. Or you can type in the server URL, username, and password.

The server access parameters showing in the 'Server Access Configuration' area are used, even if they have been modified and have not been saved.

2. In the 'Certification Testing Area' (**Figure 6**) click the 'Connect' button.



**Figure 6.** Before you can run tests, you must connect to the Server using the 'Connect' button.

Connection status and other information are updated in the Status area.

- When the Testing Tool has correctly connected to the server, it displays the server's capabilities object in the Output window.
- If the Testing Tool cannot correctly connect, it displays an error message.

You can run individual tests or the entire Test Suite (which will execute only those tests applicable based on your server's capabilities object). To run tests:

1. In the 'Certification Testing' area, from the drop-down list, select 'testsuite' or the individual test that you want to run.



The test drop-down list shows all the files in the 'scripts' directory. The test list is refreshed every time the drop-down list is clicked

2. Click the 'Execute test' button.

The Testing Tool executes the individual test selected or, for testsuite, all applicable tests based on the server's capabilities object. Output generated while running the test can be seen in the Output area of the window.

The Testing Tool saves all output from the executed tests in the file named 'witsml\_result.txt'. You can type another result file name in the 'Result Filename' edit box.

#### 2.4.4 Review Test Results

To see the output from the tests, do one of the following:

- From the menu, select 'Results>View'.
- When prompted, select the file and view it in the window provided.

Successful test script output looks something like this:

```
>test1c.py
building validation parsers for WITSML API 1.3.1.1 building validation parsers
for WITSML API 1.4.1.0 building validation parsers for WITSML API 1.4.1.1
Getting server information...
  Getting schema versions...
  > sending WMLS_GetVersion request... Response received
  > sending WMLS_GetCap request... Response received
! SCRIPT 'test1c' started

# Script setup start
# Retrieving well 1 'numGovt'
  > sending WMLS_GetFromStore request... Response received
  > validating schema... Ok
  > verifying return value is success... Ok
  > verifying element 'numGovt' is included... Ok
Well 1 numGovt = Energistics-numGovt-11111
# Script setup end
#
  > sending WMLS_GetFromStore request... Response received
  > validating schema... Ok
  > verifying return value is success... Ok
  > verifying objects received is equal to 1... Ok
  > verifying 'uid' attribute of <well> has value equal to Energistics-well-
0001
... Ok
> verifying <numGovt> value is equal to 'Energistics-numGovt-11111'... Ok
!*** PASS : Selection by 'numGovt' succeeded
!*** SUCCESS
```



Running a Test Suite creates a file showing the results of all the test scripts executed. A sample output looks like this:

```
Results Summary
-----

Script:test1a                               Fail (Duration:4.33 sec)
  Partial Pass: Selection by 'uid' succeeded
  Partial Pass: Selection by 'name' succeeded
  Partial Pass: Selection by 'dTimLastChange' succeeded
  Fail: Bad value received
Script:test1b                               Pass (Duration:1.72 sec)
  Partial Pass: Selection by 'numAPI' succeeded
Script:test1c                               Pass (Duration:1.66 sec)
  Partial Pass: Selection by 'numGovt' succeeded
Script:test2                               Pass (Duration:0.65 sec)
  Partial Pass: '1.4.1.x' exists in the returned string
Script:test3                               Pass (Duration:0.77 sec)
  Partial Pass: correct apiVers returned
Script:test4                               Pass (Duration:0.77 sec)
  Partial Pass: correct version returned
Script:test5                               Fail (Duration:0.73 sec)
  Fail: Missing expected element

Totals
-----

Run           7
  Pass       5
  Fail       2
  Skipped    0
```

## Appendix A. Reporting an Issue with Existing, Approved Tests or Testing Tool

If you find an issue (potential bug) with either a Certification Test or the Testing Tool, please report it to Energistics.

Send an email to [energistics-cert-auth@opengroup.org](mailto:energistics-cert-auth@opengroup.org). Please make sure to include:

- A thorough description of the problem.
- Your name, company, and a phone number.