P2 Well Test 4.2
User's Guide

P2 WELL TEST

User's Guide

First Edition (August 2023)

This edition applies to Version 4.2 of P2 Well Test and to all subsequent releases and modifications until otherwise indicated in new editions.

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Preface

This guide provides users with information on how to use P2 Well Test.

This document outlines how to use P2 Well Test to capture, calculate, and analyse well test data, through a web-based system that is independent of a DCS or data historian.

Who Should Read This Guide

This guide is intended for operators and engineers involved in the day-to-day tasks of analysing and forecasting well tests data on-site. Typical users of P2 Well Test include Operator Technicians, Well Optimisation Engineers, Petroleum Engineers, and Operations Managers.

This guide assumes working knowledge of:

- Microsoft® Internet Explorer®
- Microsoft® Windows® operating systems

Related Documentation

Documents in the P2 Well Test technical documentation suite are:

Title	Description
P2 Well Test 4.1 Release Notes	Release Notes for the latest version of P2 Well Test.
P2 Well Test Installation Guide	Installing the Well Test and the Flow Rate Coefficients components of P2 Well Test and configuring P2 Well Test for first time use.
P2 Well Test Administrator's Guide	How to administer well profiles and well test attributes in the Well Test component of P2 Well Test.
P2 Well Test User's Guide	How to use the Well Test component of P2 Well Test to view and manage well tests.
P2 Well Test Flow Rate Coefficients User's Guide	How to use the Flow Rate Coefficients component of P2 Well Test to generate and analyse well performance curves.

These documents are available from P2 Customer Support.

Support

P2 Customer Support provides a central point of contact for software assistance and the resolution of software issues. As part of this, P2 offers a variety of professional services, online resources, and access to experienced product specialists who are able to assist with your service requests. For support and information regarding our products, the following resources are provided:

Online Support Portal

The P2 Customer Support Portal provides access to online support, where you can raise service requests for P2 software, track defects, get product information, and communicate with P2 Customer Support.

Customer Communities

P2's customer communities offer a networking environment for you and other P2 users. Our boards and user groups offer an informal setting to exchange information and discuss issues relevant to today's oil and gas companies. P2 is confident that together, we can create an interactive venue that will provide value by allowing our customers to communicate, collaborate and connect at multiple levels. For details, see www.p2energysolutions.com/services/customer-communities.

Training

P2 offers a variety of standard and customised training courses (ranging from introductory courses through to administrator courses) to help you learn how to use P2 products.

Contact Details

You can contact P2 Customer Support via phone or through the Customer Portal for technical support on any aspect of P2's products. Please also contact P2 Customer Support for further information on the Customer Communities, access to the online support portal, and information on available training courses.

Phone:	1300 739 969 (Australia only) or +61 8 9241 0314 (outside Australia) USA: 1-844-REACHP2 (1-844-732-2472)
Support Portal	http://support.p2energysolutions.com

Introduction

In the oil & gas industry, a well test involves conducting a set of data gathering activities in order to understand the properties of an oil reservoir and to provide information about the state of a particular well, with a view to identifying the production capacity of the well. The results of the well test, such as flow rate and oil-gas ratio, can provide input to the allocation process as well as supporting reservoir management.

Management of the well test process and associated raw and calculated data sets is inherently inaccurate and often confined to the assets control system.

The well test process is one of the most critical functions in an Oil and Gas business. Test results are used for analysis, forecasting, and end of month production reconciliation and allocations. This forms the basis of a number of key production decisions and management processes. Most of the well test processes today, however, produce test results that are inherently inaccurate, stemming from manual test processes and the use of disparate test interfaces and equipment. In many cases, the management of the test data and associated results are limited to the asset control systems (DCS / SCADA).

The Well Test component of P2 Well Test provides a web-based user interface that allows operators and engineers to plan, execute, capture, calculate, and analyse well test data in a consistent manner, independent of any specific control system or data historian.

Well Test automatically or manually starts and stops tests in line with the actual physical test being performed. Tests can be performed in real time or retrospectively, if required. Users are able to select the stabilised period of the test on which to perform the calculations to determine a well's 24-hour multiphase production rate; thus improving the accuracy of the calculated test results. Detailed trending of well and test equipment parameters allows operators and engineers to visualise the high frequency data utilised when performing a test. Test results are consumed by the Flow Rate Coefficients component of P2 Well Test to derive the polynomial variables for estimating theoretical flow rate for use in other workflows.

System Overview

P2 Well Test consists of two components: Well Test, and Flow Rate Coefficients.

Note: This document covers only the topics related to the Well Test component. For topics related to the Flow Rate Coefficients component, refer to the *P2 Well Test Flow Rate Coefficients User's Guide*.

The Well Test component of P2 Well Test provides well test management functionality to P2 Explorer. It is a web-based application, and it can be easily accessed by users with the correct authentication and network access, using Microsoft Internet Explorer from any computer.

Well Test complements P2 Explorer by providing the functionality to plan, execute, capture, calculate, and analyse well test data in a consistent manner, independent of any specific control system or data historian. After well test results are available and verified, they can be submitted for further processing or reporting purposes.

Benefits

- Enables operators and engineers to perform well tests across multiple control system environments over the intranet.
- Removes the implicit overhead incurred by solutions deployed within the control domain.

- Streamlines the well test initiation, validation, and approval process.
- Removes error-prone and time-consuming manual data entry or manipulation processes.
- Leverages structure and data source integration available in P2 Server.
- Offers rapid configuration based on P2 Server templates and default test and calculation methods.
- Ensures regularity compliance with well test scheduling and full auditing of well test dates, data, results, and approval process.
- Enables seamless integration with the P2 product suite.

Key Features

- Abstraction of the well test process from the Control System domain to the company intranet.
- Abstraction of the well test process from the well test data sources (e.g. utilise multiple historians and databases as sources for well test data).
- Automatic scheduling of well tests based on well priority.
- Default library of test methods and multiphase flow rate calculations such as Test Separator, MPFM; and supports manual entry of test results.
- Well Test interfaces to the P2 Server Data Dictionary, utilising P2 Server hierarchies and templates.
- Ability to perform commingled well tests.
- Ability to perform multi-step well tests (For example, multiple choke settings in a single physical well test).
- Tests approval and validation workflows.
- Ability to perform well tests automatically in line with or retrospective of the physical well test (e.g. based on well valve status).
- Capturing of lab results for each test performed (or integrates to LIMS system to obtain qualities).
- Ability to automatically submit approved test results to an external system. (For example, for allocation or reporting purposes).
- Supports comprehensive users security configurations.
- Full audit trail.

Concepts

Well Test provides an interface for operations personnel to collect, enter, and validate well test data before it is submitted to the production reporting and allocation system.

This section explains the different terms and concepts used throughout the Well Test component of P2 Well Test.

Well Tests

A **well test** in P2 Well Test represents a physical well test performed continuously during a certain duration.

A typical workflow would be as follows:

Operator	Engineer
1. Start a scheduled well test (see page 15). 2. Stop a well test (see page 22). 3. Selected a stabilised period and calculate the test result (see page 24), optionally entering laboratory or other information manually. 4. Save (see page 29) and submit (see page 30) the test result for approval.	1. Review the submitted test results (see page 20) and if necessary, recalculate or make updates. 2. Approve or reject a well test (see page 30).

Well Test provides three modes of performing a well test:

- Test Separator
- MPFM
- Manual

These are available in the Well Test Details page.

In Test Separator or MPFM mode, you can trend high frequency data from any data historian and select a stabilised period by using the two hairlines provided in the trend for calculating well test results.

In Manual mode, you can enter well test results manually into the text boxes provided, if it is not possible to retrieve any well test data from a data historian.

Commingled Well Tests

Occasionally, you may need to combine the flow of two or more wells flowing into a test separator at the same time, in order to obtain a valid well test. For example, the flow of another well is too low to perform a test on its own.

A *Commingled Well Test* is when two or more wells are used to perform a single well test. This allows an operator to select the historical well test for a low-flowing well and to subtract it from the commingled test results (see page 26), to obtain the desired calculation.

Consider the following scenario:

1. Well 1 and Well 2 perform a test together (i.e. they flow into the same test equipment at the same time).

2. The test results calculated from these well tests are the commingled total flow for Well 1 and Well 2.

3. The operator then marks this test as a commingled well test, and then selects the historical well test record for Well 2 (assuming they want to keep this test for Well 1).

4. After the operator has selected the historical test for Well 2, they perform a calculation that subtracts the total flow from the Well 2 historical test to get the well test result for Well 1 only.

Although this is a typical workflow, the process can be customised to take into account more complicated situations (e.g. you may need to split the well tests results by using some factors/lab data etc).

Attributes of a Well Test

Well tests typically have the following attributes:

Field and well
The field and well where the test is being conducted.

Well test method
The method used to perform the well test.

Well test equipment
The equipment used for the well test.

Duration
The time taken to perform the well test.

For a list of all available attributes, refer to the *Glossary* (see page 31).

It is important to note that as P2 Well Test is highly configurable, some deployments may or may not contain the listed attributes.

Well Test Statuses

Well test statuses are used to control the workflow of Well Test. A well test will go through different statuses from the moment it is first created in the system to the point where the well test is approved, archived, and potentially exported to a production reporting system.

Pending
The well test has just been created and it does not have a start time yet.

Active
The well test has started and has a start time entered.

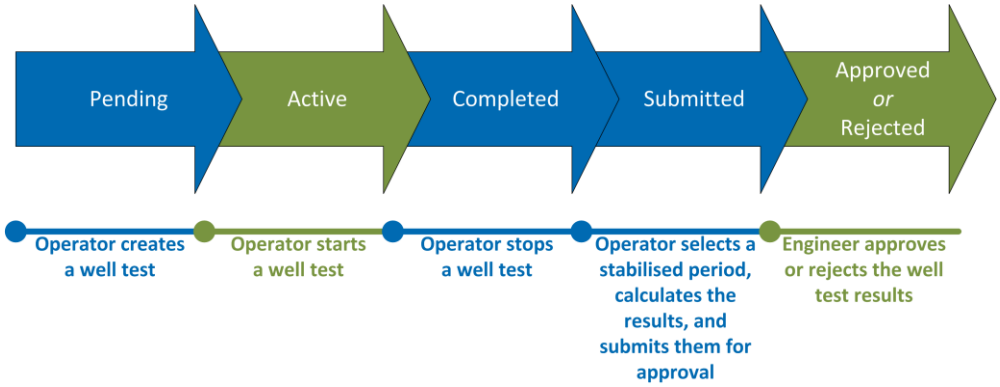
Completed
The well test is completed and has a stop time entered. You may calculate or enter test results, and also mark any result set as *Submit* or *Valid*.

Submitted
The stabilised period of the well test has been defined and the corresponding test results have been calculated or entered.

Approved
The well test is approved after the results have been validated.

Rejected

The submitted well test can be rejected for modification and re-submitted again for approval.



The Well Test Overview page (see page 13) provides you with a visual cue as to the status of a well test. Note that this is configurable and may vary for your deployment. The default styling is as follows:

- *Pending* - italic
- Active - blue
- **Completed** - bold
- ***Submitted*** - bold and italic
- Approved - normal type
- Rejected - red

Result Sets

Within a well test, there are one or more **result sets** (see page 17). Results sets are sets of monitored well test values (for example, pressure and temperature) retrieved by the system or manually entered. A well test can contain multiple result sets.

Note: Lab data and other process data are well test related; this means that these values will be common to all result sets.

In addition to a well test having different result sets, each result set can have multiple versions. Depending on the system configuration, the version can be incremented up to a certain point. This provides control over calculations and modifications as each version may offer different modification possibilities. For example, access rights based on user groups or submission to external systems. Only the latest version is displayed but all versions are stored in the system.

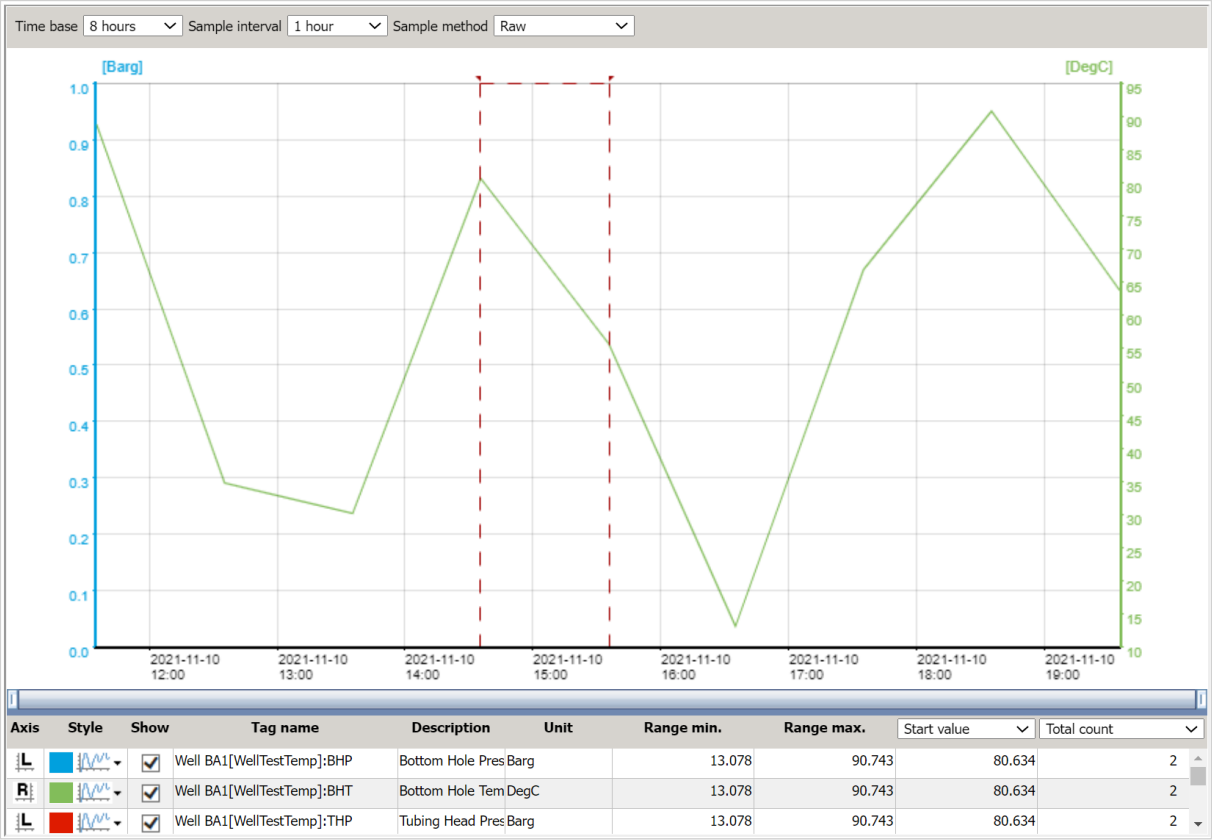
The results that are commonly displayed in the result sets include:

- Duration
- Oil Rate
- Water Rate
- Water Cut
- Total Gas Rate
- Net Gas
- Gas Lift
- Lift Gas Rate
- Lift Gas Pressure
- Choke
- Sand Rate
- MPFM/SEP Press
- MPFM/SEP Temp
- BHP
- BHT
- CGR
- GOR
- NGOR
- TGOR
- THP
- THT
- TSP
- TST
- WHP
- WHT
- WGR

For definitions, refer to the *glossary* (see page 31).

Historical Results Trend

The Historical Results Trend displays a trend of the well test results that have been approved in the past. This is displayed as a P2 Explorer trend in a separate tab, and by default appears as a line trend. For instructions on viewing the historical results trend, refer to *View Historical Results Trend* (see page 29).



Using Well Test

The Well Test component of P2 Well Test is a web-based application. It can be easily accessed by users with the correct authentication and network access, using Microsoft Internet Explorer from any computer.

A typical Well Test operational workflow goes like this:

1. The user configures a new well test.
2. At the configured time set by the user the well test changes its state for the initial *pending* state to the *active* state.
3. A well test can be stopped manually at the specific time or stopped by a background task, based on a monitored P2 Server tag.
4. When a well test reaches the *completed* state, the user can view the well test details, include additional information, and submit the results for further approval.

Based on the state of the well test results, external systems can retrieve data, and use for instance to generate performance curve polynomial coefficients or to include it in the production reports.

Getting Started

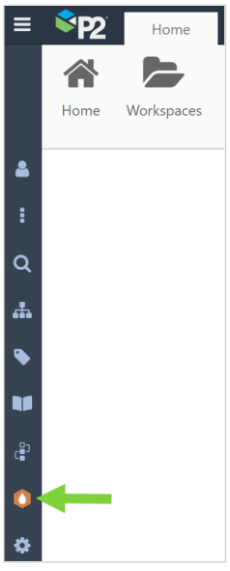
Before you start you will need:

User name and password for P2 Explorer
Normally this will be your standard network login. Check with your System Administrator if you are unsure.

User name and password for P2 Well Test
Normally this will be your standard network login. Check with your System Administrator if you are unsure.

Launching Well Test from Explorer

To launch Well Test and log in:



1. Open a browser tab.
2. In the address bar, type the URL of P2 Explorer supplied by your System Administrator. It will be something like:

   https://[FullyQualified.Domain.Name]/P2.Explorer

3. In the navigation menu on the left, click the Well Test button.
4. If prompted to do so, enter the username and password supplied by your System Administrator, and then click the **Login** button.

   You may now start using Well Test. The available options in Well Test will depend on your local configuration.

   If the login is unsuccessful, an error message appears. You can attempt to log in again or contact your System Administrator if you have forgotten your login details.

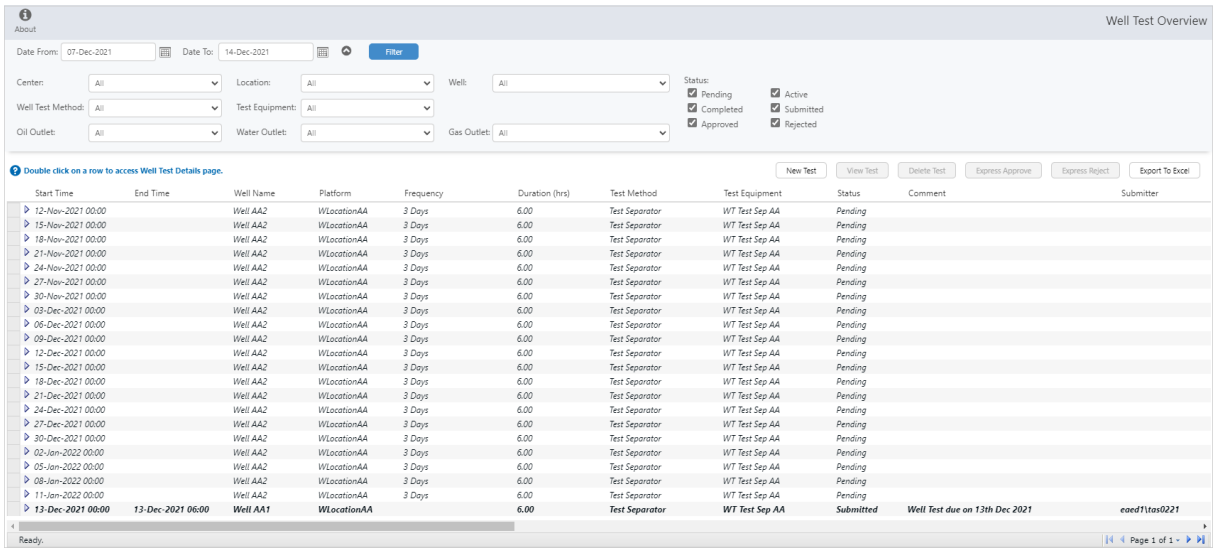
Overview of the Interface

Well Test is highly configurable, and the available fields, pages, and menu options will depend heavily on how your local configuration is structured.

The main functionalities of Well Test are presented across the following pages:

- **Well Test Overview**
  Shows an overview of past tests performed, as well as scheduled tests, in a tabular view.
- **Well Test Details**
  Shows all details regarding a well test performed at a particular time.

Note: Access to these pages depends on your security permissions.



Well Test also uses the following common controls:

- Data Grid
- Date/Time Picker

Data Grid

The Well Test data grid displays data in a tabular format. The data grid allows you to sort data and view a summary of a well test.

Start Time	End Time	Well Name	Platform	Frequency	Duration (hrs)	Test Method	Test Equipment	Status	Comment	Submitter
12-Nov-2021 00:00		Well AA2	WLocationAA	3 Days	6.00	Test Separator	WT Test Sep AA	Pending		
15-Nov-2021 00:00		Well AA2	WLocationAA	3 Days	6.00	Test Separator	WT Test Sep AA	Pending		
18-Nov-2021 00:00		Well AA2	WLocationAA	3 Days	6.00	Test Separator	WT Test Sep AA	Pending		
21-Nov-2021 00:00		Well AA2	WLocationAA	3 Days	6.00	Test Separator	WT Test Sep AA	Pending		
24-Nov-2021 00:00		Well AA2	WLocationAA	3 Days	6.00	Test Separator	WT Test Sep AA	Pending		
27-Nov-2021 00:00		Well AA2	WLocationAA	3 Days	6.00	Test Separator	WT Test Sep AA	Pending		
30-Nov-2021 00:00		Well AA2	WLocationAA	3 Days	6.00	Test Separator	WT Test Sep AA	Pending		
03-Dec-2021 00:00		Well AA2	WLocationAA	3 Days	6.00	Test Separator	WT Test Sep AA	Pending		
06-Dec-2021 00:00		Well AA2	WLocationAA	3 Days	6.00	Test Separator	WT Test Sep AA	Pending		
09-Dec-2021 00:00		Well AA2	WLocationAA	3 Days	6.00	Test Separator	WT Test Sep AA	Pending		
12-Dec-2021 00:00		Well AA2	WLocationAA	3 Days	6.00	Test Separator	WT Test Sep AA	Pending		
15-Dec-2021 00:00		Well AA2	WLocationAA	3 Days	6.00	Test Separator	WT Test Sep AA	Pending		
18-Dec-2021 00:00		Well AA2	WLocationAA	3 Days	6.00	Test Separator	WT Test Sep AA	Pending		
21-Dec-2021 00:00		Well AA2	WLocationAA	3 Days	6.00	Test Separator	WT Test Sep AA	Pending		
24-Dec-2021 00:00		Well AA2	WLocationAA	3 Days	6.00	Test Separator	WT Test Sep AA	Pending		
27-Dec-2021 00:00		Well AA2	WLocationAA	3 Days	6.00	Test Separator	WT Test Sep AA	Pending		
30-Dec-2021 00:00		Well AA2	WLocationAA	3 Days	6.00	Test Separator	WT Test Sep AA	Pending		
02-Jan-2022 00:00		Well AA2	WLocationAA	3 Days	6.00	Test Separator	WT Test Sep AA	Pending		
05-Jan-2022 00:00		Well AA2	WLocationAA	3 Days	6.00	Test Separator	WT Test Sep AA	Pending		
08-Jan-2022 00:00		Well AA2	WLocationAA	3 Days	6.00	Test Separator	WT Test Sep AA	Pending		
11-Jan-2022 00:00		Well AA2	WLocationAA	3 Days	6.00	Test Separator	WT Test Sep AA	Pending		
13-Dec-2021 00:00	**13-Dec-2021 06:00**	**Well AA1**	**WLocationAA**		**6.00**	**Test Separator**	**WT Test Sep AA**	**Submitted**	**Well Test due on 13th Dec 2021**	**eaed1\tas0221**

SORTING DATA IN THE GRID

You can sort the data in the grid by clicking a column header. There are three ways to sort data: *Ascending*, *Descending*, and *None*.

- Clicking a column header once sorts the data in ascending order.

  This is indicated by an arrow pointing upwards:

- Clicking a column header a second time sorts the data in descending order.

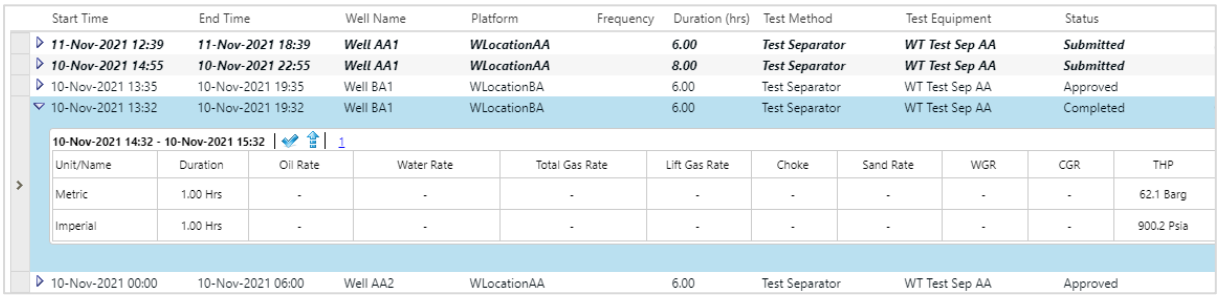
  This is indicated by an arrow pointing downwards:

- Clicking a column header a third time returns the order to its original state.

  No arrow appears in the column header:

VIEWING A RESULT SET

You can click one of the rightward-pointing arrows at the left of each row to expand a row and view the result set of a well test.



Start Time	End Time	Well Name	Platform	Frequency	Duration (hrs)	Test Method	Test Equipment	Status
11-Nov-2021 12:39	***11-Nov-2021 18:39***	***Well AA1***	***WLocationAA***		***6.00***	***Test Separator***	***WT Test Sep AA***	***Submitted***
10-Nov-2021 14:55	***10-Nov-2021 22:55***	***Well AA1***	***WLocationAA***		***8.00***	***Test Separator***	***WT Test Sep AA***	***Submitted***
10-Nov-2021 13:35	10-Nov-2021 19:35	Well BA1	WLocationBA		6.00	Test Separator	WT Test Sep AA	Approved
10-Nov-2021 13:32	10-Nov-2021 19:32	Well BA1	WLocationBA		6.00	Test Separator	WT Test Sep AA	Completed

10-Nov-2021 14:32 - 10-Nov-2021 15:32 | 1

Unit/Name	Duration	Oil Rate	Water Rate	Total Gas Rate	Lift Gas Rate	Choke	Sand Rate	WGR	CGR	THP
Metric	1.00 Hrs	-	-	-	-	-	-	-	-	62.1 Barg
Imperial	1.00 Hrs	-	-	-	-	-	-	-	-	900.2 Psia

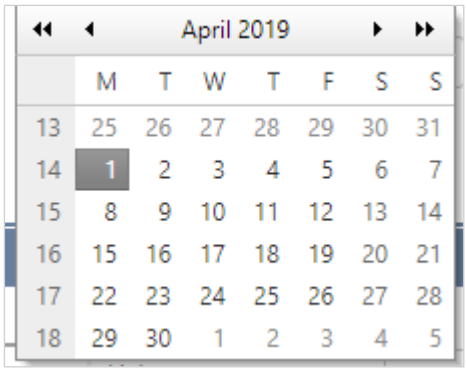
10-Nov-2021 00:00	10-Nov-2021 06:00	Well AA2	WLocationAA		6.00	Test Separator	WT Test Sep AA	Approved

Date/Time Picker

- Use the date/time picker to select a date and time.

Fields that require a date or time to be entered are displayed with a button that opens the date and time pickers when clicked.

The date picker is a visual control that allows you to specify a date (day, month, year)



To specify the date, select the month and year from the drop-down lists above the calendar, and then pick a day from the calendar.

To specify the time, click the clock button and select the time.

Time Picker		
12:00 AM	1:00 AM	2:00 AM
3:00 AM	4:00 AM	5:00 AM
6:00 AM	7:00 AM	8:00 AM
9:00 AM	10:00 AM	11:00 AM
12:00 PM	1:00 PM	2:00 PM
3:00 PM	4:00 PM	5:00 PM
6:00 PM	7:00 PM	8:00 PM
9:00 PM	10:00 PM	11:00 PM

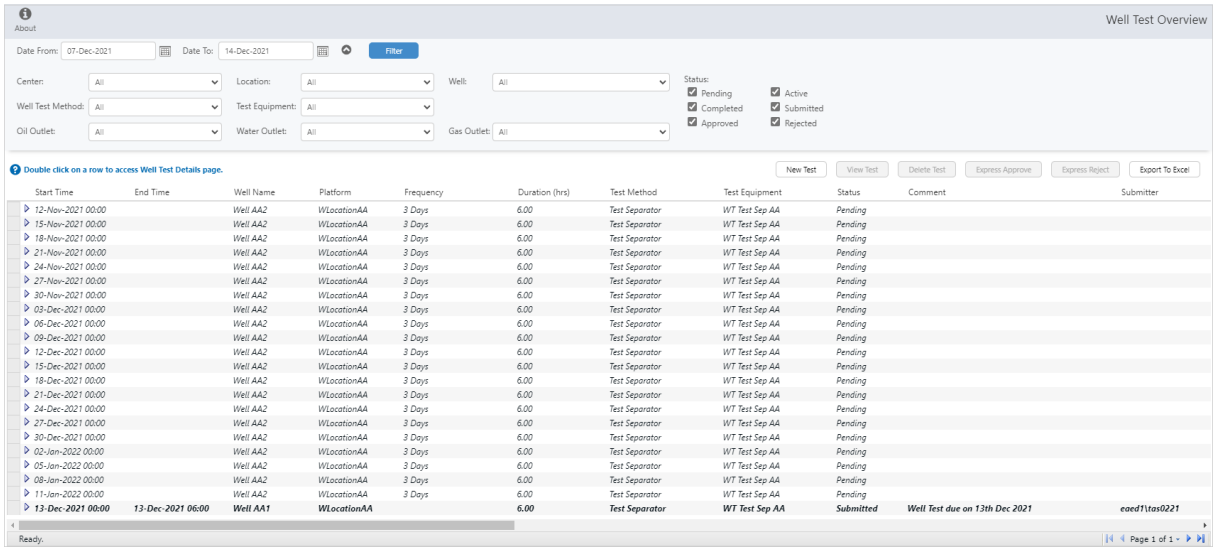
Well Test Overview

The Well Test Overview page shows an overview of past tests performed, as well as scheduled tests, in a tabular view.

The tabular view contains basic information about each test, such as the name and location of the well, the start and end time of the test, and the method used for the test.

The functionalities available on the Well Test Overview page include:

- Filter the view by well location, name, status of the test, and test method, over a range of time.
- View or edit the test results for each test performed.
- Schedule a new test.
- Quickly approve or reject a submitted well test.
- Delete an existing test.
- View details of a test by opening the Well Test Details page.
- Export test data to Microsoft® Excel® format.



The Well Test Overview page consists of roughly three sections:

1 **Header**
The Well Test header displays the name of the module on the right.

2 **Filter Selection**
The filter (see page 13) provides a number of drop-down lists and other controls that allow you to refine the data that is displayed in the table below.

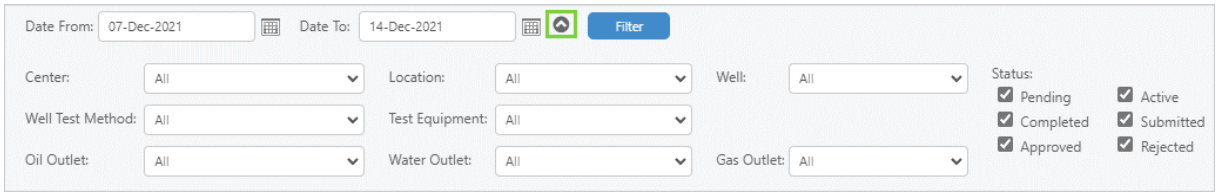
3 **Data Grid**
The tabular display area for the well test data. This area also contains some buttons in the upper right corner, which allow you to perform various tasks. The styling of the rows also provide a visual cue as to the status of the well test (see page 6).

Filter Well Test Data

To filter the well test data:

1. In the Filter Bar, choose the start and end dates.

2. Expand the filter bar to choose additional criteria.



The filter criteria are highly configurable and will be different for every deployment. Some of the criteria that may be present are:

- Date From
- Date To
- Center
- Location
- Field
- Platform
- Well
- Well Test Method
- Test Equipment
- Oil Outlet
- Water Outlet
- Gas Outlet
- Gas Lifted
- Status

For definitions, refer to the *Glossary* (see page 31).

3. Click **Filter**.

The data grid is updated to show only those tests that meet the specified criteria.

Edit or View Well Test Information

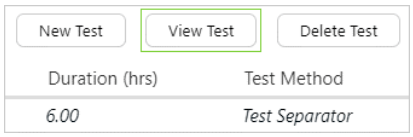
The **Edit Well Test** window allows you to modify an existing well test.

If you do not have the required permissions to edit the well test information, this window will be displayed in a view-only mode.

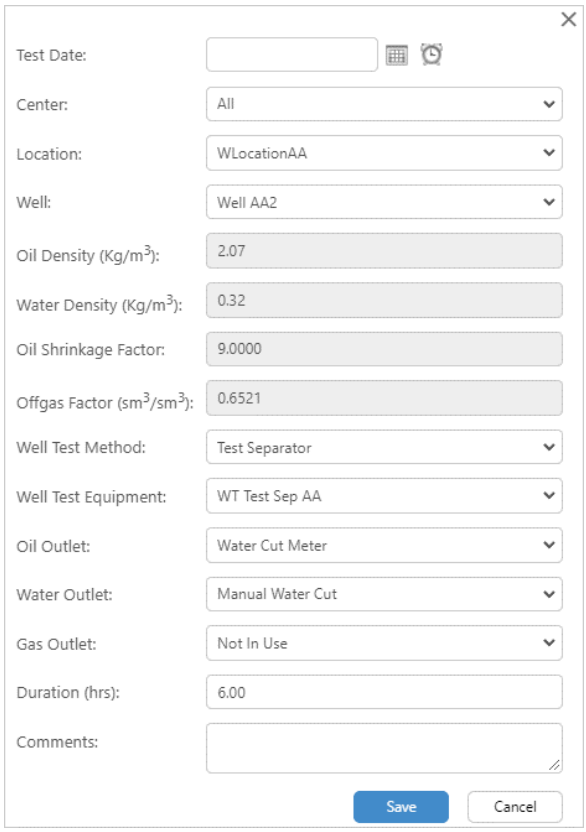
To edit or view well test information:

1. On the data grid, click a well test data row to select it.
2. To modify the test, click **Edit Test**.

Alternatively, if you are unable to edit the test, click **View Test** to see the attributes.



The **Edit Well Test** (or **View Well Test**) window appears.



3. Make the required changes to the attributes.

Note: The attributes may be different for your deployment. For definitions, refer to the *Glossary* (see page 31).

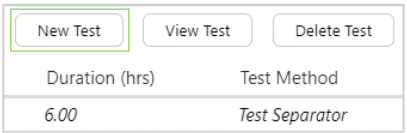
4. When you have finished, click **Save**; or click **Close** if you are viewing the test only.

Schedule a New Well Test

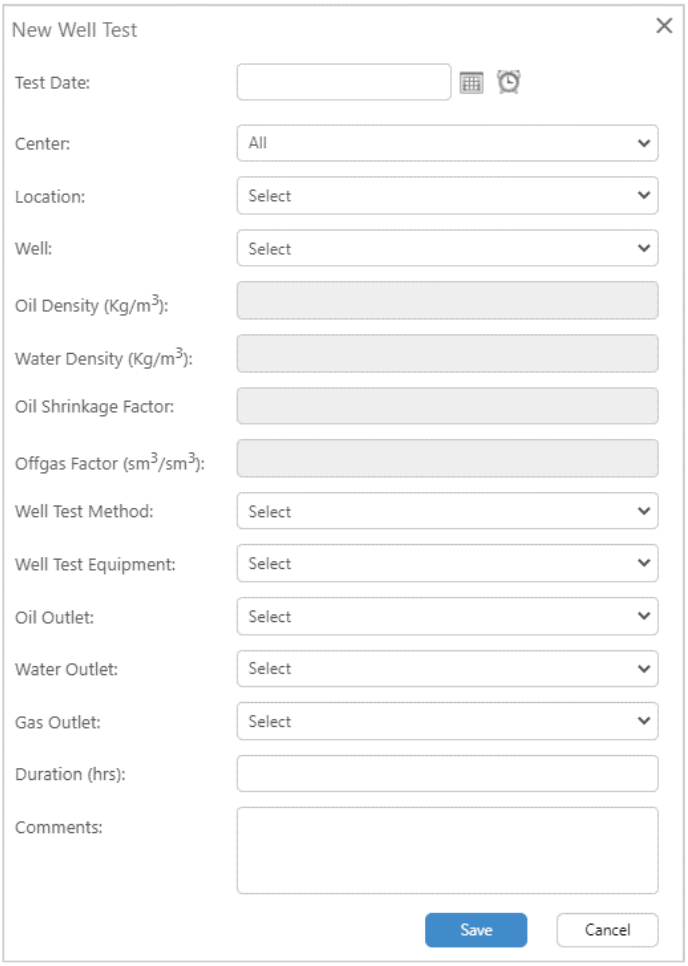
The **New Well Test** window allows you to enter the information required to schedule a new well test.

To schedule a new well test:

1. Click **New Test**.



The New Well Test window appears.



2. Make the required changes to the attributes.

Note: The attributes may be different for your deployment. For definitions, refer to the *Glossary* (see page 31).

3. When you have finished, click **Save**.

Approve or Reject a Well Test

Usually, well tests are approved or rejected from the Well Test Details page. However, Well Test also offers an "express" facility to quickly approve or reject well tests directly from the Overview (see page 13) page.

To approve or reject single or multiple well tests directly from the Well Test Overview page:

1. Click on a row in the grid to select the well test you want to approve or reject.

   To select multiple rows, press and hold the CTRL key and click the rows you want to select.

2. To approve the test, click **Express Approve**; or to reject the test, click **Express Reject**.

A confirmation message appears.

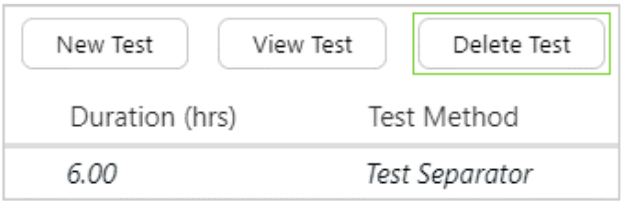
3. Click **OK**.

   The tests are approved or rejected as specified.

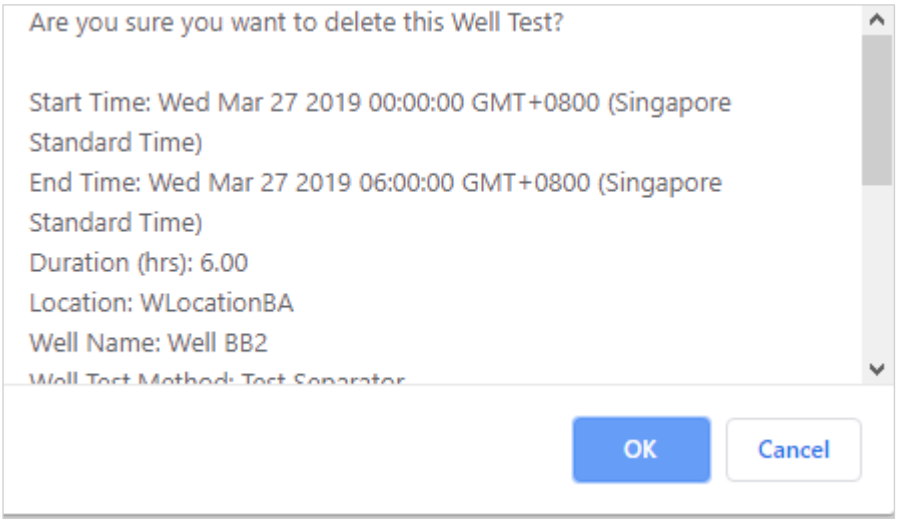
Delete a Well Test

To delete a well test:

1. Click the row on the grid that you want to delete.
2. Click **Delete Test**.



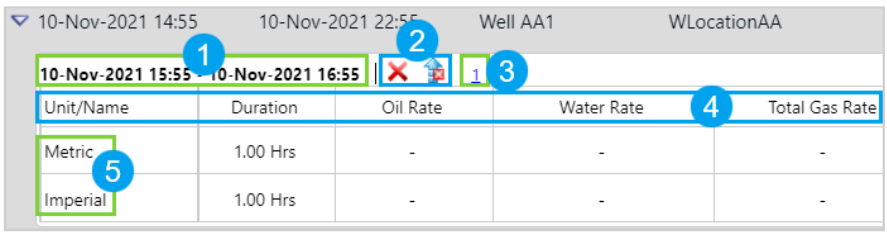
3. At the confirmation message, click **OK**.



   The well test is deleted from the system.

View a Result Set

You can click one of the rightward-pointing arrows ▷ at the left of each row to expand a row and view the result test of a well test.



The expanded row displays the following results:

1. **Date Range**
   Displays the start date and time and end date and time of the well test.

2. **Result Set Flags**
Indicates a condition in relation to the well test. These are specific to each deployment and may be used for many things. For example, the *Valid* flag (see page 28) could be used to indicate a result set is to be used for allocation and flow rate coefficients, or the *Marked for submission* flag could be used to identify whether a well test needs to be submitted to a common data repository.

   Invalid

   Valid

   Marked for submission

   Not marked for submission

3. **Result Set Number**
Indicates the number of results set in a single well test record (see page 22). You can navigate across different result sets by clicking the number.

4. **Attribute**
The attribute being tested. For a list of attributes that may be displayed here, refer to the *Glossary* (see page 31).

5. **Unit**
The results appear in both metric and imperial units.

Note: The attributes and configuration of the results set may vary for your deployment. If configured, the version number (see page 29) will appear in a column labelled *Ver*.

View the Details of a Well Test

The Well Test Details page shows all details regarding a well test performed at a particular time.

- To launch the Well Test Details page, double-click the row in the grid for which you want to view the well test details.

Export Data to Microsoft Excel

The Well Test export function exports the grid data to Microsoft Excel® in .xls format by default.

To export the grid data.

1. Click **Export To Excel**.

   You may need to wait a few seconds for the data to be processed.

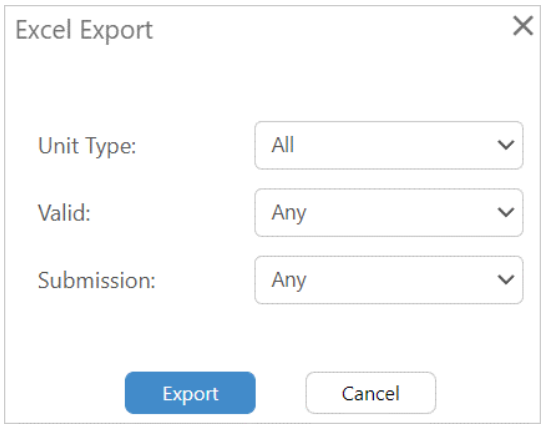
   The Excel Export window appears.

2. Select the following criteria:

   Unit Type: Imperial or Metric.

   Valid: Specify whether to export all data, only data that is valid, or only data that is invalid.

Submission: Specify whether to export all data, only data that is in a Submitted state, or only data that is Unsubmitted.



3. Click **Export**.
4. The file will download.

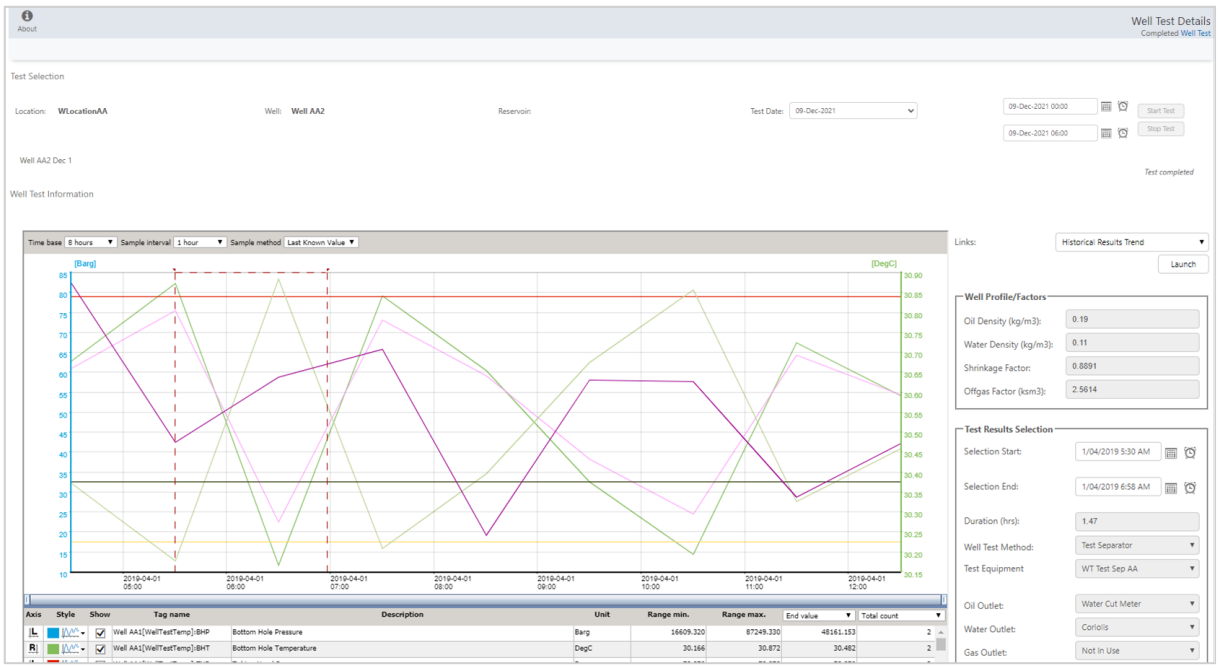
Well Test Details

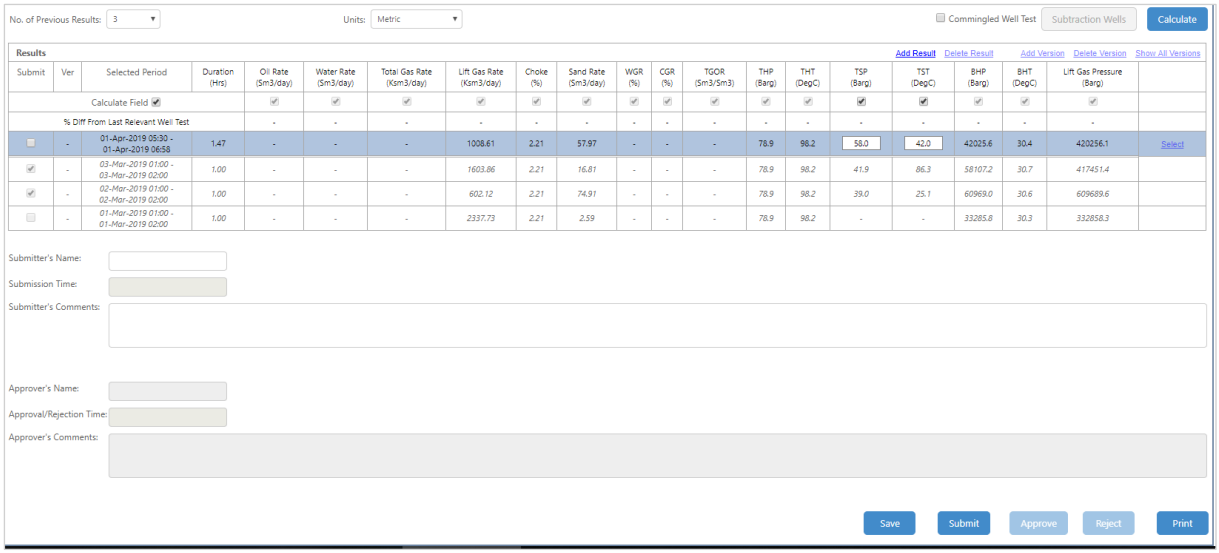
The Well Test Details page shows all details regarding a well test performed at a particular time. You can start and stop a well test, view the high frequency test data in a trend, select a stabilised period for calculating the average test result, capture information from the lab, and submit or approve a well test.

The functionalities available from the Well Test Details page include:

- Start or stop a well test.
- Capture Oil Outlet Sample data for the test.
- Record a water cut reading for the test.
- Select a stabilised well test period for calculating the well test results.
- Include Commingled Well Test.
- View a trend of the historical well test results.
- Save, submit and/or approve a well test.
- Print the Well Test Details page.

The Well Test Details page can be divided into six sections.





1. **Test Selection**
   Displays the current status of the well test, and information such as the platform and name of the well being tested, the well test data trend start time, the trend end time, the trend duration and test comments.

2. **Trend**
   Displays the well test trend data where users can select a stabilised period to calculate the well test results.

3. **Historical Trend Selector**
   Provides external links, including a link to the Historical Results Trend.

4. **Well Profile**
   Displays well profiles and factors, information regarding the well test period and methods for the results, laboratory data regarding the well test, and so on.

5. **Results Table**
   Displays the well test results and provides functionality to calculate and/or manually enter result values.

6. **Function Buttons**
   Contains buttons to save, submit, approve, reject or print the well test.

Schedule a Well Test

Well Tests can be scheduled to start and stop automatically at a given date and time.

To schedule a well test:

1. In the Test Selection area, click the Date and Time pickers icon near to the **Start Test** button.
2. Use the date/time picker (see page 11) to choose a different start date and time.

3. In the Test Selection area, click the Date and Time Pickers near the **Stop Test** button.
4. Use the date/time picker (see page 11) to choose a different stop date and time.

5. Click **Start Test**.

The test will start at the designated date and time. When the test reaches the estimated stop time (start time plus data duration hours), the test stops automatically.

Start or Stop a New Test

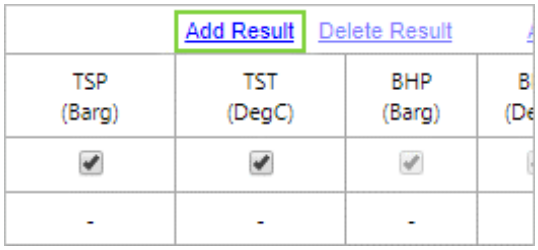
- To start a well test at the current time, click the **Start Test** button.
  The data trend is loaded with the start time at the well test start time, and end time at the start time plus the data duration in hours entered for that test.
- To stop a well test immediately, click the **Stop Test** button.

Add a New Well Test Result

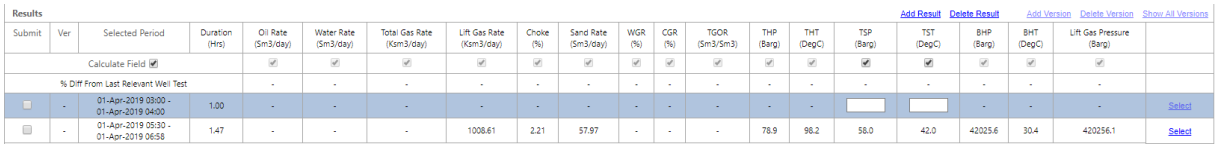
If the option of multiple results is allowed, you can add well test results to a result set (see page 7). You can do this in the Results table on the Well Test Details page.

To add a new well test result:

1. Click the **Add Result** link.



A new row appears in the table.



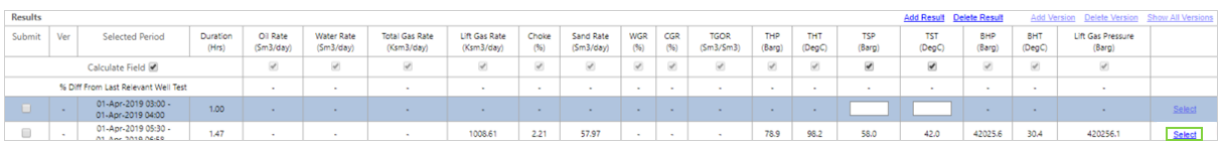
2. Type the required values into the white boxes, or perform a calculation (see page 24).
3. Click **Save**.

Edit or Delete a Well Test Result

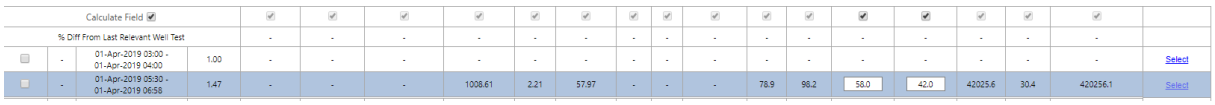
You may sometimes need to modify or remove an existing well test result. You can do this in the Results table on the Well Test Details page.

To edit an existing well test result:

1. Click the **Select** link on the row you want to edit.



The fields become editable, indicated by the values appearing in a white box. Note that some fields may not be editable.



2. Edit the fields in the white boxes as required.
3. Click **Save**.

To delete an existing well test result:

1. Select the result by clicking the **Select** link on the appropriate row.
2. Click **Delete Result**.
3. At the confirmation message, click **OK**.

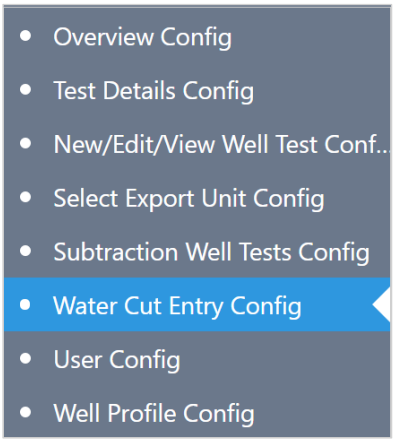
Note: If there is only one well test, this option will not be available.

Record Water Cut Readings

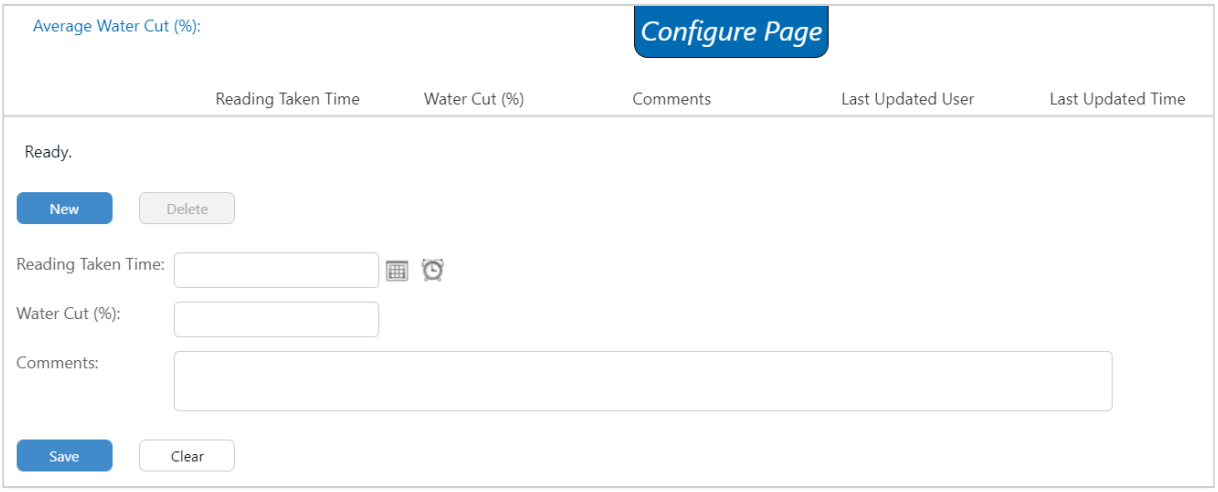
In the Lab Data Entry section of the Well Profile in the Well Test Details page, you can manually record the Water Cut readings taken from oil or water outlets over the well test duration. You can save the entered information or delete an existing Water Cut entry.

To enter a Water Cut reading:

1. Click **Water Cut Entry** from the **Config** toolbar



The Water Cut Entry window appears



The average Water Cut value is displayed at the top of the page, and a table showing all the entries is also displayed. The table shows the username of the last person who updated the Water Cut record in the system, and time at which the user updated it.

2. Click **New**.
3. Enter the following details:

   Reading Taken Time
   The time that the Water Cut reading is taken. Click the ellipsis button to open the Date/Time Picker.

   Water Cut (%)
   The Water Cut percentage value.

   Comments
   Comments regarding the water cut entry.

4. Click **Save**.

- To delete an existing water cut entry, select the entry from the table and then click **Delete**.

Calculate Well Test Results

Well test results can be calculated based on the selected range in the trend. Calculations can be performed for any tests that are not in a *Pending* state.

Unless the calculation uses the values in the well profile, you don't need to set up a well profile to perform a calculation.

1. Select a stabilised period for which you want to calculate the test results.

   You can either move the hairlines (see page 25) or select a specific start and end time (see page 25).

2. In the Results table, click **Add Result**.

3. Click **Calculate**.

The Results table is updated and the test results are added to the result set.

If the calculation fails, an error message appears. Fix the errors and try again.

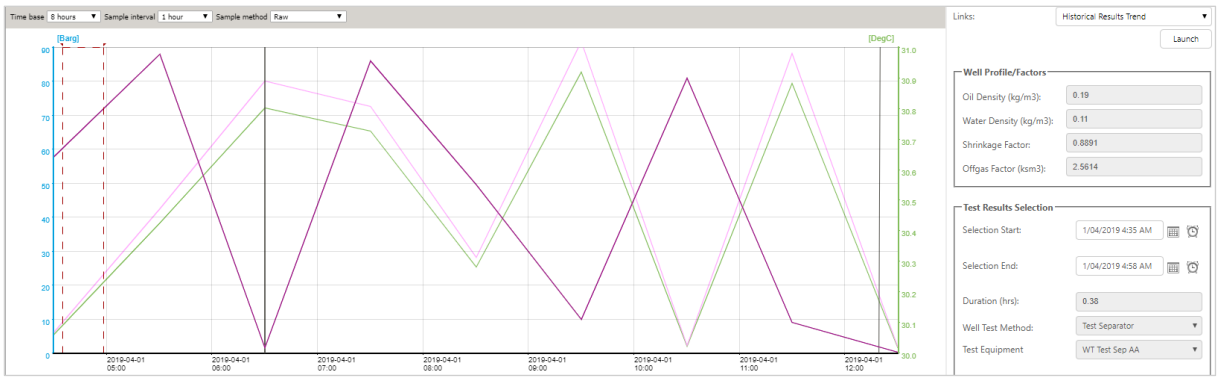
4. Click **Save**.

5. If required, click **Submit**.

Select Test Period (Test Separator Method)

Before calculating the well test results, you need to select a stabilised time period. You can do this using the trend on the Well Test Details page.

- To select a test period for calculating the well test results, move the hairlines in the trend by dragging them to a different position.

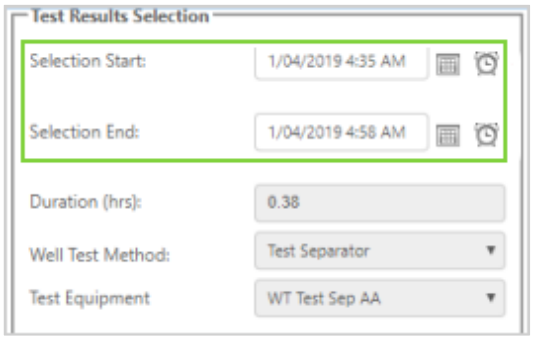


In the Test Results Selection, the **Test Start**, **Test End**, and **Duration (hrs)** are automatically populated based on the selection.

Select Test Period (Manual Method)

Before calculating the well test results, you need to select a stabilised time period. You can do this by using the Date/Time Picker in the Well Profile section of the Well Test Details page.

To select a test period:



1. Next to the **Selection Start** box, click the date/time picker.

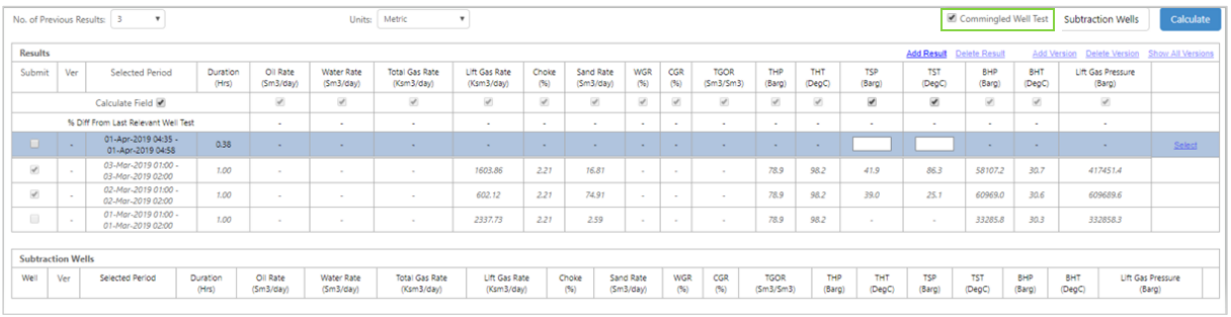
2. Use the date/time picker to select the **Test Start** time.
3. Next to the **Selection End** box, click the date/time picker.
4. Use the date/time picker to select the **Test End** time.

Commingle a Test Result

A *commingled* well test is when two or more wells are used in a single well test. The historical well test result of one well is subtracted from the total flow, to obtain a result for a well that may not otherwise be able to be tested on its own.

To perform a commingled well test:

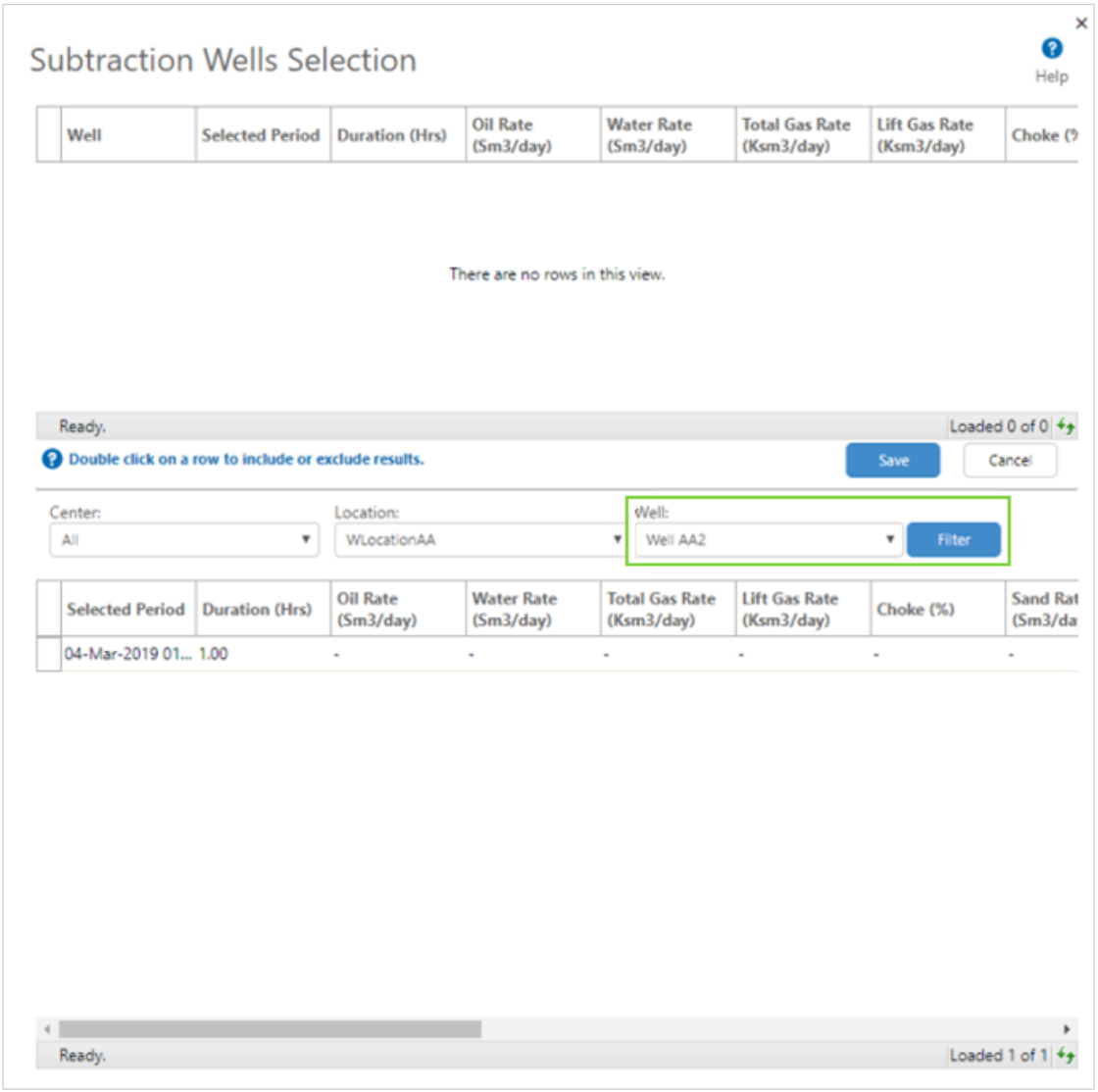
1. In the Results table of the Well Test Details page, select **Commingled Well Test**.



   The **Subtraction Wells** table appears below the Results table.

2. Click the **Subtraction Wells** button.

The **Subtraction Wells Selection** dialog box appears.



3. Use the drop-down lists to select the well you wish to use in the commingled well test.
4. Click **Filter**.

   The historical results for that well appear below the drop-down lists.
5. Double-click one or more of the rows to select the historical well tests you wish to use.

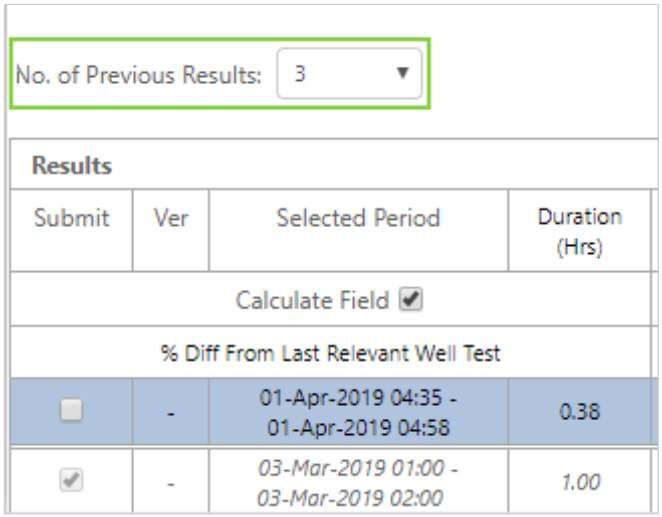
   The tests appear in the table above.
6. After you have finished selecting your tests, click **Save.**

   The dialog box disappears and the **Subtraction Wells** table is refreshed with the selected wells.
7. Click **Calculate**.

   The system subtracts the historical test results from the total flow, to derive the well test result for the well.
8. Click **Save**, and then submit the well test as required (see page 30).

Previous Test Results Filter

In the Results table, the **No. of Previous Results** drop-down list is a filter that restricts the number of rows in the results table. When the Well Test Details page is initially opened, the filter defaults to 3.

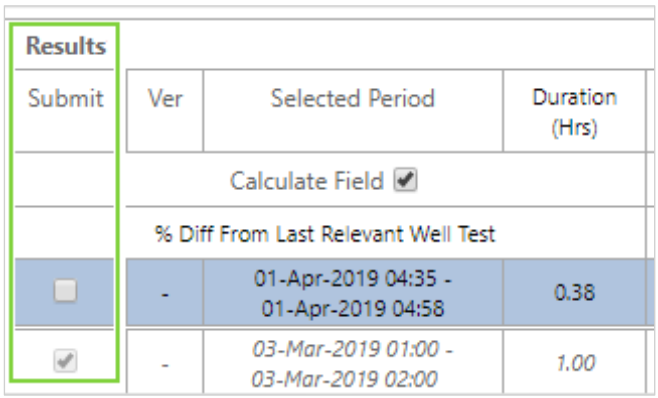


- To increase or decrease the test results to view, select the desired number from the **No. of Previous Results** drop-down list.

Specify a Result Set Flag

The result set flags (see page 17) indicate a condition in relation to the well test.

You can specify them by selecting the check boxes in the Results table in the Well Test Details page.



The check boxes may be labelled differently for your deployment, but they will usually be the leftmost check boxes in the table.

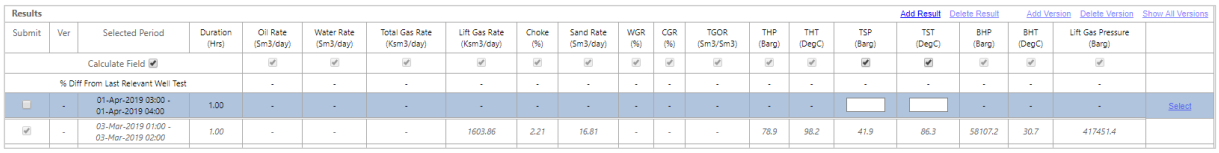
The above example shows the flags configured to specify whether this result is to be used for Allocation and whether it needs to be submitted to an external system (e.g. IFM).

Create a New Version

Versioning of result sets is an optional feature that may be enabled, and allows you to retain the history of selected calculations. Just as you can add multiple result sets to a well test record, each result set can also have multiple versions.

The version number is indicated as a column in the Results table.

Note: The version number is configurable. By default, the versions are simple numbers 1, 2, 3 etc.

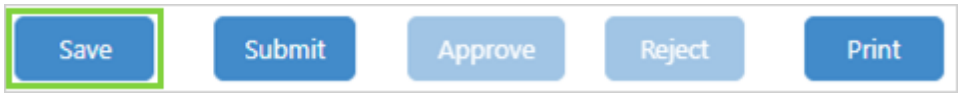


- To create a new version, click **Add Version**.
  The current selected test will automatically increase a version (e.g. from "Ver.1" to "Ver. 2") and all the test results will be cleared so you can perform another calculation for the next version.
- To remove a version, click the row for the version you want to remove and then click **Delete Version**.
  The version number reverts to the previous version number.

Save Well Test Results

You must save the well test results before you can submit them for approval.

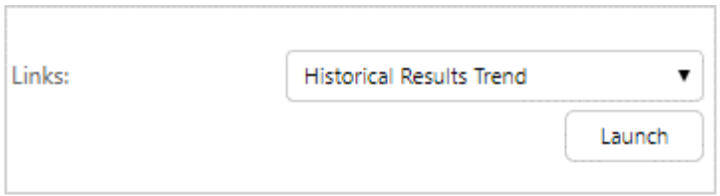
- To save the entered well test data, click the **Save** button at the bottom of the page.



View Historical Results Trend

To view the historical results trend:

1. Open the Well Test Details page.
2. From the **Links** drop-down list, select **Historical Results Trend.**



3. Click **Launch.**

   The Historical Results Trend window opens in a new tab. For details, refer to *Historical Results Trend*.

Submit Well Test Results

After all mandatory data has been entered, you can submit a well test for approval. You can only submit a test that is in a *Completed* or *Rejected* state.

To submit a well test for approval:

1. Perform your required calculations (see page 24).
2. Enter any comments you wish to make.
3. Click **Save**.
4. Click the **Submit** button at the bottom of the Well Test Details page.

Approve or Reject Submitted Well Test

After a well test has been submitted, you can either approve or reject it.

- To approve or reject a submitted well test, click the **Approve** or **Reject** button at the bottom of the Well Test Details page.

Print Well Test Details

- To print the Well Test Details page, click the **Print** button in the lower right corner of the Well Test Details page.

Glossary

Artificial Lift
A mechanical technique used to increase the flow of liquids, such as crude oil or water, from a production well.

Asset
The name of the asset being tested.

BHP
Bottom Hole Pressure. The pressure at the bottom of a hole.

BHT
Bottom Hole Temperature. The temperature at the bottom of a particular drilled hole section, at the time it is measured.

Center
The name of the center where the well is being tested.

CGR
Condensate Gas Ratio. The ratio of natural gas condensate to raw gas.

Choke
A device with an opening that is used to control fluid flow rate or downstream system pressure.

Coriolis
A Coriolis flowmeter uses the coriolis effect to measure mass flow rate.

DP
Downstream Pressure. The pressure in the outlet pipe or duct.

Duration
The length of time, usually in hours, taken to conduct the well test.

ESP
Electric Submersible Pump. A method of artificial lift whereby the pump is submersed in the fluid that it is to pump.

Field
The field in which the well test is conducted.

FTHP
Flowing Tubing Head Pressure. The pressure of the wellhead during flow.

FTHT
Flowing Tubing Head Temperature. The temperature of the wellhead during flow.

Gas Lift
A method by which the bottomhole pressure (BHP) is reduced so that the production fluid enters the wellbore at a higher flow rate.

Gas Outlet
This outlet captures most of the gas output.

Gas Rate
The rate of gas produced by a well.

GOR
Gas Oil Ratio. Ratio of the volume of gas to the volume of oil.

JP
Jet Pump artificial lift method.

Lift Gas Pressure
The pressure of the gas used during the *Lift Gas* artificial lift technique.

Lift Gas Rate
The rate of the gas used during the *Lift Gas* artificial lift technique.

Lift Method
The method of artificial lift being used. For example, Self Flow, JP, ESP.

Location
The location of the well being tested.

MPFM
Multiphase Flow Meter. Measures individual phase flow rates of oil/gas/water mixtures.

MPFM/SEP Press
The pressure of the test separator or MPFM.

MPFM/SEP Temp
The temperature of the test separator or MPFM.

Net Gas
The net gas produced during a well test.

Net Oil Rate
The net oil rate produced during a well test.

NGOR
Net Gas Oil Ratio. The gas to oil ratio against net gas.

Offgas Factor
The factor to use for converting gas from line condition to standard condition.

Oil Density
Density of the crude oil component, usually expressed in kilograms per cubic metre (kg/m³) but the units may vary for each deployment.

Oil Outlet
The oil outlet captures most of the oil output from a separator. Several methods may be used to separate the oil and water to determine the total oil coming from the well. For example, Coriolis, Water Cut Meter. In P2 Well Test, the measurements from a water cut meter may be entered manually by the operator. This could occur if, for example, the measurements came from a water cut meter that was not tied to a historian.

Oil Rate
The oil rate measured by the test equipment during a well test.

Oil Shrinkage Factor
The factor to use for converting oil from line condition to standard condition.

Platform
The platform on which the well test is conducted.

Produced GOR
The gas to oil ratio against produced gas.

Production fluid
The mixture of oil, gas, and water that flows to the surface of an oil well from a reservoir. Its composition varies.

PSep
Test separator pressure.

Sand Rate
The sand rate measured by the test equipment during a well test.

Self Flow
Self-flowing well, not artificially lifted.

Sep Liquid Rate
Test separator liquid rate. The liquid (i.e. oil + water) rate captured by the test separator during a well test.

Sep Oil Rate
Test separator oil rate. The oil rate captured by the test separator during a well test.

Sep Water Rate
Test separator water rate. The water rate captured by the test separator during a well test.

Separator
Separates oil/gas/water mixtures into their constituent components.

Status
The status (see page 6) of the well test workflow.

Test Date
The date on which the well test is conducted.

Test Equipment
The equipment used to conduct the well test.

Test Method
The method used to conduct the well test. For example, Test Separator / Separator, MPFM. Test results may be entered manually by the operator. This could occur if, for example, the test results came from an MPFM that was not tied to a historian.

Test Separator
See *Separator*.

TGOR
Total Gas Oil Ratio. This is the *GOR* uncorrected for *gas lift* gas present in the *production fluid*.

THP
Tubing Head Pressure. The pressure of the tubing head component of a wellhead.

THT
Tubing Head Temperature. The temperature of the tubing head component of a wellhead.

Total Gas Rate
The total gas rate measured by the test equipment during a well test.

TSep
Test separator temperature.

TSP
Test Separator Pressure. The pressure of the test separator during a well test.

TST
Test Separator Temperature. The temperature of the test separator during a well test.

W/C
Water cut percentage. The amount of water in oil.

Water Cut Meter
Measures the water content of oil as it flows through a pipeline.

Water Density
Density of the water component, usually expressed in kilograms per cubic metre (kg/m^3) but the units may vary for each deployment.

Water Outlet
This outlet captures most of the water output. The options here specify the method by which the oil and water is separated to determine the total water coming from the well. For example, Coriolis. Measurements from a water cut meter may also be entered manually by the operator. This could occur if, for example, the measurements came from a water cut meter that was not tied to a historian.

Water Rate
The water rate measured by the test equipment during a well test.

Well
The name of the well being tested.

Well Test Equipment
See *Test Equipment*.

Well Test Method
See *Test Method*.

WGR
Water Gas Ratio. The ratio of water to gas.

WHP
Well Head Pressure. The pressure measured at the wellhead.

WHT
Well Head Temperature. The temperature measured at the wellhead.