

## Test Plan to test the SAM 5000

There are 8 major test cases to test the SAM 5000. Each of these test cases has user input, input from the water sources, the walkthrough to perform each test cases, exceptions and expected output from the system.

### Test Case 1-Temperature Control

<b>Inputs</b>	-User interaction(touching the touch screen interface) - Hot water from hot water pipe -Cold water from cold water pipe
<b>Steps for testing</b>	1. Before turning on the shower, set the temperature on the display to the lowest setting allowed.  2. Turn the shower on, let the water run for a short period of time.  3. Measure the temperature, the temperature should be that of what is displayed and set on the touchscreen interface.  4. Rerun the test case by incrementing the temperature by 2 degrees celsius. This iteration should be done till the max temperature allowed in the system
<b>Alternate Steps</b>	After Step 1, instead of turning the water off before incrementing temperature, leave the water running. Continue test case.
<b>Exceptions</b>	Hot water tank is out of hot water prior to beginning the test, interface should notify user of this.
<b>Outputs</b>	Water of the desired and displayed temperature (+/- 1 degrees Celsius) with an acceptable flow.
<b>Non-functional requirement to consider</b>	At any point during the test, user instrumented temperature adjustments should occur as fast or faster than a regular manual shower.

This test is performed to to check whether the right temperature is displayed in the interface and also check if the correct temperature of water is coming out from the hot water system. We increment the temperature by 2 degrees each time and rerun the test to check if the temperature is changed.

#### **Test Case 2 - Time taken for the temperature to change**

<b>Inputs</b>	-User interaction(touching the touch screen interface) - Hot water from hot water pipe -Cold water from cold water pipe
<b>Steps for testing</b>	1. Turn on the shower with the default temperature and let the water run.  3. Measure the temperature, the temperature should be that of what is displayed and set on the touchscreen interface.  4. Change the temperature by 3 degrees in the interface and measure the time taken for the temperature to change in the water  5. Repeat the above steps by incrementing the temperature until the maximum temperature is reached.
<b>Exceptions</b>	Hot water tank is out of hot water prior to beginning the test, interface should notify user of this.
<b>Outputs</b>	Water of the desired and displayed temperature (+/- 1 degrees Celsius) with an acceptable flow and the time taken for the temperature change should be less than 30 seconds.

We will be testing the time taken for the system to change the temperature. This test is done to observe the performance of the system for the user input.

#### **Test Case 3-Preset and User Defined Routines**

<b>Inputs</b>	-User interaction(touching the touch screen interface) -Hot water from hot water tank
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	- Cold water from other source
<b>Steps for testing</b>	1. Start the routine.  2. Ensure examined output temperature at each stage matches that specified of the routine (+/- 1 degree Celsius).  3. Ensure that the time spent on each stage is accurate(+/- 200 ms).  4. Iterate for each of the routines.
<b>Exceptions</b>	Hot water tank is out of hot water prior to beginning the test, interface should notify user of this.
<b>Outputs</b>	Water is temperature controlled and turned on/off as specified in the routine.
<b>Non-functional requirement to consider</b>	At any point during the test, user instrumented temperature adjustments should occur as fast or faster than a regular manual shower.

This test is conducted to examine the temperature control of the routine and the time spent on each stage of the routine. Moreover, we will be testing if the water can be turned on/off at each stage in the routine.

#### Test Case 4- User Defined Routine Creation

<b>Inputs</b>	-User interaction(touching the touch screen interface)
<b>Steps for testing</b>	1. Log into the system with a user profile.  2. Press the "Create new Routine" button.  3. Create a routine with one stage.  4. Iterate, creating routines with more stages each time until a routine is created with the maximum number of stages.
<b>Exceptions</b>	-If the number of stages created as reached the

	<p>maximum, an error message should be displayed.</p> <p>- Attempting to create a routine that has the same name as a routine that exists within the scope of that user should be disallowed; the routine name must be changed before moving forward.</p>
<b>Outputs</b>	A routine containing the desired shower stages.

We perform this test to check if the system disallow user from creating additional stages when the number of stages created is reached the maximum. Furthermore, this test should be repeated for several newly created routines in order to observe the behavior of the system.

#### Test Case 5 - Profile creation

<b>Inputs</b>	-User interaction(touching the touch screen interface)
<b>Steps for testing</b>	<ol style="list-style-type: none"> <li>1. Start the shower management system.</li> <li>2. Navigate to the user creation screen.</li> <li>3. Enter a username less than or equal to 25 characters.</li> <li>4. Create the profile.</li> <li>5. Logout, then re-login as the newly created user to confirm that the user was created successfully.</li> </ol>
<b>Exceptions</b>	<p>- Attempting to create a user profile that has the same name as another user profile should be disallowed, the name must be changed before moving forward.</p> <p>-User tries to create a user profile using a name which already exists.</p> <p>-Attempting to create a profile with a username longer than 25 characters should result in an error.</p>
<b>Outputs</b>	User profile is created

<b>Non-functional requirement to consider</b>	The system should be able to create the user profile both accurately and promptly.
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This test is performed to check if the user profile is successfully created by the system. We will be also evaluating if the system prompts an error when the user tries to create a profile with a name that has been already assigned to a different profile in the system.

#### Test Case 6- Displaying remaining hot water level

<b>Inputs</b>	-User interaction(touching the touch screen interface) -Hot water from hot water pipe -Cold water from cold water pipe
<b>Steps for testing</b>	1. Run shower at a desired temperature.  2. Compare times of which the water reduced in temperature to that which displays on the system.  3. Wait for hot water tank to reheat, iterate at different temperatures.
<b>Exceptions</b>	-Hot water tank is out of hot water prior to beginning the test, interface should notify user of this.
<b>Outputs</b>	-Time and gauge of the currently available hot water is displayed. Time should countdown at an accurate rate, it shouldn't jump around or be inconsistent.
<b>Non-functional requirement to consider</b>	-The time and gauge should be a fair representation of the remaining hot water available.

#### Test Case 7- Analytics

<b>Inputs</b>	-User interaction(touching the touch screen interface) -Hot water from hot water pipe -Cold water from cold water pipe
<b>Steps for testing</b>	1. On user profile 1, run the shower at the minimum allowed temperature for 5 minutes.

	<p>2. On the same user profile, run the shower at the maximum allowed temperature for 5 minutes.</p> <p>3. Follow the same process on a different profile but for 10 minutes rather than 5.</p> <p>4. Calculate the temperature and time averages.</p> <p>5. Compare the temperature and time analytics between profiles, ensure they are the same relative to the run time.</p> <p>6. Graph the water used, the graph should be fairly linear as the time is the only variable between the user profiles.</p>
<b>Exceptions</b>	Hot water tank is out of hot water prior to beginning the test, interface should notify user of this.
<b>Outputs</b>	An analytical view for a particular user.
<b>Non-functional requirement to consider</b>	- The system should be able to present the analytics both accurately and promptly.

This test is performed to check if the analytics of the user recorded by the system are accurate when compared with the test results.

#### Test Case 8- User Water Override

<b>Inputs</b>	<p>-User interaction(touching the touch screen interface)</p> <p>-Hot water from hot water pipe</p> <p>-Cold water from cold water pipe</p>
<b>Steps for testing</b>	<p>1. Begin a preset or user defined routine.</p> <p>2. During a stage of the routine, turn on/off the water as a user override. The system should allow this.</p> <p>3. Re-run the routine, but this time adjust the temperature as a user override. The system should allow this.</p>

	4. Iterate over different routines, overriding at different stages in different ways (on/off, different temperatures.
<b>Exceptions</b>	Hot water tank is out of hot water prior to beginning the test, interface should notify user of this.
<b>Outputs</b>	Water should shut off or change temperature based upon the user input
<b>Non-functional requirement to consider</b>	At any point during the test, user instrumented temperature adjustments should occur as fast or faster than a regular manual shower.

We perform this test to check if the system allow the user to change the temperature, turn on/off the water when the user uses a routine.

#### **Test Case 9- Time check during different stages of a routine**

<b>Inputs</b>	-User interaction(touching the touch screen interface) -Hot water from hot water pipe -Cold water from cold water pipe
<b>Steps for testing</b>	1.Create a new user profile.  2. Set 3 minutes for standard stage, 2 minutes for lather stage and 4 minutes for drench stage.  3. While the water is running during a routine the following should be checked. <ol style="list-style-type: none"> <li>Count the time taken during each stage manually and check if that time matches with the time elapsed from the system.</li> <li>Count the time taken for the system to change to a different stage.</li> </ol> 4. Iterate over different timings and check if the system manages the timings accurately.
	Hot water tank is out of hot water prior to beginning the test, interface should notify user of this.
<b>Outputs</b>	System should switch to a different stage when

	the time is elapsed.
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This test is used to check if the system manages the timings accurately when a user is using a routine. We will be measuring the time taken for a stage to complete and check if that time duration is same as the time that we initially set. Moreover, we will be checking the amount of time taken for a the system to change from one stage to another another.

### Acceptance testing

As a final stage during testing we will be checking if the system has passed all the above mentioned test cases. If there are any errors encountered during any phase of the testing, it will be reported in the acceptance testing report. Following is the format of the acceptance testing report.

Test cases	Results	Errors
<b>Test Case 1-Temperature Control</b>	<input type="checkbox"/> Passed <input type="checkbox"/> Failed	
<b>Test Case 2-Preset and User Defined Routines</b>	<input type="checkbox"/> Passed <input type="checkbox"/> Failed	
<b>Test Case 3-Preset and User Defined Routines</b>	<input type="checkbox"/> Passed <input type="checkbox"/> Failed	
<b>Test Case 4- User Defined Routine Creation</b>	<input type="checkbox"/> Passed <input type="checkbox"/> Failed	
<b>Test Case 5 - Profile creation</b>	<input type="checkbox"/> Passed <input type="checkbox"/> Failed	
<b>Test Case 6- Displaying remaining hot water level</b>	<input type="checkbox"/> Passed <input type="checkbox"/> Failed	
<b>Test Case 7- Analytics</b>	<input type="checkbox"/> Passed <input type="checkbox"/> Failed	
<b>Test Case 8- User Water Override</b>	<input type="checkbox"/> Passed <input type="checkbox"/> Failed	
<b>Test Case 9- Time check during different stages of a routine</b>	<input type="checkbox"/> Passed <input type="checkbox"/> Failed	