

## Inspection and Test Protocol

Project **Mass Production, Supply and Delivery of Science and Mathematics Equipment Packages to Public Elementary Schools for Grades 1 to 3 and Grades 4 to 6, Public Junior High Schools for Grades 7 to 10, and Public Senior High Schools for Grades 11 to 12 (CORE & STEM) (MOOE) (FY2022 SME Lots 5 & 7)**

**A. General Inspection Protocol. This general protocol shall serve as guide in the conduct of the Evaluation Samples/predelivery inspection for all market items (where the following statement is applicable).**

- a.) verify/evaluate the parameters of the goods or product as indicated in the specifications e.g. material, dimensions, capacity, power rating, etc.;
- b.) check the goods for any evidence of defects visually as follows:
  - i) rust formation
  - ii) cracked/broken parts
  - iii) warps/dents
  - iv) loose parts
  - v) discoloration
- c.) look into the completeness of parts/accessories;
- d.) all goods powered by dry cell (AA, AAA, etc.) shall be included with corresponding batteries ready for use;
- e.) the bidder shall unbox, set up (if applicable), and manipulate the goods to be evaluated and shall perform corresponding performance and/or functionality tests.
- f.) Markings and Labels shall be in English, with correct spelling, permanent.
- g.) For models with key card, verify and identify the structures if correct.
- h.) The bidder/supplier shall provide the materials and consumables.

### Detailed Test and Inspection Protocol

Item	Description	Inspection and Test Procedures
<b>I. SCIENCE AND MATHEMATICS EQUIPMENT (MARKET ITEMS)</b>		
<b>GLASSWARES AND LABORATORY TOOLS AND EQUIPMENT</b>		
<b>1</b>	<b>Balance, Toploading, Electronic</b>	A. (Refer to General Inspection Protocol)
		B. Tests
		<b>Visual inspection</b> Check the visible attributes/parameters of the Balance, Toploading, Electronic, as per technical specifications <b>Dimensional inspection</b> Measure the dimensions as per technical specifications of the Balance, Toploading, Electronic
		<b>Functionality test</b>
		a) Set up and operate the unit using the User's Manual . b) Place the balance on a sturdy, level surface. c) Get the bubble centered to ensure the balance is correctly level on the bench top d) First, before weighing , it needs to be "tared," or recalibrated to read 0.01 g. e) Press the button and turn it on f) Press the Tare button and release to effect this recalibration to check <b>its</b> accuracy . g) Place the 500 g calibration mass to be weighed at the center of the pan h) Take the reading i) Take <b>three or</b> more trials to verify the precision and functionality

**Detailed Test and Inspection Protocol**

Item	Description	Inspection and Test Procedures
		C. Materials needed to perform inspection and test
		Tape rule, Vernier caliper
2	Beaker, borosilicate, 250 mL	A. (Refer to General Inspection Protocol)
		B.Tests
		<b>a).Visual inspection</b>
		Check the visible attributes/parameters of the 250 mL beaker, borosilicate as per technical specifications
		<b>b)Dimensional inspection</b>
		Measure the dimensions as per technical specifications of the 250 mL beaker, borosilicate
		<b>c)Scratch test</b>
		Scratch using your thumb nails the brand, white graduations and inscriptions and other markings , to test for the peel and adhesion properties of embossed brand and permanency of graduations, and other markings, If it wont peel off, it passed QC inspection. If not, it is rejected
		<b>d) Refractive-index test</b>
		Submerge the glass into vegetable oil or glycerin to determine whether the glass material is borosilicate.
		Borosilicate glass is identified by its refractive index, 1.474. Immersing the glass in a container of liquid of similar refractive index, makes the glass not visible or will disappear. (Vegetable oil, 1.47 and glycerin, 1.473 are some liquids with similar refractive index as to borosilicate glass).
		<b>e) Volumetric Test</b>
		a) Fill the dry beaker sample with water up to the 200 mL mark . Measure all its contents of the beaker sample using a dry, standard 100 graduated cylinder up to 200 mL and transfer the water to another beaker , to check the accuracy and preciseness of the printed graduations as stipulated in the technical specifications, is met. The capacity must be 200 mL, tolerance: $\pm 5\%$ b) Measure 250 mLwater using the standard 100 mL graduated cylinder and transfer all the contents to the beaker sample. The capacity must be 250 mL, tolerance: $\pm 5\%$
		<b>f) Functionality test</b>
		1. Place half- full of water in the 250 mL beaker. Use boiling stones or boiling sticks in liquids to facilitate even heating and boiling
		2. Heat the beaker with water up to its boiling point of 100°C and let it continue boiling for 3 more minutes to check and verify its resistance to thermal shock without breakage, it Passed QC inspection or if it it fails to resist thermal shock, it is rejected.
		C. Needed Equipment and Material:
		1. Digital vernier caliper
		2. Steel tape measure
		3. Graduated cylinder, 100 mL
		4. Funnel, glass
		5. Denatured alcohol
		6. Rag/tissue paper
		7. Glycerine (1 liter)

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Item	Description	Inspection and Test Procedures
		8. Tripod
		9. Lighter
		10. Wire gauze
		11. Thermometer, partial immersion
		12. Hand gloves
		13. Face mask
		14. Safety goggles
		15. Boiling stones
3	Beaker, borosilicate, 50 mL	A. (Refer to General Inspection Protocol)
		B. Tests
		<b>a). Visual inspection</b>
		Check the visible attributes/parameters of the 50 mL borosilicate beaker as per technical specifications
		<b>b) Dimensional inspection</b>
		Measure the dimensions as per technical specifications of the 50 mL borosilicate beaker
		<b>c) Scratch test</b>
		Scratch using your thumb nails the brand, white graduations and inscriptions and other markings, to test for the peel and adhesion properties of embossed brand and permanency of graduations, and other markings. If it will not peel off, it passed QC inspection. if not, it is rejected
		<b>d) Refractive-index test</b>
		Submerge the glass into vegetable oil or glycerin to determine whether the glass material is borosilicate.
		Borosilicate glass is identified by its refractive index, 1.474. Immersing the glass in a container of liquid of similar refractive index, makes the glass not visible or will disappear. (Vegetable oil, 1.47 and glycerin, 1.473 are some liquids with similar refractive index as to borosilicate glass).
		<b>e). Volumetric Test</b>
		a) Fill the dry beaker sample with water up to its 40 mL mark. Measure all of its contents using a standard 10 mL graduated cylinder, to check the accuracy and preciseness of the printed graduations . The capacity must be 40 mL; tolerance: $\pm 5\%$
		b) Measure 50 mL water using a standard dry graduated cylinder and transfer all the contents to the beaker sample, to verify whether the required minimum/maximum volumetric capacity as stipulated in the technical specifications , is met. The capacity must be 50 mL, tolerance: $\pm 5\%$ and it must not overflow, it passed QC inspection. If not, it is rejected
		<b>f) Functionality test</b>
		1. Place half- full water in the 50 mL beaker. Use boiling stones or boiling sticks in liquids to facilitate even heating and boiling
		2. Heat the beaker with water up to its boiling point of 100°C and let it continue boiling for 3 more minutes to check if it can resist thermal shock, it passed QC inspection. If not, it is rejected
		C. Needed Equipment and Material:
		1. Digital vernier caliper
		2. Steel tape measure
		3. Graduated cylinder, 10 mL
		4. Graduated cylinder, 100 mL

**Detailed Test and Inspection Protocol**

Item	Description	Inspection and Test Procedures
		5. Funnel, glass
		6. Denatured alcohol
		7. Rag/tissue paper
		8. Glycerine (1 liter)
		9. Tripod
		10. Lighter
		11. Wire gauze
		12. Thermometer, partial immersion
		13 Hand gloves
		14. Safety goggles 15. Boiling stones, Detergent, sponge, water
4	<b>Burette, 10 mL capacity (acid)</b>	A. (Refer to General Inspection Protocol)
		B. Tests
		<b>a).Visual inspection</b>
		Check the visible attributes/parameters of the burette as per technical specifications
		<b>b)Dimensional inspection</b>
		Measure the dimensions as per technical specifications of the burette
		<b>c) Scratch test:</b> Scratch using your thumb nails the brand and white graduations and inscriptions and other markings of the distilling flask; to test for the peel and adhesion properties of embossed brand and permanency of graduations, and other markings. If it wont peel off, it passed QC inspection. If not, it is rejected
		<b>d) Refractive-index test.</b> Submerge the glass into vegetable oil or glycerine) to determine whether the glass material is borosilicate. Borosilicate glass is identified by its refractive index, 1.474. Immersing the glass in a container of liquid of similar refractive index, the glass can no longer be seen or will disappear. (Vegetable oil, 1.47 and glycerine, 1.473 are some liquids with similar refractive index as to borosilicate glass
		<b>e) Leak test</b>

**Detailed Test and Inspection Protocol**

Item	Description	Inspection and Test Procedures
		<p>Procedure:</p> <ol style="list-style-type: none"> <li>1. Clean the burette.</li> <li>2. Allow the temperature of burette and distilled water used for verification to equalize,</li> <li>3. Note the water temperature.</li> <li>4. The burette must be fixed in a vertical position in a burette clamp</li> <li>5. Close the stopcock.</li> <li>6. Initially fill the burette to a level a few millimetres above the zero mark/line with water.</li> <li>7. With the key in one or other of the « closed » or shut off positions, the test time will last at least 30-51 minutes to ensure sufficiently accurate determination of water-tightness</li> <li>8. If a drop appears, the stopcock may need to be tightened or cleaned. If the problem persists, the burette should be rejected.</li> </ol> <p>The rate of leakage for Class A burette shall not exceed one half of one scale subdivision in 30-51 min, it Passed QC inspection. If not, it is rejected</p>
		<p><b>f) Delivery time-</b> is the time required for the free descent of the water meniscus, from the zero mark to the lowest numbered scale mark, with the stopcock fully open and with no restriction of flow.</p> <ol style="list-style-type: none"> <li>a) Fix/mount the burette in a vertical position using the burette clamp</li> <li>b) Close the stopcock.</li> <li>c) Fill initially the burette with distilled water way up the zero mark.</li> <li>d) Open the stopcock and slowly drain the liquid to set the zero point accurately, making sure the lower meniscus is up to zero mL/mark.</li> <li>d) Fully open the stopcock making sure its tip is not in contact with the wall of the receiving vessel but at the center .</li> <li>e) Drain the water into the beaker up to the lowest numbered scale mark with the stopcock fully open and with no restriction of flow.</li> </ol> <p>The delivery time determined in this way must be <b>minimum- 70 sec . maximum: 100 sec</b></p>

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Item	Description	Inspection and Test Procedures
		<p><b>g) Functionality Test</b></p> <ol style="list-style-type: none"> <li>1. Add 0.33 mL of 12 N HCl to 10 ml of distilled water to obtain a 0.4 N HCl solution.</li> <li>2. Set up the burette.</li> <li>3. Fill the burette with 0.4 N hydrochloric acid slightly above the zero mark using a pipette to rinse its inside surface very well and align burette tube vertically.</li> <li>4. Place a reading card at the back of the burette to take a more accurate initial reading at the level of the meniscus.</li> <li>5. Drain the liquid to set the zero point accurately.</li> <li>6. Pour 5 mL of the unknown NaOH solution in an Erlenmeyer flask using the 10 mL pipette and add three drops of phenolphthalein to get a pink color. Swirl the flask to mix all the substances.</li> <li>7. Place the sheet of white paper under the flask for easiest recognition of the color change.</li> <li>8. Begin the titration by adding HCl to the analyte. Open the stopcock and slowly add titrant to the sample in the flask</li> <li>9. Gently keep swirling the flask with one hand while using the other hand to manipulate the burette adding the titrant simultaneously. Rinse the walls of the beaker and the tip of the burette with deionized water from a wash bottle when the endpoint is near. This ensures that all of the HCl delivered from the burette ends up in the reaction mixture.</li> <li>10. The end point is reached when the pink color disappear and one drop changes the indicator color permanently from <b>pink to colorless</b> which lasts for at least 30 seconds</li> <li>11. Take the reading of the burette.            Volume of the acid= Final - initial reading</li> </ol>
		C. Materials
		Beaker, 250 mL
		Test tube, 16 x 150
		Sodium hydroxide, 5 mL
		Hydrochloric acid, 10 mL, 0.4 M
		Watch glass
		Burette, base
		Erlenmeyer flask, 250 mL
		Phenolphthalein indicator
		Glycerine (1L)
		Stand setup assembly/tripod
		Stirring rod
		Hand gloves
		Safety goggles
		Face mask
		Detergent
		Sponge
		Rags/tissue paper
		Pipette, 10 mL with pipettor Graduated cylinder, 10 mL Distilled water, 1 L Buret reading card, 3 x 5 index card White paper Funnel
5	Burette, 10 mL capacity (base)	A. (Refer to General Inspection Protocol)

## Detailed Test and Inspection Protocol

Item	Description	Inspection and Test Procedures
		B. Tests
		<b>a) Visual inspection</b>
		Check the visible attributes/parameters of the burette as per technical specifications
		<b>b) Dimensional inspection</b>
		Measure the dimensions as per technical specifications of the burette
		<p><b>c) Scratch test:</b> Scratch using your thumb nails the brand and white graduations and inscriptions and other markings of the distilling flask; to test for the peel and adhesion properties of embossed brand and permanency of graduations, and other markings. If it won't peel off, it passed QC inspection. If not, it is rejected</p>
		<p><b>d) Refractive-index test.</b> Submerge the glass into vegetable oil or glycerine) to determine whether the glass material is borosilicate. Borosilicate glass is identified by its refractive index, 1.474. Immersing the glass in a container of liquid of similar refractive index, the glass can no longer be seen or will disappear. (Vegetable oil, 1.47 and glycerine, 1.473 are some liquids with similar refractive index as to borosilicate glass</p>
		<b>e) Leak test</b>
		<p>Procedure:</p> <ol style="list-style-type: none"> <li>1. Clean the burette.</li> <li>2. Allow the temperature of burette and distilled water used for verification to equalize,</li> <li>3. Note the water temperature.</li> <li>4. The burette must be fixed in a vertical position in a burette clamp</li> <li>5. Close the stopcock.</li> <li>6. Initially fill the burette to a level a few millimetres above the zero mark/line with water.</li> <li>7. With the key in one or other of the « closed » or shut off positions, the test time will last at least 30-51 minutes to ensure sufficiently accurate determination of water-tightness</li> <li>8. If a drop appears, the stopcock may need to be tightened or cleaned. If the problem persists, the burette should be rejected.</li> </ol> <p>The rate of leakage for Class A burette shall not exceed one half of one scale subdivision in 30-51 min, it Passed QC inspection. If not, it is rejected</p>

## Detailed Test and Inspection Protocol

Item	Description	Inspection and Test Procedures
		<p><b>f. Delivery time-</b> is the time required for the free descent of the water meniscus, from the zero mark to the lowest numbered scale mark, with the stopcock fully open and with no restriction of flow.</p> <p>a) Fix/mount the burette in a vertical position using the burette clamp</p> <p>b) Close the stopcock.</p> <p>c) Fill initially the burette with distilled water way up the zero mark.</p> <p>d) Open the stopcock and slowly drain the liquid to set the zero point accurately, making sure the lower meniscus is up to zero mL/mark.</p> <p>e) Fully open the stopcock making sure its tip is not in contact with the wall of the receiving vessel but at the center .</p> <p>f) Drain the water into the beaker up to the lowest numbered scale mark with the stopcock fully open and with no restriction of flow.</p> <p>The delivery time determined in this way must be <b>minimum- 70 sec .</b> <b>maximum: 100 sec</b></p>
		<p><b>g) Functionality Test</b></p> <p>1. Set up the burette. Fill the burette with 0.4 M sodium hydroxide solution slightly above the zero mark using a pipette to rinse its inside surface very well and align burette tube vertically. Place a reading card at the back of the burette to take a more accurate initial reading at the level of the meniscus. Drain liquid to set the zero point accurately.</p> <p>2. Pour 5 mL of the unknown HCl solution in an Erlenmeyer flask using the 10 mL burette and add three drops of phenolphthalein. Swirl the flask to mix all the substances.</p> <p>9. Place the sheet of white paper under the flask for easiest recognition of the color change</p> <p>4 Begin the titration by adding NaOH solution to the analyte. Open the Rotaflo stopcock and slowly add titrant to the sample in the flask</p> <p>5. Gently keep swirling the flask with one hand while using the other hand to manipulate the burette adding the titrant simultaneously. Rinse the walls of the beaker and the tip of the burette with deionized water from a wash bottle when the endpoint is near. This ensures that all of the NaOH delivered from the burette ends up in the reaction mixture.</p> <p>6. The end point is reached when one drop changes the indicator color permanently from colorless to a very slight pink which lasts for at least 30 seconds . Take the final reading.</p> <p>Volume of the base = Final - initial reading</p> <p>Make three or more trials.</p>
		C. Materials
		Erlenmeyer flask, 250 mL
		Sodium hydroxide, 0.4 M
		Hydrochloric acid, 30 mL
		Phenolphthalein indicator
		Stirring rod
		Glycerine (1L)
		Stand setup assembly/tripod
		Graduated cylinder, 10 mL
		Burette reading card
		Hand gloves



Detailed Test and Inspection Protocol

Item	Description	Inspection and Test Procedures
		Safety goggles
		Face mask
		Detergent
		Sponge
		Rags/tissue paper, Pipette, 10 mL with pipettor Graduated cylinder, 10 mL Distilled water, 1 L Buret reading card, 3 x 5 index card White paper Funnel
6	<b>Burner, Alcohol, glass, 150 mL Capacity</b>	A. (Refer to General Inspection Protocol)
		B. Tests
		<b>a) Visual inspection</b>
		Check the visible attributes/parameters of the alcohol burner, 150 mL, as per technical specifications
		<b>b) Dimensional inspection</b>
		Measure the dimensions as per technical specifications of the alcohol burner, 150 mL
		<b>c) Volumetric Test</b>
		Measure 150 mL of denatured alcohol, using a standard 100 mL graduated cylinder. Fill the alcohol burner using a funnel.
		This test is used to check and verify whether the required minimum/ maximum volumetric capacity of the glass, as stipulated in the technical specifications, is met. The capacity must be 150 mL
		<b>d) Leak Test</b>
		1. Place a piece of white paper on a table.
		2. Place the alcohol lamp on top of the piece of paper. Observe.
		<b>Expected Result:</b> No leak of the alcohol on the piece of paper. This test is done to check if there is no leakage of the denatured alcohol inside the burner/lamp.
		<b>e) Functionality (Heating) test</b>
		Use the alcohol lamp for continuous heating of water for 20 minutes to test if it can resist thermal shock/withstand prolonged heating without breaking, it Passed QC inspection. If it failed to resist thermal shock and if the glass breaks, it is rejected
		C. Needed Equipment and Material:
		1. Digital vernier caliper
		2. Tape rule
		3. Graduated cylinder, 100 mL
		4. Funnel, glass
		5. Hand gloves
		6. Safety goggles
		7. Face mask
		8. Denatured alcohol
		9 Detergent
7	<b>Burner, Bunsen</b>	A. (Refer to General Inspection Protocol)

**Detailed Test and Inspection Protocol**

Item	Description	Inspection and Test Procedures
		B. Tests
		<b>Visual inspection</b>
		Check the visible attributes/parameters of the Bunsen burner as per technical specifications
		<b>Dimensional inspection</b>
		Measure the dimensions as per technical specifications of the Bunsen burner
		<b>Functionality test</b>
		1. Install/connect the Bunsen burner to LPG tank.
		2. Check for leaks especially on the Bunsen burner's serrated inlet tube and threaded gas needle valve using soap solution (soap or detergent). No bubbles formed, it passed QC inspection. If not, it is rejected
		3. Close the air holes, a yellow flame (luminous) is produced.
		4. Open the air holes, a blue flame (non-luminous) is produced.
		<b>Gas leak test before using the LPG tank</b>
		1. Prepare a soap solution by mixing 5 mL detergent to 10 mL water; ensure that bubbles do not form during the preparation of the detergent.
		2. Open the LPG tank control valve one-fourth turn counterclockwise.
		3. Place the soap solution on both ends of the rubber hose and into the connection between the regulator and the LPG tank.
		4. If bubbles are formed, it indicates that there is a leakage;
		5. Shut off the LPG tank control valve.
		6. Locate the leak and fix.
		7. Repeat steps 1-3 to re-test the leakage.
		8. After the re-test, if there is no more leakage, continue with the succeeding activity
		C. Materials needed to perform inspection and test
		Digital vernier caliper
		Tape rule
		Stand set up assembly/tripod
		Lighter
		Beaker
		Detergent
		Water
8	Cork Stopper # 5 (for Ø 16mm test tube)	A. (Refer to General Inspection Protocol) B. Tests <b>Visual inspection</b> Check the visible attributes/parameters of the cork stopper, #5 for 16 x 150 mm test tube, as per technical specifications <b>Dimensional inspection</b> Measure the dimensions as per technical specifications of the cork stopper, #5 for 16 x 150 mm test tube <b>Functionality Test</b> Plug the cork stopper to a 16 mm test tube to check if it fits snugly into it. If it does, it passed Qc inspection. If not, it is rejected  C. Materials needed to perform inspection and test protocol Tape rule, Vernier caliper, 16 x 150 mm test tube
9	Crucible with lid/cover	A. (Refer to General Inspection Protocol)

**Detailed Test and Inspection Protocol**

Item	Description	Inspection and Test Procedures
		B. Tests
		<b>Visual inspection</b>
		Check the visible attributes/parameters of the crucible with lid/cover as per technical specifications
		<b>Dimensional inspection</b>
		Measure the dimensions as per technical specifications of the crucible with lid/cover
		<b>Volumetric test</b>
		Measure 30 mL water and pour into it; to check and verify whether the its required minimum/maximum volumetric capacity as stipulated in the technical specifications, is met.
		<b>Functionality test</b> , by heating sugar until it melted to test its resistance to breakage of crucible.
		C. Materials needed to perform inspection and test protocol
		Steel tape/ ruler Vernier caliper Sugar Lighter Bunsen/alcohol burner Stand setup assembly LPG/match Burner Wire gauze Water Graduated cylinder, 10 mL
<b>10</b>	<b>Dish, Evaporating, 75 mL</b>	A. (Refer to General Inspection Protocol)
		B. Tests
		<b>Visual inspection</b>
		Check the visible attributes/parameters of the evaporating dish, 75 mL as per technical specifications
		<b>Dimensional inspection</b>
		Measure the dimensions as per technical specifications of the evaporating dish, 75 mL
		<b>Function test</b> by performing the evaporation of salt solution, to separate water from the salt crystals, with the salt residue remaining in the filter paper and the water evaporated, a to test for the functionality and the thermal shock resistance of the evaporating dish
		<b>Volumetric test</b> by measuring 75 mL of water using a standard 100 mL graduated cylinder and pouring all the contents into the evaporating dish sample, to check and verify whether the its required minimum/maximum volumetric capacity as stipulated in the technical specifications, is met.
		C. Materials needed to perform inspection and test
		Measuring tape/ ruler
		Caliper
		Stand setup assembly/tripod
		Alcohol/Bunsen Burner
		Wire gauze
		Evaporating dish
		LPG/match
		Graduated cylinder, 100 mL

## Detailed Test and Inspection Protocol

Item	Description	Inspection and Test Procedures
		Denatured alcohol
		Lighter
		Stirring rod
		Salt
		Water
		Spatula, Graduated cylinder, 100 mL
11	<b>Distillation set-up: Condenser, Liebig type</b>	A. (Refer to General Inspection Protocol)
		B. Tests
		<p><b>Visual inspection</b> Check the visible attributes/parameters of the Liebig condenser as per technical specifications</p> <p><b>Dimensional inspection</b> Measure the dimensions as per technical specifications of the Liebig condenser</p>
		<p>Insert the rubber stopper to the distilling flask and to the Liebig condenser if there will be no leak or escape of the steam or rubber hose</p> <p><b>Scratch test:</b> Scratch using your thumb nails the brand and inscriptions and other markings of the Liebig condenser; to test for the peel and adhesion properties of embossed brand and permanency of graduations, and other markings. If it wont peel off, it passed QC inspection. If not, it is rejected</p> <p><b>Refractive-index test</b> (by submerging the glass into vegetable oil or glycerine) to determine whether the glass material is borosilicate. Borosilicate glass is identified by its refractive index, 1.474. Immersing the glass in a container of liquid of similar refractive index, the glass can no longer be seen or will disappear. (Vegetable oil, 1.47 and glycerine, 1.473 are some liquids with similar refractive index as to borosilicate glass</p>
		<p><b>Refractive-index test.</b> Submerge the glass into vegetable oil or glycerine) to determine whether the glass material is borosilicate. Borosilicate glass is identified by its refractive index, 1.474. Immersing the glass in a container of liquid of similar refractive index, the glass can no longer be seen or will disappear. (Vegetable oil, 1.47 and glycerine, 1.473 are some liquids with similar refractive index as to borosilicate glass</p>
		<p><b>Functionality Test</b> Assemble the distillation setup (Liebig Condenser, distilling flask, rubber hose, rubber stopper). Perform the distillation experiment (see attached procedure) <b>The distillate shall be obtained</b> (e.g. coffee to be distilled ) without any breakage.</p>
		<p>C. Materials needed to perform inspection and test tape rule, heat source, stand, water source, glycerine (1L), coffee solution, rag/tissue paper, wire gauze, ring with stem, stand setup assembly, universal clamp, Bunsen burner, LPG</p>

## Detailed Test and Inspection Protocol

Item	Description	Inspection and Test Procedures
12	Distillation set-up: Distilling Flask, borosilicate, 250ml,	A. (Refer to General Inspection Protocol)
		B. Tests
		<p><b>Visual inspection</b> Check the visible attributes of the distilling flask, borosilicate, 250 mL, as per technical specifications</p> <p><b>Dimensional inspection</b> Measure the dimensions as per technical specifications of the distilling flask, borosilicate, 250 mL</p> <p><b>Scratch test:</b> Scratch using your thumb nails the brand and white graduations and inscriptions and other markings of the distilling flask; to test for the peel and adhesion properties of embossed brand and permanency of graduations, and other markings. If it won't peel off, it passed QC inspection. If not, it is rejected</p>
		<p><b>Refractive-index test.</b> Submerge the glass into vegetable oil or glycerine) to determine whether the glass material is borosilicate. Borosilicate glass is identified by its refractive index, 1.474. Immersing the glass in a container of liquid of similar refractive index, the glass can no longer be seen or will disappear. (Vegetable oil, 1.47 and glycerine, 1.473 are some liquids with similar refractive index as to borosilicate glass</p>
		<p><b>Volumetric Test</b> Fill the 250 mL distilling flask with 250 mL water using a standard 100 mL graduated cylinder, to check if its volumetric capacity is met.</p>
		<p><b>Functionality Test .</b> Assemble the distillation setup to perform distillation experiment (Liebig Condenser, distilling flask, rubber hose, rubber stopper). (See attached procedure). <b>Distillate shall be obtained</b> (e.g. coffee to be distilled) without any breakage .</p>
		C. Materials needed to perform test and inspection
		tape rule, heat source, stand, water source, glycerine (1L), coffee solution, rag/tissue paper, wire gauze, ring with stem, stand setup assembly, universal clamp, Bunsen burner, LPG
13	Double burette clamp/holder	A. (Refer to General Inspection Protocol)
		B. Tests
		<p>Visual inspection Check the visible attributes/parameters of the double burette clamp as per technical specifications</p> <p>Dimensional inspection Measure the dimensions as per technical specifications of the double burette clamp</p> <p>Functionality Test Let the clamp hold the burettes (acid, base) securely and in place to check its functionality.</p> <p>C. Materials needed: Tape rule, Vernier caliper</p>

Detailed Test and Inspection Protocol

Item	Description	Inspection and Test Procedures
14	Electrical Conductivity (Conductivity of Solutions) Apparatus	A. (Refer to General Inspection Protocol)
		B. Tests
		<p><b>Visual inspection</b> Check the visible attributes/parameters of the Electrical Conductivity (Conductivity of Solutions) Apparatus, as per technical specifications</p> <p><b>Dimensional inspection</b> Measure the dimensions as per technical specifications of the Electrical Conductivity (Conductivity of Solutions) Apparatus</p> <p><b>Functionality test</b> by performing the Electrical Conductivity of Substances, wherein conductors/electrolytes cause the bulbs to light while non-conductors/non-electrolyte will not cause the bulbs to light</p>
		Procedure:
		1. Prepare 10% salt solution,( 10 g salt, 90 g water)
		2. Clean the electrode using sand paper
		3. Fill the jar with the salt solution
		4. Connect the ECA to the power source
		<b>Expected Result:</b> The bulb will light up if (salt solution) electrolyte. If non-electrolyte, it will not light up(sugar)
		C. Materials needed to perform test and inspection
		Measuring tape/ ruler
		2 Battery, AA
		Power supply (0-12 V) with switch selector
		Beaker, 250 mL
		Alligator clips Connecting wires Stirring rod 10% salt solution Sugar solution
15	Electrolysis Apparatus, student-type (Brownlee)	A. (Refer to General Inspection Protocol)
		B. Tests
		a) Do the refractive-index test for the four graduated 25 mL glass test tubes and beaker/glass jar (by submerging the glass into vegetable oil or glycerine) to determine whether the glass material is borosilicate. Borosilicate glass is identified by its refractive index, 1.474. Immersing the glass in a container of liquid of similar refractive index makes the glass not visible or will disappear. (Vegetable oil, 1.47 and glycerine, 1.473 are some liquids with similar refractive index as to borosilicate glass.

## Detailed Test and Inspection Protocol

Item	Description	Inspection and Test Procedures
		b) Do the function test by performing the Electrolysis of Water experiment, to separate water into its elements to produce two part hydrogen and one part oxygen gases. ( See attached sheets), to check the accuracy and preciseness of the printed graduations and verify whether the required minimum/maximum volumetric capacity of the glass, as stipulated in the technical specifications, is met. If the hydrogen gas is present, it pops. If oxygen gas is tested, it supports combustion, making the ember glow more or re-ignites
		c) Do volumetric test:
		i) Fill each of the two (2) graduated test tube samples up to their 25 mL mark, using a standard 10 mL graduated cylinder to check the accuracy and preciseness of the printed graduations b) Measure 27 mL water and fill the two graduated test tube samples. It wont overflow , it passed QC inspection. If not, it is rejected
		ii) Measure 1000 mL of water using a standard 100 mL graduated cylinder and pour into glass jar sample, to test and verify its volumetric capacity and to check the accuracy and preciseness of the printed graduations and verify whether the required minimum/maximum volumetric capacity of the glass jar (1000 mL): as stipulated in the technical specifications, is met.
		d) Do the scratch test: scratch using your thumb nails the <b>white graduations</b> and large white enamel marking spot of the 27 mL graduated test tubes and 1000 mL beaker to test for the peel and adhesion properties of embossed/enamelled brand and permanency of graduations, If they are peeled off, the item is rejected.
		C. Materials needed to perform inspection and test
		Tape rule
		9 V battery
		Connecting wires
		Beaker, 250 mL
		Power supply with switch selector
		Stirring rod
		Sodium hydroxide solution
		Glycerine (1L)
16	<b>Flask, Erlenmeyer, borosilicate, narrow-mouth, 250 mL</b>	A. (Refer to General Inspection Protocol)
		B. Tests
		<p><b>Visual inspection</b> Check the visible attributes/parameters of the Erlenmeyer flask, 250 mL, as per technical specifications</p> <p><b>Dimensional inspection</b> Measure the dimensions as per technical specifications of the Erlenmeyer flask, 250 mL</p> <p><b>Scratch test:</b> Scratch using your thumb nails the brand and white graduations and inscriptions and other markings of the glass jar and four (4) graduated test tubes; to test for the peel and adhesion properties of embossed brand and permanency of graduations, and other markings. If it wont peel off, it passed QC inspection. If not, it is rejected.</p>

**Detailed Test and Inspection Protocol**

Item	Description	Inspection and Test Procedures
		<p><b>Refractive-index test</b>                      (by submerging the glass into vegetable oil or glycerine) to determine whether the glass material is borosilicate. Borosilicate glass is identified by its refractive index, 1.474. Immersing the glass in a container of liquid of similar refractive index makes the glass not visible or will disappear. (Vegetable oil, 1.47 and glycerine, 1.473 are some liquids with similar refractive index as to borosilicate glass.</p>
		<p><b>Volumetric test,</b>                      1) Fill the flask up to its 200 mL mark. Measure all its contents using a standard graduated cylinder and transfer to a beaker, to check the accuracy and preciseness of the printed graduations and verify whether the required minimum/maximum volumetric capacity of the glass, as stipulated in the technical specifications, is met. The capacity must be 200 mL                      2) Measure 250 mL water using a standard graduated cylinder and transfer all the contents to the Erlenmeyer flask sample, to check its volumetric capacity. The capacity must be 250 mL</p>
		<p><b>Functionality (Boiling Point) Test.</b> Use boiling stones                      1. Fill the flask with half-full water                      2. Heat the flask with water up to its boiling point of 100°C and let it continue boiling for 3 minutes, to check if it can resist thermal shock, it Passed QC inspection or its failure to resist thermal shock when the glass breaks, it is rejected</p>
		C. Materials needed to perform inspection and test
		Measuring tape/ ruler
		Boiling stones Measuring tape/ ruler Vernier Caliper, Graduated cylinder, 100 mL, Glycerine (1L)Measuring tape/ ruler Caliper Stand setup assembly/tripod Alcohol/Bunsen Burner Wire gauze Evaporating dish LPG/match Graduated cylinder, 100 mL Denatured alcohol Lighter Stirring rod Water Spatula, Stand setup assembly Wire gauze Universal clamp Universal bosshead
17	<b>Funnel, borosilicate, fluted</b>	A. (Refer to General Inspection Protocol)
		B. Tests



**Detailed Test and Inspection Protocol**

Item	Description	Inspection and Test Procedures
		<p><b>Visual inspection</b> Check the visible attributes/parameters of the funnel, borosilicate, fluted, as per technical specifications</p> <p><b>Dimensional inspection</b> Measure the dimensions as per technical specifications of the funnel, borosilicate, fluted</p>
		<p><b>Functionality test</b> 1. Make a filter cone out of a filter paper and place it snugly in a funnel</p>
		2. Place a little sand and pour 10 mL water in beaker
		3. Filter and collect in a flask
		<p><b>Expected Result:</b> The sand- water mixture must be separated The sand is retained on the filter paper as residue and the water as the filtrate passes through the filter paper and is collected in the flask</p>
		C. Materials needed to perform inspection and test
		Measuring tape/ ruler
		Digital vernier caliper
		Graduated cylinder, 100 mL
		Erlenmeyer flask, 250 mL
		Stirring rod
		Beaker, 250 mL
		Filter paper
		Pair of scissors
		Sand
		Tap Water
<b>18</b>	<b>Glass Tubing</b>	A. (Refer to General Inspection Protocol)
		B. Tests
		<p><b>Visual inspection</b> Check the visible attributes/parameters of the glass tubing, Ø 6 mm x Ø 4 mm x 1219-1500 mm long as per technical specifications</p> <p><b>Dimensional inspection</b> Measure the dimensions as per technical specifications of the glass tubing</p>
		<p><b>Function test</b> Cut a 1 foot glass tubing using the triangular file</p>
		Fire polish the ends
		C. Materials needed to perform inspection and test
		Tape rule
		Digital vernier caliper
		Triangular file
		Alcohol /Bunsen burner
		Funnel
		Denatured alcohol
		Lighter
<b>19</b>	<b>Laboratory Hot Plate with magnetic stirrer</b>	A. (Refer to General Inspection Protocol)
		B. Tests

**Detailed Test and Inspection Protocol**

Item	Description	Inspection and Test Procedures
		<p><b>Visual inspection/parameters</b> Check the visible attributes/parameters of the Laboratory Hot Plate with magnetic stirrer, as per technical specifications</p> <p><b>Dimensional inspection</b> Measure the dimensions as per technical specifications of the Laboratory Hot Plate with magnetic stirrer</p>
		<b>Functionality test</b>
		a)Place half full water in a beaker. Use boiling stones or boiling sticks in liquids to facilitate even heating and boiling
		b)Heat the water up to its boiling point and let it continue boiling for three more minutes to check functionality
		<b>Monitor the motor temperature based on NEMA Standards MG 1-2011, 12.43, defines temperature rise for motors in a maximum ambient of 40°C. *Its vibration is within the tolerance of the given motor rating without irregular noise in motor bearing and in other moving mechanical parts;</b>
		<b>Endurance Test</b> for a series of five Test Runs with one minute each to determine how the machine behaves under sustained use. Turn On and Off method is applied.
		<b>Powder coating test</b>
		Rub a ball of cotton with alcohol into the surface of the plate. If the color of the paint sticks to the cotton, it is not powder coated. Reject the item. If not, accept the item as it is powder coated.
		C. Materials needed to perform inspection and test
		Steel / ruler
		Digital vernier caliper
		Stand setup assembly
		Beaker
		Wire gauze
		Boiling stones
		Ring with stem
		Alcohol burner
		Lighter
		Denatured alcohol
<b>20</b>	<b>Manometer, Open U-tube</b>	A. (Refer to General Inspection Protocol)
		<p>B. Tests</p> <p><b>Visual inspection</b> Check the visible attributes/parameters of the Open U-tube manometer, as per technical specifications</p> <p><b>Dimensional inspection</b> Measure the dimensions as per technical specifications of the Open U-tube manometer</p> <p><b>Leak Test for the rubber hose</b> 1. Fill the rubber hose with water for at least a minute. Water must not leak. 2. Immerse the rubber hose in water. Gently blow air through the tube. There shall be no bubbles coming out from the rubber hose</p> <p><b>Functionality Test</b></p>

**Detailed Test and Inspection Protocol**

Item	Description	Inspection and Test Procedures
		1. Fill the U-tube manometer with colored water following instructions in the accompanying User's Manual.
		2. The height/level of the colored water in the two (left and right) tubes must be the same.
		3. Insert the rubber hose into the rifted tip of the U-tube manometer
		3. Apply slight pressure onto the rubber hose. There is now a difference in the level of the left and right) tubes of the manometer colored water. The colored water inside the U-tube manometer moves up and down.
		4. Allow the liquid to stop moving before taking the reading
		5. Read the height/level difference between both the tubes (arms)
		6. Record the height of the liquid in the left tube (arm).
		7. Record the height of the liquid in the right tube (arm).
		8. The pressure difference is measured by taking the difference between the two heights/levels of colored water.
		C. Materials needed to perform inspection and test
		Steel tape/ruler Vernier caliper Colored dye Water Beker, 250 mL Spatula Ruler
21	Mortar and Pestle, porcelain, 150 mL.	A. (Refer to General Inspection Protocol)
		B. Tests
		<b>Visual inspection</b> Check the visible attributes/parameters of the mortar and pestle, 150 mL, as per technical specifications <b>Dimensional inspection</b> Measure the dimensions as per technical specifications of the mortar and pestle, 150 mL
		<b>Volumetric test</b>
		Fill the mortar with 150 mL of water using a standard 100 mL graduated cylinder, to check its maximum volumetric capacity, as stipulated in the technical specifications, is met.
		<b>Functionality test</b>
		Cut a leaf into smaller pieces
		Use the mortar and pestle to extract the juice out of the leaf
		C. Materials needed to perform inspection and test
		Steel tape
		Mortar and pestle
		Pair of scissors
		Graduated cylinder, 100 mL
		Beaker, 250 mL Water
22	Osmosis Apparatus	A. (Refer to General Inspection Protocol)
		B. Tests

**Detailed Test and Inspection Protocol**

Item	Description	Inspection and Test Procedures
		<p><b>Visual inspection</b> Check the visible attributes/parameters of the Osmosis apparatus, as per technical specifications</p> <p><b>Dimensional inspection</b> Measure the dimensions as per technical specifications of the Osmosis apparatus</p>
		<b>Functionality Test</b>
		<p>Set up the Osmosis apparatus and conduct experiment (See attached procedure on Osmosis experiment)</p> <p>Procedure:</p> <ol style="list-style-type: none"> <li>1 Soak the animal membrane in water for at least 30 seconds and cover the thistle tube with it, and tie it with rubber band. Make sure that the membrane is smooth and tight against the lip of the thistle tube to prevent leakage</li> <li>2. Fill the thistle tube funnel up to a its neck with the 50 % sugar and remove trapped air using a barbecue stick</li> <li>3. Invert and mount the thistle funnel in an upright position using the aluminum stand . Make sure that it does not touch the bottom of the jar.</li> <li>4. Fill the jar with water up to the neck of the thistle funnel. Use the barbecue stick when there is a gap on the glass tube</li> <li>5. Mark the initial level of the sugar solution with a marking pen</li> <li>6. Mark the next level of the sugar solution in the thistle tube after 5 minutes</li> <li>7. Monitor the change of the level of the sugar solution in the thistle tube every after 5 minutes for 20 minutes</li> </ol> <p><b>Expected Result:</b> There is a <b>continuous rise of the level</b> of sugar solution in the thistle tube until rising of the level stops when equilibrium is reached.</p>
		C. Materials
		Sugar solution, 50%
		Sugar, 10 g
		Tape rule Balance. digital Ruler Vernier caliper Stopwatch Beaker, 250 mL Barbecue stick Water Rubber band
23	pH meter, hand-held, digital	A. (Refer to General Inspection Protocol)
		B Test
		Function test
		Standardize the pH meter first.
		1. Place the 9V battery in the battery holder at the back of the pH
		meter.
		2. Turn it on. Do not place the pH probe into the stock buffer solutions.
		3. Always pour the stock solution into a smaller beaker.
		4. Immerse the tip of the electrode in the pH 7 buffer solution.
		5. Adjust the pH reading in the LCD display using the calibration
		screw driver/ trimmer to pH 7.0.

**Detailed Test and Inspection Protocol**

Item	Description	Inspection and Test Procedures
		6. Rinse in distilled water before proceeding to measure the pH of the sample solutions.
		After every test, rinse the electrode in between the tests. Standardize again, using the pH 7 buffer solution, only after twenty samples had been taken.
		7. Immerse in an acid, base and then distilled water, one at a time
		If the sample is :
		A) an acid, the pH meter reading is from pH 0-6.9;
		B ) a base, the pH meter reading is pH 7.1- pH14.0.
		C) distilled water, pH 7.0
24	Reagent Bottle, narrow-mouth, amber, borosilicate, 250 mL	A. (Refer to General Inspection Protocol)
		B. Tests
		<p><b>Visual inspection</b> Check the visible attributes/parameters of the reagent bottle, narrow mouth, amber, 250 mL , as per technical specifications</p> <p><b>Dimensional inspection</b> Measure the dimensions as per technical specifications of the reagent bottle, narrow mouth, amber, 250 mL</p>
		<p><b>Refractive-index test</b> (by submerging the glass into vegetable oil or glycerine) to determine whether the glass material is borosilicate. Borosilicate glass is identified by its refractive index, 1.474. Immersing the glass in a container of liquid of similar refractive index makes the glass not visible or will disappear. (Vegetable oil, 1.47 and glycerine, 1.473 are some liquids with similar refractive index as to borosilicate glass.</p>
		<b>Volumetric test</b>
		Measure 250 mL water using a standard 100 mL graduated cylinder and fill the reagent bottle sample, to check its capacity.
		<p><b>Scratch test</b> Scratch using your thumb nails the white large white markings and brand of the reagent bottle to test for the peel and adhesion properties of embossed brand and permanency of the big white enamel marking spot and other markings. If the marking spot and brand name and other markings are peeled off, the item is rejected.</p>
		C. Materials needed to perform test and inspection
		Tape rule
		Digital vernier caliper Graduated cylinder, 100 mL
25	Reagent Bottle, wide-mouth, transparent, borosilicate, 250 mL	A. (Refer to General Inspection Protocol)
		B. Tests
		<p><b>Visual inspection</b> Check the visible attributes/parameters of the reagent bottle, wide mouth, clear, 250 mL , as per technical specifications</p> <p><b>Dimensional inspection</b> Measure the dimensions as per technical specifications of the reagent bottle, wide mouth, clear, 250 mL</p>

**Detailed Test and Inspection Protocol**

Item	Description	Inspection and Test Procedures
		<p><b>Scratch test</b> Scratch using your thumb nails the white large white markings and brand of the reagent bottle to test for the peel and adhesion properties of embossed brand and permanency of the big white enamel marking spot and other markings. If the marking spot and brand name and other markings are peeled off, the item is rejected.</p>
		<p><b>Refractive-index test</b> (by submerging the glass into vegetable oil or glycerine) to determine whether the glass material is borosilicate. Borosilicate glass is identified by its refractive index, 1.474. Immersing the glass in a container of liquid of similar refractive index makes the glass not visible or will disappear. (Vegetable oil, 1.47 and glycerine, 1.473 are some liquids with similar refractive index as to borosilicate glass.</p>
		<p><b>Volumetric test</b></p>
		Measure 250 mL water using a standard 100 mL graduated cylinder and fill the reagent bottle sample, to check its capacity.
		C. Materials needed to perform inspection and test
		Tape rule
		Vernier caliper
		Graduated cylinder, 100 mL
		Glycerine
		Hand gloves
		Face mask
		Stirring rod
		Safety goggles
		Detergent
		Sponge
		Rags/Tissue paper
		Water
26	Rubber Stopper # 0 (for Ø 16mm test tube)	A. (Refer to General Inspection Protocol)
		B. Tests
		<p><b>Visual inspection</b> Check the visible attributes/parameters of the rubber stopper, #0, as per technical specifications</p> <p><b>Dimensional inspection</b> Measure the dimensions as per technical specifications of the rubber stopper, #0</p>
		<b>Hardness test</b> by using the durometer.
		Hardness: 40± 5 Duro
		<b>Fitting test</b> to validate the level of performance and accuracy of the item by placing
		the bottom part of the rubber stopper into the mouth of a 16 mm x 150 mm test tube,
		and see if it fits well. It passed QC, if not, it failed QC.
		C. Materials needed to perform inspection and test
		Steel tape// ruler
		Digital vernier caliper

## Detailed Test and Inspection Protocol

Item	Description	Inspection and Test Procedures
		Durometer
27	Spatula, spoon, porcelain and glazed	A. (Refer to General Inspection Protocol)
		B. Tests
		<b>Visual inspection</b> Check the visible attributes/parameters of the Spoon-spatula, porcelain and glazed, as per technical specifications
		<b>Dimensional inspection</b> Measure the dimensions as per technical specifications of the Spoon-spatula, porcelain and glazed
		<b>Functional test</b> by transferring liquid or powder from one container to another
		<b>Volumetric test</b>
		i) Measure 0.3 mL of water using a standard 10 mL graduated cylinder
		ii) Pour the 0.3 mL water into the spoon portion
		This test is used to check and verify whether the required minimum/maximum volumetric capacity of the spoon, as stipulated in the technical specifications, is met
		C. Materials needed to perform inspection and test
		Vernier caliper
		Steel tape/ ruler, Graduated cylinder, 10 mL Water
28	Stirring Rod, Ø 6 mm x 250 mm long	A. (Refer to General Inspection Protocol)
		B. Tests
		<b>Visual inspection</b> Check the visible attributes/parameters of the Stirring Rod, Ø 6 mm x 250 mm long, as per technical specifications
		<b>Dimensional inspection</b> Measure the dimensions as per technical specifications of the Stirring Rod, Ø 6 mm x 250 mm long
		<b>Functionality Test</b>
		Mix salt and water using the stirring rod. A solution is formed, one phase.
		<b>Refractive-index Test</b>
		Submerge the glass into vegetable oil or glycerin to determine whether the glass material is borosilicate.
		Borosilicate glass is identified by its refractive index, 1.474.
		Immersing the glass in a container of liquid of similar refractive index, makes the glass not visible or will disappear. (Vegetable oil, 1.47 and glycerin, 1.473 are some liquids with similar refractive index as to borosilicate glass).
		C. Materials needed to perform inspection and test
		Tape rule
		Digital vernier caliper
		Glycerine (1L)
		Hand gloves
		Face mask

**Detailed Test and Inspection Protocol**

Item	Description	Inspection and Test Procedures
		Safety goggles
		Detergent
		Sponge, Rags/tissue paper
29	<b>Test tube brush</b>	A. (Refer to General Inspection Protocol)
		B. Tests
		<b>Visual inspection</b> Check the visible attributes/parameters of the test tube brush, as per technical specifications
		<b>Dimensional inspection</b> Measure the dimensions as per technical specifications of the test tube brush
		<b>Function test</b> by cleaning a test tube using the test tube brush
		C. Materials needed to perform inspection and test
		Vernier caliper
		Steel tape/ ruler
		Water
		Detergent, Rags/tissue paper
30	<b>Test Tube, borosilicate, Ø 16 mm x 150 mm long</b>	A. (Refer to General Inspection Protocol)
		B. Tests
		<b>Visual inspection</b> Check the visible attributes/parameters of the test tube, borosilicate, Ø 16 x 150 mm long, as per technical specifications
		<b>Dimensional inspection</b> Measure the dimensions as per technical specifications of the test tube, borosilicate, Ø16 x 150 mm long
		<b>Volumetric test</b>
		Fill the test tube with 20 mL water using a standard graduated cylinder to check its capacity.
		<b>Refractive-index test</b>
		Submerge the glass into vegetable oil or glycerine to determine whether the glass material is borosilicate.
		Borosilicate glass is identified by its refractive index, 1.474. Immersing the glass in a container of liquid of similar refractive index makes the glass not visible or will disappear. (Vegetable oil, 1.47 and glycerine, 1.473 are some liquids with similar refractive index as to borosilicate glass.
		<b>Scratch test:</b>
		Scratch using your thumb nails the white large white markings and brand of the test tubes to test for the peel and adhesion properties of embossed brand and permanency of the big white enamel marking spot and other markings. If the marking spot and brand name and other markings are peeled off, the item is rejected.



## Detailed Test and Inspection Protocol

Item	Description	Inspection and Test Procedures
		<p><b>Functionality (Boiling Point) Test:</b>            Fill the test tube half-full with water. Use boiling stones or boiling sticks in liquids to facilitate even heating and boiling. Heat to boiling and let it continue boiling for at least three more minutes to check and verify if it can resist thermal shock or withstand prolonged heating without breaking, it Passed QC inspection, or if it fails to resist thermal shock, it is rejected</p>
		C. Materials needed to perform inspection and test protocol
		Tape rule
		Vernier caliper
		Glycerine (1 L)
		Graduated cylinder, 10 mL
		Hand gloves
		Face mask
		Safety goggles
		Detergent
		Sponge
		Water
31	<b>Tong, Crucible</b>	A. (Refer to General Inspection Protocol)
		B. Test
		<p><b>Visual inspection</b>            Check the visible attributes/parameters of the Crucible tong, as per technical specifications</p> <p><b>Dimensional inspection</b>            Measure the dimensions as per technical specifications of the Crucible tong</p>
		<p><b>Functionality Test</b>            Check if it is easy to remove the lid from a crucible, transfer evaporating dish or pick small objects out of a reaction container using the tong. If it does, it passed. if not, reject it</p>
		C. Needed tools and materials:
		Steel tape rule/ ruler
		Vernier caliper
		Steel tape/ ruler
32	<b>Universal pH indicator</b>	A. (Refer to General Inspection Protocol)
		B. Test
		Functionality test:
		Dip a strip of universal pH to any of these substances, and the pH reading must be: :
		Acid : pH 0 to pH 6
		Base : p pH 8-pH 14
		Neutral : pH 7:
		C. Materials needed to perform inspection and test
		Steel tape/ ruler
		Acid
		Base
		Distilled water
		Beaker
		Watch glass

**Detailed Test and Inspection Protocol**

Item	Description	Inspection and Test Procedures
33	Vial, screw-neck, 25 mL. (with screw-type plastic cap)	A. (Refer to General Inspection Protocol)
		B. Tests
		<p><b>Visual inspection</b> Check the visible attributes/parameters of the vial, screw-neck, 25 mL (with screw-type plastic cap), as per technical specifications</p> <p><b>Dimensional inspection</b> Measure the dimensions as per technical specifications of the vial, screw-neck, 25 mL (with screw-type plastic cap)</p>
		<b>Volumetric test</b>
		Measure 25 mL water using the standard 10 mL graduated cylinder and transfer all the contents to the dry 25 mL vial sample, to check its volumetric capacity. It must not overflow and it passed QC inspection. If not. It is rejected
		<b>Refractive-index test</b>
		Submerge the glass into vegetable oil or glycerin to determine whether the glass material is borosilicate.
		Borosilicate glass is identified by its refractive index, 1.474. Immersing the glass in a container of liquid of similar refractive index, makes the glass not visible or will disappear. (Vegetable oil, 1.47 and glycerin, 1.473 are some liquids with similar refractive index as to borosilicate glass).
		C. Needed tools and materials:
		tape rule
		Vernier caliper
		Glycerine (1 L)
		Graduated cylinder, 10 mL
		Hand gloves
		Face mask
		Safety goggles
		Detergent
		Water
		Sponge
		Rags/tissue paper
34	Vial, screw-neck, 50 mL. (with screw-type plastic cap)	A. (Refer to General Inspection Protocol)
		B. Tests
		<p><b>Visual inspection</b> Check the visible attributes/parameters of the vial, screw-neck, 50 mL (with screw-type plastic cap), as per technical specifications</p> <p><b>Dimensional inspection</b> Measure the dimensions as per technical specifications of the vial, screw-neck, 50 mL (with screw-type plastic cap)</p>
		<p><b>Dimensional inspection</b> Measure the dimensions as per technical specifications of the vial, screw-neck, 50 mL (with screw-type plastic cap)</p>
		<b>Volumetric test</b>

**Detailed Test and Inspection Protocol**

Item	Description	Inspection and Test Procedures
		Fill the vial with 50 mL water using a standard 10 mL graduated cylinder to check its capacity
		<b>Refractive-index test</b>
		Submerge the glass into vegetable oil or glycerin to determine whether the glass material is borosilicate.
		Borosilicate glass is identified by its refractive index, 1.474. Immersing the glass in a container of liquid of similar refractive index, makes the glass not visible or will disappear. (Vegetable oil, 1.47 and glycerin, 1.473 are some liquids with similar refractive index as to borosilicate glass).
		C. Needed tools and materials:
		tape rule
		Vernier caliper
		Glycerine (1 L)
		Graduated cylinder, 10 mL
		Hand gloves
		Face mask
		Safety goggles
		Detergent
		Sponge
		Water
		Rags/tissue paper
35	<b>Volumetric Flask, borosilicate 250 mL</b>	A. (Refer to General Inspection Protocol)
		B. Tests
		1. Volumetric test
		OPTION 1
		Measure 250 mL of water using a standard 100 mL graduated cylinder, to check the accuracy and preciseness of the printed graduations and verify whether the required minimum/maximum volumetric capacity of the glass, as stipulated in the technical specifications, is met.
		OPTION 2
		a. Weigh the empty volumetric flask using the toploading balance and record the reading.
		b. While the volumetric flask is on the scale, pour distilled water until the reading reaches to (weight of empty flask + 250 grams) ±0.12 grams.
		c. The reading on the lower meniscus of the water shall lie on the 250 mL mark of the volumetric flask.
		2. Scratch test
		Scratch using your nails the single ground-in graduation circular line to test for the peel and adhesion properties of embossed/enamelled brand and permanency of white, circular line graduations, and other markings. If the white graduation circular
		line, and brand name and other markings are peeled off, the item is rejected.
36	<b>Watch Glass, Ø 90 mm</b>	A. (Refer to General Inspection Protocol)

## Detailed Test and Inspection Protocol

Item	Description	Inspection and Test Procedures
		B.Tests
		<p><b>Visual inspection</b> Check the visible attributes/parameters of the watch glass, as per technical specifications</p> <p><b>Dimensional inspection</b> Measure the dimensions as per technical specifications of the watch glass</p>
		<b>Refractive-index Test</b>
		Submerge the glass into vegetable oil or glycerine) to determine whether the glass material is borosilicate.
		Borosilicate glass is identified by its refractive index, 1.474. Immersing the glass in a container of liquid of similar refractive index makes the glass not visible or will disappear. (Vegetable oil, 1.47 and glycerine, 1.473 are some liquids with similar refractive index as to borosilicate glass.
		<b>Functionality Test</b>
		<p>Fill the watch glass with 5 mL acetone using a standard 10 mL graduated cylinder . Observe</p> <p>Fill the watch glass with 5 mL water and observe.</p> <p><b>The acetone evaporates faster than water since it is more volatile than water</b></p>
		C. Needed tools and materials:
		Tape rule
		Vernier caliper
		Acetone
		Glycerine (1 L)
		Graduated cylinder, 10 mL
		Stirring rod
		Hand gloves
		Face mask
		Safety goggles
		Detergent
		Sponge
		Rags/tissue paper