

Textile Processing Technology

Level – II

Based On March, 2022, Curriculum Version I



MODULE TITLE: Performing online process quality control

MODULE CODE: IND TPT2 M09 0322

NOMINAL DURATION: 80 Hours

Prepared By: Ministry of Labor and Skill

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Acronyms

SOPs	Standard operating procedures
WHS	work health and safety
PPE	personal protective equipment
LAP	learning activity performance
IND	industrial development
TPT	Textile Processing Technology
ISO	International Organization Standardization
ASTM	American Society of Testing & Materials

Introduction to the Module

Textile testing is a vital basic tool during the processing of a textile raw material into the product. It also helps the distributors and consumer to determine the end - product's quality.

Quality controls refers to ways of ensuring the quality of a service or product. Actually, quality control is a system for verifying and maintaining a desired level of quality in an existing product or service by careful planning, use of proper equipment, continued inspection, and corrective action as required.

Online quality control carried out without stopping the production process. During the running of production, process a setup is automatically performs and detects the fault and takes corrective action. Online quality control comprises with the raw material quality control and the process control.

This module is designed to meet the industry requirement under the Textile Processing Technology occupational standard, particularly for the unit of competency: Performing online process quality control.

Module units

- job requirements
- Prepare for test
- on- line process test
- Record and report result

Learning objectives of the Module

At the end of this session, the students will able to

- Determine job requirements
- Prepare for test
- Perform on line process test
- Record and report result

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Module Learning Instructions:

1. Read the information written in each unit
2. Accomplish the Self-checks at the end of each unit
3. Perform Operation Sheets which were provided at the end of units
4. Do the “LAP test” given at the end of each unit and
5. Read the identified reference book for Examples and exercise

Unit one: job requirements

This learning unit is developed to provide the trainees the necessary information regarding the following content coverage and topics:

- Standard operating procedures (SOPs)
- Complying work health and safety (WHS)
 - ✓ Hazard identification and control
 - ✓ Risk assessment
 - ✓ Implementation of risk reduction measures
- Using personal protective equipment (PPE)
- Identifying job requirements

This unit will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Follow standard operating procedures (SOPs)
- Comply with work health and safety (WHS) requirements at all times
- Use appropriate personal protective equipment (PPE) in accordance with SOPs
- Identify job requirements from specifications, drawings, or work instructions

1. 1 Standard operating procedures (SOPs)

It is a set of step - by step instructions compiled by an organization to help workers carry out complex routine operations. This is to achieve efficiency, quality output and uniformity of performance.

SOP can be defined as a step-by-step written procedure about how to do a job that gives the desired result and maintains consistency in results. SOP can also be defined as a checklist for the user (operator) who is going to do a particular job. An SOP is a sure success method of doing a job.

More than just written instructions SOP can be also made using illustrations and flow charts. For some processes factory only needs to provide detailed instructions to perform a task, where some processes required instruction as well as decision-making based on the result of intermediate steps.

In manufacturing, SOPs should be in-place for:

- Equipment startup and operation
- Equipment set up and change over
- Product assembly
- Inventory tracking
- Material ordering
- Material receiving
- Maintenance procedures
- Material processing (e.g., mixing, batching)
- Quality control

1.2 Complying Work health and safety (WHS)

Work health and safety (WHS), also known as occupational health and safety, involves managing risks to the health and safety of your workers and workplaces.

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The model WHS laws aim to protect the health and safety of workers and harmonize the WHS laws in Australia. The model WHS laws include the model WHS Act, the model WHS Regulations and the model Codes of Practice.

Occupational health deals with all aspects of health and safety in the workplace and has a strong focus on primary prevention of hazards. Health has been defined as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity. Occupational health is a multidisciplinary field of healthcare concerned with enabling an individual to undertake their occupation, in the way that causes least harm to their health. Health has been defined as It contrasts, for example, with the promotion of health and safety at work, which is concerned with preventing harm from any incidental hazards, arising in the workplace.

The intent behind the Occupational Safety and Health topic area is to prevent diseases, injuries, and deaths that are due to working conditions. Work-related illnesses and injuries include any illness or injury incurred by an employee engaged in work-related activities while on or off the worksite

Why you must do WHS

- ✓ Provide a safe work environment.
- ✓ Provide and maintain safe machinery and structures.
- ✓ Provide safe ways of working.
- ✓ Ensure safe use, handling and storage of machinery, structures and substances.
- ✓ provide and maintain adequate facilities

The focus in occupational health is on three different objectives

- 1) The maintenance and promotion of workers' health and working capacity;
- 2) The improvement of working environment and work to become conducive to safety and health and
- 3) Development of work organizations and working cultures in a direction, which supports health and safety at work, and in doing so promotes a positive social climate and smooth operation and may enhance productivity of the undertakings.

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1.2.1 Hazard identification and control

Hazard is something that can hurt you at workplace or has the potential to hurt you. There are hazards in every type of job and every type of workplace. Everyone at the workplace may it be workers, managers and the employer, have to share responsibility to identify and control hazards.

In the first step, worker has to recognize what a workplace hazard is (or could be) and how to report it to the employer. Also For employers, the first step is to inform workers of potential hazards, to have control systems in place to decrease the risk of injury. A hazard in Textile Industry are varied and encompasses many aspects, like hazards related to machinery, handling of materials including chemicals, use of pressure vessels, fire hazards and overall working environment.

Types of Hazards

1. **PHYSICAL HAZARDS** Heat, cold, noise, vibration, temperature, humidity, radiation (non-ionization), improper ventilation
2. **CHEMICAL HAZARDS** Dust, dyes, vapors, sparks, gases, solvents, antimicrobial agents, flame-retardants metals and their alloys.
3. **BIOLOGICAL HAZARDS** due to contact with living organisms or their by-product (e.g. molds, bacteria, HIV, grain dust). Anthrax, which causes tetanus, bacteria and various blood borne disease.
4. **MECHANICAL HAZARDS** Slipping out of a wet work environment, objects, such as moving machine parts and tripping hazards, hit workers.
5. **ERGONOMIC HAZARDS** Improper manual material handling method, poorly designed work practices and tasks, long sitting, unsafe work places, continuous work
6. **PSYCHOLOGICAL HAZARDS** Various aspects of work organization (system) such as increased workload, night shift, and no employee motivation, work cycle, over time
7. **ELECTRICAL HAZARDS** Improper ear thing and isolation, usage of the old wire, high voltage and contact with live electrical equipment's in, fire

1.2. 2 Risk assessment

A risk assessment is a process to identify potential hazards and analyze what could happen if a hazard occurs. Modern occupational safety and health legislation usually demands that a risk

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assessment be carried out prior to making an intervention. It should be kept in mind that risk management requires risk to be managed to a level, which is as low as is reasonably practical

This assessment should:

- ❖ Identify the hazards
- ❖ Evaluating and prioritizing risks
- ❖ Deciding on preventive action
- ❖ Taking action
- ❖ Monitoring and reviewing

1.2. 3 Implementation of risk reduction measures

Functional safety systems and describes those safety measures that are based on sensors and control systems and are designed to ensure the safe working of machines. The term “machine” can be defined as an assembly of linked parts or components joined for a specific application—in particular, for the processing, treatment, moving, or packaging of a material. Any hazard has a risk. This risk will be reduced by using different mechanisms. These mechanisms include Standard operating procedures, Personal protective equipment, Safe materials handling, Housekeeping, Reporting accidents and incidents, Environmental practices. These are explained as follow.

Proper material handling offers benefits for

- ✓ improving productivity
- ✓ increasing the handling capacity
- ✓ reducing man-power
- ✓ increasing the speed of material movement
- ✓ reducing materials wastage
- ✓ promoting easier and cleaner handling

1.3 personal protective equipment (PPE)

Personal protective equipment refers to protective clothing, helmets, goggles, or other equipment is designed to protect the wearer’s body from injury or infection. The hazards

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prevented by protective equipment include physical, electrical, heat, chemicals, biohazards and air born particulate matter.

Head Protection

Protective hats for head protection against impact blows must be able to withstand penetration and absorb the shock of a blow.).The following types

Type 1 - helmets with full brim, not less than 1 and 1/4 inches wide;

Type 2 - brimless helmets with a peak extending forward from the crown

Foot and Leg Protection

Safety shoes should be sturdy and have an impact-resistant toe. In some shoes, metal insoles protect against puncture wounds.



Figure 1.1 Eye and Face Protection

Suitable eye protectors must be provided where there is a potential for injury to the eyes or face from flying particles, molten metal, liquid chemicals, acids or caustic liquids, chemical gases or vapors, potentially injurious light radiation, or a combination of these. Every protector shall be distinctly marked to facilitate identification of the manufacturer.



Figure 1. 2 Arm and Hand Protection

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Workers in many roles may come into contact with substances or conditions that pose a risk of harm to their hands or arms. If you cannot reduce these risks in some other way, you must use personal protective equipment (PPE)

Types of hand and arm protection

- ✓ gloves
- ✓ gauntlets
- ✓ mitts
- ✓ cuffs

1.4 Identifying job requirements

Job requirements are “must haves” that an employer is looking for in a candidate for a certain job position. Job requirements are not just a list of specific qualifications, education, knowledge and skills needed for a particular position. They are a great opportunity to show case you are Employer Brand and company culture and attract the best candidates!

Job requirements are used to communicate employer's expectations from job seekers. By laying out clearly defined job requirements, employers can attract the right type of candidates.

Common job requirements

Every position has different requirements, depending on the industry, how technical the work is and how competitive the job market is. Here are the most common types of job requirements you may see:

- Work experience
- Skills
- Education
- Professional licenses, accreditations and certifications
- Specific knowledge
- Personal traits and attributes
- Languages

Self-check-1

I. short Answer question

Instruction: write short answer for the given question. You have 10 minute for each question and each point has 3 Points.

1. _____ Also known as occupational health and safety, involves managing risks to the health and safety of your workers and workplaces.
2. _____ Refers to protective clothing, helmets, goggles, or other equipment is designed to protect the wearer's body from injury or infection.
3. _____ can be defined as a step-by-step written procedure about how to do a job that gives the desired result and maintains consistency in results
4. _____ is a process to identify potential hazards and analyze what could happen if a hazard occurs

II. long Answer question

Instruction: write long answer for the given question. You have 20 minute for each question and each point has 3 Points.

5. List out the four type of lay out
6. Write Types of Hazards
7. What are the Common job requirements

Note: Satisfactory rating – above 60% Unsatisfactory - below 60%

You can ask you teacher for the copy of the correct answers

Unit Two: Prepare For Test

This learning unit is developed to provide the trainees the necessary information regarding the following content coverage and topics:

- Textile testing
- Selecting materials or samples
- preparing equipment and confirming calibration

This unit will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- know Textile testing
- select Appropriate materials or samples
- select Equipment, prepared and calibration confirmed

2.1 Textile testing

Textile testing is the methods of determining the properties of different kinds of textile substances. It is very important for checking the quality and suitability of raw material and selection of material, monitoring of production i.e. process control. It helps the scientist to decide which route should be followed. Textile testing is a vital basic tool during the processing of a textile raw material into the product. It also helps the distributors and consumer to determine the end - product's quality.

Objectives of Textile Testing

- For Research and development &D (research and development) purpose
- Process development
- To check the quality and suitability of textile raw material
- Product testing
- Conformity with government regulations and specifications
- Product failure analysis
- To monitor the production (process control)
- To assess the quality of final product
- To investigate the faulty materials
- Comparative testing and benchmarking
- For new product development.

Basic Conditions and Method of Textile Testing

- ❖ Scope & principle of the test method
- ❖ Conditioning, Sample preparation
- ❖ Test procedure
- ❖ Assessment/ Calculation
- ❖ Report

Testing is governed by 5M, which are Man, Machine, Material, Method and Measurement.

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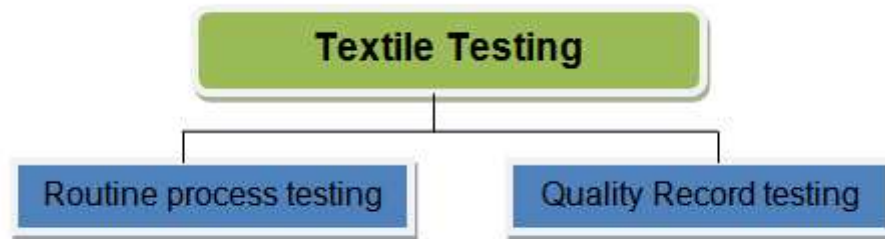
Objects of Quality Control

- To produce required quality product.
- To fulfill the customer's demand.
- To reduce the production cost.
- To minimize/reduce wastage.
- To earn maximum profit at minimum cost.

Factors Affecting Test Result

- Atmospheric conditions
- Test methods
- Testing instruments
- Technician's efficiency

Types/ Classification of Textile Testing



Classification of Textile Testing

Routine process testing: a Routine process for checking quality in the running of process or after a process.

Quality Record testing: Quality record testing to record test result for different purpose and activities in future.

Textile Testing & Quality control also classified as given below:

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Two kinds of TTQC

- Online process control
- Offline process control.

Online process control: In running a process or after a process, testing called online Textile testing & quality control.

Offline process control: Textile testing after finishing all production process called offline Textile testing & Quality control.

2.2 Selecting materials or samples

The selection of a small quantity of the material to be tested is known as sampling. As textile testing is both time consuming and destructive in nature in many cases, it is necessary that we select samples for conducting tests for various quality characteristics

The most important step in testing is to select for testing a sample that is representative of the whole of the batch, consignment or production run. If the sample is not representative of the lot, the test will give a result that does not indicate the likely performance of the bulk of the lot Laboratories.

Fabric sampling and preparation of test specimens

Sampling and sample preparation are the most important steps in evaluating a sample. If the sample is not representative and prepared in the correct manner, the result will be of little value. All major test methods have sections dedicated to sampling and sample preparation techniques prior to testing

General guidelines for sampling: example

The following example considers tensile strength testing of fabrics. Perform sampling in accordance with statistical rules (see ISO 2859-1). Ensure throughout sampling and specimen preparation that handling imposes the minimum possible tensile stress to prevent incorrect extension of the textile fabric.

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Selection of the laboratory sample

Select the laboratory sample from a test lot to be representative of properties of the textile fabric. Check the representative nature of sampling from the start or end of the textile fabric. Take the laboratory sample from across the full fabric width.

Sampling of the test specimens from the laboratory sample

Before sampling the test specimens from the laboratory samples, condition the laboratory samples free from tension, for at least 18 hours on a smooth horizontal surface with free access of air exposed to the standard atmosphere. For woven fabrics, take specimens so that each contains different weft threads. Take the test specimens at least 100 millimeters from the edge distributed across the entire laboratory sample. Take a sufficient number of test specimens (at least three) to be in accordance with established statistical variation for the product. For patterned fabrics or fabrics with a textured surface, take care that the specimens contain all characteristic parts of the pattern, ensuring that the parts of the pattern likely to be sensitive to abrasion are contained in the test specimens. Take care that none of the cases selected for sampling shows signs of damage or dampness incurred during transit or storage.

2.2.1 Fiber

Any substance, natural or manufactured with a high length to width ratio and with suitable characteristics for being processed into fabric; the smallest component hair like in nature that can be separated from a fabric.

Table 2 different fiber material

Natural Fiber examples			Manmade fibers examples	
Plant	Animal	Mineral	Synthetic	Regenerated
Linen	silk	Asbestos	polyester	Lyocell
Jute	wool		Nylon	Rayon
cotton	Hair (alipaca)		Spandex	Viscose,
cotton	Cashmere		Acrylic	acetate, triacetate
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2.2.2 Yarn

In the manufacture of raw materials, yarn occupies a mid-range role. Therefore yarn results are important both for the quality assessment of raw material and to the quality control of the manufactured cloth

Yarn is a strand composed of fibers, filaments (individual fibers of extreme length), or other materials, natural or synthetic, suitable for use in the construction of interlaced fabrics, such as woven or knitted types.

The three basic classifications of textile yarn include

Staple fiber yarn, which uses mostly short natural fibers to make yarn;

Ply yarns, which involve one or more strands of staple fiber yarn wound together;

Filament yarn, which is wound from one or more long continuous filaments

2.2. 3 Fabric

Fabric testing plays a crucial role in gauging product quality, assuring regulatory compliance and assessing the performance of textile materials. It provides information about the physical or structural properties and the performance properties of the fabrics

Textile fabrics are manufactured for several different end uses, each of which has different performance requirements. The chemical and physical structures of textile fabric determine how it will perform, and ultimately whether it is acceptable for a specific use. Fabric testing plays an important role in gauging product quality, assuring regulatory compliance and assessing the performance of textile materials. It provides information about the physical or structural properties and therefore the performance properties of the fabrics.

Textile fabrics can be natural or synthetic, woven or knitted, and come from plants, animals, or human manufacturing. Mixing these techniques creates distinguished fabric appearances and feels, providing consumers with many options when shopping for an item.

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2.3 Selecting, preparing equipment and confirming calibration

Calibration is a process used to determine and record the relationship between asset of standard units of measure and the output of an instrument or test procedure

Textile Instruments Calibration is widely used in periodic calibration along with compatible torque transducers. These are highly compact, lightweight and rigid to suit the rugged working conditions existing in various industries particularly

When any product – including footwear – is being manufactured, it is essential to check the materials of which it is made (as well as the product itself) at various stages of the manufacturing process. These assessments can range from simply measuring the thickness of a material before it is used, to full laboratory testing under simulated conditions of use to verify how durable a product or material will be.

Whether the checks involved are basic or complicated, the equipment used to carry out these assessments and tests must be calibrated to ensure that the results can be confidently viewed as accurate and reliable. Important commercial decisions are based on such results. Therefore, if an item of test or measuring equipment is giving misleading information – or even failing to identify a poor-quality material – the consequences can be very costly.

The calibration of certain items of equipment will mean discerning how accurately it is capable of displaying the required data. As an example, is a rule correct to one millimeter or five millimeter's, or does a balance read correctly to the nearest gram or ten grams? This vital information will be gained if the equipment is compared against a correct reference.

The parameters required for machine calibration should be clearly specified in the test methods used. This is because any slight difference between the machines utilized by laboratories can lead to test results that vary significantly. Acceptable tolerances should always be stated, although some methods may only quote a nominal value for a parameter, with no tolerance. This raises a number of questions. Must the value that is measured agree exactly with this nominal value, or will it be satisfactory to have a close result? In addition, what does 'close' actually mean in this situation? It is clear that nominal values for parameters are of no use in deciding if a machine is suitable or not. Where there is no tolerance given, users of a test

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machine are required to draw their own conclusions as to how suitable it is. In such cases, SATRA's unparalleled technical expertise can assist with such decision-making.

2.3.1 List of Physical Testing Machines in Dyeing Lab

Existence of modern dyeing factory cannot be thought without lab. Lab of a modern dye house can be considered as the heart of the industry. Different equipment's are used in dyeing lab. All the equipment is used in dyeing lab can be categorized into two i.e. equipment's for lab dip preparation or chemical testing machines and physical testing machines. In this article I will discuss on list of physical testing machines in dyeing lab

List of Physical Testing Machines in Dyeing Lab:

- ✓ Tumble dryer
- ✓ Dimensional stability test
- ✓ PH meter
- ✓ Per spirometer
- ✓ Washing machine
- ✓ Crock meter
- ✓ Yarn count tester
- ✓ GSM cutter
- ✓ Pilling tester
- ✓ Universal Testing Machine
- ✓ Xenon Arc Weatherometer

2.3.1.1 per spirometer

Perspiration is usually liable for the change in color of the material. It is testing equipment, which is employed to work out color fastness of dyed or printed fabric against perspiration thanks to water, seawater etc. and sublimations during storage. It is carried on by exposing the material sample to the action of the both acidic and alkaline medium during a controlled temperature and pressure alongside an undyed sample.

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Figure 2.1 per spirometer

✓ **Specification**

- ❖ Frame Construction: Stainless steel
- ❖ Load on the Test Specimen: 5 kg.
- ❖ Size of Test Specimen: 100 mm x 40 mm
- ❖ Size of Acrylic Separator Plates : 115 mm x 60 mm
- ❖ Number of Separator Plates: 21 Nos.
- ❖ Dimensions of the Unit : 225 mm (L) x 72 mm(W) x 182 mm(H)
- ❖ Net weight of the Unit : 8.3kg

2.3.1.2 Crock meter

Crock Meter is used to determine by abrasion process the discoloration of the teared cloth or teared leather. This test equipment is designed to monitor the rubbing color speed of any textile material. The amount of color transferred from one fabric to another is determined. The product is mostly used for textiles, such as teared, printed or colored fabrics. The test is performed by rubbing the sample constantly against an undyed sample. The transferred color is

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then tested for a predefined gray size and the score is accordingly allocated. This test is done on two different stages of the fabric, once in the dry state and again repeated when wet.

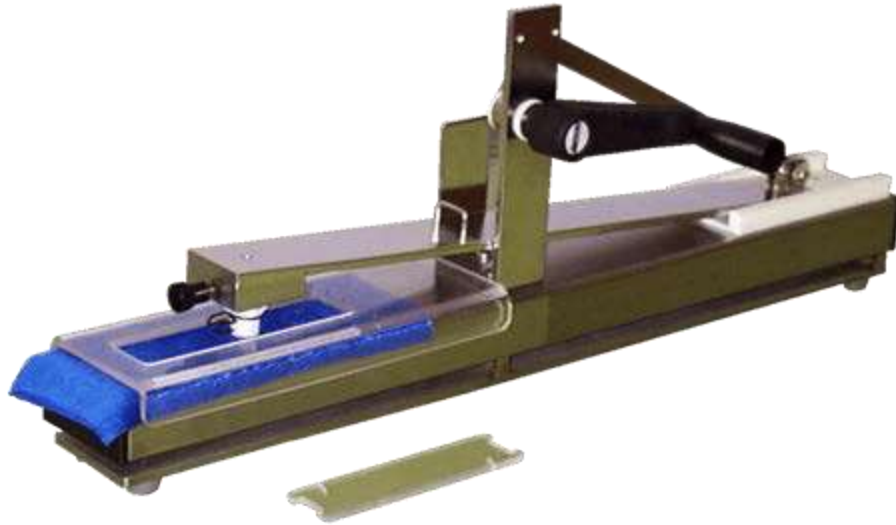


Figure 2.2 Crock meter

✓ **Specification**

- ❖ brand: SDL
- ❖ Company Name: SDL International Ltd.
- ❖ Origin: UK
- ❖ Load: 9N
- ❖ Abrasion speed: 60rpm
- ❖ Counter: LCD display 0~99,999,99
- ❖ Dimension: 43×45×52 cm
- ❖ Weight (approx.): 47kg

2.3.2 List of Chemical Testing Equipment's for Dyeing Lab

Lab is the heart of the textile industry. Higher precision lab can aid easily to achieve the goal of the organization. Before bulk production a sample for the approval from industry is sent to the buyer as per the requirement of the buyer, the shade is prepared in a lab considering the economic aspects. For doing all tests different equipment's are used in lab. All the equipment is used in lab can be categorized into two i.e. equipment's for lab dip preparation or chemical test and equipment for physical test. In this article, we will discuss on equipment's of dyeing lab for chemical testing.

List of Equipment's of Dyeing Lab for Chemical Testing

1. Sample dyeing machine
2. Washing machine
3. Water heater
4. Distilled water maker
5. Water hardness tester
6. Hot and stirrer
7. Electric balance
8. PH meter
9. Oven
10. Light box
11. Data color-spectra scan

2.3.2.1 Sample dyeing machine



Figure 2.3 Sample dyeing machine

✓ **Function**

Used for dyeing the lab samples.

✓ **Machine specification**

- Brand: Mathis LABOMAT
- Origin: Switzerland

✓ **Technical information:**

- ❖ Capacity: 24 pots
- ❖ Dyeing pot capacity: 200 ml
- ❖ Heating system: Infrared heating system
- ❖ Cooling system: Cooling is done by using water
- ❖ Temperature: For polyester: 130°C, For hot brand reactive dye: 80°C-95°C
- ❖ M: L: 1:6

2.3.2.2 Washing machine (For testing color fastness to wash)



Figure 2.4 Washing Machine

✓ **Function**

Used for washing to determine wash fastness of dyed fabric.

✓ **Machine specification**

✓ Brand: Paramount

✓ Origin: India

✓ Technical information:

✓ Capacity: 8 pots

✓ Pot capacity: 500 ml

✓ **Chemicals used for color fastness testing**

✓ ECE detergent: 4 g/l

✓ Sodium perborate: 1 g/l

✓ Sample size: 10Cm×4Cm

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- ✓ Multi-fiber fabric size: 5Cm×5Cm
- ✓ Test method: ISO 105-C06:1997/

2.3.2.3 Data color (spectrophotometer)

The spectrophotometer is an instrument, which measures the amount of light that a sample absorbs. The spectrophotometer works by passing a light beam through a sample to measure the light intensity of a sample. These instruments are used in the process of measuring color and used for monitoring color accuracy throughout production. They are primarily used by researchers and manufacturers everywhere. The major Spectrophotometer Applications are limitless as they are used in practically every industrial and commercial field. However, it finds its major applications in liquids, plastics, paper, metals and fabrics. This helps in ensuring that the color chosen remains consistent from its original conception to the final, finished product.



Figure 2.5 Data color (spectrophotometer)

- ✓ **Specification**
 - ❖ Brand: Premier Color scan
 - ❖ Origin: India

2.3.2.4 Color fastness to light tester

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Light fastness or color fastness to light is that the resistance of the dyes or pigments used for coloration to tinting or change in color thanks to exposure in direct sunlight or any artificial light. Different end uses of cloth would require different levels of fastness towards the sunshine.



Figure 2.6 Color fastness to light tester

✓ **Specification**

- ❖ Model: Light Fastness Tester GT-D02A-1
- ❖ Chamber Temperature: 25-55°C; Resolution: 0.1°C
- ❖ Chamber Humidity: Light Cycle: 10-70% RH; Resolution: 0.1RH%,
- ❖ Dark Cycle: 30-95% RH; Resolution: 0.1RH%

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- ❖ BST: 40-85°C; Accuracy: $\pm 1^\circ\text{C}$; Resolution: 0.1°C
- ❖ BPT (Option): 40-80°C, Accuracy: $\pm 2^\circ\text{C}$; Resolution: 0.1°C
- ❖ Time Control Range: $\leq 10000\text{h}$
- ❖ Irradiance Control Range: 0.80-1.20W/m²@420nm
- ❖ (Option: 340nm, 420nm, 300-400nm or 280-800nm)
- ❖ Accuracy: $\pm 0.02\text{W/m}^2@420\text{nm}$.
- ❖ Digital setting, Closed-Loop Automatic Compensation
- ❖ Xenon Arc Lamp Rated Power: 2500W
- ❖ Sample Holder Rotation Speed: 2-7 rpm
- ❖ Sample Holders Capacity: ISO: 135×45mm 12pcs
- ❖ Or AATCC: 145×70mm 6pcs
- ❖ Timing of Each Sample Holder, Respectively: $\leq 10000\text{h}$
- ❖ Light Period: $\leq 1000\text{h}$
- ❖ Spray Period: $\leq 1000\text{h}$
- ❖ Power: AC220V $\pm 10\%$ 50Hz 6.5KW .
- ❖ Rated Power: 3.3KW
- ❖ Dimension: 920×650×1680mm
- ❖ Weight: 180kg

2.3.2.5 Spray tester

It is testing equipment, which is employed to check the water repellency of a cloth sample. For testing, a little shower of water is sprayed over the material, which is kept at a particular angle. From there the quantity of water retained and soaked on the material is measured and compared from a predefined rating chart, which is then graded accordingly.

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Figure 2.7 *Spray tester*

Specification

- ❖ Model: AG20
- ❖ Brand: AVENO
- ❖ Origin: China
- ❖ Load Time: 10-20 days
- ❖ Port: Xiamen port

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Working Procedure

- 1 The sample fabric is mounted on the tambour and glued on the instrument at 45°C
- 2 Now the beaker is crammed with 250 cc water and poured on the funnel.
- 3 The water is showered through spray nozzle on the material.
- 4 After spraying has finished the sample holder is removed and therefore the surplus water removed by tapping the frame 6 times against a solid object, with the face of the sample facing the solid object.
- 5 The water repellency is assessed from the spray-rating chart.
- 6 5 tests should be made and therefore the nearest rating assigned to every, since no interpolation is allowed, i.e. a rating for a specimen can't be 75.
- 7 The mean of the 5 ratings is taken because the result.

Self-check-2

I Short Answer writing

Instruction: write short answer for the given question. You have 10 minute for each question and each point has 3 Points.

- 1 What are the standard methods of textile testing?
- 2 What are the two test methods for rubbing fastness?
- 3 _____ It is testing equipment, which is employed to check the water repellency of a cloth sample.

II Long answer writing

Instruction: write long answer for the given question. You have 15 minute for each question and each point has 5 Points

- 1 Define Textile testing
- 2 List physical testing equipment is in dyeing lab.
- 3 List chemical testing equipment is for dyeing lab.
- 4 What are the factors affecting test result?

III Choosing

Instruction: choose the best answer from the given alternative. You have 10 minute for each question and each point has 2 Points

- 1 _____ It is testing equipment, which is employed to work out color fastness of dyed or printed fabric against perspiration.
 A. spectrophotometer
 B. Crock meter
 C. Washing Machine
 D. per spirometer
- 2 _____ Test equipment is designed to monitor the rubbing color speed of any textile material.
 A. per spirometer
 B. Crock meter
 C. spectrophotometer
 D. Washing Machine

Note: Satisfactory rating – above 18% Unsatisfactory - below 18%

You can ask you teacher for the copy of the correct answers

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Unit Three: Perform Online Process Test

This learning unit is developed to provide the trainees the necessary information regarding the following content coverage and topics:

- Identifying specific standards
- Testing on-process samples

This unit will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Identify specific standards
- Test on-process samples

3.1 Identifying specific standards

When a textile material or product is tested, its results must fulfill both explicit and implicit requirements. The explicit requirements from the tests are either that how the product will perform during its life cycle or how it will meet the required specifications. The core purpose of testing is that it must be reproducible; it means that if the same material tested under similar conditions in different laboratories, or at another time, and by another operator but it should yield the same results. However, testing results of textile materials are not expected to be similar every time.

The textile industry sets standards to help ensure quality



Principles of Quality Standards

Standard Methods Adopted

1. American Society of Testing & Materials (ASTM)
2. American Association of Textile Chemists and Colorists (AATCC)
3. International Organization for Standardization (ISO)
4. European Norms (EN)
5. British Standards (BS)
6. British Standards for European Nations (BSEN)
7. Japanese Industrial Standards (JIS)
8. Bureau of Indian Standards (BIS)

Specific Textile Standards

- ❖ AATCC 8 Colorfastness to Crocking (wet & dry)
- ❖ AATCC 15 Colorfastness to Perspiration
- ❖ AATCC 16.3 Option 3 Colorfastness to Light
- ❖ AATCC 106 Colorfastness to Sea Water
- ❖ AATCC 107 Colorfastness to Water
- ❖ AATCC 116 Colorfastness to Crocking (rotary)
- ❖ AATCC 135 Dimensional Stability of Fabric for Home Laundering
- ❖ AATCC 162 Colorfastness to Chlorinated (Pool) Water
- ❖ 16 CFR 1610 Flammability of Clothing Textiles
- ❖ 16 CFR 1611 Flammability of Vinyl Plastic Film
- ❖ 16 CFR 1615 & 1616, Flammability of Children's Sleepwear
- ❖ ASTM D 1230 Standard Test Method for Flammability of Apparel Textiles
- ❖ ASTM D 4151 Standard Test Method for Flammability of Blankets
- ❖ Canadian Textile Flammability Regulations (SOR/2016-194) – Bedding Textile

3.1 .1 ISO TEXTILE TESTING STANDARDS

ISO is an acronym that stands for the International Organization for Standardization. The term comes from a Greek word ISOS, meaning equal. The International Organization for Standardization is a group of people from many industries who work to create worldwide uniform industrial standards. The standards help insure that products, regardless of where they were made, are reliable, safe and of acceptable quality. In general, ISO standards cover considerations like regulatory issues and management systems. They assess a company's ability to meet customer requirements and offer guidelines to improve performance. Within the International Organization for Standardization,

ISO 9000 & ITS SERIES STANDARDS

For product quality and performance standards The ISO 9000 series is a set of five individual, but related, international standards on quality management and quality assurance. Quality assurance –all those planned or systematic actions necessary to provide adequate confidence that a product or service will satisfy given requirements for quality.

- ❖ ISO 9000-Quality management and quality assurance standards –guidelines for selection &use.
- ❖ ISO 9001-Quality systems models for quality in design development ,production ,installation, and servicing(covers 20 elements of company operations)
- ❖ ISO 9002-Quality systems –Model for quality assurance in production, installation and servicing.
- ❖ ISO 9003 –Quality Systems-Model for quality assurance in final inspection and test.
- ❖ ISO 9004- Quality Management and Quality system elements-Guidelines.
- ❖ ISO is the road map for series .Its purpose is to provide the user with guidelines for selection of and use of ISO 9001, 9002, 9003 and 9004.
- ❖ These series of standards are called ANSI/ASQC Q90 through Q 94, are technically equivalent to the ISO series standards. Revision to ISO 9000 series standers requires every 5 years.

3.1.2 ASTM TEXTILE TESTING STANDARDS

ASTM's textile standards provide the specifications and test methods for the physical, mechanical, and chemical properties of textiles, fabrics, and cloths, as well as the natural and artificial fibers that constitute them.

The American Society for Testing and Materials (ASTM) is an internationally recognized body that develops and delivers voluntary consensus standards designed to improve product quality, make products safer, improve international standardization and therefore facilitate trade.

ASTM International's Committee D13 develops test methods and specifications for textile materials. In general, AATCC methods tend to focus on colorfastness, wet testing, and chemical analysis. ASTM tests evaluate physical properties of textiles.

AATCC and ASTM have published several joint Testing Supplements. These supplements are compilations of procedures and guidelines for textile products, not yet included in the official AATCC Manual of International Test Methods and Procedures or Annual Book of ASTM Standards. Some are based on long standing industry practices or protocols developed by specific companies for in-house use

3.2 Testing on-process samples

Textile testing is checking the quality and suitability of raw material and selection of material. It is an important part for textile production, distribution, and consumption. Though it is an expensive business but essential too. There are some reasons for textile testing; such as, checking raw materials, monitoring production, assessing the Final Product, investigation of faulty material, product development and research.

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Figure 3.1 Textile testing

Testing may be carried out for one of the following purposes

- **Quality control** – for example, testing raw materials, finished product, appraisal testing
- **Quality assurance** – testing samples on the run to allow changes to be made to improve the quality or confirm conformance of the product during or prior to production
- **Conformance** – testing to show compliance with a specification or performance criteria

Different Types of Textile Testing Method

Quality Control Testing

A. Mechanical

1. Tensile Strength and Elongation
2. Breaking Strength
3. Bursting Strength of Paper
4. Tear Strength
5. Elmendorf Tear Strength
6. Air permeability of Paper

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7. Pilling Test
8. Dry and Wet Rubbing (Crock Meter)
9. Ether Soluble Matter
10. Water Absorbency
11. Lead and its compounds
12. Scouring loss
13. Flammability

B. Physical

1. GSM
2. Fiber Diameter
3. Ends per inch
4. Linear Density

C. Chemical

1. PCP
2. Blend composition
3. Identification of Fiber
4. Identification of Dyes
5. Solvent Extractable matter
6. Chloride Content
7. Sulphate Content
8. pH value of water extract
9. Moisture Content
10. Shrinkage to Water
11. Color Fastness Tests

3.2.1 Color Fastness Test to Light

The purpose of Color fastness to light test is to determine how much the color will fade when exposed to a known light source. It is an off line quality assurance system. Generally, man wears the fabric and goes outside of the home for doing their job. In day; sun light fall on the fabric surface. Therefore, it needs to know how much protection ability have a fabric to sun light. It is determined by an experiment called color fastness to light. To measure the color fastness a blue scale is used. After completing the test, sample is compared with the blue scale.

Principle of Color Fastness to Light

This test measures the resistance to fading of dyed textile when exposed to day light. The test sample is exposed to light for a certain time that is about 24 hours to 72 hours or by customer/buyer demand and compare the change with original unexposed sample, the changes are assessed by blue scales.

Purpose and Scope

This method is used for determining the resistance of the color of textile of all kinds and in all forms to ironing and processing on hot cylinders. Tests are given for hot pressing when the textiles are wet, when it is damp, and when it is dry.

✓ Working procedure

- 1 The testing is completed systematically. Following step is maintained during measure the color fatness to light.
- 2 Cut the test specimens consistent with the 1*4.5 cm wise and attached with the specimen holder.
- 3 Then Cut the Blue scale sample consistent with the 1*4.5 cm wise and attached with another specimen holder.
- 4 Then the holder set in to the Micro sol light fastness tester.
- 5 The humidity is typically kept at 40±5 R.H% and 30°C temperature
- 6 Then the experiment continued at 72 hours consistent with the buyer's requirement.

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- 7 After 72 hours later the specimen taken from the sunshine fastness tester.
- 8 Then the test specimen compares with the Blue scale

3.2.2 Color Fastness to Perspiration

The color fastness to perspiration (acid and alkaline) shall be at least level 3-4 (color change and staining). This criterion does not apply to white products, to products that are neither dyed nor printed, to furniture fabrics, curtains or similar textiles intended for interior decoration. A level of 3 is nevertheless allowed when fabrics are both light colored (standard depth $< 1/12$) and made of silk or of blends with more than 20% silk. This kind of test is specially applied for the sportswear and heavy dresses, which is used specially. Normal cloths are also tested by perspiration test.

The garments which encounter the body where perspiration is heavy may suffer serious local discoloration. This test is intended to determine the resistance of color of dyed textile to the action of acidic and alkaline perspiration. Before knowing about the Color Fastness to perspiration, you must have to know about Color Fastness to Wash and Color Fastness to Rubbing.

Purpose and Scope

This method is used to determine the resistance of the color of textile of all kinds and in all forms to perspiration.

✓ Testing procedure

- 1 A sample measuring 10Cm×4Cm is cut and a multi-fiber fabric is sewn with it.
- 2 The sample is dipped into the solution containing perspiration chemical.
- 3 The sample is squeezed to remove excess chemical.
- 4 Then the sample is placed into two plates of the per spirometer and is pressed by 12.5 KPa.
- 5 After that together with the specimen the per spirometer is kept in oven at 37°C for four hours.
- 6 Finally, the sample is assessed for color change and the adjacent fabric for color staining.

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3.2.3 Washing Fastness Test

The property of a dye to retain its color when the dyed (or printed) textile material is exposed to conditions or agents such as light, perspiration, atmospheric gases, or washing that can remove or destroy the color. A dye may be reasonably fast to one agent and only moderately fast to another. Degree of fastness of color is tested by standard procedures. Textile materials often must meet certain fastness specifications for a particular use.

It is always useful and interesting to test the dye, which is to be used on a sample of the yarn or fabric to be dyed. The outcome will depend on the fabric; the mordant that has been used and dye that has have been chosen. Testing is best carried out on a series of Groundnuts marked (for identification) samples, which have been mordant with a number of different mordents. Tests can be carried out for light, water and washing fastness using simple standard test methods.

✓ **Testing procedure**

- 1 At first multi-fiber fabric, measuring 5cm×5cm is sewn with the dyed sample measuring 10Cm×4Cm.
- 2 Then the sample is placed into the test vessel that contains washing chemical.
- 3 Then the vessel is placed into the machine and the machine is run for certain time under standard temperature.
- 4 After the wash treatment, the treated sample is compared with the original untreated sample and any loss in color is graded with reference to the grey scale. This is done for assessing the change in color of the sample.
- 5 The treated multi-fiber fabric is compared with untreated multi-fiber fabric with the help of color staining grey scale to assess color staining.

3.2.4 Absorbency

The absorbency of the fabrics is determined by the time the sample takes to absorb a fixed amount (usually a drop) of distilled or deionized water. Sample conditioning is extremely important as the residual moisture on the sample to be measured can affect the absorbency results considerably. The sample under a set tension (mounted on an embroidery hoop) is

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placed vertically at the prescribed distance from the end of a burette with water. The time starting from the moment the water drop touches the surface of the sample to the moment the water drop is completely absorbed by the sample (disappearance of the liquid reflection) is taken on a stopwatch. One sample should be measured at least five times to get an averaged result. The longer the time, the lower the absorbency. A more critical examination of fabric absorbency can be achieved using a 50% or 65% sucrose solution, because the sucrose solution is more viscous and is absorbed more slowly than water, thus distinguishing between samples with very small differences in their water absorbency.

3.2.5 Rubbing Fastness Test

A **fastness** is a place, such as a castle, which is considered safe because it is difficult to reach or easy to defend against attack. Color fastness to rubbing test is designed to determine the degree of color which may be transferred from the surface of a colored fabric to a specify test cloth for rubbing (which could be dry and Wet).

Sample Preparation

1. Two specimens are used, one each for the dry and the wet tests.
2. Additional specimens may be used to increase the precision of the average.
3. Cut specimens at least 50 x 130 mm (2.0 x 5.1 in.) and position for testing preferably with the long dimension oblique to warp and filling or wales and courses.
4. Larger or full width lab samples may be used without cutting individual specimens, when multiple tests are needed and when using for production testing.
5. Knit a piece of fabric at least 50 x 130 mm, or wind yarn tightly on a suitable form at least 50 x 130 mm with the yarn running in the long direction; or otherwise stretched.

✓ **Testing procedure:**

1. First, we take the sample.
2. Then the material is placed on the sandpaper.
3. Pinned specimen holder is employed to fix the material.
4. After that crocking (rubbing) cloth is about 3×5 cm has settled with rubbing finger by spring clip.

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5. Loading unit (9 N) is applied put the finger pinned the operating handle is operated by using of hand.
6. We give 10 cycle stocks the direction of each cycle stock is 1 sec.
7. The sample is then collected of gray compound.
8. Cloth is collected and scale-compounded

There are two test methods for rubbing fastness:

- ❖ ISO-105-X12
- ❖ AATCC-08

In ISO-105-X 12, the wet pickup of the rubbing cloth is 100%. While in AATCC-08 the wet Pickup of the rubbing, cloth is 65%. We check rubbing by Dry and Wet methods. In wet rubbing, we wet the rubbing cloth according to test method and give rating by comparing the Staining with the gray scale. Similarly, for dry rubbing we check the rubbing with dry rubbing cloth and compare the staining with gray scale for ratings. Color fastness to rubbing is a main test which is always required for every colored fabric either it is Printed or dyed.

Example of on Line quality control (QC) of knitted fabric

On Line Quality Control (QC) of knitted fabric is the process of evaluating the greige and dyed yarn prior to knitting and checking the knit circular and flat machine parameter(s), in order to ensure conformity with the fabric specifications required by the customer.

Process Requirements

✓ **Equipment**

Equipment used for on line quality control of knitted fabrics are

- Data color Spectrophotometer
- Inspection Table
- Light Box.

✓ **Key Accessories**

Key accessories used for on line knit quality control ar

- Cutter/Scissors

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- Weighing Balance
- Inch Tape

Materials/Chemicals Used

Sulphuric acid solution is used for fiber composition.

✓ **Safety Instructions**

In order to ensure floor safety, an Inspector should follow the instructions given below:

Smoking is strictly prohibited in the factory premises.

- Adequate number of Fire extinguishers is placed in Inspection Area. Floor personnel are trained to use it.
 - Do not place fabric stack in front of the electric panels.
 - Follow the safety instructions and guideline while operating the machines.
- ✓ Take necessary safety precautions (e.g. use of hand gloves) while handling chemicals and

✓ **Operation Procedure**

✓ **Operation Staff**

Operation stuffs for on line quality control process includes

- Manager, Quality Control
- Production Executive
- Supervisor
- Sr. Inspector
- Inspector

✓ **Check List Before Operation**

Supervisor should check the following points prior to operation:

- Required labor is available.
- All the tools/accessories are available.
- Fabric/yarn is ready for inspection/evaluation.

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✓ On Line Quality Control (QC) Procedure for Knitting

Rihan Textile Ltd. (RTL) considers the customer-approved sample or the specifications as the standard for quality control. However, in absence of customer's specification(s), RTL follows the standard guidelines as specified in the RTL Quality Standard Specification in order to ensure quality product other hazardous materials.

Dyed Yarn Evaluation

A few pieces of collars/cuffs are knitted and washed to match with approved standard visually. Spectrophotometer is also used if decision is to be taken whether the yarn is approved for shade or not in case of DE less than 1.0. Color Fastness Test does further evaluation to Washing. If blended yarn is used then it is burned out with Sulphuric Acid (70%) to check the shade of other component.

Greige Yarn Evaluation

One roll of fabric is knitted to evaluate the yarn and it is processed as soon as possible. Based on the fabric appearance both Greige and Dyed yarns are evaluated. Refer to Greige Yarn Evaluation Report for other parameters that are checked and recorded.

Machine Parameter Checking

Following machine parameters are checked during on-line QC

Table 3.Machine Parameter Checking

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Machine	Parameters to be Checked
Circular Knit Machine	Stitch Length
	Machine Gauge
	Yarn Tension
	Machine Efficiency
Circular Knit Machine	Stitch Length
	Machine Gauge
	Yarn Tension

Yarn/Fabric Quality Checking

Every yarn cone/package is checked before using it in circular and flat knitting machine. Each of 30 Circular and 55 Flat knit machines are checked randomly while they are in running condition. Different faults and specifications like Needle line, GSM, width, Barre mark, thick/thin, unevenness, etc. are checked for tube/open fabrics. In case of collars and cuffs the width, length, ply, tube, and appearance are checked.

Fabric Roll Monitoring

The Online Knit QC Supervisors continuously monitor all the processes to identify various faults or defects, as crease mark, needle line, patches, holes, etc., and to take immediate necessary action. Based on the sequence of Greige Inspection, the Inspector serially numbers each roll ensuring that all the rolls are having the Knit Card with complete details of the roll. This newly assigned number is termed as “Hole Number” and it is written on the Knit Card and on the corresponding roll. Refer to Greige Inspection Process Specification for details.

The roll numbers and weights are written on the backside of the Batch Card against these “Hole Numbers” assigned by the Greige Inspection department (as shown in the following example), and required number of holes are made on the fabric (50cm from the edge) using a hole creator.

Example

Hole #	Roll #	Qty (kg)
1	0018	22.5
2	0370	32.0
3	1105	27.8
4	3011	28.2
.....
25	0178	30.0

Then the fabric roll moves to the Batch Preparation section along with the Knit Card. Refer to Batch Preparation Specification for details.

At Dyeing section, a new column “Tube” is added to the existing data mentioned on the backside of the Batch Card. Here, the number of the tube, in which a particular roll is loaded for dyeing, is recorded against the corresponding roll number (as shown in following example). This number has two parts. The first part i.e. T1, T2, or T3 denotes the tube number of the machine (assigned from left to right for each machine). The tube number is followed by the nozzle codes, i.e. a, b, c etc. (assigned depending upon the machine capacity).

1) The hole marks should not be removed during processing.

2) Example

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Hole #	Roll #	Qty (kg)	Tube
1	0018	22.5	T1a
2	0370	32.0	T1b
3	1105	27.8	T2a
4	3011	28.2	T3d
....
25	0178	30.0	T1c

The Online Knit QC Supervisors keep track of each roll using these data along the process line; i.e. Hydro-extractor Machine, De-water Machine, Slitting Machine, Compactor Machine and Stenter Machine. They also ensure that the hole mark is not removed from the roll during processing as it helps to identify a particular roll easily during Final Inspection.

Laboratory Testing

Color Fastness to Wash and Water, TPI and yarn strength are tested in RTL QC Laboratory. Due to unavailability of required arrangements, some parameter(s) cannot be checked at RTL QC Lab. In that case, these are sent to BTL QC (for fabric)/PTML QC (for yarn) for testing. The Yarn Quality Report is used to record the details of yarn testing done at PTML.

Sample Test

Sample is sent to laboratory for testing. Refer to Specification on Off Line QC Test

Response to Faults

Response to QC Faults

Following response is to be taken in case of any QC faults

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For Finished Fabric for details.

Faults	Response
Greige Yarn Fault	Inform Yarn Supplier (Spinning)
Dyed Yarn Fault	Inform Yarn Dyeing Department
Knitting Fault	Inform Knitting Department

Response to Machine Faults

Following response is to be taken in case of any machine faults

Faults	Response
Any Electrical Faults	Inform Electrical Maintenance Department
Any Mechanical Faults	Inform Mechanical Maintenance Department

✓ **Applicable Forms and Documents**

✓ **Forms and Documents Used**

Following forms are used for Online Quality Control process:

- ❖ Daily Knit Machine and Yarn Evaluation Report
- ❖ Greige Yarn Evaluation Report
- ❖ Dyed Yarn Evaluation Report
- ❖ Lot-wise Yarn Consumption Report
- ❖ Knit Card
- ❖ Batch Card

- ❖ Yarn Quality Report
- ❖ On Line Circular QC Report
- ❖ On Line Flat QC Report

Document Flow

Document flow for the above documents are as follows

- ❖ Daily Knit Machine and Yarn Evaluation Report is maintained to keep record of Yarn and process faults for each order. Supervisor records detailed information in this form and signs on it and the area in-charge puts his signature upon verification.
- ❖ Greige Yarn Evaluation Report and Dyed Yarn Evaluation Report are filled out by the QC department upon testing the quality of the sample yarn. Three copies of these forms are sent to planning, knitting and stores. If the yarn quality meets the specification, stores places bulk order.
- ❖ Lot-wise Yarn Consumption Report is prepared to keep record of total **yarn consumption** per lot. Supervisor prepares the document on put his signature. The Area In-charge signs on it upon verification.
- ❖ The Greige Inspector records all the details of greige inspection result on the Knit Card. It includes information like order no., style, quality, greige GSM, roll quantity, reject quantity, knitter, shift, date, etc. He also puts his signature and comments (i.e. approved or rejected) on the Knit Card, which moves with the fabric along process line.
- ❖ Batch Card includes detailed information related to fabric like order no. customer, quantity, type and quality of fabric and yarn, GSM, shade, etc. On the other hand, Job Card includes information related to collars and cuffs for the same order.
- ❖ The Yarn Quality Report is used to record the details of yarn testing done at PTML. The person performing the testing signs on it after recording the test findings and the section head sign on it upon verification.

Self-check-3

I Short Answer writing

Instruction: write short answer for the given question. You have 10 minute for each question and each point has 3 Points.

- 1 List methods of textile testing standard?
- 2 What are the two test methods for rubbing fastness?

II Long answer writing

Instruction: write long answer for the given question. You have 15 minute for each question and each point has 5 Points

- 1 List Principles of Quality Standards
- 2 List Different Types of Textile Testing Method
- 3 write Testing procedure of Rubbing Fastness Test
- 4 discuss Principle of Color Fastness to Light

III multiple choose question

Instruction: choose the best answer form the given alternative. You are have 3 minute for each question and each point has 2 Points

- 1 ISO is an acronym stands for which organization?

- A. Inter industrial Organization Systems
- B. International Organization for Standardization
- C. International Operating Standards
- D. International Standards Operations

- 2 _____ Quality Systems-Model for quality assurance in final inspection and test.

- A. ISO 9001
- B. ISO 9002
- C. ISO 9003
- D. ISO 9004

Note: Satisfactory rating – above 16% Unsatisfactory - below 16%

You can ask you teacher for the copy of the correct answers

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Operation sheet 3.1

OPERATION TITLE: Determination of colorfastness of the given fabric by per spirometer

PURPOSE

To find out the color fastness of given fabric by using per spirometer

INSTRUCTION

The color fastness of given fabric is measured as per the test procedures and methods in per spirometer

EQUIPMENT TOOLS AND MATERIALS

- ❖ Perspiration tester. (Plastic/glass plate is available with the equipment)
- ❖ Drying oven.
- ❖ Multi fiber.
- ❖ Test specimen. (Colored)
- ❖ Grey scale for staining/color change.
- ❖ Distilled water.
- ❖ Wringer.
- ❖ NaCl, NaH₂ PO₄ 2H₂O, C₆ H₉ O₂ N₃ HCl H₂O.

PROCEDURE:

1. A sample measuring 10Cm×4Cm is cut and a multi-fiber fabric is sewn with it.
2. The sample is dipped into the solution containing perspiration chemical.
3. The sample is squeezed to remove excess chemical.
4. Then the sample is placed into two plates of the per spirometer and is pressed by 12.5 KPa.
5. After that together with the specimen the per spirometer is kept in oven at 37°C for four hours.

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6. Finally, the sample is assessed for color change and the adjacent fabric for color staining.

Reagent for Perspiration Test

1. Solution freshly prepared, containing 0.5g 1-histidine mono-hydrochloride monohydrate, 5g sodium chloride, and 2.5g disodium hydrogen ortho phosphate per liter brought to PH 8.0 with 0.1N sodium hydroxide.
2. Solution freshly prepared, containing 0.5g 1-histidine mono-hydrochloride monohydrate, 5g sodium chloride, and 2.2g sodium dihydrogen ortho phosphate per liter brought to PH 5.5 with 0.1N sodium hydroxide.
3. Two un dyed cloths for each specimen each 6×6cm of the same kind of fiber as the sample. Place the specimen between the two pieces of white cloth and sew along one side to form a composite sample.

QUALITY CRITERIA

The final appearance of to assist in online quality control operation can be checked its quality by the trainers and trainees .If there is any problem checking again and if they completed the learning outcome preparation for Assist in online quality control operation pass to next learning outcome.

The details of the values assigned for these properties are:

5 =Negligible (Excellent)

4 =slightly changed (Good)

3 =Noticeable changed (Fairly good)

2 =considerably changed (Fair)

1 =Much changed (Poor)

Precautions

- Never work alone in the laboratory. Smoking is not permitted in the laboratory. Do not bring or consume food or drinks in the laboratory.

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- Safety goggles or glasses should be worn whenever any member of the class is working with chemicals. Use gloves as required.
- Use the equipment in the laboratory carefully and always leave it clean for the next student. Always report equipment problems immediately. Failure to do this may delay your progress or that of another student.

Operation sheet 3.2

OPERATION TITLE: Determination of color fastness of the given fabric by crock meter

PURPOSE

To determine the amount of color transferred from the surface of colored textile materials to other surface by rubbing

INSTRUCTION

- ❖ Sample fabric dimension must be (4×1.5) cm
- ❖ When the fabric set on the every paper there should not any crease on fold 11 stroke must be taken in every second
- ❖ For the wet crocking test, the sample must be wetted and excess water should be sequenced.

EQUIPMENT TOOLS AND MATERIALS

- ❖ AATCC Crock meter
- ❖ Test specimen. (Colored)
- ❖ Blotting paper or woven cloth. (2 inch. Square)
- ❖ AATCC Grey scale for staining.
- ❖ Distilled water.
- ❖ Specimen holder for crock meter.
- ❖ Clip for blotting paper.

TEST PROCEDURE

DRY CROCKING

- 1 Place a test specimen (2×6 inch cut diagonally) on the base of the crock meter with its long dimensions in the direction of rubbing.
- 2 Place specimen holder over specimen to avoid slippage.
- 3 Mount the blotting paper (2×2 square) over the end of the finger, which project downward from the weighted sliding. The wave should be parallel to the rubbing direction.

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- 4 Lower the covered finger on to the test specimen and give 10 strokes at the rate of one turn per second.
- 5 Remove the blotting paper and give it four hours conditioning ($21 \pm 1^\circ\text{C}$ temperature) then evaluate.

WET CROCKING

- 1 For wet crocking, take one drop of distilled water on the blotting paper.
- 2 Squeeze the blotting paper in white fabric. ($65 \pm 5\%$ moisture approximately)
- 3 Remove the blotting paper and give it four hours conditioning ($21 \pm 1^\circ\text{C}$ temperature) then evaluate

QUALITY CRITERIA

The final appearance of to assist in online quality control operation can be checked its quality by the trainers and trainees .If there is any problem checking again and if they completed the learning outcome preparation for Assist in online quality control operation pass to next learning outcome

Precautions

Cotton rubbing fabric(the fabric must not contain fluorescent brightness ,sizing materials ,or any finish rubbing cloth should be damped 90-100% if you follow ISO ,65% for the AATCC method during wet rubbing assessment sample and rubbing cloth should be completely air – dried

- ✓ Never work alone in the laboratory. Smoking is not permitted in the laboratory. Do not bring or consume food or drinks in the laboratory.
- ✓ Safety goggles or glasses should be worn whenever any member of the class is working with chemicals. Use gloves as required.
- ✓ Use the equipment in the laboratory carefully and always leave it clean for the next student. Always report equipment problems immediately. Failure to do this may delay your progress or that of another student

LAP Test

LAP Test	Practical Demonstration
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Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within 3 hour

Task 1 Perform spray rating test using spray rating tester

Task 2 Perform Color fastness to light test

UNIT FOUR: Recording and Reporting Result

This learning unit is developed to provide the trainees the necessary information regarding the following content coverage and topics:

- Converting collected data for interpretation
- Reporting outcomes and advising appropriate personnel
- Recording result

This unit will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Convert collected data for interpretation
- Report outcomes and advising appropriate personnel
- Record result

4.1 Converting collected data for interpretation

Interpretation of results Test results will be presented in a number of ways, depending on what the test is designed to measure. It could be simple pass/fail criteria for online testing, subjective observation or a number. It is important to know what you are expecting and understand the meaning of the test result. A test method is not always designed to reproduce exactly what is likely to actually happen in a real-use situation but it is designed to be a guide to the relative performance of a particular product compared with other similar products. The correct interpretation and understanding of the test results is important.

There are two main methods of assessment: objective assessment and subjective assessment.

Objective assessment

Objective assessment occurs where a test method gives a ‘number’ or ‘result’ produced by a machine, which is measurable and quantitative.

Subjective assessment

Subjective assessment occurs where the test method has an assessment element and requires an operator or a number of operators to give a visual rating of the performance of a product.

With a subjective test method, there are a number of areas that are not quantifiable and the quality of the test result will be dependent on the experience and capabilities of the assessors. Tests for colorfastness, pilling, wrinkling and appearance change, typically involve subjective ratings.

There is currently a great deal of work being carried out to design and correlate machines capable of carrying out these subjective assessments but, still, in the majority of cases, subjective assessments are carried out for these test methods.

Objective tests such as breaking force, extension and shrinkage give a number or numerical value that can be compared with an expected range of results for that test method and particular product.

The number is generated by using a calibrated piece of ‘specified machinery’ in a ‘specific manner’ in accordance to a test method. In the case of objective tests, it is very important to understand what the actual numbers mean.

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Depending on the end use of the product, the same series of test results for individual test specimens may have a significantly different interpretation; for example, in a tensile strength result where five specimens are tested.

4.1.1 Interpretation of colorfastness test results

- The color of the tested specimen shall be compared by eye with the color of a piece of the original sample. In making the comparison, the specimens shall be held in the same plane and about at the same angle under a daylight fluorescent lamp or equivalent illumination.
- A specimen shall be considered to pass a given test when there is no appreciable change in color and when there is no appreciable staining of the white cloth attached to it. "Appreciable change" shall be understood to mean a change that is immediately noticeable in comparing the tested sample with the original; "appreciable staining" shall be understood to mean staining which is immediately noticeable Without comparing the white cloth attached to the tested specimen with a piece of the white cloth.
- If closer Inspection or a change of angle of light is required to make apparent the slight change in color or staining, the change shall not be considered appreciable. Tested samples should be assigned the highest classification for which they qualify, although any sample may be assigned a lower classification than that for which it qualifies.
- In order that the system of evaluation based on "appreciable change" shall be properly safeguarded, it is necessary that several of the test procedures given here in be calibrated at frequent intervals by means of dyed standards of known characteristics.

4.2 Reporting outcomes and advising appropriate personnel

The test report includes all processes, materials and procedures of the tests. It shows the conditions from each phase, so that you can understand why a material reacted in a certain way and make your inferences accordingly.

In general, the report should include:

- ❖ subdivision of the tested material
- ❖ equipment used
- ❖ test conditions
- ❖ procedure
- ❖ results
- ❖ critical results
- ❖ final observations

To implement a comprehensive business intelligence platform, organizations must design effective reporting, analytics, and information delivery framework. This strategy encompasses the ability for end user to efficiently consume integrated data in an efficient manner to drive proactive decision-making and develop a competitive advantage.

4.2 1 reporting colorfastness to perspiration

Class 0 , Textiles which have been subjected to the above test and which show appreciable change in color or which yield to discoloration of the white cloth greater than that corresponding to Munsell neutral 7.0, but which discoloration does not disappear after scrubbing shall be reported as having "Class 0 colorfastness to normal perspiration." Such textiles may be expected to be unsatisfactory where any resistance of the color to normal perspiration is required.

Class 1. Textiles which have been subjected to the above test and which show no appreciable change In color but yield a discoloration of the white cloth equal to or less than that corresponding to Munsell neutral 7.0, which is not removable after scrubbing , shall be reported as having "Class 1 colorfastness to- normal perspiration. Such textiles show some

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discoloration of white or light-colored textiles with which they may come in contact, and this discoloration will not be removable with soap and water.

Class 2. Textiles which have been subjected to the above test, and which show no appreciable change in color but appreciable staining of the test cloth, which disappears after scrubbing shall be reported as having "Class 2 colorfastness to normal perspiration." Such textiles show some discoloration of white or light-colored textiles with which they may come in contact, but this discoloration will be removable with soap and water.

Class 3. Textiles which have been subjected to the above test and which show no appreciable change in color and no appreciable staining of the test cloth shall be reported as having "Class 3 colorfastness to normal perspiration." Such textiles may be expected to give excellent service where resistance of the color to normal perspiration is important

Test Report example

Report No. : JC17052708703

Date .../.../...

Applicant : Alemu

Sample Description One Sample of Woven Fabric

Sample type

Sample code

Test method

Equipment used

End Uses Suit

Export to xxxxxx

Date Receive date... /...../.....

Test item	Result
	A
Care Labeling Code of Textile	#
Color Fastness to Light	#
Dimensional Stability to Steam	#
Stretch Properties of Fabrics	#
Fiber Content	#
Seam Slippage	#
Color Fastness to Rubbing	#
Color Fastness to Perspiration	#
Tensile Strength	#

Tested by

Namesign.....date

Checked and approved by.....sign.....date

4.3 Recording result

Recording is the process of capturing data or translating information to a recording format stored on some storage medium, which is often referred to as a record or, if an auditory medium, a recording.

A record is any document - in any format (paper **or** electronic and yes even video) - created or received by you or your department - that allows you to conduct business.

The value of a record is determined by content, not by format

An easy test: If a document helps you perform your job description or documents the history and/or administration of your office, it is probably a record and should be handled appropriately. This includes email and instant messages!

Common Records	Disposable Records
Includes, but is not limited to: <ul style="list-style-type: none"> ❖ Emails ❖ Correspondence ❖ forms ❖ instant messages ❖ committee minutes ❖ memoranda ❖ policy statements ❖ budgets ❖ SharePoint files 	These items may be discarded at will: <ul style="list-style-type: none"> ❖ duplicate or convenience copies of correspondence ❖ drafts of letters or reports ❖ routing slips ❖ correspondence not related to your job duties

Every textile factory records its production data because this information happens to be of great value and is used by not only the production managers to evaluate the business output of the firm, but also helps to measure the productivity of the workers who are putting immense effort on the production floor.

Reporting and Recording in general plays a vital role in the manufacturing and service industry. It contains all the information related to the ongoing business performance and helps to neutralize the bottlenecks by focusing on areas that need improvement.

Self-check-4

I Short Answer writing

Instruction: write short answer for the given question. You have 10 minute for each question and each point has 3 Points.

- 1 What is Reporting and recording in textile testing?
- 2 Prepare Test Report format for the following textile testing parameter
 - a) Color Fastness to Light
 - b) Color Fastness to Rubbing
 - c) Color Fastness to Perspiration

Note: Satisfactory rating – above 10% Unsatisfactory - below 10%

You can ask you teacher for the copy of the correct answers

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