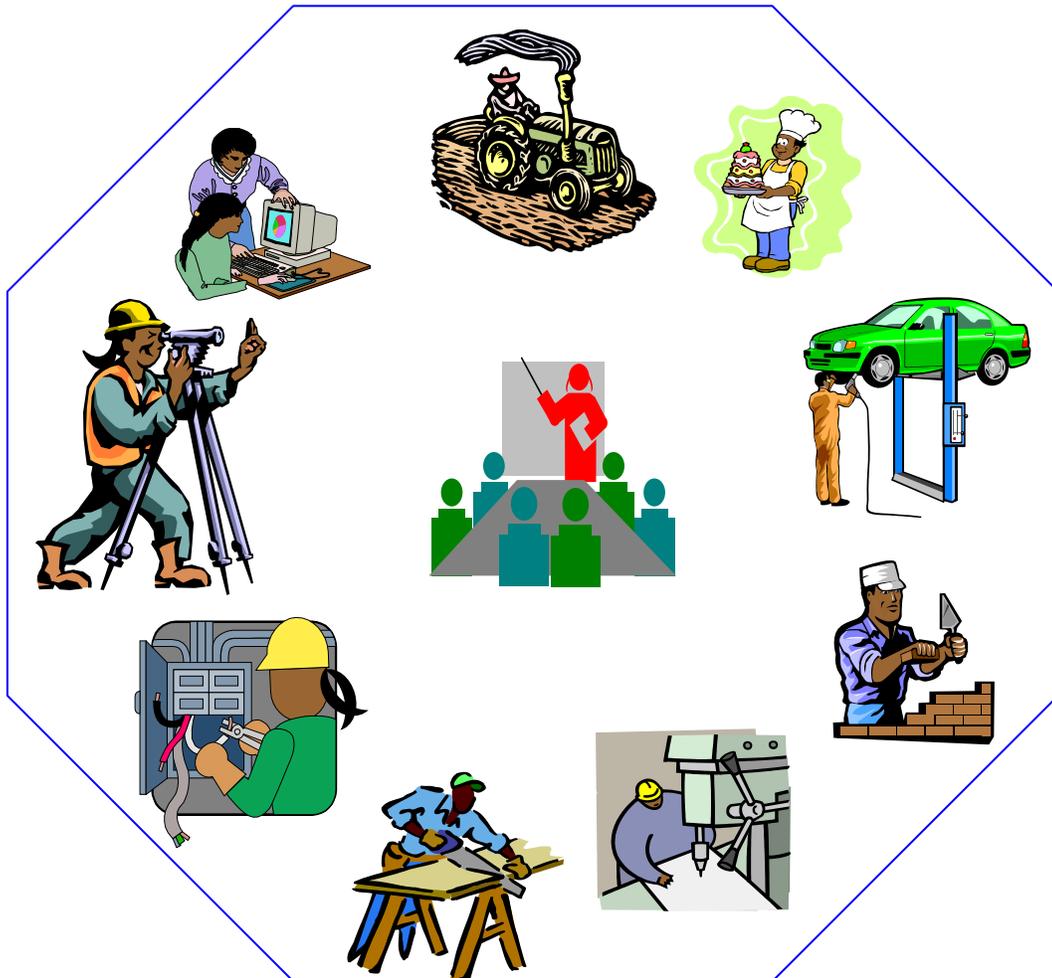




**Federal Democratic Republic of Ethiopia
Occupational Standard**

Garment Production

NTQF Level IV



Ministry of Labor and skill

December 2021

Introduction

Ethiopia has embarked on a process of reforming its TVET-System. Within the policies and strategies of the Ethiopian Government, technology transformation – by using international standards and international best practices as the basis, and, adopting, adapting and verifying them in the Ethiopian context – is a pivotal element. TVET is given an important role with regard to technology transfer. The new paradigm in the outcome-based TVET system is the orientation at the current and anticipated future demand of the economy and the labor market.

The Ethiopia Occupational Standard (EOS) is the core element of the Ethiopian National TVET-Strategy and an important factor within the context of the National TVET-Qualification Framework (NTQF). They are national Ethiopia standards, which define the occupational requirements and expected outcome related to a specific occupation without taking TVET delivery into account.

This document details the mandatory format, sequencing, wording and layout for the Ethiopia Occupational Standard, which comprised of Units of Competence.

A Unit of Competence describes a distinct work activity. It is documented in a standard format that comprises:

- Occupational title, NTQF level
- Unit title
- Unit code
- Unit descriptor
- Elements and Performance criteria
- Variables and Range statement
- Evidence guide

Together all the parts of a Unit of Competence guide the assessor in determining whether the candidate is competent.

The ensuing sections of this EOS document comprise a description of the respective occupation with all the key components of a Unit of Competence:

- the chart with an overview of all Units of Competence for the respective occupation including the Unit Codes and the Unit Titles
- the contents of each Unit of Competence (competence standard)
- occupational map providing the technical and vocational education and training (TVET) providers with information and important requirements to consider when designing training programs for this standards and for the individual, a career path

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UNIT OF COMPETENCE CHART

Occupational standard: Garment Production IV		
Unit Code: GTP		
NTQF Level IV		
IND GAP4 01 1221 Organize Garment production process	IND GAP4 02 1221 Perform Machine lay out for product change	IND GAP4 03 1221 Drape fabrics to make patterns
IND GAP4 04 1221 Produce Advanced Garment products	IND GAP4 05 1221 Improve Garment production process	IND GAP4 06 1221 Apply textile coloration and finishing
IND GAP4 07 1221 Apply statistics to operational processes		

NTQF Level IV

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Occupational Standard: Garment production Level IV	
Unit Title	Organize Garment Production Process
Unit Code	IND GAP4 01 1221
Unit Descriptor	This unit covers the skills and knowledge required to plan, organize and implement work activities of production Process to achieve planned outcomes in Garment industries.

Elements	Performance Criteria
1. Set objectives	<p>1.1. Objectives are planned consistent with and linked to work activities in accordance with organizational aims.</p> <p>1.2. Objectives are stated as measurable targets with clear time frames.</p> <p>1.3. Support and commitment of team members are reflected in the objectives.</p> <p>1.4. Realistic and attainable objectives are identified.</p>
2. Determine production requirements	<p>2.1 Projected quantity and quality requirements, standard times and production capacities are identified.</p> <p>2.2 Production process and material handling options are identified.</p> <p>2.3 Resources required for the project or production order are established.</p>
3. Prioritise work and Sequence production	<p>3.1 Work is prioritised taking into account production demands, customer requests, requirements, and efficiency standards of the workplace.</p> <p>3.2 Steps required for the process are identified ensuring most efficient use of resources.</p> <p>3.3 Documentation is prepared in accordance with workplace practices.</p>
4. Organise team and resources	<p>4.1 Work team is selected and organised in accordance with workplace practices.</p> <p>4.2 Facility, equipment, material, and resources required for the production process are identified and organised in accordance with the production schedule and OHS practices.</p>
5. Implement variations to production plan	<p>5.1 Systematic implementation of variations to the production plan are coordinated to ensure production meets the schedule and specifications.</p> <p>5.2 Work is re-allocated in accordance with production priorities, where required.</p> <p>5.3 Inefficiencies are identified and dealt with in accordance with workplace production practices.</p> <p>5.4 Team or individual responsibilities are defined and communicated</p>

6. Implement and monitor work flow	<p>6.1 Workflow is monitored to ensure production schedule is maintained.</p> <p>6.2 Methods are implemented to ensure that work is directed to each work area or location as required, and potential congestion areas are identified.</p> <p>6.3 Troubleshooting occurs on a regular basis in response to breakdowns, absenteeism and other factors.</p> <p>6.4 Records are maintained and reports prepared, where necessary, in accordance with workplace procedures</p>
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Variable	Range
Objectives	May include, but not limited to: <ul style="list-style-type: none"> • Specific • General
Production process	May include, but not limited to: <ul style="list-style-type: none"> • just in time (JIT) • VAM • quick response • quality circles • team processes • benchmarking
Product schedule	May include, but not limited to: <ul style="list-style-type: none"> • plant layout and machine involvement • personnel required for particular operations
Production plan	May include, but not limited to: <ul style="list-style-type: none"> • establishing an overall plan for manufacture/product delivery • repetitive production runs • short runs • quick changes • a diversity of styles • indent orders • stock services replenishment

Evidence Guide	
Critical Aspects of Competence	Demonstrates skills and knowledge to: <ul style="list-style-type: none"> • apply OHS practices in production operations establish production requirements • prioritise work

	<ul style="list-style-type: none"> • select and organise work team • ensure efficiency of production schedule • deal with inefficiencies • maintain accurate records
Underpinning Knowledge and Attitudes	<p>Demonstrates knowledge of:</p> <ul style="list-style-type: none"> • OHS practices, including hazard identification and control measures • work organisation systems and workplace organisation features • Production planning processes, such as material supply etc. • safety and environmental aspects of relevant workplace activities • quality practices • workplace practices
Underpinning skills	<p>Demonstrates knowledge of:</p> <ul style="list-style-type: none"> • interpret and use data from a range of sources • sequence production • monitor workflow • organise resources • Respond to breakdowns, absenteeism, etc. • coordinate variations to production plan • document and transfer information • read, interpret and follow information on work specifications, , standard operating procedures and work instructions and other reference material • maintain accurate records • communicate within the workplace • sequence operations • meet specifications • clarify and check task-related information • carry out work according to OHS practices
Resource Implications	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • Observation/Demonstration with oral questioning • Interview/Written Test
Context of Assessment	Competence may be assessed in the workplace or in a simulated workplace setting

Occupational Standard: Garment Production Level IV	
Unit Title	Perform Machine lay out for product change
Unit Code	IND GAP4 02 1221
Unit Descriptor	This unit covers the skills and knowledge required to Perform Machine lay out for production changes in a Garment industry.

Elements	Performance Criteria
1 Identify machine/s	1.1 <i>Machine</i> is selected in accordance with product specifications and <i>OHS practices</i> 1.2 Product specifications are interpreted correctly in relation to types of machine requirements. 1.3 <i>Production systems</i> are identified
2 Conduct production layout	2.1 Garment to be used for production is obtained 2.2 Machine operation is checked to ensure correct operation 2.3 Machine layout is performed in accordance with product specifications and operations sequences. 2.4 Sample is produced and checked for conformance with product standards and specifications.
3. Pilot/proto	3.1 Pilot is tested in accordance with workplace practices to ensure required standards of quality are met. 3.2 Re-set the machine to meet the required product standards.
4. Re-allocate machine to meet the requirements	4.1 Pilot results are interpreted to determine re-allocation requirements 4.2 <i>Lay out</i> changes are assessed in accordance with product specifications and <i>target set</i> . 4.3 Appropriate production personnel are informed of the availability of the newly arranged machine in accordance with Standard Operation Procedure. 4.4 Records are maintained and reports prepared, where necessary, in accordance with workplace practices

Variable	Range
Machines	May include but not limited to: <ul style="list-style-type: none"> • Single needle lock stitch • Double needle lock stitch • Over lock/safety stitch • Flat lock • Button hole • Button attach

	<ul style="list-style-type: none"> • Welting • Eye let • Pattern sewer • Snap fast • Bar tacking • Feed of the arm • Pocket setting • Sleeve setting • Multi-needle chain stitch
OHS practices	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • personal protective equipment • standard operating procedures • safe materials handling • ergonomic arrangement of workplaces • safe storage of equipment • housekeeping • manual handling techniques • taking of rest breaks • following marked walkways • reporting accidents and incidents • other OHS practices relevant to the job and enterprise
Production systems	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • Progressive bundle system • Modular production • Make though • Sectional production
Layout	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • U shape • Side by side • Straight line • Ups • Modular • With/without center table
Target set	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • line out put • worker out put

Evidence Guide	
Critical Aspects of Competence	<p>Demonstrates skills and knowledge to:</p> <ul style="list-style-type: none"> • interpret specifications for machine settings • perform sample runs • arrange or conducting testing of sample • make appropriate re-adjustments • apply workplace health and safety policies in production operations • maintain accurate records
Underpinning Knowledge and Attitudes	<p>Demonstrates knowledge of:</p> <ul style="list-style-type: none"> • setting up and adjustment requirements for the range of machines and equipment used in the workplace • Lay out techniques • Types of production system • quality requirements • machine manufacturer specifications • safety and environmental aspects of relevant workplace activities • OHS practices, including hazard identification and control measures • quality practices • workplace practices • recording and reporting practices
Underpinning skills	<p>Demonstrates skill of:</p> <ul style="list-style-type: none"> • set and operate machines • test and analyse pilot • Types of layout • apply all the relevant safety practices when working in the industry • communicate effectively with individuals, work groups and supervisors • interpret and carry out established procedures • read, interpret and follow information on work specifications, , standard operating procedures and work instructions and other reference material • maintain accurate records • communicate within the workplace • sequence operations • meet specifications

	<ul style="list-style-type: none"> • clarify and check task-related information • carry out work according to OHS practices
Resource Implications	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: <ul style="list-style-type: none"> • Observation/Demonstration with oral questioning • Interview/Written Test
Context of Assessment	Competence may be assessed in the workplace or in a simulated workplace setting

Occupational Standard: Garment Production Level IV	
Unit Title	Drape fabrics to make patterns
Unit Code	IND GAP4 03 1221
Unit Descriptor	This unit covers the skills and knowledge required to produce pattern using draping techniques in garment industry.

Elements	Performance Criteria
1. Prepare draping tools and equipment	1.1 Work area is set up according to <i>OHS practices</i> and specifications for work. 1.2 <i>Draping tools and equipment</i> are selected and prepared.
2. Prepare model form for draping	2.1 <i>Body reference points</i> on model form are identified and marked. 2.2 Any additional model form preparation is identified. 2.3 Measurements are checked for conformance to required specifications.
3. Prepare fabric for draping	3.1 Dimensions of fabric piece required for each section/ <i>piece to be draped</i> are estimated. 3.2 Warp, weft and bias of fabric are identified. 3.3 <i>Fabric handling qualities</i> are identified and assessed.
4. Plan drape	4.1 Requirements for adding wearing ease for movement are identified. 4.2 Requirements for manipulating dart excess are identified. 4.3 Seam positioning is planned. 4.4 <i>Drape plan</i> is developed.
5. Perform draping	5.1 <i>Fabric</i> is pinned on model form, relating body reference points and fabric grains. 5.2 Fabric is molded and manipulated to fit model form. 5.3 Ease is added to allow for movement. 5.4 Fabric is smoothed or manipulated over contours of model form. 5.5 Darts and seams are formed and pinned. 5.6 Drape is prepared for truing.
6. Transfer drape to paper	6.1 Drape is removed from model form. 6.2 Lines are drawn or ruled on drape at pin positions. 6.3 Drape is used as a template to create paper pattern or block. 6.4 Pattern or block is trued and marked.
7. Produce final pattern	7.1 Pattern is produced. 7.2 Pattern pieces are checked for accuracy of seam allowances, hems, functional openings and closures, seam match, and flow-through. 7.3 Pattern pieces are labelled and <i>markings</i> completed. 7.4 Pattern is finalized and checked to ensure accuracy, completeness and compliance to specifications. 7.5 Specification sheets are completed and attached to pattern blocks

	for storage. 7.6 Finished patterns are filed and stored.
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Variable	Range
OHS practices	May include but not limited: <ul style="list-style-type: none"> • manual handling techniques • standard operating procedures • personal protective equipment • safe materials handling • taking of rest breaks • ergonomic arrangement of workplaces • following marked walkways • safe storage of equipment • housekeeping • reporting accidents and incidents • other OHS practices relevant to the job and enterprise
Draping tools and equipment	May include but not limited to : <ul style="list-style-type: none"> • model form • narrow tape/ribbon • tape measure • pen/pencil • scissors • square rule • marker pens • hole punch • pins • fashion triangle • French curve • pattern notcher • weights
Body reference points	May include but not limited to : <ul style="list-style-type: none"> • bust • waist • hips • centre front • center back • side seam
Pieces to be	May include but not limited to :

draped	<ul style="list-style-type: none"> • front bodice • back bodice • front skirt • back skirt • other pieces to be draped may include: • front extended line • back extended line
Fabric handling qualities	<p>May include but not limited to :</p> <ul style="list-style-type: none"> • fall • stretch • stability • drape
Drape plan	<p>May include but not limited to :</p> <ul style="list-style-type: none"> • adding fullness (pleats, tucks, gathers) • multiple darts/division of darts • symmetric and/or asymmetric design features • cowls, twists, knots
Fabric	<p>May include but not limited to :</p> <ul style="list-style-type: none"> • toile fabric • sample fabric
Markings	<p>May include but not limited to :</p> <ul style="list-style-type: none"> • appropriate seam widths • notches • dart lines • drill holes • grain line • cutting instructions • stitching lines

Evidence Guide	
Critical Aspects of Competence	<p>Demonstrates skills and knowledge to:</p> <ul style="list-style-type: none"> • prepare the model form for draping • prepare tools, equipment and fabric pieces • develop a draping plan • carry out the draping on the model form • transfer the drape to paper • produce and label a final pattern/block
Underpinning	Demonstrates knowledge of:

Knowledge and Attitudes	<ul style="list-style-type: none"> • principles and concepts of patternmaking • customer and workplace requirements • cost efficiency in relation to patternmaking • range of typical garment fabrics, including weight and other characteristics • cutting and garment construction • OHS practices, including hazard identification and control measures • quality practices • workplace practices • recording and reporting practices
Underpinning skills	<p>Demonstrates skills to:</p> <ul style="list-style-type: none"> • consistently achieve quality and production output requirements • read, interpret and follow information on work specifications, standard operating procedures and work instructions, and other reference material • maintain accurate records • communicate within the workplace • sequence operations • meet specifications • clarify and check task-related information • carry out work according to OHS practices
Resource Implications	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • Observation/Demonstration with oral questioning • Interview/Written Test
Context of Assessment	Competence may be assessed in the workplace or in a simulated workplace setting

Occupational Standard: Garment Production Level IV	
Unit Title	Produce Advanced Garment products
Unit Code	IND GAP4 04 1221
Unit Descriptor	This unit covers the skills and knowledge required to design, planning and production of advanced garment

Elements	Performance Criteria
1 Prepare for garment production	1.1. Pattern is developed for garment production according to size and design requirements. 1.2. Patterns are modified for new design 1.3. Fabric, <i>materials</i> , tools and <i>equipment</i> are selected and prepared. 1.4. Equipment is checked to ensure correct operation. 1.5. Ability of tools and equipment to achieve plan is assessed. 1.6. Additional resources that may be required are identified.
2 Produce garment	2.1 Equipment is used to produce or sew garment according to pattern and required <i>OHS practices</i> . 2.2 Garment is checked against pattern and design. 2.3 Minor process faults are identified and corrected where necessary. 2.4 Production techniques and design are continuously reviewed in an iterative manner to make improvements.
3. Complete production process	4.1 Garment is finished according to design requirements. 4.2 Garment is assessed against design and pattern. 4.3 <i>Garment faults</i> are rectified. 4.4 Area and equipment is cleaned. 4.5 Tools and equipment are stored as required.

Variable	Range
Garment	May include but not limited to: <ul style="list-style-type: none"> • Jacket with lining • Denim jacket • Suit • coat
Equipment	May include but not limited to: <ul style="list-style-type: none"> • pins • scissors • industrial sewing machines • needle and thread • marker or chalk

Materials	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • fabric • trims • accessories , • components
Garment faults	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • holes • inconsistent sewing • broken thread • broken seam • uneven stitch • puckering • spot and oil • fabric defect
OHS practices	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • manual handling techniques • standard operating procedures • personal protective equipment • safe materials handling • taking of rest breaks • ergonomic arrangement of workplaces • following marked walkways • safe storage of equipment • housekeeping • reporting accidents and incidents • other OHS practices relevant to the job and enterprise
Appropriate people	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • trainers • colleagues • mentors

Evidence Guide	
Critical Aspects of Competence	<p>Demonstrates skills and knowledge to:</p> <ul style="list-style-type: none"> • design a garment • use sewing machine safely and effectively • modify to make patterns • make minor adjustments • check garment against pattern

Underpinning Knowledge and Attitudes	<p>Demonstrates knowledge of:</p> <ul style="list-style-type: none"> • principles and elements of design • modification techniques • techniques in using a sewing machine • sizing requirements • fabric suitability • typical fault conditions and related fault-finding procedures • types and styles of threads • simple equipment maintenance techniques • OHS practices, including hazard identification and control measures • quality practices • workplace practices • recording and reporting practices
Underpinning skills	<p>Demonstrates skills to:</p> <ul style="list-style-type: none"> • apply design principles • check equipment • prepare fabric and thread • use a sewing machine • start and stop equipment • monitor production • recognise and rectify faults or problems as required • clean equipment as required • read, interpret and follow information on work specifications, standard operating procedures and work instructions, and other reference material • maintain accurate records • communicate within the workplace • sequence operations • meet specifications • clarify and check task-related information • carry out work according to OHS practices
Resource Implications	<p>Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.</p>
Methods of Assessment	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • Observation/Demonstration with oral questioning • Interview/Written Test
Context of Assessment	<p>Competence may be assessed in the workplace or in a simulated workplace setting</p>

Occupational Standard: Garment Production Level IV	
Unit Title	Improve Garment production process
Unit Code	<u>IND GAP4 05 1221</u>
Unit Descriptor	This unit covers the skills and knowledge to review production processes used in garment production and contribute to identifying and implementing improvements. The unit applies to providing input to improvement of processes in the range of garment production industry, including volume and custom production.

Elements	Performance Criteria
1 Identify key elements of production requirements	1.1 Key customers and their needs and expectations are identified. 1.2 <i>Garment production processes</i> are described in terms of how they contribute to the <i>value chain</i> . 1.3 Key <i>suppliers</i> are identified and their role in the value chain described. 1.4 Enterprise quality standards for critical points of production process are identified. 1.5 Enterprise <i>production requirements</i> are identified.
2 Review production processes	2.1 Housekeeping practices are identified and reviewed against enterprise standards to assess conformity. 2.2 <i>OHS practices</i> are identified and reviewed against enterprise standards to assess conformity. 2.3 <i>Production waste</i> is identified. 2.4 Methods of monitoring <i>production outcomes</i> are identified. 2.5 Garment production outcomes are assessed against production goals.
3 Identify improvement opportunities	3.1 Opportunities for improvement are identified. 3.2 Suggestions for improvement are made. 3.3 Improvement is tested with appropriate personnel . 3.4 Reports, records and recommendations for improvement are provided.
4 Implement improvement	4.1 Implications of improvement are identified. 4.2 Desired result of improvement is identified and method of measuring outcome established. 4.3 Methods of addressing any possible negative implications are identified and implemented. 4.4 Consultation with relevant personnel is conducted to communicate improvement. 4.5 Improvement is implemented. 4.6 Improvement is monitored to ensure correct implementation and review effectiveness in achieving desired result. 4.7 Adjustments to improvement are made as required.

Variable	Range
Garment production processes	May include but not limited to : <ul style="list-style-type: none"> • receiving and processing of fabric • identification of fabric quality • lay-up and cutting of fabric • making marker • pressing • Specialist machine use such as binding, molding, embroidery, etc. • pattern design, modification and development • sewing, machine processes • repairs and alterations • blocking and shaping • trimming, finishing • testing, inspecting • dispatch, storage, packing • finishing processes
Value chain	May include but not limited to : <ul style="list-style-type: none"> • the entire chain of production from raw materials to distribution of final product
Suppliers	May include but not limited to : <ul style="list-style-type: none"> • suppliers of fabrics, trims, buttons, zips, thread and components used in garment production • personnel, specialist support, contractors • despatch, warehousing, transport operators • publicity and promotional suppliers • machinery and equipment suppliers and repair contractors
Production requirements	May include but not limited to : <ul style="list-style-type: none"> • timing requirements • quantity • quality • specific order requirements • procedural requirements • OHS practices • personnel • resource use
OHS practices	May include but not limited to: <ul style="list-style-type: none"> • manual handling techniques • standard operating procedures

	<ul style="list-style-type: none"> • personal protective equipment • safe materials handling • taking of rest breaks • ergonomic arrangement of workplaces • following marked walkways • safe storage of equipment • housekeeping • reporting accidents and incidents • environmental practices
Production waste	<p>May include but not limited to :</p> <ul style="list-style-type: none"> • unusable materials, off-cuts • delays • movement and transport • poor process design • inventory • inefficient performance of a process • making defective items
Production outcomes	<p>May include but not limited to :</p> <ul style="list-style-type: none"> • outcomes achieved at various stages of the production process
Tested	<p>May include but not limited to :</p> <ul style="list-style-type: none"> • trialled • verified • piloted • measured against research
Appropriate personnel	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • managers • supervisors • colleagues • specialist staff

Evidence Guide	
Critical Aspects of Competence	<p>Demonstrates skills and knowledge to:</p> <ul style="list-style-type: none"> • review garment production processes • identify and assess improvement opportunities • evaluate implications of improvement • identify and interpret workplace standards • Communicate process improvement options contribute suggestions for improvement.

Underpinning Knowledge and Attitudes	<p>Demonstrates knowledge of:</p> <ul style="list-style-type: none"> • quality standards applying to garment handling procedures, construction processes and finished product • impact of incorrect production techniques on garment construction • workplace communication procedures • sequence of operations in the production process • production suppliers and value chain concepts • quality standards and practices • OHS practices, including hazard identification and control measures • workplace practices • recording and reporting practices
Underpinning skills	<p>Demonstrates knowledge of:</p> <ul style="list-style-type: none"> • plan product construction • analyze and evaluate • communicate with management • conduct quality checks to identify non-compliances with quality standards • read, interpret and follow information on work specifications, standard operating procedures and work instructions, and other reference material • maintain accurate records • communicate within the workplace • sequence operations • meet specifications • clarify and check task-related information • carry out work according to OHS practices
Resource Implications	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	<p>Competence may be assessed through:</p> <ul style="list-style-type: none"> • Observation/Demonstration with oral questioning • Interview/Written Test
Context of Assessment	Competence may be assessed in the workplace or in a simulated workplace setting.

Occupational Standard: Garment Production Level IV	
Unit Title	Apply textile coloration and finishing
Unit Code	IND GAP4 06 1221
Unit Descriptor	This unit covers the skills and knowledge to use fabric colorization techniques to create new finishes for design effects on garment products.

Elements	Performance Criteria
1 Identify colourisation techniques	1.1 Types of <i>Fabric colorization techniques</i> are identified. 1.2 Effects of colourisation techniques on different <i>fabrics</i> are described. 1.3 Processes used to achieve different colourisation techniques are described.
2 Describe uses of colourisation techniques in design process	2.1 <i>Uses of colour</i> to inform and inspire design are described. 2.2 Role of colourisation as production tool is described, including impact on process. 2.3 Effect of colourisation on the design are described
3 Colourise fabrics	3.1 Colourisation techniques are applied to a variety of fabrics. 3.2 Process is analysed to assess outcome. 3.3 Colourisation is modified as required.
4 Ensure workplace standards are met	4.1 <i>OHS practices</i> are implemented in colourising fabrics. 4.2 Colourisation effects and garment quality meet quality standards.
5 Document process	5.1 Techniques used to colourise fabrics and their effects are documented for future reference. 5.2 Documentation is filed and stored.

Variable	Range
Fabric colorization techniques	May include but not limited to: <ul style="list-style-type: none"> • dyeing - shibori, • tie dyeing <ul style="list-style-type: none"> ➤ tie ➤ stitch ➤ fold ➤ pole • resist (batik) • printing - block, silk screen, transfer, roller, stencilling
Fabrics	May include but not limited to: <ul style="list-style-type: none"> • knitted fabrics, including weft knits and warp knits

	<ul style="list-style-type: none"> • woven fabrics, including plain, twill, satin, dobby and jacquard • non-woven fabrics such as felts, nets, braids and bonded
Uses of color	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • dyeing fabrics to match others • over-printing fabrics to create a new print design • mixing colours to create something different • removing colour to create print design • emphasise texture and patterns
OHS practices	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • manual handling techniques • standard operating procedures • personal protective equipment • safe materials handling • taking of rest breaks • ergonomic arrangement of workplaces • following marked walkways • safe storage of equipment • housekeeping • reporting accidents and incidents • other OHS practices relevant to the job and enterprise

Evidence Guide	
Critical Aspects of Competence	<p>Demonstrates skills and knowledge to:</p> <ul style="list-style-type: none"> • identify fibres and fabrics • determine effects of colourising fabrics • use colourisation techniques to achieve design effects • apply OHS practices in work operations
Underpinning Knowledge and Attitudes	<p>Demonstrates knowledge of:</p> <ul style="list-style-type: none"> • uses and performance characteristics of fabrics • information resources on fibres and fabrics • OHS practices, including hazard identification and control measures • quality practices • workplace practices • recording and reporting practices
Underpinning skills	<p>Demonstrates knowledge of:</p> <ul style="list-style-type: none"> • analyse performance characteristics • use tools and equipment associated with colouring fabrics • read, interpret and follow information on work specifications,

	<p>standard operating procedures and work instructions, and other reference material</p> <ul style="list-style-type: none"> • maintain accurate records • communicate within the workplace • sequence operations • meet specifications • clarify and check task-related information • carry out work according to OHS practices
Resource Implications	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: <ul style="list-style-type: none"> • Observation/Demonstration with oral questioning • Interview/Written Test
Context of Assessment	Competence may be assessed in the workplace or in a simulated workplace setting

Occupational Standard: Garment Production Level IV	
Unit Title	Apply statistics to operational processes
Unit Code	<u>IND GAP4 07 1221</u>
Unit Descriptor	This unit of competency covers the skills and knowledge required to apply statistical theory and principles to the analysis and control of processes and operations.

Elements	Performance Criteria
1. Collect process data	1.1 Interpret <i>sampling scheme</i> 1.2 Obtain measurements in accordance with standard procedures 1.3 <i>Handle data</i> , as required
2. Interpret data	2.1 Plot data on appropriate control chart 2.2 Distinguish between <i>random</i> and <i>non-random</i> patterns of results 2.3 Identify results outside the control limits 2.4 Recognize situations requiring action 2.5 Take appropriate action in accordance with standard <i>procedures</i> 2.6 Determine <i>cost of non-conformance</i>
3. Calculate control limits	3.1 Consult relevant stakeholders to determine appropriate limits 3.2 Use relevant methods to calculate/revise control limits 3.3 Plot limits on <i>control chart</i> 3.4 Explain impact of limit to relevant stakeholders

Variable	Range
Sampling scheme	May include but not limited to: <ul style="list-style-type: none"> • sampling for attributes or sampling for variables • batch, continuous or custom made products • number of items/samples • size of sample • timing of sampling • location of sampling points • type of sample • number/type of measurements to be done on each sample • sampling equipment • measurement/testing equipment/methods
Procedures	May include but not limited to: <ul style="list-style-type: none"> • work instructions • standard operating procedures • formulas/ recipes

	<ul style="list-style-type: none"> • batch sheets • temporary instructions and similar instructions provided for the smooth running of the plant • good operating practice as may be defined by industry codes of practice (e.g. good manufacturing practice (GMP) and responsible care) • government regulations • Procedures may be: • written, verbal, computer-based or in some other format
Handle data	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • calculating means, ranges, mean of means and standard deviations (using appropriate calculation aids) • entering data into a software package • recording data either in writing or electronically • other required manipulations of the data
Control chart	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • run • tally • mean/range • attributes • other relevant charts
Random	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • refer to those variations for which no cause can be found
Non-random	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • variations for which a cause can be found and so the cause of the variation eliminated. Non-random variation may also be used to predict possible breaches of the control limits
Cost of non-conformance	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • reprocessing/rework • expediting • unplanned service • excess inventory • complaint handline • downtime • returns • scrap • labour costs • material costs • infrastructure costs/overhead

	<ul style="list-style-type: none"> • utility costs
Competitive systems and practices	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • lean operations • agile operations • preventative and predictive maintenance approaches • monitoring and data gathering systems, such as Systems Control and Data Acquisition (SCADA) software, Enterprise Resource Planning (ERP) systems, Materials Resource Planning (MRP) and proprietary systems • statistical process control systems, including six sigma and three sigma • Just in Time (JIT), kanban and other pull-related operations control systems • supply, value, and demand chain monitoring and analysis • 5S • continuous improvement (kaizen) • breakthrough improvement (kaizen blitz) • cause/effect diagrams • overall equipment effectiveness (OEE) • takt time • process mapping • problem solving • run charts • standard procedures • current reality tree • Competitive systems and practices should be interpreted so as to take into account: <ul style="list-style-type: none"> • the stage of implementation of competitive systems and practices • the size of the enterprise • the work organisation, culture, regulatory environment and the industry sector

Evidence Guide	
Critical Aspects of Competence	<p>Demonstrates skills and knowledge to:</p> <ul style="list-style-type: none"> • follow sampling procedures • apply basic statistical processes • analyse data to identify variations and non-conformances • Plot or document results.

<p>Underpinning Knowledge and Attitudes</p>	<p>Demonstrates knowledge of:</p> <ul style="list-style-type: none"> • sampling techniques • purpose of sampling and measurement • random, systematic and stratified sampling • purpose of replication of data for statistical control • samples, populations, finite and infinite populations and the differences • methods of calculating means, standard deviations and the like and their purpose in statistical control • the meaning of broad/narrow frequency distributions/range/standard deviations and skewed distributions in process terms • concept of limits, including: <ul style="list-style-type: none"> ➤ 1 sigma warning limits ➤ sigma warning limits ➤ sigma control limits ➤ sigma limits • types of control charts and their applications to different types of process/product and for different purposes • process causes of variation and typical cause types of non-random variation • non-process (e.g. measurement) causes of variation • recognition of stable and unstable processes • causes of stability/instability in the process • calculation of control limits/process capability and the applications of different control limits • the standard distribution curve and confidence limits
<p>Underpinning skills</p>	<p>Demonstrates knowledge of:</p> <ul style="list-style-type: none"> • applying a range of sampling procedures • analysing samples and data for variation, relevance, reliability and representativeness • problem solving the causes of variation in a process • communicating with other employees to obtain samples/data and to explain results and limits • plotting or documenting results • undertaking calculations, including: <ul style="list-style-type: none"> • basic arithmetic functions • mean, range, mean of means, standard deviation (using appropriate calculation aids) • using statistics to support process and operations control

Resource Implications	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: <ul style="list-style-type: none"> • Observation/Demonstration with oral questioning • Interview/Written Test
Context of Assessment	Competence may be assessed in the workplace or in a simulated workplace setting

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GARMENT OCCUPATIONAL MAP

