TRAINING REGULATIONS

MECHANICAL DRAFTING NC I

METALS AND ENGINEERING SECTOR

TECHNICAL EDUCATION AND SKILLS DEVELOPMENT AUTHORITY
East Service Road, South Superhighway, Taguig City, Metro Manila

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MECHANICAL DRAFTING NC I

TRAINING REGULATIONS FOR

MECHANICAL DRAFTING NC I

SECTION 1 MECHANICAL DRAFTING NC I QUALIFICATION

The Mechanical Drafting NC I Qualification consists of competencies that a person must achieve to interpret sketches, prepare basic engineering drawing and perform basic engineering drafting.

The Units of Competency comprising this qualification include the following:

Code No.	BASIC COMPETENCIES
500311101	Receive and respond to workplace communication
500311102	Work with others
500311103	Demonstrate Work Values
500311104	Practice Housekeeping Procedures

Code No.	COMMON COMPETENCIES
MEE722201	Apply safety practices
MEE722202	Interpret working drawings and sketches
MEE722204	Perform shop computations (Basic)
MEE722205	Measure workpiece (Basic)

Code No.	CORE COMPETENCIES
MEE311301	Prepare basic engineering drafting
MEE311302	Perform basic engineering detail drafting

A person who has achieved this qualification is competent to be:

- Mechanical Draftsman

SECTION 2 COMPETENCY STANDARDS

This section gives the details of the contents of the basic, common and core units of competency required in MECHANICAL DRAFTING NC I.

BASIC COMPETENCIES

UNIT OF COMPETENCY : RECEIVE AND RESPOND TO WORKPLACE COMMUNICATION

UNIT CODE : 500311101

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to receive, respond and act on verbal and written communication

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ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables
1. Follow routine spoken messages	1.1. Required information is gathered by listening attentively and correctly interpreting or understanding information/instructions 1.2. Instructions/information are properly recorded *1.3.* Instructions are acted upon immediately in accordance with information received 1.4. Clarification is sought from workplace supervisor on all occasions when any instruction/information is not clear
2. Perform workplace duties following written notices	2.1 ***Written notices and instructions*** are read and interpreted correctly in accordance with ***organizational guidelines*** 2.2 Routine written instruction are followed in sequence 2.3 Feedback is given to workplace supervisor based on the instructions/information received

RANGE OF VARIABLES

VARIABLE	RANGE
1. Written notices and instructions	It refers to : 1.1. Handwritten and printed material 1.2. Internal memos 1.3. External communications 1.4. Electronic mail 1.5. Briefing notes 1.6. General correspondence 1.7. Marketing materials 1.8. Journal articles
2. Organizational Guidelines	It may include: 2.1. Information documentation procedures 2.2. Company policies and procedures 2.3. Organization manuals 2.4. Service manual

EVIDENCE GUIDE

1. Critical aspects of Competency	Assessment requires evidence that the candidate: 1.1. Demonstrated knowledge of organizational procedures for handling verbal and written communications 1.2. Received and acted on verbal messages and instructions 1.3. Demonstrated competency in recording instructions/information
2. Underpinning Knowledge and Attitudes	2.1. Knowledge of organizational policies/guidelines in regard to processing internal/external information 2.2. Ethical work practices in handling communications 2.3. Communication process
3. Underpinning Skills	3.1. Conciseness in receiving and clarifying messages/ information/communication 3.2. Accuracy in recording messages/information
4. Resource Implications	The following resources **MUST** be provided: 4.1. Pens 4.2. Note pads
5. Methods of Assessment	Competency may be assessed through: 5.1. Direct Observation 5.2. Oral interview 5.3. Written Evaluation 5.4. Third Party Report
6. Context of Assessment	Competency may be assessed individually in the actual workplace or simulation environment in TESDA accredited institutions

UNIT OF COMPETENCY : WORK WITH OTHERS

UNIT CODE : 500311102

UNIT DESCRIPTOR : This unit cover the skills, knowledge and attitudes required to develop workplace relationship and contribute in workplace activities.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables
1. Develop effective workplace relationship	1.1 ***Duties and responsibilities*** are done in a positive manner to promote cooperation and good relationship 1.2 Assistance is sought from ***workgroup*** when difficulties arise and addressed through discussions 1.3 ***Feedback*** provided by others in the team is encouraged, acknowledged and acted upon 1.4 Differences in personal values and beliefs are respected and acknowledged in the development
2. Contribute to work group activities	2.1 ***Support is provided to team members*** to ensure workgroup goals are met 2.2 Constructive contributions to workgroup goals and tasks are made according to ***organizational requirements*** 2.3 Information relevant to work is shared with team members to ensure designated goals are met

RANGE OF VARIABLES

VARIABLE	RANGE
1. Duties and responsibilities	1.1 Job description and employment arrangements 1.2 Organization's policy relevant to work role 1.3 Organizational structures 1.4 Supervision and accountability requirements including OHS 1.5 Code of conduct
2. Work group	2.1 Supervisor or manager 2.2 Peers/work colleagues 2.3 Other members of the organization
3. Feedback on performance	3.1 Formal/Informal performance appraisal 3.2 Obtaining feedback from supervisors and colleagues and clients 3.3 Personal, reflective behavior strategies 3.4 Routine organizational methods for monitoring service delivery
4. Providing support to team members	4.1 Explaining/clarifying 4.2 Helping colleagues 4.3 Providing encouragement 4.4 Providing feedback to another team member 4.5 Undertaking extra tasks if necessary
5. Organizational requirements	5.1 Goals, objectives, plans, system and processes 5.2 Legal and organization policy/guidelines 5.3 OHS policies, procedures and programs 5.4 Ethical standards 5.5 Defined resources parameters 5.6 Quality and continuous improvement processes and standards

EVIDENCE GUIDE

1. Critical aspects of Competency	Assessment requires evidence that the candidate: 1.1. Provided support to team members to ensure goals are met 1.2. Acted on feedback from clients and colleagues 1.3. Accessed learning opportunities to extend own personal work competencies to enhance team goals and outcomes
2. Underpinning Knowledge	2.1. The relevant legislation that affects operations, especially with regards to safety 2.2. Reasons why cooperation and good relationships are important 2.3. Knowledge of the organization's policies, plans and procedures 2.4. Understanding how to elicit and interpret feedback 2.5. Knowledge of workgroup member's responsibilities and duties 2.6. Importance of demonstrating respect and empathy in dealings with colleagues 2.7. Understanding of how to identify and prioritize personal development opportunities and options
3. Underpinning Skills	3.1. Ability to read and understand the organization's policies and work procedures 3.2. Write simple instructions for particular routine tasks 3.3. Interpret information gained from correspondence 3.4. Communication skills to request advice, receive feedback and work with a team 3.5. Planning skills to organized work priorities and arrangement 3.6. Technology skills including the ability to select and use technology appropriate to a task 3.7. Ability to relate to people from a range of social, cultural and ethnic backgrounds.

4. Resource Implications	The following resources **MUST** be provided: 4.1. Access to relevant workplace or appropriately simulated environment where assessment can take place 4.2. Materials relevant to the proposed activity or task
5. Methods of Assessment	Competency may be assessed through: 5.1. Direct observations of work activities of the individual member in relation to the work activities of the group 5.2. Observation of simulation and/or role play involving the participation of individual member to the attainment of organizational goal 5.3. Case studies and scenarios as a basis for discussion of issues and strategies
6. Context for Assessment	6.1. Competency assessment may occur in workplace or any appropriately simulated environment 6.2. Assessment shall be observed while task are being undertaken whether individually or in group

UNIT OF COMPETENCY: DEMONSTRATE WORK VALUES

UNIT CODE : 500311103

UNIT DESCRIPTOR : This unit covers the knowledge, skills, and attitude in demonstrating proper work values.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables
1. Define the purpose of work	1.1 One's unique sense of purpose for working and the why's of work are identified, reflected on and clearly defined for one's development as a person and as a member of society. 1.2 Personal mission is in harmony with company's values
2. Apply work values/ethics	2.1 ***Work values/ethics/concepts*** are classified and reaffirmed in accordance with the transparent company ethical standards, policies and guidelines. 2.2 ***Work practices*** are undertaken in compliance with industry work ethical standards, organizational policy and guidelines 2.3 Personal behavior and relationships with co-workers and/or clients are conducted in accordance with ethical standards, policy and guidelines. 2.4 ***Company resources*** are used in accordance with transparent company ethical standard, policies and guidelines.
3. Deal with ethical problems	3.1 Company ethical standards, organizational policy and guidelines on the prevention and reporting of unethical conduct are accessed and applied in accordance with transparent company ethical standard, policies and guidelines. 3.2 ***Work incidents/situations*** are reported and/or resolved in accordance with company protocol/guidelines. 3.3 Resolution and/or referral of ethical problems identified are used as learning opportunities.
4. Maintain integrity of conduct in the workplace	4.1 Personal work practices and values are demonstrated consistently with acceptable ethical conduct and company's core values. 4.2 ***Instructions*** to co-workers are provided based on ethical, lawful and reasonable directives. 4.3 Company values/practices are shared with co-workers using appropriate behavior and language.

RANGE OF VARIABLES

VARIABLE	RANGE
1. Work values/ethics/ concepts	May include but are not limited to: 1.1 Commitment/ Dedication 1.2 Sense of urgency 1.3 Sense of purpose 1.4 Love for work 1.5 High motivation 1.6 Orderliness 1.7 Reliability 1.8 Competence 1.9 Dependability 1.10 Goal-oriented 1.11 Sense of responsibility 1.12 Being knowledgeable 1.13 Loyalty to work/company 1.14 Sensitivity to others 1.15 Compassion/Caring attitude 1.16 Balancing between family and work 1.17 *Pakikisama* 1.18 *Bayanihan* spirit/teamwork 1.19 Sense of nationalism
2. Work practices	2.1 Quality of work 2.2 Punctuality 2.3 Efficiency 2.4 Effectiveness 2.5 Productivity 2.6 Resourcefulness 2.7 Innovativeness/Creativity 2.8 Cost conciousness 2.9 5S 2.10 Attention to details
3. Incidents/situations	3.1 Violent/intensed dispute or argument 3.2 Gambling 3.3 Use of prohibited substances 3.4 Pilferages 3.5 Damage to person or property 3.6 Vandalism 3.7 Falsification 3.8 Bribery 3.9 Sexual Harassment 3.10 Blackmail

VARIABLE	RANGE
4. Company resources	4.1 Consumable materials 4.2 Equipment/Machineries 4.3 Human 4.4 Time 4.5 Financial resources
5. Instructions	5.1 Verbal 5.2 Written

EVIDENCE GUIDE

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Defined one's unique sense of purpose for working 1.2 Clarified and affirmed work values/ethics/concepts consistently in the workplace 1.2 Demonstrated work practices satisfactorily and consistently in compliance with industry work ethical standards, organizational policy and guidelines 1.4 Demonstrated personal behavior and relationships with co-workers and/or clients consistent with ethical standards, policy and guidelines 1.5 Used company resources in accordance with company ethical standard, policies and guidelines. 1.6 Followed company ethical standards, organizational policy and guidelines on the prevention and reporting of unethical conduct/behavior
2. Underpinning Knowledge	2.1 Occupational health and safety 2.2 Work values and ethics 2.3 Company performance and ethical standards 2.4 Company policies and guidelines 2.5 Fundamental rights at work including gender sensitivity 2.6 Work responsibilities/job functions 2.7 Corporate social responsibilities 2.8 Company code of conduct/values 2.9 Balancing work and family responsibilities
3. Underpinning Skills	3.1 Interpersonal skills 3.2 Communication skills 3.3 Self awareness, understanding and acceptance 3.4 Application of good manners and right conduct
4. Resource Implications	The following resources **MUST** be provided: 4.1 Workplace or assessment location 4.2 Case studies/Scenarios
5. Methods of Assessment	Competency may be assessed through: 5.1 Portfolio Assessment 5.2 Interview 5.3 Third Party Reports
6. Context of Assessment	Competency may be assessed in the work place or in a simulated work place setting

UNIT OF COMPETENCY : PRACTICE HOUSEKEEPING PROCEDURES

UNIT CODE : 500311104

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to apply the basic housekeeping procedures.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables
1. Sort and remove unnecessary items	1.1 Reusable, recyclable materials are sorted in accordance with company/office procedures 1.2 ***Unnecessary items*** are removed and disposed of in accordance with company or office procedures
2. Arrange items	2.1 Items are arranged in accordance with company/office housekeeping procedures 2.2 Work area is arranged according to job requirements 2.3 Activities are prioritized based on instructions. 2.4 Items are provided with clear and visible ***identification marks*** based on procedure 2.5 Safety equipment and evacuation passages are kept clear and accessible based on instructions
3. Maintain work area, tools and equipment	3.1 Cleanliness and orderliness of work area is maintained in accordance with company/office procedures 3.2 Tools and equipment are cleaned in accordance with manufacturer's instructions/manual 3.3 ***Minor repairs*** are performed on tools and equipment in accordance with manufacturer's instruction/manual 3.4 Defective tools and equipment are reported to immediate supervisor
4. Follow standardized work process and procedures	4.1 Materials for common use are maintained in designated area based on procedures 4.2 Work is performed according to standard work procedures 4.3 Abnormal incidents are reported to immediate supervisor
5. Perform work spontaneously	5.1 Work is performed as per instruction 5.2 Company and office ***decorum*** are followed and complied with 5.3 Work is performed in accordance with occupational health and safety (OHS) requirements

RANGE OF VARIABLES

VARIABLE	RANGE
1. Unnecessary items	May include but are not limited to: 1.1 Non-recyclable materials 1.2 Unserviceable tools and equipment 1.3 Pictures, posters and other materials not related to work activity 1.4 Waste materials
2. Identification marks	2.1 Labels 2.2 Tags 2.3 Color coding
3. Decorum	3.1 Company/ office rules and regulations 3.2 Company/ office uniform 3.3 Behavior
4. Minor repair	Minor repair include but not limited to: 4.1 Replacement of parts 4.2 Application of lubricants 4.3 Sharpening of tools 4.4 Tightening of nuts, bolts and screws

EVIDENCE GUIDE

1. Critical Aspects of Competency	Assessment requires evidence that the candidate practiced the basic procedures of 5S
2. Underpinning Knowledge and Attitudes	2.1 Principles of 5S 2.2 Work process and procedures 2.3 Safety signs and symbols 2.4 General OH&S principles and legislation 2.5 Environmental requirements relative to work safety 2.6 Accident/Hazard reporting procedures
3. Underpinning Skills	3.1 Basic communication skills 3.2 Interpersonal skills 3.3 Reading skills required to interpret instructions 3.4 Reporting/recording accidents and potential hazards
4. Resource Implications	The following resources **MUST** be provided: 4.1 Facilities, materials tools and equipment necessary for the activity
5. Methods of Assessment	Competency may be assessed through: 5.1 Third party report 5.2 Interview 5.3 Demonstration with questioning
6. Context for Assessment	Competency may be assessed in the work place or in a simulated work place setting

COMMON COMPETENCIES

UNIT OF COMPETENCY : APPLY SAFETY PRACTICES

UNIT CODE : MEE722201

UNIT DESCRIPTOR : This unit covers the competencies required to apply safety practices in the workplace.

ELEMENTS	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables
1. Identify hazards	1.1 ***Hazards*** are identified correctly in accordance with OHS principles. 1.2 Safety signs and symbols are identified and adhered to.
2. Use protective clothing and devices	2.1 Appropriate *protective* ***clothing and devices*** correctly selected and used in accordance with OHS requirements or industry/company policy
3. Perform safe handling of tools, equipment and materials	3.1 Safety procedures for pre-use check and operation of tools and equipment followed in accordance with industry/ company policies. 3.2 Tools, equipment and materials handled safely in accordance with OHS requirements and industry/ company policies.
4. Perform first aid	4.1 First aid treatment of ***injuries*** are carried out according to recommended procedures
5. Use fire extinguisher	5.1 Fire extinguisher selected and operated correctly according to the ***type of fire***.

RANGE OF VARIABLES

VARIABLE	RANGE
1. Hazards	1.1 Cluttered tools and materials 1.2 Slippery floors (caused by oil, grease or any liquid) 1.3 Exposed electrical wires 1.4 Sharp edges 1.5 Machine without guards or with exposed moving parts 1.6 Uncollected chips or other wastes etc.
2. Protective clothing and devices	Protective clothing and devices may include but is not limited to: 2.1 safety glasses/goggles 2.2 safety shoes 2.3 overalls 2.4 cap
3. Injuries	Injuries may include: 3.1 burns/scalds 3.2 fractures 3.3 cuts and abrasions 3.4 poisoning 3.5 foreign bodies in the eye 3.6 concussion 3.7 shock
4. Type of fires	Fires involving or caused by: 4.1 common combustibles (wood, cloth, paper, rubber and plastic) 4.2 flammable liquids (gasoline, oil, solvents, paints, etc.) 4.3 energized electrical equipment (wiring, fuse boxes, circuit breakers, appliances, etc. 4.4 combustible metals (magnesium, sodium, etc.)

EVIDENCE GUIDE

1. Critical aspects of Competency	Assessment requires evidence that the candidate: 1.1 identified hazardous area 1.2 used protective clothing and devices 1.3 handled tools, equipment and materials properly 1.4 performed first aid 1.5 used fire extinguisher
2. Underpinning knowledge and attitude	2.1 Shop safety signs, symbols and alarms 2.2 Safety precautionary measures 2.3 Housekeeping 2.4 Machine tools 2.5 First aid 2.6 Engineering materials 2.7 Fire extinguishers
3. Underpinning skills	3.1 Operating machine tools 3.2 Handling tools and materials 3.3 Communicating with superiors and co-workers 3.4 Interpreting instructions
4. Resource implications	The following resources **MUST** be provided 4.1 Tools, equipment and facilities appropriate to processes or activity 4.2 Materials relevant to the proposed activity
5. Method of assessment	Competency may be assessed through: 5.1 Demonstration 5.2 Written or oral short answer questions 5.3 Practical exercises
6. Context for assessment	Competency may be assessed in the workplace or in simulated workplace environment.

UNIT OF COMPETENCY : INTERPRET WORKING DRAWINGS AND SKETCHES

UNIT CODE : MEE722202

UNIT DESCRIPTOR : This unit covers the competencies required to read and interpret drawings and sketches.

ELEMENTS	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables
1. Interpret technical drawing	1.1 Components, assemblies or objects recognized as required. 1.2 Dimensions identified as appropriate. 1.3 Instructions identified and followed as required. 1.4 Material requirements identified as required. 1.5 Symbols recognized as appropriate in the ***drawing*.** 1.6 ***Tolerance***, limits and fits identified in the drawing.
2. Prepare freehand sketch of parts	2.1 Sketch drawn correctly and appropriately. 2.2 Sketch depicted objects or part appropriately. 2.3 Dimensions indicated in sketch are clear and correct. 2.4 Instructions included in sketch are clear and correct. 2.5 Base line or datum points indicated as required.
3. Interpret details from freehand sketch	3.1 Components, assemblies or objects recognized as required. 3.2 Dimensions identified as appropriate. 3.3 Instructions identified and followed as required. 3.4 Material requirements identified as required. 3.5 Symbols recognized as appropriate in the drawing.

RANGE OF VARIABLES

VARIABLE	RANGE
1. Drawing	1.1 Drawing technique include 1.1.1 Perspective 1.1.2 Exploded view 1.1.3 Hidden view technique 1.2 Projections 1.2.1 First angle projections 1.2.2 Third angle projections
2. Tolerance	2.1 General tolerance 2.2 Angular tolerance 2.3 Geometric tolerance

EVIDENCE GUIDE

1. Critical aspects of Competency	Assessment requires evidence that the candidate: 1.1 Interpreted technical drawing 1.2 Prepared sketches 1.3 Interpreted sketches.
2. Underpinning knowledge	2.1 Alphabet of lines 2.2 Projections 2.3 Drawing symbols 2.4 Dimensioning techniques 2.5 Tolerance, limits and fits 2.6 Engineering materials 2.7 Drawing tools and supplies
3. Underpinning skills	3.1 Handling tools and drawing instruments 3.2 Using measuring instruments
4. Resource implications	The following resources **MUST** be provided 4.1 Drafting room/facilities and drafting instruments and supplies appropriate to the activity 4.2 Measuring tools 4.3 Drawings, sketches or blueprint 4.4 Specimen parts/components
5. Method of assessment	Competency may be assessed through: 5.1 direct observation 5.2 written or oral short answer questions 5.3 demonstration 5.4 project/work sample 5.5 portfolio
6. Context for assessment	Competency may be assessed in the workplace or in simulated workplace environment.

UNIT OF COMPETENCY : PERFORM SHOP COMPUTATIONS (BASIC)

UNIT CODE : MEE722204

UNIT DESCRIPTOR : This unit covers the competencies required to perform basic calculations using the four fundamental operation.

ELEMENTS	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables
1. Perform four fundamental operations.	1.1 Simple calculations performed using ***four fundamental operations.*** 1.2 Simple calculations performed involving fractions and mixed numbers using four fundamental operations
2. Perform basic calculations involving fractions and decimals	2.1 Simple calculations are performed involving fractions and decimals using the four fundamental 2.2 operations. Decimal are converted into fraction (and vice versa) accurately,
3. Perform basic calculations involving percentages.	3.1 Simple calculations are performed to obtain percentages from information expressed in either fractional or decimal format
4. Perform basic calculation involving ration and proportion	4.1 Simple calculations are performed involving ratios and proportion using whole numbers, fractions and decimal fractions.
5. Perform calculations on algebraic expressions	5.1 Simple calculations are performed on ***algebraic expressions*** using the four fundamental operations. 5.2 Simple transposition of formulae is carried out to isolate the variable required, involving the four fundamental operations.

RANGE OF VARIABLES

VARIABLE	RANGE
1. Four fundamental operations	1.1 Addition 1.2 Subtraction 1.3 Multiplication 1.4 Division
2. Algebraic expressions	Calculation using formula for determining 2.1 tap drill size 2.2 feed 2.3 speed

EVIDENCE GUIDE

1. Critical aspects of Competency	Assessment requires evidence that the candidate performed calculations: 1.1 using four fundamental operations 1.2 involving fractions and mixed numbers 1.3 involving fractions and decimals 1.4 involving percentages 1.5 involving ratio and proportion 1.6 on algebraic expressions 1.7 of simple formulae
2. Underpinning knowledge and attitude	English and metric system of measurements
3. Underpinning skills	Performing calculations using pen and paper or on a calculator.
4. Resource implications	The following resources **MUST** be provided: 4.1 Tools, equipment and facilities appropriate to processes or activity 4.2 Materials relevant to the proposed activity
5. Method of assessment	Competency may be assessed through: 5.1 written or oral short answer questions 5.2 practical exercises
6. Context for assessment	Competency may be assessed in the workplace or in simulated workplace environment.

UNIT OF COMPETENCY : MEASURE WORKPIECE (BASIC)

UNIT CODE : MEE722205

UNIT DESCRIPTOR : This unit covers the competencies required to measure workpieces using measuring instruments such as steel rules, vernier calipers , micrometers, etc….

ELEMENTS	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables
1. Select and use measuring tools	1.1 ***Measuring tools*** are selected and used according to the level of accuracy required. 1.2 ***Measurements*** taken are accurate to the finest graduation of the selected measuring instrument. 1.3 Measuring technique used is correct and appropriate to the device used.
2. Clean and store measuring tools	2.1 Care and storage of devices undertaken to manufacturer's specifications or standard operating procedures.

RANGE OF VARIABLES

VARIABLE	RANGE
1. Measuring tools	Measuring tools include: 1.1 Steel tape 1.2 Steel rule 1.3 Straight edge 1.4 Combination square 1.5 Steel square 1.6 Divider or trammel 1.7 Caliper 1.8 Protractor 1.9 Vernier caliper 1.10 Micrometer
2. Measurements	2.1 length 2.2 diameter 2.3 depth 2.4 flatness 2.5 straightness 2.6 squareness

EVIDENCE GUIDE

1. Critical aspects of Competency	Assessment requires evidence that the candidate: 1.1 Selected and used measuring instruments 1.2 Cleaned and stored measuring instruments
2. Underpinning knowledge	2.1 Types, purposes and accuracy of measuring instruments 2.2 Capability of measuring instruments 2.3 Part dimensions and tolerances 2.4 Techniques for measuring dimensions 2.5 Care and storage procedure of measuring tools
3. Underpinning skills	3.1 Safe handling of measuring tools and materials
4. Resource implications	The following resources **MUST** be provided 4.1 Tools, equipment and facilities appropriate to the activity 4.2 Specimen component or part to the proposed activity
5. Method of assessment	Competency may be assessed through: 5.1 direct observation 5.2 demonstration 5.3 written or oral short answer questions 5.4 portfolio
6. Context for assessment	Competency may be assessed in the workplace or in simulated workplace environment.

CORE COMPETENCIES

UNIT OF COMPETENCY : PREPARE BASIC ENGINEERING DRAWING

UNIT CODE : MEE311301

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to prepare basic engineering drawings .

ELEMENTS	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables
1. Identify drawing requirements	1.1 Specifications and other data are determined from customer, work specification, actual sample or relevant documents. 1.2 Drawing requirements are verified by ***relevant personnel*** and timeframes for completion are established in accordance with standard operating procedures.
2. Prepare engineering drawing or make changes to existing drawings	2.1 ***Drafting principles*** are applied to produce a drawing that is consistent with standard operating procedures. 2.2 Dimensions, notes and specifications are indicated in the drawing in accordance with drafting principles and standards 2.3 Drafting is accomplished safely and to prescribed procedures 2.4 Completed drawing is presented for approval in accordance with standard operating procedures
3. Prepare engineering parts list	3.1 Component parts are identified and organized by component type and/or in accordance with company/customer requirements 3.2 Drawings and/or parts lists ***records*** are completed in accordance with standard operating procedures.
4. Issue approved drawing	4.1 Approved drawing and/or parts lists are copied and ***issued*** to relevant personnel in accordance with standard operating procedures. 4.2 Approved drawings and/or parts lists are stored and catalogued in accordance with standard operating procedures.

RANGE OF VARIABLES

VARIABLE	RANGE
1. Relevant personnel	Personnel involve include 1.1 supervisor 1.2 technical personnel 1.3 manufacturers 1.4 suppliers 1.5 contractors 1.6 customers
2. Drafting principles	Drawings are prepared in accordance with: 2.1 local standards 2.2 international standards
3. Records	Drawing records may include: 3.1 cataloguing 3.2 issuing security classifications 3.3 filing 3.4 preparing distribution lists
4. Issued	Drawing issued are in the form of: 4.1 hard copy 4.2 photographic 4.3 slide or transparency form including presentation as a single drawing and/or with other drawings 4.4 support documentation as a package

EVIDENCE GUIDE

1. Critical aspects of Competency	Assessment requires evidence that the candidate: 1.1 identified drawing requirements 1.2 prepared engineering .drawing or made changes to existing drawing 1.3 prepared engineering parts list 1.4 issued approved drawing
2. Underpinning knowledge and attitude	2.1 Types and uses of drafting equipment and drawing instruments 2.2 Requirements and purpose of the engineering drawing and/or parts list 2.3 Sources of relevant data/information 2.4 Drafting principles to be applied in the preparation of drawing 2.5 Drawing symbols and standards 2.6 Isometric, orthographic and exploded view drafting 2.7 Tolerances and fits 2.8 Shop mathematics (geometric principles and trigonometric functions 2.9 Types and forms of supply of engineering materials 2.10 Types and uses of measuring instruments (scale, steel rule, vernier caliper, micrometer, universal protractor) 2.11 Basic machine shop operations 2.12 Procedures in checking, recording, copying and issuing completed drawings and/or parts lists 2.13 Procedures for safe handling, filing and storage of drawings and/or parts lists 2.14 Pattern development procedures for sheet metal work 2.15 Safe work practices
3. Underpinning skills	3.1 Using drafting equipment and instruments 3.2 Using measuring instruments 3.3 Reading and interpreting drawings and sketches 3.4 Performing basic mathematical computations 3.5 Communication skills
4. Resource implications	The following resources **MUST** be provided: 4.1 Drafting tools, equipment and facilities appropriate to activity 4.2 Materials relevant to the proposed activity 4.3 Drawings, sketches and product sample 4.4 Precision measuring instruments (Vernier, micrometer, universal protractor, etc.)
5. Method of assessment	Competency may be assessed through: 5.1 Observation with questioning 5.2 Demonstration with questioning 5.3 Written examination 5.4 Portfolio
6. Context for assessment	Competency may be assessed in the workplace or in simulated workplace environment.

UNIT OF COMPETENCY : **PERFORM BASIC ENGINEERING DETAIL DRAFTING**

UNIT CODE : **MEE311302**

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitude required to prepare basic engineering detail drawings.

ELEMENTS	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables
1. Prepare assembly, layout and detail drawings	1.1 ***Drawings*** are prepared in accordance with local or international standards 1.2 Layout, assembly and component drawings are prepared consistent with the specifications 1.3 Drawings are dimensioned and labeled using supplied tolerances in accordance with relevant local and international standards 1.4 Drawing are produced to specification in accordance with standard operating procedures 1.5 Standard drawing symbols are used to specify requirements in accordance with local or international standards or equivalent 1.6 Drawing requirements are verified by ***relevant personnel*** and timeframes for completion are established in accordance with standard operating procedures.
2. Determine component and/or material requirement	2.1 Components and/or materials are selected from supplier/ manufacturer's catalogues using design specifications
3. Issue approved drawing	3.1 Completed drawing is presented for approval in accordance with standard operating procedures 3.2 Approved drawings are copied and ***issued*** to relevant personnel in accordance with standard operating procedures. Approved drawings are stored and catalogued in accordance with standard operating procedures.

RANGE OF VARIABLES

VARIABLE	RANGE
1. Drawings	Drawings are prepared in: 1.1 plane octagonal 1.2 isometric projection or equivalent including auxiliary views and sections
2. Relevant personnel	Personnel involve include 2.1 supervisor 2.2 technical personnel 2.3 manufacturers 2.4 suppliers 2.5 contractors 2.6 customers
3. Issued	Drawing issued are in the form of: 3.1 hard copy 3.2 photographic 3.3 slide or transparency form including presentation as a single drawing and/or with other drawings 3.4 support documentation as a package

EVIDENCE GUIDE

1. Critical aspects of Competency	Assessment requires evidence that the candidate: 1.1 prepared assembly, layout and detail drawings 1.2 determined component and/or material requirement 1.3 issued approved drawing
2. Underpinning knowledge and attitude	2.1 Types and uses of drafting equipment and drawing instruments 2.2 Requirements and purpose of the engineering drawing 2.3 Sources of relevant data/information 2.4 Drafting principles to be applied in the preparation of drawing 2.5 Drawing symbols and standards 2.6 Isometric, orthographic and exploded view drafting 2.7 Tolerances and fits 2.8 Shop mathematics (geometric principles and trigonometric functions 2.9 Types and forms of supply of engineering materials 2.10 Types and uses of measuring instruments (scale, steel rule, vernier caliper, micrometer, universal protractor) 2.11 Basic machine shop operations 2.12 Procedures in checking, recording, copying and issuing completed drawings and/or parts lists 2.13 Procedures for safe handling, filing and storage of drawings 2.14 Safe work practices
3. Underpinning skills	3.1 Using drafting equipment and instruments 3.2 Using measuring instruments 3.3 Reading and interpreting drawings and sketches 3.4 Performing basic mathematical computations 3.5 Communication skills
4. Resource implications	The following resources **MUST** be provided: 4.1 Drafting tools, equipment and facilities appropriate to activity 4.2 Materials relevant to the proposed activity 4.3 Drawings, sketches and/or product sample 4.4 Precision measuring instruments (Vernier, micrometer, universal protractor, etc.)
5. Method of assessment	Competency may be assessed through: 5.1 Observation with questioning 5.2 Demonstration with questioning 5.3 Written examination 5.4 Portfolio
6. Context for assessment	Competency may be assessed in the workplace or in simulated workplace environment.

SECTION 3. TRAINING STANDARDS

These guidelines are set to provide the Technical and Vocational Education and Training (TVET) providers with information and other important requirements to consider when designing training programs for MECHANICAL DRAFTING NC I.

3.1 CURRICULUM DESIGN

Course Title: **MECHANICAL DRAFTING** NC Level: **NC I**

Nominal Training Duration : 218 Hours

This qualification is designed to develop knowledge, desirable attitudes and skills in Mechanical Drafting NC I.

It covers the competencies required to Prepare Basic Engineering Drawing and Perform Basic Engineering Detail Drafting.

To obtain this, all units of competency prescribed for this qualification must be achieved.

BASIC COMPETENCIES

Unit of Competency	Learning Outcomes	Methodology	Assessment Approach
1. Receive and respond to workplace communication	1.1 Explain routinary speaking & messages in a workplace 1.2 Follow routinary speaking & messages 1.3 Perform work duties following written notices	• Group discussion • Interaction	• Interviews/ questioning • Observation
2. Work with others	2.1 Develop effective workplace relationship 2.2 Contribute to work group activities	• Group discussion • Interaction	• Interviews/ questioning • Demonstration • Observation
3. Demonstrate work values	3.1 Define the purpose of work 3.2 Apply work values/ ethics 3.3 Deal with ethical problems 3.4 Maintain integrity of conduct in the workplace	• Group discussion • Interaction	• Demonstration • Observation • Interviews/ questioning

4. Practice housekeeping procedures	4.1 Sort and remove unnecessary items 4.2 Arrange items 4.3 Maintain work areas, tools and equipment 4.4 Follow standardize work process and procedures 4.5 Perform work spontaneously	• Group discussion • Interaction	• Demonstration • Observation • Interviews/ questioning

COMMON COMPETENCIES

Unit of Competency	Learning Outcomes	Methodology	Assessment Approach
1. Apply safety practices	1.1 Identify hazards 1.2 Use protective clothing and devices 1.3 Perform safe handling of tools, equipment and materials 1.4 Perform first aid 1.5 Use fire extinguisher	• Lecture • Group discussion • Interaction • Role playing / Simulation	• Observation • Demonstration • Interview / Questioning
2. Interpret working drawing and sketches	2.1 Interpret technical drawing 2.2 Prepare freehand sketch of parts 2.3 Interpret details from freehand sketch	• Lecture • Group discussion • Interaction	• Observation • Interview / Questioning
3. Perform shop computations (Basic)	3.1 Perform four fundamental operations 3.2 Perform basic calculations involving fractions and decimals 3.3 Perform basic calculations involving percentages 3.4 Perform basic calculations involving ration and proportion 3.5 Perform calculations on algebraic expressions	• Lecture • Demonstration • Practical exercise	• Demonstration • Observation • Performance test • Interview / Questioning

4. Measure workpiece (Basic)	4.1 Select and use measuring tools 4.2 Clean and store measuring tools	• Lecture • Demonstration • Practical exercise	• Demonstration • Observation • Performance test • Interview / Questioning

CORE COMPETENCIES

Unit of Competency	Learning Outcomes	Methodology	Assessment Approach
1. Prepare basic engineering drafting	1.1 Identify drawing requirements 1.2 Prepare engineering drawing or make changes to existing drawings 1.3 Prepare engineering parts list	• Lecture/ discussion • Self-paced instructions • Demonstration	• Written or oral • Demonstration
2. Perform basic engineering detail drafting	2.1 Prepare assembly, layout and detail drawings 2.2 Determine component and/or material requirement and issue approved drawing	• Lecture/ discussion • Self-paced instructions • Demonstration	• Written or oral • Demonstration

3.2 TRAINING DELIVERY

The delivery of training should adhere to the design of the curriculum. Delivery should be guided by the 10 basic principles of Competency-Based TVET.

- The training is based on curriculum developed from the competency standards;
- Learning is modular in its structure;
- Training delivery is individualized and self-paced;
- Training is based on work that must be performed;
- Training materials are directly related to the competency standards and curriculum modules;
- Assessment is based in the collection of evidence of the performance of work to the industry required standard;
- Training is based both on and off-the –job component;
- Allows for the recognition of prior learning (RPL) or current competencies;
- Training allows for multiple entry and exit ; and
- Approved training programs are nationally accredited.

The competency-based TVET system recognizes various types of delivery modes, both on and off-the–job as long as the learning is driven by the competency standards specified by the industry. The following training modalities may be adopted when designing training programs:

- The dualized mode of training delivery is preferred and recommended. Thus programs would contain both in school and in-industry training of fieldwork components. Details can be referred to the Dual Training System (DTS) Implementing Rules and Regulations

- Modular / self-paced learning is a competency- based training modality wherein the trainee is allowed to progress at his own pace. The trainer facilitates the training delivery

- Peer teaching / mentoring is training modality wherein fast learners are given the opportunity to assist the slow learners.

- Supervised industry training or on-the-hob training is an approach in training designed to enhance the knowledge and skills of the trainee through actual experience in the workplace to acquire specific competencies prescribed in the training regulations.

- Distance learning is formal education process in which majority of the instruction occurs when the students and instructor are not in the same place. Distance learning may employ correspondence study, or audio, video or computer technologies.

3.3 TRAINEE ENTRY REQUIREMENTS

This section specifies the qualifications of trainees and educational experience. Other requirements like health and physical requirements are also stated. Passing entry written examinations may also be indicated if necessary.

- Must be high school graduate
- With good moral character
- Ability to communicate
- Physically and mentally fit

3.4 LIST OF TOOLS, EQUIPMENT AND MATERIALS MECHANICAL DRAFTING NC I

Recommended list of tools, equipment and materials for the training of 25 trainees for Mechanical Drafting NC I

TOOLS					
QTY		**QTY**		**QTY**	
Drawing Instruments:					
25 pcs.	• Drawing table	25 pcs.	• Protractor	25 pcs	• Compass
25 pcs.	• 30 x 60 degrees triangle	25 pcs	• Ruler	2 5set	• Drawing pencil
25 pcs.	• 45 degrees triangle	25 pcs.	• Scale Ruler 12 “	25 pcs	• Triangular scale
Measuring Tools:					
25 pcs	• Scale	15 pcs.	• Vernier caliper 200mm	15 pcs.	• Micrometer 50-75
25 pcs.	• Protractor	10 pcs.	• Gauges	10 pcs.	• Sine bars

Safety Device:					
1 box	• First –Aid kit	25 pcs	• Safety shoes		
4 cyl	• Fire extinguisher				

EQUIPMENT					
QTY		**QTY**		**QTY**	
1 unit	Photocopier machine				
MATERIALS					
	• Drawing paper		▪ A4 folders		▪ Drawing binders
	• White prints		▪		▪
Training Materials:					
	▪ Reference books ▪ Manuals		▪ Catalogs ▪ Brochures /		▪ CD s / Video tape

Housekeeping materials:					
20 pcs	▪ Brooms	10 pcs	▪ Mops	2 pcs.	▪ Trash can
10 pcs	▪ Scrapers	2 bars	▪ Soap		▪
10 k	▪ Clean rags	5 pcs	▪ Dustpan		

3.5 TRAINING FACILITIES
MECHANICAL DRAFTING NC I

The Drafting workshop must be of concrete structure. Based on class size of 25 students/trainees the space requirements for the teaching/learning and circulation areas are as follows:

SPACE REQUIREMENT	SIZE IN METERS	AREA IN SQ. METERS	TOTAL AREA IN SQ. METERS
• Building (permanent)	10 M X 30 M		300 Sq. M
▪ Trainee working space	2 M X 2 M	4 Sq.M / trainee	100 sq. M.
▪ Lecture Room	8 M X 10 M	80 Sq. M.	80 Sq. M
▪ Learning Resource Center	4 M X 8 M.	32 Sq. M	32 Sq. M
▪ Facilities/ Equipment/ Circulation Area			88 Sq. M.

3.6 TRAINER'S QUALIFICATIONS FOR METALS AND ENGINEERING SECTOR

TRAINER QUALIFICATION (TQ I)

- Must be a holder of Mechanical Drafting NC I
- Must have undergone training on Training Methodology I (TM I)
- Must be computer literate
- Must be physically and mentally fit
- *Must have at least 2 years job/industry experience
- Must be a civil service eligible (for government position or appropriate professional license issued by the Professional Regulatory Commission)

*** Optional. Only when required by the hiring institution.**

Reference: TESDA Board Resolution No. 2004 03

3.7 INSTITUTIONAL ASSESSMENT

Institutional assessment is undertaken by trainees to determine their achievement of units of competency. A certificate of achievement is issued for each unit of competency.

SECTION 4 NATIONAL ASSESSMENT AND CERTIFICATION ARRANGEMENTS

4.1 To attain the National Qualification of Mechanical Drafting NC I, the candidate must demonstrate competence in all the units of competency listed in Section 1. Successful candidates shall be awarded a National Certificate signed by the TESDA Director General.

4.2 Assessment shall focus on the core units of competency. The basic and common units shall be integrated or assessed concurrently with the core units.

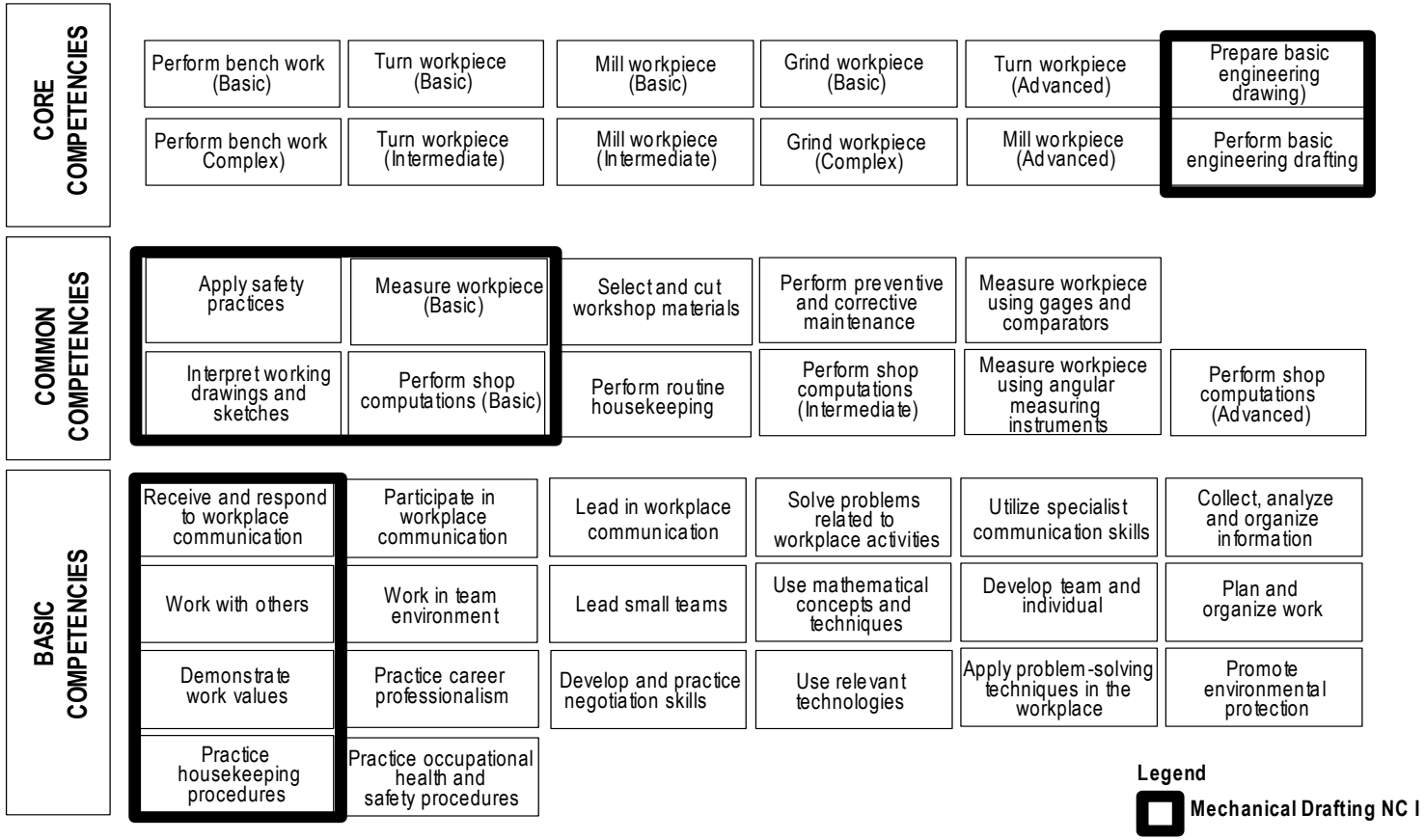
4.3 The following are qualified to apply for assessment and certification:

4.3.1 Graduates of formal, non-formal and informal including enterprise-based training programs.

4.3.2 Experienced workers (wage employed or self employed)

4.4 The guidelines on assessment and certification are discussed in detail in the "Procedures Manual on Assessment and Certification" and "Guidelines on the Implementation of the Philippine TVET Qualification and Certification System (PTOQS)".

Supermarket of Competencies
Metals and Engineering Sector
MACHINING



Definition of Terms

Drafting	The making of drawings of objects, structures or systems that have been visualized by engineers and others
Mechanical drawing	Drawing with the aid of instruments
Drafting machine	A mechanical device to aid in drafting, having two straight edges fixed perpendicularly to each other
Isometric projection	A drawing that shows an object's inclined position with respect to the planes of projection
Orthographic projection	A perspective projection of one hemisphere produced by straight parallel lines from any point desired from an infinite distance
Scale drawing	A drawing of an object or structure showing all parts in the same proportion of their actual size
Tolerance	A permissible deviation from a specified value, expressed in actual values or more often as a percentage of the nominal value
Limits	The maximum and minimum values prescribed for a specific dimension; the limits may be of size if dimension concerned is size dimension, or may be of location if the dimension concerned is a location dimension
Fit	The dimensional relationship between mating parts, such as press, shrink or sliding fit

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