STANDARD KEMAHIRAN PEKERJAAN KEBANGSAAN
(NATIONAL OCCUPATIONAL SKILLS STANDARD)

F433-001-2:2017

BUILDING GLASS AND ALUMINIUM INSTALLATION

LEVEL 2

JPK

Jabatan Pembangunan Kemahiran
Kementerian Sumber Manusia, Malaysia

Department of Skills Development (DSD)

Federal Government Administrative Centre

62530 PUTRAJAYA, MALAYSIA

STANDARD KEMAHIRAN PEKERJAAN KEBANGSAAN

(NATIONAL OCCUPATIONAL SKILLS STANDARD)

FOR

BUILDING GLASS AND ALUMINIUM INSTALLATION

LEVEL 2

GLOSSARY & ABBREVIATION

GLOSSARY

Aluminium Profiles	Integrated shape of aluminium extrusion in variant shape
Door Schedule	a tabulation, usually on a drawing, listing all the door by size, specification and location
Frame Member	assembly of Outer/Inner frame that have more than one component
Sash	a framework of a window that holds the glass
Shop Drawing	Detail construction and fabrication drawing that show the proposed material, shape, size and assembly of the parts, and how the entire unit will be installed.
Wall Partition/Schedule Drawing	a drawing listing all the wall construction details by size, specification location, and hardware requirement.
Window Schedule	a tabulation, usually on a drawing, listing all windows on a project, and indicating sizes, number of light, type of sash and frame, and hardware requirement.

ABBREVIATION

CAGR	Compound Annual Growth Rate
CIDB	Construction Industry Development Board
CITP	Constructruction Industry Transformation Program
GDP	Gross Domestic Products
GHG	Greenhouse Gases
GNI	Gross National Income
NOSS	National Occupational Skill Standard

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STANDARD PRACTICE

NATIONAL OCCUPATIONAL SKILLS STANDARD (NOSS) FOR; BUILDING GLASS AND ALUMINIUM INSTALLATION LEVEL 2

1. INTRODUCTION

The construction industry is crucial to the Malaysian economy and its growth. The sector is becoming more important due to higher demand for modern and efficient infrastructure in line with the aim of becoming an advanced nation. The construction industry currently contributes 4 per cent to the Malaysian Gross Domestic Product (GDP) and is expected to contribute 5.5 per cent to the Malaysian GDP up to 2020.

The industry provides significant employment opportunities with a registered workforce of 1.226 million, representing 9.06 % of Malaysia's total workforce, out of which 75 per cent of the workforce in the construction industry are Malaysian resident. Employees in the industry include professionals such as engineers, architects, planners, and surveyors, in addition to skilled and non-skilled construction workers.

Figure 1.1 Number of employed person by Industries 2010-2014

No. of Employed Person by Industries 2010 -2014		
Year	Construction	Total
2010	1,082,700	11,899,500
2011	1,133,600	12,284,400
2012	1,163,700	12,723,200
2013	1,244,100	13,210,000
2014	1,226,400	13,532,100

Source: Dept. of Statistics Malaysia, 2015 based on MSIC 2008

Construction industry occupies a key position in the Economic Transformation Programme (ETP). Four strategic thrusts have been identified to guide the transformation and continued development of the construction industry which includes, Quality, Safety and Professionalism; Environmental Sustainability; Productivity; andInternationalisation. As of fourth quarter 2015, the value of construction done by private and public sector reached RM20.5 billion and RM9.7 billion respectively.

The Glass and Aluminium Installation is becoming an increasingly important nowadays. In the last decade, the industry has undergone very rapid and fundamental changes with the booming economic growth which spurred the building of more commercial centres, emergence of new high rise building which exceeding 150m and 450m height categories, and Malaysia commitment on reducing greenhouse gas (GHG) emission intensity of its

Gross Domestic Product (GDP) by up to 40 per cent by 2020, through a resilient, low-carbon, resource-efficient, and socially-inclusive manner, with the incorporation of energy efficient glass building.

Glass and Aluminium Installation underpins the growth and development of all areas in the Construction based industry. The demand for qualified and experienced operators and supervisors is critical as of now and will increase rapidly in the near future. Hence, the development of this NOSS is essential for the industry to have a certain guideline and standard based on the level of competencies that have been set by the industrial expert in this field. The rational of developing this NOSS document is for the purpose of benchmarking and most of all for the purpose of conducting training for the future generation.

Regulatory and statutory bodies in Malaysia:

- Construction Industry Development Board (CIDB)–authority and the regulator which is responsible in the construction industry.
- JabatanPengurusanSisaPepejalNegera (JPSPN) – authority and regulator which is responsible for solid waste management and public cleansing
- PertubuhanAkitek Malaysia(PAM)–promote the advancement of architecture for the betterment of society

Under the Glass and Aluminium Installationsector, there are a few acts and regulation to be followed, such as

- Act A328 of Building Operations and Works of Engineering Construction (Safety Regulations) of Factories and Machinery Act 139 (Amendment) 1986
- Act A1268 of Factories and Machinery Act 139 (Amendment) 2006
- Act A1407 of Lembaga Pembangunan IndustriPembinaan Malaysia of Act 520 (Amendment) 2011,
- Act 514 of Occupational Safety and Health Act 1994 (Amendment) 2006.
- Act 672 of The Solid Waste Management and Public Cleansing Act 2007

The minimum requirements for those interested to pursue in this Glass and Aluminium Installation occupational is 18 years of age and passed CIDB Green Card requirements.

2. OCCUPATIONAL STRUCTURE (OS)

Occupational Structure shows career pathway for particular occupation derived from Occupational Analysis (OA) process. This table describes the Industry Sector, Sub-sector, Job Area, Job Title and Level of an occupation based on information gathered from needs analysis or industries input.

Table 2.1 shows the Occupational Structure (OS) for Glass and Aluminium Installation job area with job-titles classified according to MSIC 2008, as in the Building, Completion and Finishing sub-sector. The Occupational Structure for this NOSS is highlighted.

The Glass and Aluminium Installation (Level 2) personnel are usually called the Installer, as the job involves performing a significant range of varied work activities in a variety of contexts. Installer were assigned the responsibility for their work and will work under the supervision. Some of the activities performed are non-routine and required individual responsibility and autonomy.

3. OCCUPATIONAL AREA STRUCTURE (OAS)

The Occupational Area Structure for the Glass and Aluminium Installation sub-sector is shown in Table 3.1 which shows that some job areas require the same competency to perform different job functions.

Table 3.1: Occupational Area Structure for Building Glass and Aluminium Installation

SECTOR	**CONSTRUCTION (F)**
SUB-SECTOR	**BUILDING, COMPLETION AND FINISHING (43)**
AREA	**GLASS AND ALUMINIUM INSTALLATION (301)**
Level 5	GLASS AND ALUMINIUM MANAGEMENT
Level 4	GLASS AND ALUMINIUM TECHNICAL ADMINISTRATION
Level 3	GLASS AND ALUMINIUM INSTALLATION
Level 2	GLASS AND ALUMINIUM INSTALLATION
Level 1	Embedded Into Level 2

Table 2.1: Occupational Structure for Building Glass and Aluminium Installation.

Sector	(C) MANUFACTURING			(F) CONSTRUCTION	(C) MANUFACTURING			(C) MANUFACTURING		
Sub-Sector	(23) MANUFACTURE OF GLASS AND GLASS PRODUCTS	(25) MANUFACTURE OF FABICATED METAL PRODUCT EXCEPT MACHINERY AND EQUIPMENT		(43) BUILDING, COMPLETION AND FINISHING	(29)MANUFACTURE OF MOTOR VEHICLE			(30) MANUFACTURE OF OTHER TRANSPORT EQUIPMENT		
Area	(101) MANUFACTURE OF FLAT GLASS, INCLUDING WIRED, COLORED OR TINTED FLAT GLASS	(113) MANUFACTURE OF METAL DOORS, WINDOWS AND THEIR FRAMES, SHUTTER AND GATES		(301) GLASS AND ALUMINIUM INSTALLATION	(200) MANUFACTURE OF BODIES COACHWORK FOR MOTOR VEHICLE			(200) MANUFACTURE OF RAILWAY LOCOMOTIVES AND ROLLING STOCK		
JOB AREA	GLASS	ALUMINIUM	ASSEMBLY	INSTALLATION	GLASS	ALUMINIUM	FIXER	GLASS	ALUMINIUM	FIXER
Level 5	PROJECT MANAGER	PROJECT MANAGER		PROJECT MANAGER	MANAGER			MANAGER		
Level 4	TECHNICAL EXECUTIVE	TECHNICAL EXECUTIVE		CONSTRUCTION SUPERINTENDANT	TECHNICAL EXECUTIVE			TECHNICAL EXECUTIVE		
Level 3	SUPERVISOR	SUPERVISOR	SUPERVISOR	SUPERVISOR / FOREMAN	SUPERVISOR	SUPERVISOR	SUPERVISOR	SUPERVISOR	SUPERVISOR	SUPERVISOR
Level 2	GLASS CUTTER	ALUMINIUM CUTTER	GLASS AND ALUMINIUM ASSEMBLER	GLASS AND ALUMINIUM INSTALLER	GLASS CUTTER	ALUMINIUM CUTTER	GLASS AND ALUMINIUM FIXER	GLASS CUTTER	ALUMINIUM CUTTER	GLASS AND ALUMINIUM FIXER
Level 1	NO LEVEL	NO LEVEL	NO LEVEL	NO LEVEL	NO LEVEL	NO LEVEL	NO LEVEL	NO LEVEL	NO LEVEL	NO LEVEL

4. DEFINITION OF COMPETENCY LEVELS

The NOSS is developed for various occupational areas. Candidates for certification must be assessed and trained at certain levels to substantiate competencies. Below is a guideline of each NOSS Level as defined by the Department of Skills Development, Ministry of Human Resources, Malaysia.

Level 1: Competent in performing a range of varied work activities, most of which are routine and predictable.

Level 2: Competent in performing a significant range of varied work activities, performed in a variety of contexts. Some of the activities are non-routine and required individual responsibility and autonomy.

Level 3: Competent in performing a broad range of varied work activities, performed in a variety of contexts, most of which are complex and non-routine. There is considerable responsibility and autonomy and control or guidance of others is often required.

Level 4: Competent in performing a broad range of complex technical or professional work activities performed in a wide variety of contexts and with a substantial degree of personal responsibility and autonomy. Responsibility for the work of others and allocation of resources is often present.

Level 5: Competent in applying a significant range of fundamental principles and complex techniques across a wide and often unpredictable variety of contexts. Very substantial personal autonomy and often significant responsibility for the work of others and for the allocation of substantial resources features strongly, as do personal accountabilities for analysis, diagnosis, planning, execution and evaluation.

5. AWARD OF CERTIFICATE

The Director General shall award, to any person upon completing successfully the NOSS program following skills level qualifications as stipulated under the National Skills Development Act, 652:

- Malaysia Skills Certificate / Sijil Kemahiran Malaysia (SKM) Level 1, 2 or 3
- Malaysia Skills Diploma / Diploma Kemahiran Malaysia (DKM) Level 4
- Malaysia Skills Advanced Diploma / Diploma Lanjutan Kemahiran Malaysia (DLKM) Level 5
- Statement of Achievement / Penyata Pencapaian (PC)

6. JOB COMPETENCIES

TheBuilding Glass and Aluminium Installation (Level 2) personnel is competent in performing the following core competencies:-

a. Partition Wall Installation
b. Sliding Glass and Aluminium Installation
c. Casement and Top Hung Window Installation
d. Shop Front Installation
e. Curtain Wall Installation

7. WORK CONDITIONS

Glass and Aluminium Installation personnel cut, fit, install and replace glass in residential, commercial and industrial buildings, on exterior walls and other structures storefronts of a buildings.The work is physically demanding, whereby the personnel may handling large, awkward, heavy sheets of glass. The personnel spend most of the day standing, bending, or stretching, and they often must lift and manoeuvre heavy, cumbersome materials, such as large glass plates in a difficult postures, which may cause back and arm injuries. They also work at heights, including work on ladders and scaffolds, which expose them to the risks of slips, trips and falls.

The job requires them to cuts and lacerations from sharp edges of glass, which might injure eyes from flying particles when cutting and grinding glass. Moreover they are exposed to dust from cutting, grinding, drilling and polishing of glass and aluminium profiles. Besides, they are exposures to solvents in adhesives, sealants and cleaning products which may affect their health.

The standard working hours for Glass and Aluminium Installation is 40 hours, and during peak periods that will require to work overtime. The number of additional hours vary from one job to another. The personnel may be working indoors or outdoors, alone or with a team of other construction professionals.

In most large-scale construction jobs, glass is pre-cut and mounted into frames at a factory or a contractor's shop. The finished glass arrives at the jobsite ready for installer to position and secure them into place. Using cranes or hoists with suction cups, installer lift large, heavy pieces of glass for installation. In cases where the glass is not secure inside the frame, installer may attach steel and aluminium sashes or frames to the building, and then secure the glass with clips, moldings, or other types of fasteners.

The personnel who are working in Glass and Aluminium Installation are required to wear protection attire in order to comply with the occupational health and safety requirements, and practice due diligent when handling sharp, heavy material, and operating machine tools.

8. EMPLOYMENT PROSPECTS

The demand for Glass and Aluminium Installer is dependent upon economic growth, as the demand is related to income and living standards. The construction of commercial and high rise building in Malaysia are expanding, and currently there are 51 high-rise building with elevation of more than 150m being constructed throughout the nation.

The Employment opportunities for Glass and Aluminium Installation Level 2 personnel are as below:

- Consultant Firms
- Train and Bus Fabricators
- Glass and Aluminium Contractor
- Pre-Fabricated Aluminium and Glass Manufacturer

The building code and standards practices in Malaysia are as the following:

- Overall Thermal Transfer Value (OTTV) of Residential Buildings in Malaysia,
- MS 2095:2008, Radiant barrier building materials
- MS 1135:2009, Float and polished plate glasses - Specification (First revision),
- MS 1498:2011, Safety glass in building - Safety performance specification (First revision),
- MS 2397:2011, Solar reflective glass – Specification,

The global market for construction glass is projected to grow at a CAGR of 7.31% during the period 2016-2020, to reach $115,083.65 Million by 2020. The Asia-Pacific region is projected to become the fastest-growing market for construction glass with a share of 57% due to an increase in spending on constructing skyscrapers. As of June 2015, there are over 400 skyscrapers under construction, and over 2,000 new airport construction projects with a total investment of over $200 billion, where the majority of them are in the Asia-Pacific region.

In the United States of America, Aluminium and Glazing Installation employment is projected to grow 4 percent annually from 2014 to 2024. Employment growth is expected as architects are designing more buildings with glass exteriors due to continuous improvement in the energy efficiency of glass windows and laminated glass.

The employment opportunities internationally for Glass and Aluminium Installation Level 2 personnel are as below:

- Consultant Firms
- Train and Bus Fabricators
- Glass and Aluminium Contractor
- Pre-Fabricated Aluminium and Glass Manufacturer
- Aerospace industries
- Submarines industries

Some of the codes and standards practices applied internationally are as follows:

- Singapore standard for Envelope Thermal Transfer Value (ETTV),
- Australian Building Code (ABC) energy efficiency Deemed-to-Satisfy Provisions for NCC 2014, NCC 2015 and NCC 2016.

9. CAREER ADVANCEMENT

The personnel in this industry are eligible to works in local and international glass and aluminium installer and fabricator, provided they have acquired certain level of certification and working experience.

10. SOURCES OF ADDITIONAL INFORMATION

The following organisations can be referred as sources of additional information which can assist in defining the document's contents.

Local

- Pertubuhan Akitek Malaysia (PAM)
  Wisma Bandar, Level 11,
  No 18 Jalan Tuanku Abdul Rahman,
  50100 Kuala Lumpur, Malaysia
  Tel: (+603) 2693 4182
  Fax: (+603) 2692 8782
  Website: www.pam.org.my/

International

- American Architectural Manufacturers Association (AAMA)
  1827 Walden Office Square, Suite 104
  Schaumburg, Illinois, 60173.
  Tel: (847) 303 – 5664
  Fax: (847) 303 – 5774
  Website: www.aamanet.org

- Glass Association of North America. (GANA)
  800 SW Jackson St., Suite 1500
  Topeka, Kansas 66612 – 1200
  Tel: (785) 271 – 0208
  Website: www.glasswebsite.com/

11. ACKNOWLEDGEMENT

The Director General of DSD would like to extend his gratitude to the organisations and individuals who have been involved in developing this standard; especially members of Standard Technical Evaluation Committee (STEC) for having been involved in developing and validating this document.

STANDARD TECHNICAL EVALUATION COMMITTEE (STEC)		
1.	Dato. Othman Bin Ahmad	Chairman Kelab Usahawan Binaan IBS Satu Malaysia (KUBIM)
2.	En. Jefry Bin Hassan	Project Manager Majutera Sdn. Bhd.
3.	En. MohdRashidi Bin Ramle	Director Triple Consult and Resources Sdn. Bhd.
4.	En.Azizon Bin Abdul Ghani	Director R.I.S.Enterprise Sdn. Bhd
5.	En, Hairudin Bin Mohamad	Researcher Fakulti Kejuruteraan Awam dan Alam Sekitar Universiti Tun Hussein Onn, Malaysia

12. NOSS DEVELOPMENT COMMITTEE MEMBERS

BUILDING GLASS AND ALUMINIUM INSTALLATION (LEVEL 2)		
1.	Zainal Abidin bin Sin	Senior Assistant Director Cawangan Kerja Bangunan Am Jabatan Kerja Raya Malaysia (JKR)
2.	Mohamad Yusrey Bin Mahat	General Manager Cawangan Kerja Pembinaan Jabatan Kerja Raya Malaysia (JKR)
3.	Muhamad Saiful Bin Muhamad Ghous	General Manager Pantas Hebat Sdn. Bhd.
4.	Azman Bin Sani	Director Kuorum Sdn. Bhd.
5.	Mazni Bin Amat	Production Manager Capstone Aluminium Sdn. Bhd.
6.	Mohd. Husni Bin Idin	Technical Manager Frontier Autotech Sdn. Bhd.
7.	Yuanti Binti Mohamed	Manager CIDB-IBS Centre
8.	Ariffin Bin Mamat	Building Instructor Akademi Binaan Malaysia
9.	Yusri Bin Mahmud	Project Manager (Installation) Pembinaan Reka Cipta
10.	Mohd Ezanee Bin Fauzi	Senior Supervisor (Installation) Iskalia Aluminium and Glass Services
FACILITATOR		
1.	Mohd. Akhbar Bin Yahya	International Islamic Research Academy (I-IRA) Sdn. Bhd.

STANDARD CONTENT

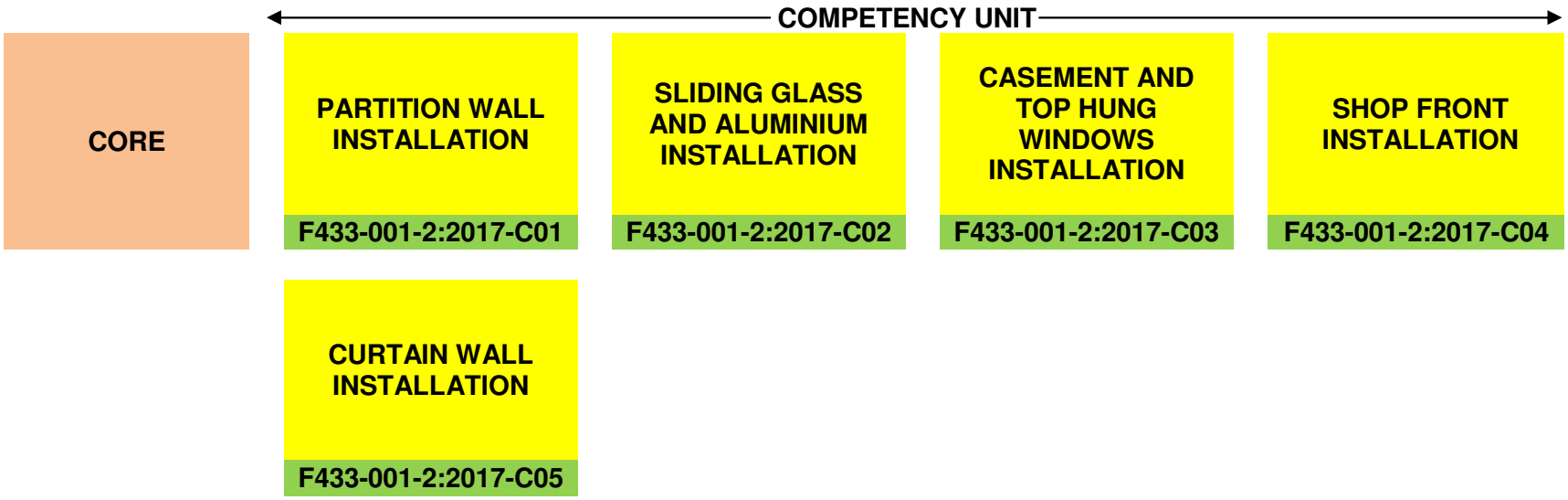
NATIONAL OCCUPATIONAL SKILLS STANDARD (NOSS) FOR;

BUILDING GLASS AND ALUMINIUM INSTALLATION

LEVEL 2

13. COMPETENCY PROFILE CHART (CPC)

SECTOR	**CONSTRUCTION (F)**		
SUB SECTOR	**SPECIALISED CONSTRUCTION ACTIVITIES (43)**		
AREA	**BUILDING COMPLETION AND FINISHING (301)**		
NOSS TITLE	**BUILDING GLASS AND ALUMINIUM INSTALLATION**		
NOSS LEVEL	**TWO (2)**	**NOSS CODE**	**F433-001-2:2017**



14. COMPETENCY PROFILE (CP)

SECTOR	**CONSTRUCTION (F)**		
SUB SECTOR	**SPECIALISED CONSTRUCTION ACTIVITIES (43)**		
AREA	**BUILDING COMPLETION AND FINISHING (301)**		
NOSS TITLE	**BUILDING GLASS AND ALUMINIUM INSTALLATION**		
NOSS LEVEL	**TWO (2)**	**NOSS CODE**	

CU Title	CU Code	CU Descriptor	Work Activities	Performance Criteria
1. Partition Wall Installation	**F433-001-2:2017-C01**	Partition Wall Installation describe the competency in the installation of metal studs frame to the floor, ceiling and wall, which is then covered with plasterboard. A competent person in this CU shall be able to prepare partition wall installation requirement, carry out main frame installation, perform panel board installation, carry out door leaf installation, carry out window installation, and carry out aluminium finishing installation. The outcome of this competency will enable the	1. Prepare partition wall installation requirement	1.1 Site construction drawing obtained as per work order requirements 1.2 Site layout location identified according to shop drawing 1.3 Wall partition schedule drawing identified according to installation requirements 1.4 Types of partition wall construction identified as indicated by wall partition schedule drawing 1.5 Wall partition schedule drawing interpreted in agreement with shop drawing 1.6 Partition wall requirement list produced according to installation requirements

CU Title	CU Code	CU Descriptor	Work Activities	Performance Criteria
		personnel to identify, assembled and install wall partition members, and explain layout and installation procedure for these member in building construction according to standard operating procedure, and waste management requirements. To perform the CU, the competency owner is required to be physically fit.	2. Carry out Main Frame installation	2.1 Personal protective equipment (PPE) applied suitable for job safety requirements 2.2 "Metal Plate" measured to scale according to wall partition schedule drawing 2.3 Cut metal plate laid out on structure according to shop drawing requirements 2.4 "Metal Stud" fastened to the metal plate structure according to shop drawing requirements 2.5 Door and windows opening prepared at designated location according to shop drawing requirements 2.6 Main frame positioned at locationin conformance with shop drawing requirements
			3. Perform panel board installation	3.1 Types of partition wall construction identified as per shop drawing requirements 3.2 "Panel frame" measured to size according to partition wall schedule/ drawing 3.3 "Panel board" measured to match with main frame dimension 3.4 Panel board cut as per main frame dimension

CU Title	CU Code	CU Descriptor	Work Activities	Performance Criteria
				3.5 Panel board positioned to the main frame according shop drawing requirements 3.6 In-filled materials placed between metal stud at interval as specified in partition wall schedule/ drawing 3.7 Panel board installation area cleaned as per Standard Operating Procedure (SOP)
			4. Carry out door leaf installation	4.1 Types of doors identified according to shop drawing requirements 4.2 “Door Schedule” interpreted as per installation requirements 4.3 Door jamb cut as specified in door schedule 4.4 Door accessories fastened at position as specified in door schedule 4.5 Doors leaf installed at designated position according to shop drawing requirements 4.6 Gasket and glass installed to the aluminium mould and glass panel according to door schedule 4.7 Installed door leaf functionality tested as per

CU Title	CU Code	CU Descriptor	Work Activities	Performance Criteria
				installation requirements
			5. Carry out window installation	5.1 Type of windows identified according to shop drawing requirements 5.2 "Window Schedule" interpreted as per installation requirements 5.3 Aluminium mould and Glass panel assembled and fitted according to window schedule. 5.4 Window accessories fastened at position as specified in window schedule 5.5 Windows installed at designated location according to shop drawing requirements 5.6 Installed window sash functionality tested as per installation requirements 5.7 Work area cleaned free from debris in accordance with SOP
			6. Carry out aluminium finishing installation	6.1 Installation drawing latest revision inspected according to job requirements 6.2 Types of aluminium finishing identified according to wall partition schedule/ drawing 6.3 Aluminium skirting, angle

CU Title	CU Code	CU Descriptor	Work Activities	Performance Criteria
				and trimming dimension measured to size, as per installation requirements. 6.4 Aluminium skirting, angle and trimming cut to size as per installation requirements 6.5 Aluminium installation area cleaned free from debris according to SOP 6.6 Installation wastes sorted in compliance with waste management requirement
2. Sliding Glass and Aluminium Installation	**F433-001-2:2017-C02**	Sliding Glass and Aluminium Installation describes the competency in the installation of large sliding glass opening in a structure that provide door access from a room to the outdoors, or window access to fresh air, and copious natural light. A competent person in this CU shall be able to Prepare sliding glass and aluminium installation requirement, Carry out Aluminium Main frame Assembly, Execute main frame to wall opening, Carry out Aluminium Inner frame Assembly, Conduct glass cutting, Carry out Aluminium inner frame and	1. Prepare sliding glass and aluminium installation requirement	1.1 Detail instruction for sliding glass and aluminium installation interpreted according to door and window schedule/drawing 1.2 Types of aluminium profile inspected according to door and window schedule/ drawing 1.3 Glass sheet types and dimension inspected according to door and window schedule/ drawing 1.4 Installation materials and tools arranged according to work order requirements 1.5 Sliding glass and aluminium requirement list produced according to shop drawing requirements

CU Title	CU Code	CU Descriptor	Work Activities	Performance Criteria
		glass assembly, and Perform inner frame installation to the main frame. The outcome of this competency will enable the personnel to identify, assembled and install Sliding Glass and Aluminium members, and explain layout and installation procedure for these member in building construction according to standard operating procedure and waste management requirements. To perform the CU, the competency owner is required to be physically fit.	2. Carry out aluminium main frame assembly 3. Execute main frame to wall opening	2.1 Personal protective equipment (PPE) applied suitable for job safety requirements 2.2 Aluminium profile cut according to installation dimension requirements. 2.3 Screw hole punched at designated location in accordance with drawing requirements 2.4 Parts of main frame members assembled as per assembly specifications 2.5 Black tape placed to the main frame based on assembly specification 3.1 Site layout location identified according to shop drawing requirements 3.2 Installation obstruction inspected according to work order requirements 3.3 Main frame size checked in agreement with the opening size 3.4 Main frame installation area cleaned free from debris suitable for installation requirements 3.5 Main frame installation location marked according to shop drawing

CU Title	CU Code	CU Descriptor	Work Activities	Performance Criteria
				requirements 3.6 Main frame positioned at location according to shop drawing requirements
			4. Carry out aluminium inner frame assembly	4.1 Aluminium profile cut to size according to door and window schedule/ drawing 4.2 Screw hole punched at designated place according to door and window schedule/ drawing 4.3 Parts of inner frame members assembled according to door and window schedule/ drawing 4.4 Assembled inner frame cleaned free from debris according to SOP.
			5. Conduct glass cutting	5.1 Glass plate position levelled according to SOP 5.2 Glass cutting dimension marked according to cutting specification 5.3 Glass dimensions and quantities cut at sequence to reduce wastage based on glass cutting list 5.4 Cutting dimension checked according door and window schedule/ drawing

CU Title	CU Code	CU Descriptor	Work Activities	Performance Criteria
				5.5 Glass sharp edges cleared according to SOP 5.6 Sliding glass and aluminium waste sorted in compliance with waste management requirement
			6. Carry out aluminium inner frame and glass assembly	6.1 Glass and aluminium assembly checked according to door and window schedule/ drawing 6.2 Glass and aluminium frame dimension checked and matched to assembly requirements 6.3 Glass panel and accessories inserted to the Aluminium inner frame based on assembly requirements 6.4 Gasket placed between inner frame and glass panel in accordance with assembly requirements 6.5 Assembled glass and inner frame checked according to door and window schedule/ drawing
			7. Perform inner frame installation to the main frame	7.1 Installation instruction interpreted according to door and window schedule/ drawing 7.2 Aluminium main frame cleaned free from debris

CU Title	CU Code	CU Descriptor	Work Activities	Performance Criteria
				according to SOP 7.3 Aluminium main frame opening size and location checked as per installation instruction 7.4 Inner frame installed to the main frame as per door and window schedule/ drawing 7.5 Installed sliding glass and aluminium functionality tested as per installation requirement
3. Casement and top hung windows Installation	**F433-001-2:2017-C03**	Casement and Top Hung Windows Installation competency describes the installation of a casement window which is attached to its frame by one or more hinges at the side, and aluminium top hung windows sash hinge on the top of the main frame, thereby allowing windows to swing out secured by high quality steel friction stays. A competent person in this CU shall be able to Prepare casement and top hung windows installation requirements, Carry out Aluminium main frame Assembly, Execute main	1. Prepare casement and top hung windows installation requirement	1.1 Detail instruction for casement and top hung window installation interpreted according to window schedule/ drawing 1.2 Aluminium profile inspected according to window schedule/ drawing 1.3 Glass profile inspected according to window schedule/ drawing 1.4 Installation materials and tools arranged according to shop drawingrequirements 1.5 Casement and Top Hung window requirements produced according to installation plan 1.6 Aluminium Sub-frame installed according to window schedule/ drawing

CU Title	CU Code	CU Descriptor	Work Activities	Performance Criteria
		frame to wall opening, Carry out Aluminium Inner frame Assembly, conduct glass cutting, carry out Aluminium inner frame and glass assembly, and perform inner frame installation to the main frame The outcome of this competency will enable the personnel to identify, assembled and install Casement and Top Hung Windows members, and explain layout and installation procedure for these member in building construction according to standard operating procedure, and waste management requirements. To perform the CU, the competency owner is required to be physically fit.	2. Carry out aluminium main frame assembly 3. Install main frame to wall opening	2.1 Personal protective equipment (PPE) applied suitable for job safety requirements 2.2 Aluminium profile cut to size according to installation dimension requirements 2.3 Screw hole punched at designated location in accordance with drawings requirements 2.4 Parts of main frame members assembled as per assembly specifications 2.5 Gasket, black tape and accessories placed to the main frame based on assembly specification 3.1 Site layout location identified according to shop drawing 3.2 Installation obstruction inspected according to work order requirements 3.3 Main frame size checked in agreement with site opening size 3.4 Main frame installation area cleaned free from debris suitable for installation requirements

CU Title	CU Code	CU Descriptor	Work Activities	Performance Criteria
				3.5 Main frame installation location marked according to shop drawing 3.6 Main frame positioned according to shop drawing
			4. Carry out aluminium inner frame assembly	4.1 Aluminium profile cut according to window schedule/ drawing 4.2 Screw hole punched at designated place according to window schedule/ drawing 4.3 Weather strip placed to the inner frame according to assembly requirements 4.4 Parts of inner frame members assembled according to window schedule/ drawing
			5. Conduct glass cutting	5.1 Glass plate position levelled according to SOP 5.2 Glass cutting dimension marked to size according to cutting list 5.3 Glass dimensions and quantities cut to size according to work orderrequirements 5.4 Cutting dimension accuracy checked according to window schedule/ drawing 5.5 Glass sharp edges cleared

CU Title	CU Code	CU Descriptor	Work Activities	Performance Criteria
				according to SOP
			6. Carry out aluminium inner frame and glass assembly	6.1 Aluminium and Glass assembly requirements checked according to window schedule/ drawing 6.2 Glass and aluminium frame dimension checked and matched to assembly requirements 6.3 Glass panel inserted to the aluminium inner frame based on assembly drawing requirements 6.4 Gasket placed between inner frame and glass panel in accordance with assembly requirements 6.5 Assembled glass and inner frame checked according to window schedule/ drawing
			7. Perform inner frame installation to the main frame	7.1 Installation instruction interpreted according to window schedule/ drawing 7.2 Aluminium main frame cleaned free from debris according to SOP 7.3 Aluminium main frame opening size and location checked as per installation instruction 7.4 Inner frame installed to the

CU Title	CU Code	CU Descriptor	Work Activities	Performance Criteria
				main frame as per window schedule/ drawing 7.5 Installed casement and top hung window forfunctionality 7.6 Casement and top hung windows wastes sorted in compliance with waste management requirement
4. Shop Front Installation	**F433-001-2:2017-C04**	Shop Front Installation describes the competency in the installation of Aluminium glass panel of a retail or commercial building to attract visual attention to a business and merchandise. A competent person in this CU shall be able to prepare work instruction, carry out aluminium profile cutting, perform aluminium profile installation, conduct glass cutting, and carry out glass panel installation The outcome of this competency will enable the personnel to identify, assembled and install Shop Front members, and explain layout and installation procedure for these member in building construction	1. Prepare work instruction 2. Carry out aluminium profile cutting	1.1 Detail instruction for aluminium profile interpreted according to shop drawing requirements 1.2 Detail instruction for glass panel identified based on shop drawing requirements 1.3 Aluminium profile and glass panel checked according to shop drawing requirements 1.4 Installation Materials and tools arranged according to work order requirements 1.5 Shop Front requirement list recorded according to work order requirements 2.1 Personal protective equipment (PPE) applied suitable for job safety requirements 2.2 Aluminium profile cut according to shop drawing. 2.3 Screw hole punched at designated location as

CU Title	CU Code	CU Descriptor	Work Activities	Performance Criteria
		according to standard operating procedure and waste management requirements. To perform the CU, the competency owner is required to be physically fit.		specified in shop drawing 2.4 Bracket fixed to aluminium profile as per shop drawing 2.5 Gasket, black tape and accessories installed to the Aluminium profile according to SOP
			3. Perform aluminium profile installation	3.1 Installation instruction interpreted according to work order requirements 3.2 Site layout location identified according to shop drawing 3.3 Selected aluminium profile assembled according to shop drawing 3.4 Black tape and plastic wrapped to aluminium profile according to SOP 3.5 Aluminium profile checked according to the opening dimension and location
			4. Conduct glass cutting	4.1 Glass plate position levelled according to SOP 4.2 Glass cutting dimension marked according to cutting specification 4.3 Glass dimensions and quantities cut according to work order requirements 4.4 Cutting dimension checked according to shop drawing 4.5 Glass sharp edges cleared

CU Title	CU Code	CU Descriptor	Work Activities	Performance Criteria
				according to SOP 4.6 Glass surface protected from scratch and crack according to SOP 4.7 Shop front waste separated in compliance with waste management requirement
			5. Carry out glass panel installation	5.1 Accessories inserted to the aluminium profile in accordance with shop drawing 5.2 Glass lifting machineries and tools prepared based on installation requirement 5.3 Glass panel inserted to the aluminium profile in accordance with shop drawing 5.4 Gasket fixed to assembled profile according to shop drawing 5.5 Silicon applied to glass panel according to installation requirements 5.6 Black tape, silicon and residue cleaned from the aluminium profile and glass panel according to SOP 5.7 Aluminium profile and glass panel checked according to shop drawing

CU Title	CU Code	CU Descriptor	Work Activities	Performance Criteria
5. Curtain Wall Installation	**F433-001-2:2017-C05**	Curtain Wall Installation describes the competency in the installation of aluminium framed wall containing in-fills of glass forming vertical enclosure that attached to the building structure and does not carry the floor load of the building. A competent person in this CU shall be able to prepare work instruction, carry out aluminium profile cutting, perform aluminium profile installation, conduct glass cutting, and carry out glass panel installation The outcome of this competency will enable the personnel to identify, assembled and install Curtain Wall members, and explain layout and installation procedure for these member in building construction according to standard operating procedure and waste management requirements. To perform the CU, the competency owner is	1. Prepare work instruction 2. Carry out aluminium profile cutting	1.1 Related installation procedure interpreted according to curtain wall types installation 1.2 Types of curtain wall structure identified according to installation procedure 1.3 Detail instruction for aluminium profile and glass panel identified based on shop drawing requirements 1.4 Aluminium profile and glass panel checked according to shop drawing requirements 1.5 Installation materials and tools arranged according to installation requirements 1.6 Curtain wall requirementlist recorded according to installation requirements 2.1 Personal protective equipment (PPE) applied suitable for job safety requirements 2.2 Aluminium profile cut according to shop drawing. 2.3 Bracket fixed to aluminium profile as per shop drawing 2.4 Black tape and accessories installed to the aluminium profile according to SOP

CU Title	CU Code	CU Descriptor	Work Activities	Performance Criteria
		required to be physically fit.	3. Perform aluminium profile installation	3.1 Installation instruction interpreted according to work order requirements 3.2 Site layout location identified according to installation requirements 3.3 Selected aluminium profile assembled according to shop drawing 3.4 Aluminium profile checked according to the opening dimension and location
			4. Conduct glass cutting	4.1 Glass positioned on level checked according to SOP 4.2 Glass cutting dimension marked according to cutting specification 4.3 Glass dimensions and quantities cut according to installation requirements 4.4 Glass cutting dimension checked according to shop drawing requirements 4.5 Glass sharp edges cleared using sanding paper according to SOP 4.6 Glass surface protected from scratch and crack according to SOP 4.7 Curtain wall waste sorted in compliance with waste management requirement

CU Title	CU Code	CU Descriptor	Work Activities	Performance Criteria
			5. Carry out glass panel installation	5.1 Accessories inserted to the Aluminium profile in accordance with shop drawing 5.2 Glass lifting machineries and tools prepared as per installation requirement 5.3 Glass panel inserted to the Aluminium profile in accordance with shop drawing requirements 5.4 Gasket fixed to assembled profile according to shop drawing requirements 5.5 Silicon applied to glass panel according to installation requirements 5.6 Black tape, silicon and residue cleaned from the aluminium profile and glass panel according to SOP 5.7 Aluminium profile and glass panel checked according to shop drawing requirements

CURRICULUM

NATIONAL OCCUPATIONAL SKILLS STANDARD (NOSS) FOR;

BUILDING GLASS AND ALUMINIUM INSTALLATION

LEVEL 2

15. CURRICULUM OF COMPETENCY UNIT (COCU): CU01

SECTOR	**CONSTRUCTION (F)**						
SUB SECTOR	**SPECIALISED CONSTRUCTION ACTIVITIES (43)**						
AREA	**BUILDING COMPLETION AND FINISHING (301)**						
NOSS TITLE	**BUILDING GLASS AND ALUMINIUM INSTALLATION**						
COMPETENCY UNIT TITLE	**PARTITION WALL INSTALLATION**						
PRE-REQUISITE (if applicable)	**-**						
LEARNING OUTCOMES	The outcome of this competency will enable the personnel to identify, assembled and install wall partition members, and explain layout and installation procedure for these member in building construction according to standard operating procedure, and waste management requirements. Upon completion of this competency unit, trainees will be able to:- 1. Prepare partition wall installation requirement 2. Carry out main frame installation 3. Perform panel board installation 4. Carry out door leaf installation 5. Carry out window installation 6. Carry out aluminium finishing installation						
COMPETENCY UNIT ID	**F433-001-2:2017-C01**	**LEVEL**	Two (2)	**TRAINING DURATION**	220 hours	**SKILL CREDIT**	22

Work Activities	Related Knowledge	Related Skills	Attitude / Safety / Environmental	Training Hours	Delivery Mode	Assessment Criteria
1. Prepare partition wall installation requirement	1.1 Partition wall support structure such as: • Types • Function • Jointing method	1.1 Obtain detail instruction for partition wall installation 1.2 Determine site layout	Attitude: – Knowledgeable in tools and equipment – Systematic in operating SOP	Related Knowledge 12	Related Knowledge Lecture	1.1 Partition wall installation instruction interpreted as per installation requirement

Work Activities	Related Knowledge	Related Skills	Attitude / Safety / Environmental	Training Hours	Delivery Mode	Assessment Criteria
	partition wall and support 1.2 Type of partition wall such as: • Dry wall/Gypsum • Sandwich partition • Plywood • Glass 1.3 Type of infilled material such as: • Rock Wool • Fire Stop 1.4 Method of installation such as: • Full board • Semi-board 1.5 Types of aluminium profile, thickness and tolerance: • Profile: – Performance – Standard • Thickness: • Tolerance: – Calculation – Measurement 1.6 Types of glass sheet such as:	location 1.3 Determine type of partition wall 1.4 Determine partition wall thickness 1.5 Identify layout of partition wall support structure 1.6 Determine dimension of partition wall 1.7 Determine type of infilled material 1.8 Determine method of installation 1.9 Determine types and quantity of glass sheet to be used 1.10 Determine dimension of aluminium and glass	<u>Safety:</u> – Adhere to safety procedure and requirement – Able to distinguish hazards <u>Environmental:</u> – Conducive working environment	<u>Related Skills</u> 18	<u>Related Skills</u> Demonstration & Observation	1.2 Site layout location confirmed based on installation requirement 1.3 Type of partition wall confirmed as per installation requirement 1.4 Partition wall thickness confirmed as per installation requirement 1.5 Partition wall support structure layout determined according to installation shop drawing 1.6 Dimension of partition wall confirmed as per installation requirement 1.7 Type of infilled material confirm as per installation

Work Activities	Related Knowledge	Related Skills	Attitude / Safety / Environmental	Training Hours	Delivery Mode	Assessment Criteria
	• Float glass • Tempered • Laminated • Double glazing • Fire rated • Low emission • Reflective glass 1.7 Types of accessories such as: • Hinges • Handle • Lock 1.8 Types of tools and machineries such as: • Screwdriver • Air Compressor • Glass Suction Cup lifter • Diamond cutter • Chop Box / Circular Saw • Grinder • Rivett gun/Screw Gun • Power actuated nailer • Hammer Drill • Level/ Laser	profile 1.11 Determine cutting list for aluminium and glass 1.12 Identify types of tools to be used 1.13 Gather Tools and machineries 1.14 Produce partition wall requirement list				requirement 1.8 Method of installation confirmed as per installation requirement 1.9 Type and quantity of glass sheet to be used confirm as per shop drawing 1.10 Dimension of aluminium and glass profile confirmed as per installation requirement 1.11 Cutting list for aluminium and glass prepared based on cutting list 1.12 Types and tools to be used determined as per installation requirement 1.13 Tools and machineries prepared as per installation

Work Activities	Related Knowledge	Related Skills	Attitude / Safety / Environmental	Training Hours	Delivery Mode	Assessment Criteria
	level /Plumb bob 1.9 Basic computer knowledge such as: • Word processing • Spreadsheet					requirement 1.14 Partition wall requirement list produced in soft and hard copies
2. Carry out main frame installation	2.1 Types of PPE: • Rubber Palm Glove (for aluminium) • Goggle • Ear plug/ protection • Apron • Safety boot 2.2 Cutting sequence 2.3 Handling procedure during Metal Plate and Metal Stud cutting: • Precaution - Scratch - Bend - Dent • Safety • Handling method	2.1 Select and apply suitable PPE 2.2 Determine cutting sequence to reduce wastage 2.3 Measure and cut Metal Plate and Metal Stud 2.4 Arrange Metal Plate and Metal Stud 2.5 Mark out the starting line 2.6 Install top and bottom metal track 2.7 Install starter	<u>Attitude:</u> – Knowledgeable in tools and equipment – Systematic in operating SOP <u>Safety:</u> – Adhere to safety procedure and requirement – Able to distinguish hazards <u>Environmental:</u> – Comply to CIDB and OSHA requirements – Conducive working environment	<u>Related Knowledge</u> 15 <u>Related Skills</u> 35	<u>Related Knowledge</u> Lecture <u>Related Skills</u> Demonstration & Observation	2.1. Suitable PPE picked as per installation requirement 2.2. Smart cutting sequence confirmed to minimize wastage 2.3. Metal plate and stud measured and cut according to installation requirement 2.4. Metal plate and stud categorized according to installation requirement 2.5. Starting line marked out as per installation

Work Activities	Related Knowledge	Related Skills	Attitude / Safety / Environmental	Training Hours	Delivery Mode	Assessment Criteria
		and intermediary metal stud 2.8 Check main frame alignment 2.9 Fasten Metal Stud to Metal Plate 2.10 Install metal bracing for window and door opening 2.11 Install stiffener for door				drawing 2.6. Top and bottom metal track fixed as per installation requirement 2.7. Starter and intermediary metal stud fixed as per installation requirement 2.8. Main frame alignment confirmed as per installation requirement 2.9. Metal stud fastened to metal plate as per installation requirement 2.10. Metal bracing for window and door opening fixed as per installation requirement 2.11. Stiffener for door fixed according to

Work Activities	Related Knowledge	Related Skills	Attitude / Safety / Environmental	Training Hours	Delivery Mode	Assessment Criteria
						installation requirement
3. Perform panel board installation	3.1 Partition wall support structure • Types • Function • Jointing method partition wall and support 3.2 Type of partition wall such as: • Dry wall/Gypsum • Sandwich partition • Plywood • Glass 3.3 Type of infilled material such as: • Rock Wool • Fire Stop 3.4 Method of installation such as: • Full board • Semi-board 3.5 Types of aluminium profile, thickness and tolerance: • Profile: – Performance	3.1 Determine type of partition wall 3.2 Select types of panel board material for installation 3.3 Confirm panel board installation dimension 3.4 Cut panel board to size 3.5 Install one side panel board 3.6 Insert and secure infilled materials 3.7 Install remaining side panel board 3.8 Install fibre tape / aluminium	Attitude: – Knowledgeable in tools and equipment – Systematic in operating SOP Safety: – Adhere to safety procedure and requirement – Able to distinguish hazards Environmental: – Comply to CIDB and OSHA requirements – Conducive working environment	Related Knowledge 12 Related Skills 28	Related Knowledge Lecture Related Skills Demonstration & Observation	3.1 Type of partition wall confirm according to installation requirement 3.2 Types of panel board picked as per installation requirement 3.3 Panel board dimension selected as per installation requirement 3.4 Panel board cut to size according to installation requirement 3.5 One side of panel board fixed to main frame as per shop drawing 3.6 Infilled material secured as per installation requirements 3.7 Remaining side of panel board

Work Activities	Related Knowledge	Related Skills	Attitude / Safety / Environmental	Training Hours	Delivery Mode	Assessment Criteria
	– Standard • Thickness: • Tolerance: – Calculation – Measurement 3.6 Types of accessories: • Fibre tape • Stopping 3.7 Types of tools and machineries such as: • Screwdriver • Air Compressor • Hand saw • Rivett gun • Drill	border strip to the board surface 3.9 Plaster and paint panel board 3.10 Clean installation area				fixed to main frame according to shop drawings 3.8 Fibre tape / aluminium border strip fixed to panel board surface as per shop drawing requirements 3.9 Panel board plastered and paint as per shop drawing requirements 3.10 Joint and installation area cleaned as per SOP
4. Carry out door leaf installation	4.1 Type of doors: • Single leaf • Double leaf 4.2 Door leaf installation procedure: • Door Schedule • Method of statement 4.3 Door accessories: • Handle	4.1 Determine type of door 4.2 Check door size opening 4.3 Determine dimension of door leaf 4.4 Cut Door Jamb 4.5 Cut glass to the required	Attitude: – Knowledgeable in tools and equipment – Systematic in operating SOP Safety: – Adhere to safety procedure and requirement	Related Knowledge 9 Related Skills 21	Related Knowledge Lecture Related Skills Demonstration & Observatio	4.1 Type of door confirm as per door schedule 4.2 Door size opening confirmed as per door schedule 4.3 Door leaf dimension confirmed as per door schedule

Work Activities	Related Knowledge	Related Skills	Attitude / Safety / Environmental	Training Hours	Delivery Mode	Assessment Criteria
	• Hinges • Locks • Decorative • Door closure • Door stopper 4.4 Door functionality testing such as: • Opening • Lock • Squeaking • Alignment	door size 4.6 Fix door leaf 4.7 Install door accessories 4.8 Fix gasket to the glass panel 4.9 Conduct door leaf functionality test	– Able to distinguish hazards <u>Environmental:</u> – Comply to CIDB and OSHA requirements – Conducive working environment		n	4.4 Door jamb cut according to installation requirement 4.5 Glass sheet cut according to door size 4.6 Door lead fixed to the main frame as per installation requirement 4.7 Door accessories fastened as per door schedule 4.8 Gasket fixed to the glass panel according to door schedule 4.9 Door tested for functionality as per SOP
5. Carry out window installation	5.1 Type of windows such as: • Top Hung • Casement 5.2 Window sash installation procedure such as:	5.1 Determine type of windows 5.2 Confirm window size opening 5.3 Determine	<u>Attitude:</u> – Knowledgeable in tools and equipment – Systematic in operating SOP	<u>Related Knowledge</u> 12	<u>Related Knowledge</u> Lecture	5.1 Type of window confirmed as per window schedule 5.2 Window size opening measured as per window schedule

Work Activities	Related Knowledge	Related Skills	Attitude / Safety / Environmental	Training Hours	Delivery Mode	Assessment Criteria
	• Window Schedule • Method of statement 5.3 Window accessories such as: • Handle • Hinges • Locks 5.4 Window functionality testing such as: • Opening • Lock • Squeaking • Alignment	dimension of window sash 5.4 Cut glass to the required window size 5.5 Fix gasket to the glass panel 5.6 Fix window sash 5.7 Install window accessories 5.8 Conduct window sash functionality test	<u>Safety:</u> – Adhere to safety procedure and requirement – Able to distinguish hazards <u>Environmental:</u> – Comply to CIDB and OSHA requirements – Comply with waste sorting requirements	<u>Related Skills</u> 28	<u>Related Skills</u> Demonstration & Observation	5.3 Window sash dimension confirmed as per window schedule 5.4 Glass sheet cut to size according to window schedule 5.5 Gasket fixed to the glass panel according to window schedule 5.6 Window sash fixed to the main frame as per installation requirement 5.7 Window accessories fastened as per door schedule 5.8 Window sash tested for functionality as per SOP
6. Carry out aluminium finishing installation	6.1 Type of aluminium finishing such as: • Skirting • Angle • Trimming	6.1 Review latest installation drawing 6.2 Apply	<u>Attitude:</u> – Knowledgeable in tools and equipment – Systematic in	<u>Related Knowledge</u> 9	<u>Related Knowledge</u> Lecture	6.1 Latest installation drawing assessed as per installation

Work Activities	Related Knowledge	Related Skills	Attitude / Safety / Environmental	Training Hours	Delivery Mode	Assessment Criteria
	• Acoustic sealant • External corner bead • Control Joint components • Joint tape/ mesh tape • Joint compound 6.2 Installation procedure 6.3 Waste sorting	acoustic sealant 6.3 Determine type of aluminium finishing 6.4 Select types of Aluminium finishing for installation 6.5 Confirm Aluminium finishing installation size 6.6 Cut Aluminium finishing 6.7 Install Aluminium finishing to partition wall 6.8 Clean installation joint and area 6.9 Sort types of waste in designated bin	operating SOP <u>Safety:</u> – Adhere to safety procedure and requirement – Able to distinguish hazards <u>Environmental:</u> – Comply to CIDB and OSHA requirements – Comply with waste sorting requirements	<u>Related Skills</u> 21	<u>Related Skills</u> Demonstration & Observation	requirement 6.2 Acoustic sealant fixed at joint to reduce outside noise 6.3 Type of aluminium finishing confirmed as per installation requirement 6.4 Types of aluminium finishing picked as per installation requirement 6.5 Aluminium finishing installation size measured as per installation requirement 6.6 Aluminium finishing cut to size as per installation requirement 6.7 Aluminium finishing fixed to partition wall

Work Activities	Related Knowledge	Related Skills	Attitude / Safety / Environmental	Training Hours	Delivery Mode	Assessment Criteria
						6.8 Joint and installation area cleaned as per SOP 6.9 Types of waste sorted according to waste management requirements

Employability Skills

Core Abilities	Social Skills
01.04 Analyse information 01.05 Utilize the internet to locate and gather information 01.06 Utilize word processor to process information 02.06 Write memos and letters 02.07 Utilize Local Area Network (LAN)/Internet to exchange information 02.08 Prepare pictorial and graphic information 03.08 Develop and maintain a cooperation within work group 04.01 Organize own work activities 04.02 Set and revise own objectives and goals 04.03 Organize and maintain own workplace 04.04 Apply problem solving strategies 04.05 Demonstrate initiative and flexibility 06.05 Analyse technical systems 06.06 Monitor and correct performance of systems	1. Communication skills 2. Conceptual skills 3. Interpersonal skills 4. Learning skills 5. Leadership skills 6. Multitasking and prioritising 7. Self-discipline 8. Teamwork

Tools, Equipment and Materials (TEM)

ITEMS	RATIO (TEM : Trainees)
1. Personal Protective Equipment (PPE)	1:1
2. Production planning samples	1:1
3. Production manpower schedule samples	1:1
4. Standard Operating Procedure (SOP) samples	1:1
5. Screwdriver	1:1
6. Air Compressor	1:10
7. Glass Suction Cup lifter	1:10
8. Diamond cutter	1:5
9. Chop Box / Circular Saw	1:5
10. Grinder	1:1
11. Rivett gun/Screw Gun	1:5
12. Power actuated nailer	1:10
13. Hammer Drill	1:1
14. Level/ Laser level /Plumb bob	1:5
15. Skirting/Angle/Trimming	1:5
16. Acoustic sealant	As required
17. External corner bead	As required
18. Joint tape/ mesh tape	As required
19. Dry wall/Gypsum/Sandwich partition /Plywood	1:5

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16. CURRICULUM OF COMPETENCY UNIT (COCU): CU02

SECTOR	**CONSTRUCTION (F)**						
SUB SECTOR	**SPECIALISED CONSTRUCTION ACTIVITIES (43)**						
AREA	**BUILDING COMPLETION AND FINISHING (301)**						
NOSS TITLE	**BUILDING GLASS AND ALUMINIUM INSTALLATION**						
COMPETENCY UNIT TITLE	**SLIDING GLASS AND ALUMINIUM INSTALLATION**						
PRE-REQUISITE (if applicable)	**-**						
LEARNING OUTCOME	The outcome of this competency will enable the personnel to identify, assembled and install Sliding Glass and Aluminium members, and explain layout and installation procedure for these member in building construction according to standard operating procedure and waste management requirements. Upon completion of this competency unit, trainees will be able to:- 1. Prepare sliding glass and aluminium installation requirement 2. Carry out aluminium main frame assembly 3. Execute main frame to wall opening 4. Carry out aluminium inner frame assembly 5. Conduct glass cutting 6. Carry out aluminium inner frame and glass assembly 7. Perform inner frame installation to the main frame						
COMPETENCY UNIT ID	**F433-001-2:2017-C02**	**LEVEL**	Two (2)	**TRAINING DURATION**	260 hours	**SKILL CREDIT**	26

Work Activities	Related Knowledge	Related Skills	Attitude / Safety / Environmental	Training Hours	Delivery Mode	Assessment Criteria
1. Prepare sliding glass and aluminium installation	1.1 Type of coating: • Natural anodize • Bronze anodized • Powder coating	1.1 Obtain detail instruction for sliding glass and aluminium	<u>Attitude:</u> – Knowledgeable in tools and equipment	<u>Related Knowledge</u> 12	<u>Related Knowledge</u> Lecture	1.1 Sliding glass and aluminium installation instruction interpreted as per

Work Activities	Related Knowledge	Related Skills	Attitude / Safety / Environmental	Training Hours	Delivery Mode	Assessment Criteria
requirement	• Polyvinylidene Fluoride (PVDF) 1.2 Types of aluminium profile, thickness and tolerance: • Profile: – Performance – Economy – Standard • Thickness: • Tolerance: – Calculation – Measurement 1.3 Types of glass sheet: • Float glass • Tempered • Laminated • Wired • Double glazing • Fire rated • Low emission 1.4 Types of accessories: • Roller • Spacer • Lock set • Rail/ Profile • Handle	installation 1.2 Determine types, thickness and coating of aluminium profile, and quantity to be used 1.3 Determine types and quantity of glass sheet to be used 1.4 Determine door and windows types and quantity 1.5 Determine dimension of aluminium and glass profile 1.6 Determine cutting list for aluminium and glass 1.7 Determine	– Systematic in operating SOP <u>Safety:</u> – Adhere to safety procedure and requirement – Able to distinguish hazards <u>Environmental:</u> – Conducive working environment	<u>Related Skills</u> 18	<u>Related Skills</u> Demonstration & Observation	installation requirement 1.2 Type, thickness, coating and quantity of aluminium profile confirmed according to shop drawing 1.3 Types and quantity of glass sheet confirmed according to shop drawing 1.4 Door and windows types confirmed based on door and window schedule 1.5 Aluminium and glass profile dimension measured as per shop drawing 1.6 Aluminium and glass cutting schedule prepared according tocutting list 1.7 Types of accessories confirmed as per

Work Activities	Related Knowledge	Related Skills	Attitude / Safety / Environmental	Training Hours	Delivery Mode	Assessment Criteria
	• Gasket 1.5 Types of tools and machineries: • Puncher • Screwdriver • Air Compressor • Glass Suction • Diamond cutter • Grinder • Rivett gun • Drill 1.6 Basic computer knowledge such as: • Spreadsheet • Word processor	types of accessories 1.8 Identify types of tools and materials to be used 1.9 Gather Tools and materials 1.10 Prepare cutting list for aluminium and glass profile, types and quantity				shop drawing 1.8 Tools and materials determined as per installation requirement 1.9 Tools and materials collected as per installation requirement 1.10 Sliding glass and aluminium requirement list produced in soft and hard copies
2. Carry out aluminium main frame assembly	2.1 Types of PPE: • Rubber Palm Glove (for aluminium) • Goggle • Ear plug/ protection • Apron • Safety boot 2.2 Cutting sequence 2.3 Handling procedure during cutting and	2.1 Select and apply suitable PPE 2.2 Measure and mark aluminium extrusion refer to cutting list 2.3 Determine cutting sequence to reduce	<u>Attitude:</u> – Knowledgeable in tools and equipment – Systematic in operating SOP – Handle material meticulously <u>Safety:</u> – Adhere to safety procedure and requirement	<u>Related Knowledge</u> 12 <u>Related Skills</u> 28	<u>Related Knowledge</u> Lecture <u>Related Skills</u> Demonstration & Observatio	2.1 Suitable PPE picked as per installation requirement 2.2 Aluminium extrusion measured and marked according to cutting list 2.3 Smart cutting sequence confirmed to minimize wastage

Work Activities	Related Knowledge	Related Skills	Attitude / Safety / Environmental	Training Hours	Delivery Mode	Assessment Criteria
	delivery: • Precaution - Scratch - Bend - Dent • Safety 2.4 Operating Punching Machine 2.5 Profile wrapping •Black tape 2.6 Tagging and packing Material 2.7 Assembly Aluminium profile • Method • Precaution	wastage 2.4 Cut aluminium to profile 2.5 Operate punching machine 2.6 Gather cut aluminium profile 2.7 Arrange aluminium profile according to installation drawings 2.8 Fix GI strip to the outer aluminium profile 2.9 Fix black tape to the aluminium profile 2.10 Tagging and packing for site delivery 2.11 Assemble aluminium profile on site	– Able to distinguish hazards – Able to handle punching and cutting machine <u>Environmental:</u> – Comply to OSHA requirements – Conducive working environment		n	2.4 Aluminium profile cut according to installation requirement 2.5 Aluminium profile punched according to shop drawing 2.6 Cut and punched aluminium profile collected as per work order 2.7 Cut and punched aluminium profile categorize according to installation requirement 2.8 GI strip fastened to outer aluminium profile 2.9 Black tape fixed to aluminium profile to protectagainst scratch and dent as per SOP 2.10 Aluminium profile tagged and packed for site delivery as per SOP 2.11 Aluminium profile assembled at site

Work Activities	Related Knowledge	Related Skills	Attitude / Safety / Environmental	Training Hours	Delivery Mode	Assessment Criteria
						as per installation requirement
3. Execute main frame to wall opening	3.1 Types of PPE such as: • Glove • Goggle • Safety Helmet • Safety boot • Safety harness 3.2 Types of drawing such as: • Door and window schedule • Floor plan layout 3.3 Types of instrument such as: • Levelling Instrument – Water level (hose) – Plumb Bob – Laser leveller – Spirit level • Hammer • Drill • Chisel	3.1 Receive latest installation drawing and floor plan 3.2 Arrange material according to floor/ units as per tagging 3.3 Determine obstruction on site 3.4 Notify obstruction to respective site personnel for rectification 3.5 Site opening size reconfirm 3.6 Prepare material and work area 3.7 Assemble aluminium	<u>Attitude:</u> – Knowledgeable in tools and equipment – Systematic in operating SOP – Observant to obstruction on site – Meticulous in performing work <u>Safety:</u> – Adhere to safety procedure and requirement – Able to distinguish hazards <u>Environmental:</u> – Comply to CIDB and OSHA requirements	<u>Related Knowledge</u> 9 <u>Related Skills</u> 21	<u>Related Knowledge</u> Lecture <u>Related Skills</u> Demonstration & Observation	3.1 Installation drawing and floor plan interpreted as per installation requirement 3.2 Material distributed according to floor/ units according to tagging 3.3 Obstruction on site listed and confirmed according to shop drawing 3.4 Respective site personnel notified for rectification 3.5 Site opening size measured as per installation requirement 3.6 Material and work area arranged as per installation requirement 3.7 Aluminium profile assembled into main frame as per

Work Activities	Related Knowledge	Related Skills	Attitude / Safety / Environmental	Training Hours	Delivery Mode	Assessment Criteria
	3.4 Tool and equipment application 3.5 Support and bracing such as: • Types • Installation method	profile into main frame 3.8 Measure floor raise level 3.9 Adjust vertical and horizontal alignment of main frame 3.10 Fix main frame to the opening and fasten GI strip/wall plug to the wall 3.11 Fix support and bracing 3.12 Install sliding door jamb to floor opening				shop drawing 3.8 Floor raise level measured as per installation requirement 3.9 Vertical and horizontal alignment of main frame adjusted according to installation requirement 3.10 GI Strip/Wall plug fixed Main frame to wall opening 3.11 Support and bracing metal fixed to the main frame for stability 3.12 Sliding door jamb fixed to floor openingas per shop drawing
4. Carry out aluminium inner frame assembly	4.1 Types of PPE such as: • Rubber Palm Glove (for aluminium) • Goggle • Ear plug/	4.1 Select and apply suitable PPE 4.2 Measure and mark aluminium extrusion	Attitude: – Knowledgeable in tools and equipment – Systematic in operating SOP – Clean and tidy	Related Knowledge 12 Related Skills	Related Knowledge Lecture Related Skills	4.1 Suitable PPE picked as per installation requirement 4.2 Aluminium extrusion measured and

Work Activities	Related Knowledge	Related Skills	Attitude / Safety / Environmental	Training Hours	Delivery Mode	Assessment Criteria
	protection • Apron • Safety boot 4.2 Cutting sequence 4.3 Precaution during cutting and delivery: • Scratch – Protective film • Bend – Two man handling • Dent – Proper work space and storage area 4.4 Operating Punching Machine 4.5 Profile wrapping • Black tape 4.6 Assembly Aluminium profile such as: • Method • Precaution 4.7 Tagging and packing Material	refer to cutting list 4.3 Determine cutting sequence to reduce wastage 4.4 Fix black tape to the aluminium profile 4.5 Cut aluminium to profile 4.6 Operate punching machine 4.7 Gather cut aluminium profile 4.8 Arrange aluminium profile according to installation requirements 4.9 Assemble aluminium profile at factory	<u>Safety:</u> – Adhere to safety procedure and requirement – Able to distinguish hazards – Able to handle punching and cutting machine <u>Environmental:</u> – Comply to CIDB and OSHA requirements – Comply to Solid Waste Management	28	Demonstration & Observation	marked according to cutting list 4.3 Smart cutting sequence confirmed to minimize wastage 4.4 Black tape applied to aluminium profile as protection against scratch and dent according to SOP 4.5 Aluminium profile cut to size according to installation requirement 4.6 Aluminium profile punched according to shop drawing 4.7 Cut and punched aluminium profile collected 4.8 Cut and punched aluminium profile categorize according to installation requirements 4.9 Aluminium profile assembled at

Work Activities	Related Knowledge	Related Skills	Attitude / Safety / Environmental	Training Hours	Delivery Mode	Assessment Criteria
		4.10 Tagging and packing for site delivery				factory as per installation requirements 4.10 Aluminium profile tagged and packed for site delivery as per SOP
5. Conduct glass cutting	5.1 Types of PPE such as: • Rubber Palm Glove • Goggle • Ear plug • Mask • Apron • Safety boot 5.2 Cutting sequence 5.3 Precaution during cutting such as: • Scratch – Lining table • Crack • Sharp edges – Proper glass handling – Sufficient manpower 5.4 Glass cutting and grinding such as: • Method	5.1 Select and apply suitable PPE 5.2 Measure and mark glass refer to cutting list 5.3 Determine cutting sequence to reduce wastage 5.4 Lay glass on the clean carpeted lining table 5.5 Cut glass to size with tolerance and quantity 5.6 Check dimension cut	<u>Attitude:</u> – Knowledgeable in tools and equipment – Systematic in operating SOP – Clean and tidy – Meticulous <u>Safety:</u> – Adhere to safety procedure and requirement – Able to distinguish hazards <u>Environmental:</u> – Comply to OSHA requirements – Comply to Solid Waste	<u>Related Knowledge</u> 12 <u>Related Skills</u> 28	<u>Related Knowledge</u> Lecture <u>Related Skills</u> Demonstration & Observation	5.1 Suitable PPE picked as per installation requirement 5.2 Glass sheet measured and marked as per cutting list 5.3 Smart cutting sequence confirmed to minimize wastage 5.4 Glass sheet laid on clean carpeted lining table for protection as per SOP 5.5 Glass cut to quantity with size and tolerance and according to glass cutting list 5.6 Glass cut

Work Activities	Related Knowledge	Related Skills	Attitude / Safety / Environmental	Training Hours	Delivery Mode	Assessment Criteria
	• Tool and Equipment • Handling 5.5 Tagging Material 5.6 Waste Sorting • Categorize • Waste disposal method • Disposal/ recycle location	5.7 Grind sharp edges 5.8 Tag glass for assembly 5.9 Clean the working area	Management			dimension measured as per shop drawing 5.7 Glass edges grinded to remove sharp edges as per safety requirement 5.8 Cut Glass tagged according to assembly requirement 5.9 Waste glass cleared to designated bin
6. Carry out aluminium inner frame and glass assembly	6.1 Types of PPE such as: • Rubber Palm Glove (for aluminium) • Goggle • Ear plug/ protection • Apron • Safety boot 6.2 Precaution during assembly and delivery: • Scratch – Protective film	6.1 Select and apply suitable PPE 6.2 Arrange aluminium profile and glass match according to installation drawings 6.3 Fix gasket to the glass 6.4 Assemble aluminium profile and	<u>Attitude:</u> – Knowledgeable in tools and equipment – Systematic in operating SOP – Clean and tidy – Meticulous <u>Safety:</u> – Adhere to safety procedure and requirement – Able to	<u>Related Knowledge</u> 12 <u>Related Skills</u> 28	<u>Related Knowledge</u> Lecture <u>Related Skills</u> Demonstration & Observation	6.1 Suitable PPE picked as per installation requirement 6.2 Aluminium profile and glass matched and grouped as per shop drawings 6.3 Gasket inserted to the glass as per installation requirement 6.4 Aluminium profile and glass with

Work Activities	Related Knowledge	Related Skills	Attitude / Safety / Environmental	Training Hours	Delivery Mode	Assessment Criteria
	• Bend – Two man handling • Dent – Proper workspace and storage area • Crack • Sharp edges 6.3 Assembly Aluminium profile and glass such as: • Method • Precaution • Accessories ➢ Spacer ➢ Roller ➢ Lock set ➢ Iron mongary 6.4 Tagging and packing Material method	glass with accessories at factory 6.5 Confirm glass panel assembly complete as per drawing 6.6 Tagging and packing for site delivery	distinguish hazards <u>Environmental:</u> – Comply to CIDB and OSHA requirements – Comply to Solid Waste Management			accessories assembled at factory as per shop drawing 6.5 Assembled Glass panel fixed as per shop drawing 6.6 Assembled glass panel tagged and packed for site delivery
7. Perform inner frame installation to the main frame	7.1 Types of PPE such as: • Glove • Goggle • Safety Helmet • Safety boot	7.1 Receive installation drawing, floor plan and door & window schedule	<u>Attitude:</u> – Knowledgeable in tools and equipment – Systematic in operating SOP – Clean and tidy	<u>Related Knowledge</u> 12 <u>Related</u>	<u>Related Knowledge</u> Lecture	7.1 Installation drawing and floor plan, door and window interpreted as per and door & window schedule 7.2 Method of

Work Activities	Related Knowledge	Related Skills	Attitude / Safety / Environmental	Training Hours	Delivery Mode	Assessment Criteria
	• Safety harness 7.2 Types of drawing such as: • Door and window schedule • Floor plan layout 7.3 Types of instrument such as: • Levelling Instrument – Water level (hose) – Plumb Bob – Laser leveller – Spirit level • Hammer • Drill • Chisel 7.4 Tool and equipment application 7.5 Support and bracing • Types • Installation method	7.2 Determine method of installation 7.3 Arrange material according to floor/ units refer tagging 7.4 Remove protective film from main frame 7.5 Clean main frame 7.6 Inner frame match with main frame 7.7 Install sliding door track 7.8 Fix inner frame into main frame 7.9 Conduct functionality test 7.10 Remove protective film from inner frame 7.11 Perform waste sorting	<u>Safety:</u> – Adhere to safety procedure and requirement – Able to distinguish hazards <u>Environmental:</u> – Comply to CIDB and OSHA requirements – Comply to Solid Waste Management	<u>Skills</u> 28	<u>Related Skills</u> Demonstration & Observation	installation confirmed as per shop drawing 7.3 Material distributed according to floor/ units according to tagging 7.4 Protective film removed from main frame before installation 7.5 Main frame cleaned from debris and grease according to SOP 7.6 Inner frame and main frame matched and confirmed as per shop drawing 7.7 Sliding door track fixed to the bottom and upper frame according to door schedule 7.8 Inner frame fixed into main frame according to door schedule 7.9 Sliding Door and window tested for

Work Activities	Related Knowledge	Related Skills	Attitude / Safety / Environmental	Training Hours	Delivery Mode	Assessment Criteria
						functionality as per SOP 7.10 Protective film removed from inner frame and cleaned according to SOP 7.11 Waste sorted to designated bin according to waste disposal requirement

Employability Skills

Core Abilities	Social Skills
01.04 Analyse information 01.05 Utilize the internet to locate and gather information 01.06 Utilize word processor to process information 02.06 Write memos and letters 02.07 Utilize Local Area Network (LAN)/Internet to exchange information 02.08 Prepare pictorial and graphic information 03.08 Develop and maintain a cooperation within work group 04.01 Organize own work activities 04.02 Set and revise own objectives and goals 04.03 Organize and maintain own workplace 04.04 Apply problem solving strategies 04.05 Demonstrate initiative and flexibility 06.05 Analyse technical systems 06.06 Monitor and correct performance of systems	1. Communication skills 2. Conceptual skills 3. Interpersonal skills 4. Learning skills 5. Leadership skills 6. Multitasking and prioritising 7. Self-discipline 8. Teamwork

Tools, Equipment and Materials (TEM)

ITEMS	RATIO (TEM : Trainees)
1. Personal Protective Equipment (PPE)	1:1
2. Production planning samples	1:1
3. Production manpower schedule samples	1:1
4. Allen wrenches: 4mm , 5mm, 6mm (PAM specific)	1:1
5. Glass Suction Cups	1:10
6. Tape Measure	1:1
7. Laser or water level	1:5
8. Plumb bob or level	1:1
9. Drill and assortment of drill bits	1:1
10. Step Ladders	1:5
11. All related fasteners	As required
12. ¼" all thread	As required
13. ¼" concrete anchors	As required
14. ¼" nuts	As required
15. ¼" washers	As required
16. 10 x 3-½" or 4" long stainless steel screws for the jambs	As required
17. Phillips and regular screw drivers and/or screw guns	1:1
18. Caulking gun and high quality compatible sealant	As required
19. Flat Bar	1:5
20. Story Pole	1:5
21. Wrenches	1:1
22. Hammer	1:1
23. Impervious shims	1:1
24. Utility knife	1:1
25. Colored Keel	1:1
26. Pencil or fine marker	As required
27. Nylon String	As required
28. Metal Saw	1:1

REFERENCES

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2. Australian Window Association (2010), An Industry Guide to the Correct Installation of Windows and Doors, 71 Ridge Street Gordon NSW 2072, Document No. AWA2010/INSV2.
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17. CURRICULUM OF COMPETENCY UNIT (COCU): CU03

SECTOR	**(F) CONSTRUCTION**						
SUB SECTOR	**(43) SPECIALISED CONSTRUCTION ACTIVITIES**						
AREA	**(301) BUILDING COMPLETION AND FINISHING**						
NOSS TITLE	**BUILDING GLASS AND ALUMINIUM INSTALLATION**						
COMPETENCY UNIT TITLE	**CASEMENT AND TOP HUNG WINDOWS INSTALLATION**						
PRE-REQUISITE (if applicable)	**-**						
LEARNING OUTCOMES	The outcome of this competency will enable the personnel to identify, assembled and install Casement and Top Hung Windows members, and explain layout and installation procedure for these member in building construction according to standard operating procedure, and waste management requirements. Upon completion of this competency unit, trainees will be able to:- 1. Prepare casement and top hung windows installation requirement 2. Carry out aluminium main frame assembly 3. Execute main frame to wall opening 4. Carry out aluminium inner frame assembly 5. Conduct glass cutting 6. Carry out aluminium inner frame and glass assembly 7. Perform inner frame installation to the main frame						
COMPETENCY UNIT ID	**F433-001-2:2017-C03**	**LEVEL**	Two (2)	**TRAINING DURATION**	260 hours	**SKILL CREDIT**	26

Work Activities	Related Knowledge	Related Skills	Attitude / Safety / Environmental	Training Hours	Delivery Mode	Assessment Criteria
1. Prepare casement and top hung windows	1.1 Type of aluminium coating such as: • Natural anodize • Bronze	1.1 Obtain detail instruction for	<u>Attitude:</u> - Knowledgeable in tools and equipment	<u>Related Knowledge</u> 12	<u>Related Knowledge</u> Lecture	1.1 Casement and top hung window installation instruction

Work Activities	Related Knowledge	Related Skills	Attitude / Safety / Environmental	Training Hours	Delivery Mode	Assessment Criteria
installation requirement	anodized • Powder coating • Polyvinylidene Fluoride (PVDF) 1.2 Types of aluminium profile, thickness and tolerance: • Profile: – Performance – Economy – Standard • Thickness: • Tolerance: – Calculation – Measurement 1.3 Types of glass sheet such as: • Float glass • Tempered • Laminated • Wired • Double glazing • Fire rated • Low emission 1.4 Types of accessories such as:	casement and top hung window installation 1.2 Determine types, thickness and coating of aluminium profile, and quantity to be used 1.3 Determine types and quantity of glass sheet to be used 1.4 Determine windows types and quantity 1.5 Determine dimension of aluminium and glass profile 1.6 Determine cutting list	- Adhere to SOP <u>Safety:</u> - Adhere to safety procedure and requirement - Able to distinguish hazards <u>Environmental:</u> - Conducive working environment	<u>Related Skills</u> 18	<u>Related Skills</u> Demonstration & Observation	interpreted as per shop drawing 1.2 Type, thickness, coating and quantity of aluminium profile confirmed according to shop drawing 1.3 Types and quantity of glass sheet confirmed according to shop drawing 1.4 Types of windows and quantity confirmed based on window schedule 1.5 Aluminium and glass profile dimension measured as per shop drawing 1.6 Aluminium and glass cutting schedule prepared as per cutting list 1.7 Types of accessories

Work Activities	Related Knowledge	Related Skills	Attitude / Safety / Environmental	Training Hours	Delivery Mode	Assessment Criteria
	• Lock set • Handle • Gasket/Weather strip • Stay hinge • Screws 1.5 Types of tools and machineries such as: • Puncher • Screwdriver • Air Compressor • Glass Suction • Diamond cutter • Grinder • Rivett gun • Drill 1.6 Basic computer knowledge such as: • Spreadsheet • Word processor	for aluminium and glass 1.7 Determine types of accessories 1.8 Identify types of tools and materials to be used 1.9 Select machineries and tools to be used 1.10 Prepare cutting list for aluminium and glass profile, types and quantity 1.11 Determine GI strip quantity and position				confirmed according to shop drawing 1.8 Types of materials and tools determined as per installation requirement 1.9 Machineries and tools confirmed as per installation requirement 1.10 Sliding glass and aluminium requirement list produced in soft and hard copies 1.11 GI strip quantities confirmed and location on frame marked as per installation requirement

Work Activities	Related Knowledge	Related Skills	Attitude / Safety / Environmental	Training Hours	Delivery Mode	Assessment Criteria
2. Carry out aluminium main frame assembly	2.1 Types of PPE such as: • Rubber Palm Glove (for aluminium) • Goggle • Ear plug/ protection • Apron • Safety boot 2.2 Cutting sequence 2.3 Precaution during cutting and delivery such as: • Scratch – Protective film – Stretch film • Bend – Two man handling • Dent – Proper work space and storage area 2.4 Operating Punching Machine 2.5 Profile wrapping 2.6 Tagging and packing material	2.1 Select and apply suitable PPE 2.2 Measure and mark aluminium extrusion 2.3 Determine cutting sequence to reduce wastage 2.4 Cut aluminium to profile 2.5 Operate punching machine 2.6 Gather cut aluminium profile 2.7 Arrange aluminium profile according to installation drawings 2.8 Assemble main frame	<u>Attitude:</u> - Knowledgeable in tools and equipment - Systematic in operating SOP <u>Safety:</u> - Adhere to safety procedure and requirement - Able to distinguish hazards <u>Environmental:</u> - Comply to OSHA requirements - Comply to waste disposal requirement	<u>Related Knowledge</u> 12 <u>Related Skills</u> 28	<u>Related Knowledge</u> Lecture <u>Related Skills</u> Demonstration & Observation	2.1 Suitable PPE picked as per installation requirement 2.2 Aluminium extrusion measured and marked according to cutting list 2.3 Smart cutting sequence confirmed to minimize wastage 2.4 Aluminium profile cut according to installation requirement 2.5 Aluminium profile punched according to shop drawing 2.6 Cut and punched aluminium profile collected 2.7 Cut and punched aluminium profile categorize according to installation requirement 2.8 Aluminium main

Work Activities	Related Knowledge	Related Skills	Attitude / Safety / Environmental	Training Hours	Delivery Mode	Assessment Criteria
		members 2.9 Fix GI strip to the main frame members 2.10 Fix black tape and stretch film to the main frame 2.11 Tagging and packing for site delivery				frame member assembled as per installation requirement 2.9 GI strip fastened to main frame members 2.10 Black tape and stretch film fixed to main frame for protection as per SOP 2.11 Aluminium profile tagged and packed for site delivery as per SOP
3. Install main frame to wall opening	3.1 Types of PPE such as: • Glove • Goggle • Safety Helmet • Safety boot • Safety harness 3.2 Types of drawing such as: • Window schedule • Floor plan layout	3.1 Receive installation drawing and floor plan 3.2 Arrange material according to floor/ units refer tagging 3.3 Determine obstruction	<u>Attitude:</u> - Knowledgeable in tools and equipment - Systematic in operating SOP <u>Safety:</u> - Adhere to safety procedure and requirement - Able to distinguish	<u>Related Knowledge</u> 9 <u>Related Skills</u> 21	<u>Related Knowledge</u> Lecture <u>Related Skills</u> Demonstration & Observation	3.1 Installation drawing and floor plan interpreted as per installation requirement 3.2 Material distributed according to floor/ units according to tagging 3.3 Obstruction on site listed and confirmed

Work Activities	Related Knowledge	Related Skills	Attitude / Safety / Environmental	Training Hours	Delivery Mode	Assessment Criteria
	3.3 Types of instrument such as: • Levelling Instrument – Water level (hose) – Plumb Bob – Laser leveller – Spirit level • Hammer • Drill • Chisel 3.4 Tool and equipment application 3.5 Support and bracing such as: • Types • Installation method	on site 3.4 Notify obstruction to respective site personnel for rectification 3.5 Site opening size reconfirm 3.6 Prepare material and work area 3.7 Measure floor raise level 3.8 Mark main frame installation location 3.9 Adjust vertical and horizontal alignment of main frame 3.10 Fix main	hazards <u>Environmental:</u> - Comply to CIDB and OSHA requirements - Comply to waste disposal requirement			according to shop drawing 3.4 Respective site personnel notified for rectification 3.5 Site opening size measured as per installation requirement 3.6 Material and work area arranged as per installation requirement 3.7 Floor raise level measured as per installation requirement 3.8 Main frame installation location marked according to shop drawing 3.9 Vertical and horizontal alignment of main frame adjusted according to installation requirement 3.10 GI Strip/Wall plug fixed Main

Work Activities	Related Knowledge	Related Skills	Attitude / Safety / Environmental	Training Hours	Delivery Mode	Assessment Criteria
		frame to the opening and fasten GI strip/wall plug to the wall 3.11 Fix support and bracing				frameto wall opening 3.11 Support and bracing metal fixed to the main frame for stability
4. Carry out aluminium inner frame assembly	4.1 Types of PPE such as: • Rubber Palm Glove (for aluminium) • Goggle • Ear plug/ protection • Apron • Safety boot 4.2 Cutting sequence 4.3 Precaution during cutting and delivery such as: • Scratch – Protective film • Bend – Two man handling • Dent – Proper work space and	4.1 Select and apply suitable PPE 4.2 Measure and mark aluminium extrusion refer to cutting list 4.3 Determine cutting sequence to reduce wastage 4.4 Fix black tape to the aluminium profile 4.5 Cut aluminium to profile	<u>Attitude:</u> - Knowledgeable in tools and equipment - Systematic in operating SOP <u>Safety:</u> - Adhere to safety procedure and requirement - Able to distinguish hazards <u>Environmental:</u> - Comply to OSHA requirements - Conducive working environment	<u>Related Knowledge</u> 12 <u>Related Skills</u> 28	<u>Related Knowledge</u> Lecture <u>Related Skills</u> Demonstration & Observation	4.1 Suitable PPE picked as per installation requirement 4.2 Aluminium extrusion measured and marked according to cutting list 4.3 Smart cutting sequence confirmed to minimize wastage 4.4 Black tape fixed to aluminium profile for protection against scratch and dent as per SOP 4.5 Aluminium profile cut and tagged as per installation

Work Activities	Related Knowledge	Related Skills	Attitude / Safety / Environmental	Training Hours	Delivery Mode	Assessment Criteria
	storage area 4.4 Operating Punching Machine 4.5 Profile wrapping 4.6 Assembly Aluminium profile • Method • Precaution	and tag 4.6 Operate punching machine 4.7 Gather cut aluminium profile 4.8 Fix weather strip to the inner frame 4.9 Arrange aluminium profile according to installation drawings 4.10 Assemble aluminium profile at factory 4.11 Tagging and packing for site delivery				requirement 4.6 Aluminium profile punched according to shop drawing 4.7 Cut and punched aluminium profile collected 4.8 Weather strip fixed to the inner frame as per installation requirement 4.9 Cut and punched aluminium profile categorize according to installation requirement 4.10 Aluminium profile assembled at factory as per installation requirement 4.11 Aluminium profile tagged and packed for site delivery as per SOP

Work Activities	Related Knowledge	Related Skills	Attitude / Safety / Environmental	Training Hours	Delivery Mode	Assessment Criteria
5. Conduct glass cutting	5.1 Types of PPE such as: • Rubber Palm Glove • Goggle • Ear plug • Mask • Apron • Safety boot 5.2 Cutting sequence 5.3 Precaution during cutting such as: • Scratch – Lining table • Crack • Sharp edges – Proper glass handling – Sufficient manpower 5.4 Glass cutting and grinding such as: • Method • Tool and Equipment • Handling 5.5 Tagging Material 5.6 Waste Sorting • Categorize • Waste disposal	5.1 Select and apply suitable PPE 5.2 Measure and mark glass refer to cutting list 5.3 Determine cutting sequence to reduce wastage 5.4 Lay glass on the clean carpeted lining table 5.5 Cut glass to size with tolerance and quantity 5.6 Check dimension cut 5.7 Grind sharp edges 5.8 Tag glass for	<u>Attitude:</u> - Knowledgeable in tools and equipment - Systematic in operating SOP <u>Safety:</u> - Adhere to safety procedure and requirement - Able to distinguish hazards <u>Environmental:</u> - Comply to OSHA requirements - Comply to waste disposal requirement	<u>Related Knowledge</u> 12 <u>Related Skills</u> 28	<u>Related Knowledge</u> Lecture <u>Related Skills</u> Demonstration & Observation	5.1 Suitable PPE picked as per installation requirement 5.2 Glass sheet measured and marked as per cutting list 5.3 Smart cutting sequence confirmed to minimize wastage 5.4 Glass sheet laid on clean carpeted lining table to protect against scratch and crack as per SOP 5.5 Glass cut to quantity with size and tolerance and according to glass cutting list 5.6 Glass cut dimension measured as per shop drawing 5.7 Glass edges grinded to remove sharp edges as per safety

Work Activities	Related Knowledge	Related Skills	Attitude / Safety / Environmental	Training Hours	Delivery Mode	Assessment Criteria
	method • Disposal/ recycle location	assembly 5.9 Clean the working area				requirement 5.8 Cut Glass tagged according to assembly requirement 5.9 Waste glass cleared to designated bin
6. Carry out aluminium inner frame and glass assembly	6.1 Types of PPE such as: • Rubber Palm Glove (for aluminium) • Goggle • Ear plug/ protection • Apron • Safety boot 6.2 Precaution during assembly and delivery: • Scratch – Protective film • Bend – Two man handling • Dent – Proper work space and storage area	6.1 Select and apply suitable PPE 6.2 Determine aluminium inner frame and glass assembly drawing 6.3 Arrange aluminium profile and glass match according to installation drawings 6.4 Assemble aluminium profile and glass with	<u>Attitude:</u> - Knowledgeable in tools and equipment - Systematic in operating SOP <u>Safety:</u> - Adhere to safety procedure and requirement - Able to distinguish hazards <u>Environmental:</u> - Comply to CIDB and OSHA	<u>Related Knowledge</u> 12 <u>Related Skills</u> 28	<u>Related Knowledge</u> Lecture <u>Related Skills</u> Demonstration & Observation	6.1 Suitable PPE picked as per installation requirement 6.2 Aluminium inner frame and glass assembly drawing confirmed as per installation requirement 6.3 Aluminium profile and glass matchedand grouped as per installation drawings 6.4 Aluminium profile and glass with accessories assembled at factory as per shop drawing

Work Activities	Related Knowledge	Related Skills	Attitude / Safety / Environmental	Training Hours	Delivery Mode	Assessment Criteria
	• Crack • Sharp edges 6.3 Assembly Aluminium profile and glass • Method • Precaution • Accessories ➢ Spacer ➢ Roller ➢ Lock set ➢ Iron mongary 6.4 Tagging and packing Material method	accessories at factory 6.5 Confirm glass panel assembly complete as per drawing 6.6 Fix gasket to the glass 6.7 Clean assembled inner frame and glass 6.8 Tagging and packing for site delivery	requirements			6.5 Assembled Glass panel fixed as per shop drawing 6.6 Gasket inserted to the glass as per installation requirement 6.7 Inner frame and glass cleaned according to SOP 6.8 Assembled glass panel tagged and packed for delivery
7. Perform inner frame installation to the main frame	7.1 Types of PPE such as: • Glove • Goggle • Safety Helmet • Safety boot • Safety harness 7.2 Types of drawing such as: • Door and window schedule • Floor plan	7.1 Determine installation drawing, floor plan and door & window schedule 7.2 Determine method of installation 7.3 Arrange material according	<u>Attitude:</u> - Knowledgeable in tools and equipment - Systematic in operating SOP <u>Safety:</u> - Adhere to safety procedure and requirement - Able to distinguish	<u>Related Knowledge</u> 12 <u>Related Skills</u> 28	<u>Related Knowledge</u> Lecture <u>Related Skills</u> Demonstration & Observation	7.1 Installation drawing, floor plan, window interpreted as per and door & window schedule 7.2 Method of installation confirmed as per shop drawing 7.3 Material distributed according to floor/

Work Activities	Related Knowledge	Related Skills	Attitude / Safety / Environmental	Training Hours	Delivery Mode	Assessment Criteria
	layout 7.3 Method of statement • Installation method • Instruction manual 7.4 Types of instrument such as: • Levelling Instrument – Water level (hose) – Plumb Bob – Laser leveller – Spirit level • Hammer • Drill • Chisel 7.5 Tool and equipment application 7.6 Support and bracing • Types • Installation method	to floor/ units as per tagging 7.4 Remove protective film from main frame 7.5 Clean main frame 7.6 Inner frame match with main frame 7.7 Fix inner frame to main frame 7.8 Conduct windows functionality test 7.9 Remove protective film from inner frame 7.10 Perform waste sorting	hazards <u>Environmental:</u> - Comply to CIDB and OSHA requirements - Comply to waste disposal requirement			units according to tagging 7.4 Protective film removed from main frame before installation 7.5 Main frame cleaned from debris and grease according to SOP 7.6 Inner frame and main frame matched and confirmed as per shop drawing 7.7 Inner frame fitted into main frame according to window schedule 7.8 Window tested for functionality 7.9 Protective film removed from inner frame and cleaned according to SOP 7.10 Waste sorted to designated bin according to waste disposal requirement

Employability Skills

Core Abilities	Social Skills
01.04 Analyse information 01.05 Utilize the internet to locate and gather information 01.06 Utilize word processor to process information 02.06 Write memos and letters 02.07 Utilize Local Area Network (LAN)/Internet to exchange information 02.08 Prepare pictorial and graphic information 03.08 Develop and maintain a cooperation within work group 04.01 Organize own work activities 04.02 Set and revise own objectives and goals 04.03 Organize and maintain own workplace 04.04 Apply problem solving strategies 04.05 Demonstrate initiative and flexibility 06.05 Analyse technical systems 06.06 Monitor and correct performance of systems	1. Communication skills 2. Conceptual skills 3. Interpersonal skills 4. Learning skills 5. Leadership skills 6. Multitasking and prioritising 7. Self-discipline 8. Teamwork

Tools, Equipment and Materials (TEM)

ITEMS	RATIO (TEM : Trainees)
1. Personal Protective Equipment (PPE)	1:1
2. Production planning samples	1:1
3. Production manpower schedule samples	1:1
4. Allen wrenches: 4mm , 5mm, 6mm (PAM specific)	1:1
5. Glass Suction Cups	1:10
6. Tape Measure	1:1
7. Laser or water level	1:5
8. Plumb bob or level	1:1
9. Drill and assortment of drill bits	1:1
10. Step Ladders	1:5
11. All related fasteners	As required As required

12. ¼” x 20 all thread	As required
13. ¼” concrete anchors	As required
14. ¼” nuts	As required
15. ¼” washers	As required
16. 10 x 3-½” or 4” long stainless steel screws for the jambs	1:1
17. Phillips and regular screw drivers and/or screw guns	As required
18. Caulking gun and high quality compatible sealant	1:5
19. Flat Bar	1:5
20. Story Pole	1:1
21. Wrenches	1:1
22. Hammer	1:1
23. Impervious shims	1:1
24. Utility knife	1:1
25. Colored Keel	As required
26. Pencil or fine marker	As required
27. Nylon String	1:1
28. Metal Saw	

REFERENCES

1. Andrew J. Charlett, Craig Maybery-Thomas (2003), Fundamental Building Technology, Revised Edition, Routledge, New York, NY. ISBN: 1136579826, 9781136579820
2. Australian Window Association (2010), An Industry Guide to the Correct Installation of Windows and Doors, 71 Ridge Street Gordon NSW 2072, Document No. AWA2010/INSV2.
3. Michael McEvoy (2014), External Components, Revised Edition, Routledge. New York, NY 10017. ISBN: 1317893999, 9781317893998
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18. CURRICULUM OF COMPETENCY UNIT (COCU): CU04

SECTOR	**(F) CONSTRUCTION**						
SUB SECTOR	**(43) SPECIALISED CONSTRUCTION ACTIVITIES**						
AREA	**(301) BUILDING COMPLETION AND FINISHING**						
NOSS TITLE	**BUILDING GLASS AND ALUMINIUM INSTALLATION**						
COMPETENCY UNIT TITLE	**SHOP FRONT INSTALLATION**						
PRE-REQUISITE (if applicable)	**-**						
LEARNING OUTCOME	The outcome of this competency will enable the personnel to identify, assembled and install Shop Front members, and explain layout and installation procedure for these member in building construction according to standard operating procedure and waste management requirements. Upon completion of this competency unit, trainees will be able to:- 1. Prepare work instruction 2. Carry out aluminium profile cutting 3. Perform aluminium profile installation 4. Conduct glass cutting 5. Carry out glass panel installation						
COMPETENCY UNIT ID	**F433-001-2:2017-C04**	**LEVEL**	Two (2)	**TRAINING DURATION**	220 hours	**SKILL CREDIT**	22

Work Activities	Related Knowledge	Related Skills	Attitude / Safety / Environmental	Training Hours	Delivery Mode	Assessment Criteria
1. Prepare work instruction	1.1 Type of coating such as: • Natural anodize • Bronze anodized • Powder coating	1.1 Obtain detail instruction for shop front installation 1.2 Determine	Attitude: - Knowledgeable in tools and equipment - Systematic in operating SOP	Related Knowledge 16	Related Knowledge Lecture	1.1 Shop front installation instruction interpreted as per installation requirement

Work Activities	Related Knowledge	Related Skills	Attitude / Safety / Environmental	Training Hours	Delivery Mode	Assessment Criteria
	• PolyvinylideneFluoride (PVDF) 1.2 Shop Front support Structure such as: • Types • Function • Jointing method and support 1.3 Types of aluminium profile, thickness and tolerance: • Profile: – Performance – Standard • Thickness • Tolerance: – Calculation – Measurement 1.4 Types of glass sheet such as: • Float glass • Tempered • Laminated • Double glazing • Fire rated • Low emission	aluminium profile types, thickness and coating ,and quantity to be used 1.3 Determine types and quantity of glass sheet to be used 1.4 Determine dimension of aluminium and glass profile 1.5 Determine cutting list for aluminium and glass 1.6 Identify types of accessories 1.7 Identify types of materials and tools to be used 1.8 Gather machineries	<u>Safety:</u> - Adhere to safety procedure and requirement - Able to distinguish hazards <u>Environmental:</u> - Conducive working environment	<u>Related Skills</u> 24	<u>Related Skills</u> Demonstration & Observation	1.2 Type, thickness, coating and quantity of aluminium profile confirmed according to shop drawing 1.3 Types and quantity of glass sheet confirmed according to shop drawing 1.4 Aluminium and glass profile dimension measured as per shop drawing 1.5 Aluminium and glass cutting schedule prepared based on cutting list 1.6 Types of accessories confirmed according to shop drawing 1.7 Types of materials and tools confirmed as per

Work Activities	Related Knowledge	Related Skills	Attitude / Safety / Environmental	Training Hours	Delivery Mode	Assessment Criteria
	• Reflective glass 1.5 Types of windows/doors and accessories such as: • Hinges • Handle • Lock • Windows • Doors 1.6 Types of tools and machineries such as: • Screwdriver • Air Compressor • Glass Suction/Cup lifter • Diamond cutter • Grinder • Rivett gun • Drill 1.7 Basic computer knowledge such as: • Spread sheet • Word Processor	and tools 1.9 Prepare cutting list for aluminium and glass profile, types and quantity				installation requirement 1.8 Machineries and tools confirmed as per installation requirement 1.9 Shop Front glass and aluminium requirement list produced in soft and hard copies

Work Activities	Related Knowledge	Related Skills	Attitude / Safety / Environmental	Training Hours	Delivery Mode	Assessment Criteria
2. Carry out aluminium profile cutting	2.1 Types of PPE such as: • Rubber Palm Glove (for aluminium) • Goggle • Ear plug/ protection • Apron • Safety boot 2.2 Cutting sequence 2.3 Precaution during cutting and delivery: • Scratch – Protective film • Bend – Two man handling • Dent – Proper work space and storage area 2.4 Profile wrapping • Black tape 2.5 Accessories: • Wall plug /GI strip 2.6 Tagging and packing Material	2.1 Select and apply suitable PPE 2.2 Measure and mark aluminium extrusion refer to cutting list 2.3 Determine cutting sequence to reduce wastage 2.4 Punch screw hole at designated location 2.5 Prepare aluminium bracket and frame material 2.6 Prepare aluminium capping 2.7 Fix black tape to the	Attitude: - Knowledgeable in tools and equipment - Systematic in operating SOP Safety: - Adhere to safety procedure and requirement - Able to distinguish hazards Environmental: - Comply to OSHA requirements - Comply to waste disposal requirement	Related Knowledge 15 Related Skills 35	Related Knowledge Lecture Related Skills Demonstration & Observation	2.1 Suitable PPE picked as per installation requirement 2.2 Aluminium extrusion measured and marked according to cutting list 2.3 Smart cutting sequence confirmed to minimize wastage 2.4 Screw hole prepared at location based on shop drawing 2.5 Aluminium bracket and frame material gathered as per shop drawing 2.6 Aluminium capping gathered as per shop drawing 2.7 Black tape applied to aluminium profile for protection as

Work Activities	Related Knowledge	Related Skills	Attitude / Safety / Environmental	Training Hours	Delivery Mode	Assessment Criteria
	2.7 Assembly Aluminium profile • Method • Precaution 2.8 Standard Operating Procedure (SOP)	aluminium profile 2.8 Cut aluminium bracket and frame profile according to quantity 2.9 Arrange aluminium bracket, frame and accessories according to installation drawings 2.10 Tagging and packing for site delivery 2.11 Assemble aluminium profile on sit				per SOP 2.8 Aluminium bracket and frame profile cut to quantity as per aluminium cutting list 2.9 Aluminium bracket, frame and accessories grouped as per installation drawings 2.10 Aluminium profile tagged and packed for site delivery as per SOP 2.11 Aluminium profile assembled at site as per installation requirement
3. Perform aluminium profile installation	3.1 Types of PPE such as: • Glove • Goggle	3.1 Check installation drawing and floor	Attitude: - Knowledgeable in tools and equipment	Related Knowledge 12	Related Knowledge Lecture	3.1 Installation drawing and floor plan interpreted as per

Work Activities	Related Knowledge	Related Skills	Attitude / Safety / Environmental	Training Hours	Delivery Mode	Assessment Criteria
	• Safety Helmet • Safety boot • Safety harness 3.2 Types of drawing such as: • Window schedule • Floor plan layout 3.3 Types of instrument such as: • Levelling Instrument – Water level (hose) – Plumb Bob – Laser leveller – Spirit level • Hammer • Drill • Chisel 3.4 Tool and equipment application 3.5 Support and bracing such as: • Types • Installation method	plan 3.2 Determine site layout location 3.3 Arrange material according to floor/ units refer tagging 3.4 Prepare material and work area 3.5 Assemble aluminium profile into main frame 3.6 Fix black tape and plastic wrapping to main frame 3.7 Site opening size reconfirm 3.8 Measure floor raise level 3.9 Fix bracket	- Systematic in operating SOP <u>Safety:</u> - Adhere to safety procedure and requirement - Able to distinguish hazards <u>Environmental:</u> - Comply to CIDB and OSHA requirements	<u>Related Skills</u> 28	<u>Related Skills</u> Demonstration & Observation	installation requirement 3.2 Site layout location confirmed based on installation requirement 3.3 Material distributed according to floor/ units according to tagging 3.4 Material and work area arranged as per installation requirement 3.5 Aluminium profile assembled into main frame as per shop drawing 3.6 Black tape and plastic wrapping applied to main frame as protection according to SOP 3.7 Site opening size measured as per

Work Activities	Related Knowledge	Related Skills	Attitude / Safety / Environmental	Training Hours	Delivery Mode	Assessment Criteria
		to wall opening 3.10 Fix main frame to bracket				installation requirement 3.8 Floor raise level measured as per installation requirement 3.9 Bracket plugged to wall opening as per installation requirement 3.10 Main frame fitted to bracket and aligned as per installation requirement
4. Conduct glass cutting	4.1 Types of PPE such as: • Rubber Palm Glove • Goggle • Ear plug • Mask • Apron • Safety boot 4.2 Cutting sequence 4.3 Precaution during cutting such as: • Scratch – Lining table	4.1 Select and apply suitable PPE 4.2 Lay glass on the clean carpeted lining table 4.3 Measure and mark glass refer to cutting list	<u>Attitude:</u> - Knowledgeable in tools and equipment - Systematic in operating SOP <u>Safety:</u> - Adhere to safety procedure and requirement - Able to distinguish hazards	<u>Related Knowledge</u> 12 <u>Related Skills</u> 28	<u>Related Knowledge</u> Lecture <u>Related Skills</u> Demonstration & Observation	4.1 Suitable PPE picked as per installation requirement 4.2 Glass sheet laid on clean carpeted lining table to protect against scratch and crack 4.3 Glass sheet measured and marked as per cutting list 4.4 Smart cutting

Work Activities	Related Knowledge	Related Skills	Attitude / Safety / Environmental	Training Hours	Delivery Mode	Assessment Criteria
	• Crack • Sharp edges – Proper glass handling – Sufficient manpower 4.4 Glass cutting and grinding • Method • Tool and Equipment • Handling 4.5 Glass surface protection • Material • Method • Tools 4.6 Tagging Material 4.7 Waste Sorting • Categorize • Waste disposal method • Disposal/ recycle location	4.4 Determine cutting sequence to reduce wastage 4.5 Cut glass to size with tolerance and quantity 4.6 Check dimension cut 4.7 Grind sharp edges 4.8 Fix glass protection film 4.9 Tag glass for assembly 4.10 Clean waste material	<u>Environmental:</u> - Comply to OSHA requirements			sequence confirmed to minimize wastage 4.5 Glass cut to size, quantity and tolerance as per glass cutting list 4.6 Dimension of cut Glass measured as per shop drawing 4.7 Edges of cut glass grinded as per safety requirement 4.8 Protective film applied to glass sheet to avoid scratch and crack according to SOP 4.9 Cut Glass tagged as per assembly requirement 4.10 Waste sorted to designated bin as per waste disposal requirement
5. Carry out glass panel	5.1 Types of PPE such as:	5.1 Select and apply	<u>Attitude:</u> - Knowledgeable in	<u>Related Knowledge</u>	<u>Related Knowledge</u>	5.1 Suitable PPE picked as per

Work Activities	Related Knowledge	Related Skills	Attitude / Safety / Environmental	Training Hours	Delivery Mode	Assessment Criteria
installation	• Rubber Palm Glove • Goggle • Safety harness • Safety helmet • Safety boot 5.2 Tools and Machineries such as: • Suction cup lifter • Winching • Cranes • Spacer 5.3 Precaution during installation such as: • Scratch – Glass Protective film – Black tape • Bend – handling • Dent – Proper work space and storage area • Crack • Sharp edges 5.4 Glass Installation • Method • Precaution • Accessories	suitable PPE 5.2 Arrange aluminium profile and glass 5.3 Arrange Machineries and tools 5.4 Install glass to the main frame opening 5.5 Install aluminium capping 5.6 Lay masking tape between joint to avoid smear 5.7 Apply gasket/ silicon to the glass 5.8 Remove protective black tape, silicon	tools and equipment - Systematic in operating SOP <u>Safety:</u> - Adhere to safety procedure and requirement - Able to distinguish hazards <u>Environmental:</u> - Comply to CIDB and OSHA requirements	15 <u>Related Skills</u> 35	Lecture <u>Related Skills</u> Demonstration & Observation	installation requirement 5.2 Aluminium profile and glass matched and grouped as per shop drawings 5.3 Machineries and tools allocated as per installation requirement 5.4 Glass installed location at main frame opening confirmed as per shop drawing 5.5 Aluminium capping fitted as per installation requirement 5.6 Masking tape laid between joint to avoid sealing smear as per SOP 5.7 Gasket fitted and silicon applied to glass joint as per installation requirement

Work Activities	Related Knowledge	Related Skills	Attitude / Safety / Environmental	Training Hours	Delivery Mode	Assessment Criteria
	– Aluminium capping – Spacer – Roller – Capping – Masking tape – Lock set – Iron mongary 5.5 Inspection such as: • Gap • Water proof • Stability • Alignment • Scratch • Crack • warping • Frame Sagging • Cleanliness	residue from the aluminium profile 5.9 Remove protective film from glass panel 5.10 Inspect glass panel installation complete as per drawing				5.8 Protective black tape, silicon residue removed from aluminium profile and cleaned as per SOP 5.9 Protective film removed from glass panel and cleaned as per SOP 5.10 Installed glass panel checked as per shop drawing

Employability Skills

Core Abilities	Social Skills
01.04 Analyse information 01.05 Utilize the internet to locate and gather information 01.06 Utilize word processor to process information 02.06 Write memos and letters 02.07 Utilize Local Area Network (LAN)/Internet to exchange information 02.08 Prepare pictorial and graphic information 03.08 Develop and maintain a cooperation within work group	1. Communication skills 2. Conceptual skills 3. Interpersonal skills 4. Learning skills 5. Leadership skills 6. Multitasking and prioritising

04.01 Organize own work activities 04.02 Set and revise own objectives and goals 04.03 Organize and maintain own workplace 04.04 Apply problem solving strategies 04.05 Demonstrate initiative and flexibility 06.05 Analyse technical systems 06.06 Monitor and correct performance of systems	7. Self-discipline 8. Teamwork

Tools, Equipment and Materials (TEM)

ITEMS	RATIO (TEM : Trainees)
1. Personal Protective Equipment (PPE)	1:1
2. Installation planning samples	1:1
3. Installation manpower schedule samples	1:1
4. Wrench	1:1
5. Non-metal hand wedges	1:5
6. Gasket roller	1:5
7. C-clamps	1:5
8. Rubber mallet	1:5
9. Metric Allen wrench set	1:5
10. Power drill	1:1
11. Heavy-duty glass handling tools	1:5
12. Knife	1:1
13. Tape measure	1:1
14. Level	1:1
15. Mineral wool insulating material	1:5
16. Clear 33S Silicone Sealant or equivalent	As required
17. UL Listed Fire Caulk Sealant	As required
18. Zinc-coated flat head sheet metal screws	As required
19. Concrete screws for substrate anchoring	As required

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19. CURRICULUM OF COMPETENCY UNIT (COCU): CU05

SECTOR	**(F) CONSTRUCTION**						
SUB SECTOR	**(43) SPECIALISED CONSTRUCTION ACTIVITIES**						
AREA	**(301) BUILDING COMPLETION AND FINISHING**						
NOSS TITLE	**BUILDING GLASS AND ALUMINIUM INSTALLATION**						
COMPETENCY UNIT TITLE	**CURTAIN WALL INSTALLATION**						
PRE-REQUISITE (if applicable)							
LEARNING OUTCOME	The outcome of this competency will enable the personnel to identify, assembled and install Curtain Wall members, and explain layout and installation procedure for these member in building construction according to standard operating procedure and waste management requirements. Upon completion of this competency unit, trainees will be able to:- 1. Prepare work instruction 2. Carry out aluminium profile cutting 3. Perform aluminium profile installation 4. Conduct glass cutting 5. Carry out glass panel installation						
COMPETENCY UNIT ID	**F433-001-2:2017-C05**	**LEVEL**	Two (2)	**TRAINING DURATION**	240 hours	**SKILL CREDIT**	24

Work Activities	Related Knowledge	Related Skills	Attitude / Safety / Environmental	Training Hours	Delivery Mode	Assessment Criteria
1. Prepare work instruction	1.1 Type of coating such as: • Natural anodize • Bronze anodized	1.1 Obtain detail instruction for curtain wall	Attitude: - Knowledgeable in tools and equipment - Systematic in	Related Knowledge 16	Related Knowledge Lecture	1.1 Curtain wall installation instruction interpreted as per installation

Work Activities	Related Knowledge	Related Skills	Attitude / Safety / Environmental	Training Hours	Delivery Mode	Assessment Criteria
	• Powder coating • Polyvinylidene Fluoride (PVDF) 1.2 Curtain wall support Structure • Types • Function • Jointing method curtain wall and support 1.3 Types of aluminium profile, thickness and tolerance: • Profile: – Performance – Standard • Thickness • Tolerance: – Calculation – Measurement 1.4 Types of glass sheet such as: • Float glass • Tempered • Laminated • Double glazing	installation 1.2 Determine types curtain wall support structure 1.3 Determine aluminium profile types, thickness and coating ,and quantity to be used 1.4 Determine types and quantity of glass sheet to be used 1.5 Determine dimension of aluminium and glass profile 1.6 Determine cutting list for aluminium and glass	operating SOP <u>Safety:</u> - Adhere to safety procedure and requirement - Able to distinguish hazards <u>Environmental:</u> - Conducive working environments	<u>Related Skills</u> 24	<u>Related Skills</u> Demonstration & Observation	requirement 1.2 Type of curtain wall support structure confirmed as per installation requirement 1.3 Type, thickness, coating and quantity of aluminium profile confirmed according to shop drawing 1.4 Types and quantity of glass sheet confirmed according to shop drawing 1.5 Aluminium and glass profile dimension measured as per shop drawing 1.6 Aluminium and glass cutting schedule prepared as per cutting list 1.7 Types of accessories confirmed according to shop

Work Activities	Related Knowledge	Related Skills	Attitude / Safety / Environmental	Training Hours	Delivery Mode	Assessment Criteria
	• Fire rated • Low emission • Reflective glass 1.5 Types of accessories such as: • Top hung window • Hinges • Handle • Lock 1.6 Types of tools and machineries such as: • Screwdriver • Air Compressor • Glass Suction/Cup lifter • Diamond cutter • Grinder • Rivett gun • Drill 1.7 Basic computer knowledge such as: • Spread sheet • Word	1.7 Identify types of accessories to be used 1.8 Identify types of materials and tools to be used 1.9 Select machineries and tools to be used 1.10 Prepare cutting list for aluminium and glass profile, types and quantity				drawing 1.8 Types of materials and tools confirmed as per installation requirement 1.9 Machineries and tools confirmed as per installation requirement 1.10 Curtain wall glass and aluminium requirement list produced in soft and hard copies

Work Activities	Related Knowledge	Related Skills	Attitude / Safety / Environmental	Training Hours	Delivery Mode	Assessment Criteria
	Processor					
2. Carry out aluminium profile cutting	2.1 Types of PPE such as: • Rubber Palm Glove (for aluminium) • Goggle • Ear plug/ protection • Apron • Safety boot 2.2 Cutting sequence 2.3 Precaution during cutting and delivery: • Scratch – Protective film • Bend – Two man handling • Dent – Proper work space and storage area 2.4 Profile wrapping • Black tape 2.5 Accessories such as: • Wall plug • GI strip	2.1 Select and apply suitable PPE 2.2 Measure and mark aluminium extrusion 2.3 Determine cutting sequence to reduce wastage 2.4 Prepare aluminium bracket and frame material 2.5 Prepare aluminium capping 2.6 Fix black tape to the aluminium profile 2.7 Cut aluminium bracket and frame profile	Attitude: - Knowledgeable in tools and equipment - Systematic in operating SOP Safety: - Adhere to safety procedure and requirement - Able to distinguish hazards Environmental: - Comply with waste sorting requirements - Comply to OSHA requirements	Related Knowledge 15 Related Skills 35	Related Knowledge Lecture Related Skills Demonstration & Observation	2.1 Suitable PPE picked as per installation requirement 2.2 Aluminium extrusion measured and marked according to cutting list 2.3 Smart cutting sequence confirmed to minimize wastage 2.4 Aluminium bracket and frame material gathered as per shop drawing 2.5 Aluminium capping gathered as per shop drawing 2.6 Black tape applied to aluminium profile for protection as per SOP 2.7 Aluminium bracket and frame profile cut to quantity as

Work Activities	Related Knowledge	Related Skills	Attitude / Safety / Environmental	Training Hours	Delivery Mode	Assessment Criteria
	2.6 Tagging and packing Material 2.7 Assembly Aluminium profile • Method • Precaution 2.8 Standard Operating Procedure (SOP)	according to quantity 2.8 Arrange aluminium bracket, frame and accessories according to installation drawings 2.9 Tagging and packing for site delivery 2.10 Assemble aluminium profile on site				per aluminium cutting list 2.8 Aluminium bracket, frame and accessories grouped as per installation drawings 2.9 Aluminium profile tagged and packed for site delivery as per SOP 2.10 Aluminium profile assembled at site as per installation requirement
3. Perform aluminium profile installation	3.1 Installation areaobservation • Obstruction • Existing utilities • Layout 3.2 Installation requirement such as: • Scaffolding • Support	3.1 Obtain installation instruction 3.2 Determine Site layout location 3.3 Prepare installation work area 3.4 Check scaffolding	<u>Attitude:</u> – Knowledgeable in tools and equipment – Systematic in operating SOP <u>Safety:</u> – Adhere to safety procedure and requirement	<u>Related Knowledge</u> 15 <u>Related Skills</u> 35	<u>Related Knowledge</u> Lecture <u>Related Skills</u> Demonstration & Observatio	3.1 Curtain wall installation instruction interpreted based on installation requirement 3.2 Site layout location confirmed as per installation requirement 3.3 Work area cleared

Work Activities	Related Knowledge	Related Skills	Attitude / Safety / Environmental	Training Hours	Delivery Mode	Assessment Criteria
	structure • Opening – Location – Dimension – Tolerance – Filling • Logistic – Winching – Crane – Bracket – Access – Stock – accessories 3.3 Aluminium Profile assembly • Method • Tool, Equipment and Machineries (TEM) • Precaution 3.4 Bracket installation • Method • TEM • Precaution 3.5 Frame installation • Method • TEM	3.5 Check type of curtain wall support structure 3.6 Check material logistic 3.7 Perform Aluminium profile Assembly 3.8 Fix bracket to main support structure 3.9 Perform aluminium frame installation to bracket 3.10 Inspect profile installation position 3.11 Inspect opening dimension 3.12 Inspect aluminium profile installation	– Able to distinguish hazards <u>Environmental:</u> – Comply to CIDB and OSHA requirements		n	and arranged as per installation requirement 3.4 Scaffolding access way and assembly confirmed based on installation requirement 3.5 Types of Curtain wall support structure determined according to shop drawing 3.6 Logistic schedule confirmed based on installation requirement 3.7 Aluminium profile assembled at site according to shop drawing 3.8 Aluminium bracket fitted to main support structure as per installation requirement 3.9 Aluminium frame fitted to bracket as per shop drawing

Work Activities	Related Knowledge	Related Skills	Attitude / Safety / Environmental	Training Hours	Delivery Mode	Assessment Criteria
	• Precaution 3.6 Inspection • Joint gap • Alignment • Fittings • Protection • Cleanliness					3.10 Profile installation position marked and confirmed as per shop drawing 3.11 Measured opening dimension confirmed as per shop drawing 3.12 Installed main frame checked as per installation requirement
4. Conduct glass cutting	4.1 Types of PPE such as: • Rubber Palm Glove • Goggle • Ear plug • Mask • Apron • Safety boot 4.2 Cutting sequence 4.3 Precaution during cutting: • Scratch – Lining table • Crack • Sharp edges – Proper glass handling	4.1 Select and apply suitable PPE 4.2 Lay glass on the clean carpeted lining table 4.3 Measure and mark glass refer to cutting list 4.4 Determine cutting sequence to reduce	<u>Attitude:</u> – Knowledgeable in tools and equipment – Systematic in operating SOP <u>Safety:</u> – Adhere to safety procedure and requirement – Able to distinguish hazards <u>Environmental:</u> – Comply with waste sorting	<u>Related Knowledge</u> 12 <u>Related Skills</u> 28	<u>Related Knowledge</u> Lecture <u>Related Skills</u> Demonstration & Observation	4.1 Suitable PPE picked as per installation requirement 4.2 Glass sheet laid on clean carpeted lining table to protect against scratch and crack 4.3 Glass sheet measured and marked as per cutting list 4.4 Smart cutting sequence confirmed to minimize wastage 4.5 Glass cut to size,

Work Activities	Related Knowledge	Related Skills	Attitude / Safety / Environmental	Training Hours	Delivery Mode	Assessment Criteria
	– Sufficient manpower 4.4 Glass cutting and grinding • Method • Tool and Equipment • Handling 4.5 Glass surface protection • Material • Method • Tools 4.6 Tagging Material 4.7 Waste Sorting • Categorize • Waste disposal method • Disposal/ recycle location	wastage 4.5 Cut glass to size with tolerance and quantity 4.6 Check dimension cut 4.7 Grind sharp edges 4.8 Fix glass protection film 4.9 Tag glass for assembly 4.10 Clean waste materials	requirements – Comply to OSHA requirements			quantity and tolerance as per glass cutting list 4.6 Dimension of cut Glass measured as per shop drawing 4.7 Edges of cut glass grinded as per safety requirement 4.8 Protective film applied to glass sheet as per SOP 4.9 Cut Glass tagged as per assembly requirement 4.10 Waste sorted to designated bin as per waste disposal requirement
5. Carry out glass panel installation	5.1 Types of PPE such as: • Rubber Palm Glove • Goggle • Safety harness • Safety helmet • Safety boot 5.2 Tools and	5.1 Select and apply suitable PPE 5.2 Arrange aluminium profile and glass 5.3 Lay Eva	<u>Attitude:</u> – Knowledgeable in tools and equipment – Systematic in operating SOP <u>Safety:</u> – Adhere to safety	<u>Related Knowledge</u> 18 <u>Related Skills</u>	<u>Related Knowledge</u> Lecture <u>Related Skills</u>	5.1 Suitable PPE picked as per installation requirement 5.2 Aluminium profile and glass matched and grouped as per shop drawings

Work Activities	Related Knowledge	Related Skills	Attitude / Safety / Environmental	Training Hours	Delivery Mode	Assessment Criteria
	Machineries such as: • Suction cup lifter • Winching • Cranes • Spacer 5.3 Precaution during installation: • Scratch – Glass Protective film – Black tape • Bend – handling • Dent – Proper work space and storage area • Crack • Sharp edges 5.4 Glass Installation • Method • Precaution • Accessories –Aluminium capping –Spacer –Roller –Capping –Masking tape	foam to the installation frame 5.4 Fix spacer to frame bottom chord 5.5 Arrange Machineries and tools 5.6 Install glass to the frame opening 5.7 Install aluminium capping 5.8 Lay masking tape between joint to avoid smear 5.9 Apply gasket/ silicon to the glass 5.10 Remove protective black tape, silicon	procedure and requirement – Able to distinguish hazards <u>Environmental:</u> – Comply to CIDB and OSHA requirements	42	Demonstration & Observation	5.3 Eva foam laid on main frame as per installation requirement 5.4 Spacer fitted to bottom chord of main frame as per installation requirements 5.5 Machineries and tools allocated as per installation requirement 5.6 Glass installed location at main frame opening confirmed as per shop drawing 5.7 Aluminium capping fitted as per installation requirement 5.8 Masking tape laid between joint to avoid sealing smear as per SOP 5.9 Gasket fitted and silicon applied to glass joint as per installation requirement

Work Activities	Related Knowledge	Related Skills	Attitude / Safety / Environmental	Training Hours	Delivery Mode	Assessment Criteria
	– Lock set – Iron mongary 5.5 Inspection • Gap • Water proofing • Stability • Alignment • Scratch • Crack • Warping • Frame Sagging • Cleanliness	residue from the aluminium profile 5.11 Remove protective film from glass panel 5.12 Inspect glass panel assembly complete as per drawing				5.10 Protective black tape, silicon residue removed from aluminium profile and cleaned as per SOP 5.11 Protective film removed from glass panel and cleaned as per SOP 5.12 Assembled glass panel checked as per shop drawing

Employability Skills

Core Abilities	Social Skills
01.04 Analyse information 01.05 Utilize the internet to locate and gather information 01.06 Utilize word processor to process information 02.06 Write memos and letters 02.07 Utilize Local Area Network (LAN)/Internet to exchange information 02.08 Prepare pictorial and graphic information 03.08 Develop and maintain a cooperation within work group 04.01 Organize own work activities 04.02 Set and revise own objectives and goals 04.03 Organize and maintain own workplace	1. Communication skills 2. Conceptual skills 3. Interpersonal skills 4. Learning skills 5. Leadership skills 6. Multitasking and prioritising 7. Self-discipline 8. Teamwork

04.04 Apply problem solving strategies 04.05 Demonstrate initiative and flexibility 06.05 Analyse technical systems 06.06 Monitor and correct performance of systems	

Tools, Equipment and Materials (TEM)

ITEMS	RATIO (TEM : Trainees)
1. Personal Protective Equipment (PPE)	1:1
2. Installation planning samples	1:1
3. Installation manpower schedule samples	1:1
4. Power drill	1:1
5. Heavy-duty glass handling tools	1:5
6. Rubber mallet	1:5
7. Knife	1:1
8. Tape measure	1:1
9. Level	1:5
10. Mineral wool insulating material	1:5
11. Clear 33S Silicone Sealant or equivalent	As required
12. UL Listed Fire Caulk Sealant	As required
13. Zinc-coated flat head sheet metal screws	As required
14. Concrete screws for substrate anchoring	As required

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20. TRAINING HOURS SUMMARY

CU Code	Competency Unit Title	Work Activities	Related Knowledge (A)	Related Skill (B)	Hours (C) = (A)+(B)	Total (Hours) ∑(C)
F433-001-2:2017-C01	PARTITION WALL INSTALLATION	1. Prepare partition wall installation requirement	12	18	30	220
		2. Carry out main frame installation	15	35	50	
		3. Perform panel board installation	12	28	40	
		4. Carry out door leaf installation	9	21	30	
		5. Carry out window installation	12	28	40	
		6. Carry out aluminium finishing installation	9	21	30	
F433-001-2:2017-C02	SLIDING GLASS AND ALUMINIUM INSTALLATION	1. Prepare sliding glass and aluminium installation requirement	12	18	30	260
		2. Carry out aluminium main frame assembly	12	28	40	
		3. Execute main frame to wall opening	9	21	30	
		4. Carry out aluminium inner frame assembly	12	28	40	
		5. Conduct glass cutting	12	28	40	
		6. Carry out aluminium inner frame and glass assembly	12	28	40	
		7. Perform inner frame installation to the main frame	12	28	40	

CU Code	Competency Unit Title	Work Activities	Related Knowledge (A)	Related Skill (B)	Hours (C) = (A)+(B)	Total (Hours) ∑(C)
F433-001-2:2017-C03	CASEMENT AND TOP HUNG WINDOWS INSTALLATION	1. Prepare casement and top hung windows installation requirement	12	18	30	260
		2. Carry out aluminium main frame assembly	12	28	40	
		3. Install main frame to wall opening	9	21	30	
		4. Carry out aluminium inner frame assembly	12	28	40	
		5. Conduct glass cutting	12	28	40	
		6. Carry out aluminium inner frame and glass assembly	12	28	40	
		7. Perform inner frame installation to the main frame	12	28	40	
F433-001-2:2017-C04	SHOP FRONT INSTALLATION	1. Prepare work instruction	16	24	40	220
		2. Carry out aluminium profile cutting	15	35	50	
		3. Perform aluminium profile installation	12	28	40	
		4. Conduct glass cutting	12	28	40	
		5. Carry out glass panel installation	15	35	50	
F433-001-2:2017-C05	CURTAIN WALL INSTALLATION	1. Prepare work instruction	16	24	40	240
		2. Carry out aluminium profile cutting	15	35	50	
		3. Perform aluminium profile installation	15	35	50	
		4. Conduct glass cutting	12	28	40	
		5. Carry out glass panel installation	18	42	60	
Total Hours (Core Competency)			**377**	**823**	**1200**	**1200**