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1. Introduction

Wardrobes and kitchen cabinets are important components to private residential homeowners. The common homeowners' complaints are stained wardrobe, wardrobe and kitchen cabinet are not vertical or squared, and shelves are misaligned.

This guide is to share with the industry the recommended good practices to achieve quality cabinet-work. It includes good practices on design, material selection, fabrication, storage, installation and protection. This guide adopts the quality standards set out in CONQUAS 21 and includes the CONQUAS quality assessment criteria in the recommended inspection checklists. We hope it will help you to avoid problems in those areas where they are most likely to occur.

This guide focuses on the installation of timber wardrobe and kitchen cabinet for residential projects. Aluminium profile wardrobe and kitchen cabinet are not included.

2. Design

There is a wide range of cabinet doors and ironmongeries available in the local market. This guide book focuses only on those commonly used products.

2.1. TYPES OF CABINET DOOR

There are various cabinet door systems available in the market, including sliding door, hinged door and bi-fold door. Table 2.1 shows the design considerations for the various types of cabinet door systems.

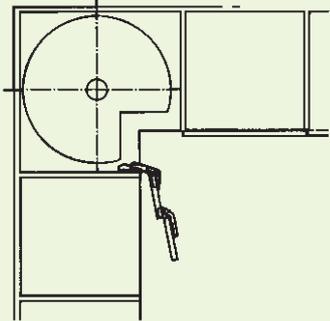
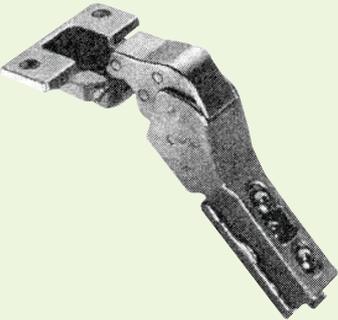
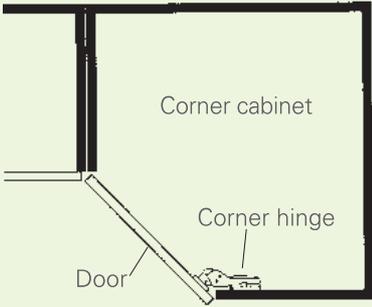
Table 2.1 Common cabinet door used locally

Types of cabinet door	Description
<p>1. Sliding door</p> 	<ul style="list-style-type: none"> • Design sliding doors to glide along an aluminium track system. • Features: <ul style="list-style-type: none"> ◦ Space saving as only a few inches of clearance is required for the door panel to slide ◦ Could achieve full height and even slide behind or within the wall to have full opening
<p>2. Hinged door</p> 	<ul style="list-style-type: none"> • 50mm to 100mm high cabinet base or plinth are built together with the cabinet, so the door panel does not scratch the floor when it swings. • Features: <ul style="list-style-type: none"> ◦ Gives full access to the interior of the closet ◦ Could achieve higher height ◦ Would have slight warpage problem
<p>3. Bi-fold door</p> 	<ul style="list-style-type: none"> • Features: <ul style="list-style-type: none"> ◦ Allows access to the full width of the closet while it requires only half the clearance space that swing door needs ◦ The number of moving parts is twice that of sliding doors and hence higher probability of them falling off their tracks, if quality system is not selected

2.2. TYPES OF CABINET HINGE

There are various types of cabinet hinges available in the market. Table 2.2 shows the design considerations for the various types of cabinet hinges.

Table 2.2 Common cabinet hinge used locally

Types of cabinet hinge	Description
<p>1. Folding door hinge</p> 	<ul style="list-style-type: none"> • Features: <ul style="list-style-type: none"> ◦ Suitable for kitchen corner cabinet with folding door 
<p>2. Corner hinge</p> 	<ul style="list-style-type: none"> • Features: <ul style="list-style-type: none"> ◦ Suitable for corner cabinet 

The factors to take into consideration when selecting the type of hinge are:

- Opening angle required,
- Side panel thickness,
- Door thickness, and
- Gap between door and carcass.

The number of hinges to use per cabinet door depends on the dimensions and weight of the door. In case of doubt, e.g. for doors with mirrors, glass or exceptionally wide doors, a trial mounting is recommended. Door with width that is greatly disproportionate to its height should be avoided. For normal cabinet doors made of conventional materials, Figure 2.1 may be used as a guide.

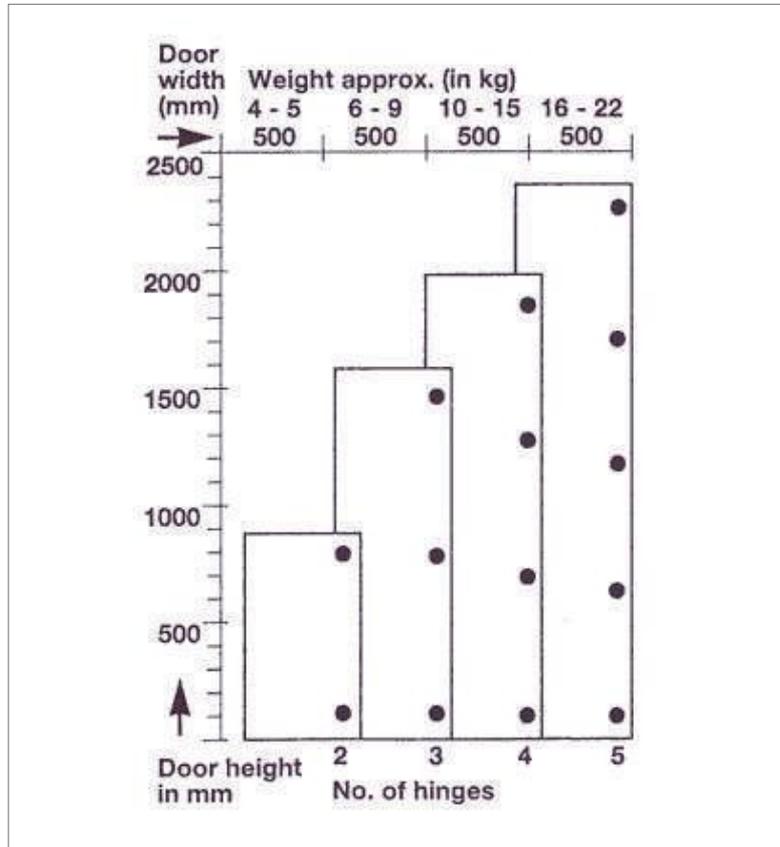


Figure 2.1 Relation between height of door and number of hinges
(Source: The Complete Häfele Handbook)

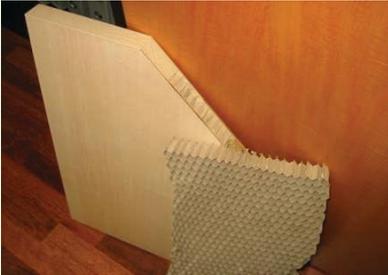
3. Material Selection

3.1. CARCASS

The carcass for cabinet-work may be made from a combination of timber products, aluminium or glass. This section focuses on the different timber products commonly used in the local industry. Table 3.1 describes the use of the various timber products for carcass construction.

Table 3.1 Common timber products used in cabinet-work

Timber product	Description and uses
<p>1. Plywood</p> 	<ul style="list-style-type: none"> • Formed by gluing several thin layers of timber (e.g. plies of softwood or hardwood), with the grains of adjacent layers oriented at right angles to one other. • The dimension variation of the plywood shall comply with the BS EN 315. • Features: <ul style="list-style-type: none"> ◦ Available in various thicknesses ◦ Provides an excellent strength-to-weight ratio, and exhibits superior stiffness along both the length and width of the panel ◦ Need to cover the unsightly edges ◦ Poor warping tolerance
<p>2. Moisture resistant plywood</p>	<ul style="list-style-type: none"> • Made of selected hardwood veneers for the required strength and stiffness. • Commonly used for kitchen cabinet carcass. • Features: <ul style="list-style-type: none"> ◦ Special glue, fortified with melamine, makes it more resistant to moisture than other plywood materials that use the ordinary Urea-Formaldehyde (UF) glue ◦ Preservative treated to protect it from fungus, borer, insects and termite attack
<p>3. Medium Density Fibre (MDF) board</p> 	<ul style="list-style-type: none"> • Dry-formed panel product manufactured by applying high pressure and heat to wood pulp impregnated with resin. • Commonly used for cabinet door panel to create 3D profile or for spray painting finish. • Features: <ul style="list-style-type: none"> ◦ Available in various thicknesses ◦ Tough and hardy surface with high stability ◦ Good for profile cutting as smooth finishes on both sides of the panel can be obtained

Timber product	Description and uses
<p data-bbox="180 302 496 331">4. Particle board or chipboard</p> 	<ul style="list-style-type: none"> • Made from timber chips bonded by synthetic resins to form boards (sheets) under pressure and heat. • Two ways of manufacturing chipboard: the extruded method and the platen press method. • Commonly used for wardrobe, kitchen cabinet, drawer and door panels. • Moisture resistant particle board or chipboard are commonly used for kitchen cabinet door. • Features: <ul style="list-style-type: none"> ◦ Stable and hardy surface ◦ Environmental friendly ◦ Good fire resistance and air tightness ◦ Low stiffness
<p data-bbox="180 1137 341 1167">5. Honeycomb</p> 	<ul style="list-style-type: none"> • Recycled kraft paper formed into hexagonal cells. • Sandwiched between plywoods or melamine boards to produce a strong and light weight structure. • Commonly used for wardrobe, shelves, side panel and doors of large dimension. • Features: <ul style="list-style-type: none"> ◦ Minimum warping and twisting ◦ High load-bearing capacity of 4,5kg/cm² ◦ Good shock-absorption quality ◦ Light weight ◦ Rigid structure ◦ Allows greater degree of flexibility in design ◦ Environmental friendly

3.2. FINISH

The type of finishes for wardrobes and kitchen cabinets depends on a variety of factors such as design specifications, client's requirements and project budget. The common types of finishes used are summarized in Table 3.2.

Table 3.2 Common finishes used in cabinet-work

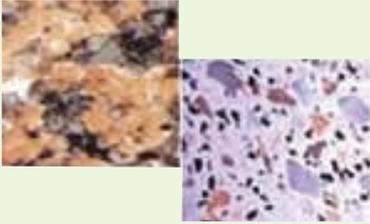
Finishing material	Description and uses
<p>1. Veneer</p> 	<ul style="list-style-type: none"> • Slices of wood skin from tree logs are used. • Formed by either slicing or rotary cutting. • Veneers are differentiated according to its structure, colour, and characteristics. Different processing methods adopted will determine the size and appearance (striped, flame-pattern, etc.) of the veneers. • Commonly used on door panel and exposed panel. • Features: <ul style="list-style-type: none"> ◦ Environmental friendly as fewer trees are used to make a veneer than the same size of solid timber board ◦ Could discolor under exposure to natural light ◦ Could get water stained, hence not suitable for use in wet area
<p>2. Melamine</p> 	<ul style="list-style-type: none"> • A thermosetting plastic, composed of a decorative sheet of paper which is covered with a transparent layer of melamine resin. • Commonly used on wardrobe carcass, drawer and door panel. • Features: <ul style="list-style-type: none"> ◦ High resistance against scratch, shock and abrasion ◦ Strong and hard surface ◦ Easy to clean and maintain ◦ Resistant to fungus and borer ◦ Resistant to household chemicals ◦ Not ideal for use in high humidity area like bathroom, wet kitchen and sauna

Finishing material	Description and uses
<p>3. Laminate</p> 	<ul style="list-style-type: none"> • Made by bonding layers of resin impregnated paper, which has a plastic coated finish, together under very high pressure to create a solid and solvent / abrasion-resistant material. • Commonly used on door panel and exposed panel. • Features: <ul style="list-style-type: none"> ◦ Available in a variety of looks (e.g. real wood, stone, ceramics) ◦ Scratch resistant ◦ More consistent color and grain pattern compared to veneer ◦ Easy to clean and maintain ◦ High moisture resistance
<p>4. Polykem</p> 	<ul style="list-style-type: none"> • A layer of polymer film which is usually coated onto a piece of plywood. • Commonly used on the carcass of drawer. • Features: <ul style="list-style-type: none"> ◦ Superior anti-corrosion protection against oil, gas, water and chemicals ◦ Scratch resistant
<p>5. Vinyl</p> 	<ul style="list-style-type: none"> • A plastic sheet with laminated or printed pattern of various colors, grain patterns or tonality. • The film is made of polyvinyl chloride (PVC) used mainly for decorative finishing. • Commonly used on door panel and exposed panel. • Features: <ul style="list-style-type: none"> ◦ Easily sourced and available in wide range of colours, texture designs ◦ Tough and durable surface ◦ Scratch resistant ◦ Likely to be damaged by high heat and moisture hence, not suitable for using on kitchen cabinet

3.3. EDGE BAND

The edge band serves both a protective and design function. The common types of edge band used come in a wide range of colours and wood grains pattern and are summarized in Table 3.3.

Table 3.3 Common edge band used in cabinet-work

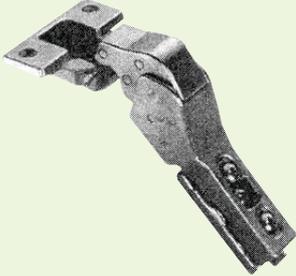
Edge band	Description
<p>1. Acrylonitrile Butadiene Styrene (ABS)</p> 	<ul style="list-style-type: none"> • Features: <ul style="list-style-type: none"> ◦ Available in various widths from 1mm to 3mm ◦ High heat resistant ◦ Environmental friendly
<p>2. Polyvinyl Chloride (PVC)</p> 	<ul style="list-style-type: none"> • Features: <ul style="list-style-type: none"> ◦ Available in various widths from 0.4mm to 3mm
<p>3. Melamine</p> 	<ul style="list-style-type: none"> • Features: <ul style="list-style-type: none"> ◦ Available in various widths ◦ Comes in rolls, glued or unglued
<p>4. Polypropylene (PP)</p> 	<ul style="list-style-type: none"> • Features: <ul style="list-style-type: none"> ◦ Available in various widths ◦ Excellent heat and solvent resistant ◦ Good Ultra-Violet (UV) resistance ◦ Little shrinkage ◦ Commonly used for finishing kitchen work surfaces

3.4. IRONMONGERY

Ironmongery plays an important role in the functionality of wardrobes and kitchen cabinets. The choice of ironmongery differs from project to project, depending on the design requirements. Some common ironmongeries are shown in Table 3.4.

Table 3.4 Common ironmongeries used in cabinet-work

Ironmongery	Description and uses
<p>1. Clip-on concealed hinge</p> 	<ul style="list-style-type: none"> • Typically made of cold-rolled steel. • Preferably certified by ANSI/BHMA, KCMA. • Features: <ul style="list-style-type: none"> ◦ Easy installation and removal ◦ Allow height, side and depth adjustments ◦ Available in opening angle of 110° or 125° ◦ Use for door with thickness ranging from 14-24 mm
<p>2. Slip-on concealed hinge</p> 	<ul style="list-style-type: none"> • Typically made of cold-rolled steel. • Preferably certified by ANSI/BHMA, KCMA. • Features: <ul style="list-style-type: none"> ◦ Slip-resistant ◦ Allow height, side and depth adjustments ◦ Available in opening angle of 110° or 125° ◦ Use for door with thickness ranging from 14-24 mm
<p>3. Clip-on, two way aluminium frame hinge</p> 	<ul style="list-style-type: none"> • Typically made of cold-rolled steel hinge arm with zinc alloy hinge head. • Preferably certified by ANSI/BHMA, KCMA. • Features: <ul style="list-style-type: none"> ◦ Easy installation and removal ◦ Allow height, side and depth adjustments ◦ 95° opening angle ◦ Use for aluminium door frame with thickness ranging from 19-24 mm

Ironmongery	Description and Uses
<p>4. Slide-on, two-way aluminium frame hinge</p> 	<ul style="list-style-type: none"> • Typically made of cold-rolled steel hinge arm with zinc alloy hinge head. • Preferably certified by ANSI/BHMA, KCMA. • Features: <ul style="list-style-type: none"> ◦ Slip-resistant ◦ Allow height, side and depth adjustments ◦ 95° opening angle ◦ Use for aluminium door frame with thickness ranging from 19-24mm
<p>5. Folding door hinge</p> 	<ul style="list-style-type: none"> • Typically made of cold-rolled steel hinge arm with zinc alloy hinge head. • Preferably certified by ANSI/BHMA, KCMA. • Features: <ul style="list-style-type: none"> ◦ Easy installation ◦ Use for door with thickness ranging from 15-22 mm
<p>6. Corner hinge</p> 	<ul style="list-style-type: none"> • Typically made of zinc alloy. • Features: <ul style="list-style-type: none"> ◦ Easy installation ◦ Use for door with thickness ranging from 16-22 mm ◦ Available in opening angle of 30° to 60°
<p>7. Handle</p> 	<ul style="list-style-type: none"> • Typically made of zinc alloy or steel. • Features: <ul style="list-style-type: none"> ◦ Available in various colours and sizes
<p>8. Drawer slider</p> 	<ul style="list-style-type: none"> • Slider typically made of galvanized steel or cold-rolled steel with galvanized steel ball retainer. • Features: <ul style="list-style-type: none"> ◦ Available with blumotion ◦ Can withstand load capacity of 10-25 kg depending on choice and drawer sizes

4. Fabrication

4.1. FABRICATION PROCESS

Quality assurance for the wardrobes and kitchen cabinets starts in the factory where the components are fabricated and assembled. Figure 4.1 below shows the flowchart of a typical fabrication process of cabinet-work.



Figure 4.1 Key processes in the fabrication stage

Table 4.1 lists the good practices involved in various stages of the fabrication process.

Table 4.1 Good practices in fabrication stage

Process	Good practices
<p>1. Confirmation of project details</p>	<ul style="list-style-type: none"> For preparation of effective production schedule, the following should be developed: <ol style="list-style-type: none"> Production database (i.e. type of materials, finishes and dimensions etc.) Detailed shop drawings Installation schedule <div data-bbox="678 629 1286 1088" data-label="Image"> <p>The image is a technical drawing titled 'ELEVATION A' with a scale of 1:20. It shows a side view of a kitchen cabinet unit. The drawing includes various components and their material specifications: <ul style="list-style-type: none"> OPEN SHELF: 18mm PB PLYWOOD IN MIRROR(OPT.1) OR OPT.2 FLIP DOOR PANEL - TOP UNIT: ALUMINIUM SET w/ 5mm PB ACID ETCHED GLASS LONG BAR HANDLE: FOR ALUMINIUM DOOR ONLY DOOR PANEL - TOP UNIT: 18mm PB PLYWOOD IN MIRROR(OPT.1) OR OPT.2 12mm PB CORIAN COUNTERTOP: GLASS WHITE(OPT.1) / BLACK QUARTZ(OPT.2) DOOR PANEL - BASE UNIT: 18mm PB MR PLYWOOD IN MIRROR TO OPT.1 OR OPT.2 / EXTERNAL FIN. & INTERNAL IN WHITE POLYUREA FIN. Dimensions are provided for various parts, such as a total width of 1200mm and a total height of 1100mm. The drawing is labeled 'ELEVATION A' and 'SCALE: 1:20' at the bottom. </p> </div>
<p>2. Procurement of raw materials</p>	<ul style="list-style-type: none"> Consider the type, area and usage of cabinet-work. Submit samples of the materials for approval prior to procurement. Procure the raw materials as per the approved samples.
<p>3. Precision cutting</p>	<ul style="list-style-type: none"> For better dimensional accuracy, the use of precision cutting machinery is recommended. <div data-bbox="756 1485 1305 1883" data-label="Image"> <p>The image shows a large industrial factory setting. In the foreground, there is a long, yellow and black precision cutting machine, likely a CNC router or a similar automated cutting system. The machine is processing a large sheet of material, possibly wood or metal. The background shows a high-ceilinged industrial space with various pipes, structural beams, and other machinery, indicating a large-scale manufacturing environment.</p> </div> <ul style="list-style-type: none"> Measurements should be taken to ensure dimensions, positions of openings and alignment are within the specified tolerances.

Process	Good practices
<p>4. Wrapping and lamination</p>	<p>The following machinery can be used to manufacture quality products:</p> <ul style="list-style-type: none"> • Hot Press Machines - to laminate vinyl, laminate or veneer on flat panel surfaces. • Membrane Form Press - to create 3D designs on door panel. • Edge banding machines - to band the expose edges. 
<p>5. Further cutting for installation of ironmongery works</p>	<ul style="list-style-type: none"> • For better quality control, openings and provisions in the panels for subsequent installation of ironmongeries should be prepared in the factory.
<p>6. Surface preparation and finishing</p>	<ul style="list-style-type: none"> • Flat surfaces of parts and components should be smoothed via sanding process. • Sensor sanding machines can be used to achieve higher consistency of colour than manual sanding. • Ultraviolet (UV) line machine can be used for the application of the base coat to finish coat in a single cycle. 

Process	Good practices
7. Quality control (QC) checks	<ul style="list-style-type: none">• Visual quality control checks on the quality of the finishes should be carried out before proceeding to assemble the parts.
8. Packing and delivery	<ul style="list-style-type: none">• Finished products are checked to ensure that they are in accordance with specifications.• The panels should be packed and delivered without the hinges. If the hinges are installed, there is a higher risk of damage during delivery and storage.• Products can be packed via “shrink-wrapping” or “strap-wrapping” method.  <ul style="list-style-type: none">• All materials should be labeled after quality inspection, indicating the panel dimensions and project details (i.e. location to be installed). 

5. Delivery, Handling and Storage

5.1. TIMBER PRODUCTS

Table 5.1 highlights the good practices in delivery, handling and storage of timber products before assembling them into wardrobes and kitchen cabinets. Site supervisory personnel and installers should adopt these practices to ensure that the materials are in good condition before installation.

Table 5.1 Good practices in delivery, handling and storage of timber products

Items	Good practices
1. Delivery	<ul style="list-style-type: none"> • All timber products are transported in covered lorry. • Materials shall be delivered to site in accordance with the installation schedule to minimize site storage and unnecessary handling. • Delivered materials should be inspected to ensure they are in good conditions and as per specifications / approved samples. 
2. Handling	<ul style="list-style-type: none"> • Unloading should be carried out under good weather condition. Never transport or unload timber panels in the rain. • The materials, where possible, should be delivered directly to the locations where they are to be installed.
3. Storage	<ul style="list-style-type: none"> • The materials should be stored in an enclosed building space that is well ventilated. • Storage area should be clean and dry. • Materials should be stored in a manner to avoid unnecessary handling and shifting.

5.2. IRONMONGERY

The functionality of wardrobes and kitchen cabinets depends greatly on the condition of the ironmongeries delivered. Table 5.2 highlights the good practices in the delivery, handling and storage of ironmongeries.

Table 5.2 Good practices in delivery, handling and storage of ironmongeries

Items	Good practices
1. Delivery	<ul style="list-style-type: none"> • The ironmongeries should be packed and delivered in sealed carton boxes. Handles to be delivered with proper plastic protection. • Ironmongeries should be delivered to site in accordance with the installation schedule to minimize site storage and unnecessary handling. • Delivered ironmongeries should be inspected to ensure they are in good conditions and as per specifications / approved samples.
2. Handling	<ul style="list-style-type: none"> • Unloading should be carried out under good weather condition.
3. Storage	<ul style="list-style-type: none"> • The ironmongeries should be stored in an enclosed building space that is well ventilated. • Storage area should be clean and dry.

6. Installation

6.1. INSTALLATION OF WARDROBE

Table 6.1 highlights the sequence of installation of wardrobe and the recommended good practices to achieve quality works.

Table 6.1 Installation of wardrobe

Work sequence	Good practices
1. Preparatory works for installation of wardrobe	
1.1. Window glazing should be installed before commencing the installation of wardrobe	<ul style="list-style-type: none"> • To avoid dampness to wardrobe due to rainwater ingress.
1.2. Preparation of floor and wall area behind wardrobe 	<ul style="list-style-type: none"> • Floor must be leveled to avoid misalignment of gap between wardrobe base and finished floor. • Wall must be vertical. • Parquet flooring, if applicable, should be laid over the entire room. Area under the wardrobe should be sanded and finished with under coat. • Wall areas behind the wardrobe should be painted before installation of wardrobe.
1.3. Installation of plinth 	<ul style="list-style-type: none"> • Check that the plywood plinth is positioned at the approved location. • Ensure the levelness of the plinth. Plywood packer can be used to level the plinth. • Secure the plinth using finishing nails.

Work sequence**2. Installation of carcass**

2.1. Assemble the carcass as per approved shop drawings and position the carcass on the plinth

**Good practices**

- Secure the bottom panel of carcass firmly to the plinth with air tacker.
- Secure all carcass together with adequate joinery screws / dowel pins.



- Check the levelness and alignment of the carcass.



Work sequence	Good practices
<p data-bbox="177 282 469 309">2. Installation of carcass</p> <p data-bbox="177 353 692 380">2.2. Install filler and seal the edge with silicon</p> 	<ul data-bbox="1010 353 1409 667" style="list-style-type: none"> • To allow approximately 50mm gap for all sides between wall/ ceiling and wardrobe carcass for the side and top filler respectively. • Filler to be cut to size, scribed and fixed to the designated gap. • Gaps between filler and wall are to be sealed with caulking.
<p data-bbox="177 891 743 918">2.3. Install drawer compartments and accessories</p> 	<ul data-bbox="1010 891 1409 1491" style="list-style-type: none"> • Drawer compartments, shelving, hanging rods and other accessories should be installed accordingly as per approved shop drawings and specifications. • Ensure the shelving are properly adjusted and rests firmly on the shelf studs. • It is a good design practice to install the drawer set at the carcass compartment which is not installed against a wall. This helps to support the side panel of the carcass and prevent warpage of the panel. • Ensure smooth operation of the drawers.

Work sequence	Good practices
2. Installation of carcass	
<p>2.4. Install door panels and handles</p> 	<ul style="list-style-type: none"> • Door panels and handles should be installed only after all finishing trades are completed and clean. • Install door panels and handles as per approved shop drawings and specifications. • Check the alignment of the door panels. • Verify smooth operation of the door panels by opening and closing the panels. • Adequate ventilation within the unit should be ensured to avoid warpage of the cabinet-works.

6.2. INSTALLATION OF KITCHEN CABINET

Care must be taken during the installation of kitchen cabinet due to the routing of Mechanical & Electrical (M&E) services behind the cabinet. Table 6.2 highlights the sequence of installing kitchen cabinet and the recommended good practices to achieve quality works.

Table 6.2 Installation of kitchen cabinet

Work sequence	Good practices
1. Preparatory works for installation of kitchen cabinet	
1.1. Window glazing should be installed before commencing the installation of kitchen cabinet	<ul style="list-style-type: none"> • To avoid dampness to kitchen cabinet due to rainwater ingress.
1.2. Preparation of ceiling, floor and wall	<ul style="list-style-type: none"> • Ceiling should be painted. • Kitchen wall and floor tiles should be completed. • Kitchen floor should be clean.

Work sequence	Good practices
<p>1. Preparatory works for installation of kitchen cabinet</p>	
<p>1.3. Check location of M&E services</p> 	<ul style="list-style-type: none"> • Wall behind top kitchen cabinet should be plastered. Concealed M&E services must be clearly marked, to avoid damage to these services during drilling of holes for wall plugs, which are used for securing the top cabinet to the wall.
<p>1.4. Check that there is no leakage of gas or water supply</p>	<ul style="list-style-type: none"> • Pressure test on gas and water pipes running behind the cabinet must be successfully completed.
<p>1.5. All water inlets and outlets should be plugged off</p>	
<p>1.6. To construct the concrete plinth in accordance to approved shop drawings and specifications</p>  <p style="text-align: center;">Concrete plinth</p>	<ul style="list-style-type: none"> • The concrete plinth must be leveled to ensure levelness of the cabinet and to avoid unacceptable gap between the kitchen cabinet base and the plinth.

Work sequence	Good practices
<p data-bbox="178 295 810 324">1. Preparatory works for installation of kitchen cabinet</p> <p data-bbox="178 362 880 392">1.7. Check the site measurements against approved drawings</p> 	<ul data-bbox="1008 362 1407 430" style="list-style-type: none">• To ensure the dimensions are as per approved drawings.
<p data-bbox="178 1335 932 1402">1.8. Verify the routing of electrical cabling as well as water and gas pipes</p> 	<ul data-bbox="1008 1335 1407 1402" style="list-style-type: none">• This is to avoid damages to services during installation of the cabinet.

Work sequence	Good practices
<p data-bbox="177 293 469 322">2. Installation of carcass</p> <p data-bbox="177 365 788 394">2.1. Carcass installation as per the approved drawings</p> 	<ul data-bbox="1011 365 1409 645" style="list-style-type: none"> • Assemble and position the carcass on the plinth. • Secure the lower kitchen cabinet carcass using adequate joinery screws and approved wall plugs. • Check the levelness and alignment of the carcass.
<p data-bbox="177 1041 884 1104">2.2. Install worktop base panel and cut out the opening for the installation of the appliances</p> 	<ul data-bbox="1011 1041 1409 1261" style="list-style-type: none"> • Appropriate opening in the worktop base panel should be cut out in accordance with the approved shop drawings for subsequent installation of appliances. • Check the levelness of base panel.

Work sequence	Good practices
<p data-bbox="177 293 469 322">2. Installation of carcass</p> <p data-bbox="177 365 520 394">2.3. Install top kitchen cabinet</p> 	<ul data-bbox="1010 365 1409 618" style="list-style-type: none"> • Top kitchen cabinet carcass should be mounted onto the wall using adequate number and size of wall plugs. • The top kitchen cabinet carcass should rest temporarily on adjustable support.  <ul data-bbox="1010 1003 1409 1061" style="list-style-type: none"> • Check the levelness and alignment of the carcass. 
<p data-bbox="177 1451 352 1480">2.4. Install filler</p> 	<ul data-bbox="1010 1451 1409 1868" style="list-style-type: none"> • To allow approximately 50mm gap for the sides between wall / ceiling and kitchen cabinet carcass for the side and top filler respectively. • Filler to be cut to size, scribed and fixed to the designated gap. Caulking to be applied along the fillers, adjacent to wall. • Laminate all the edging and exposed surfaces with approved finishing material.

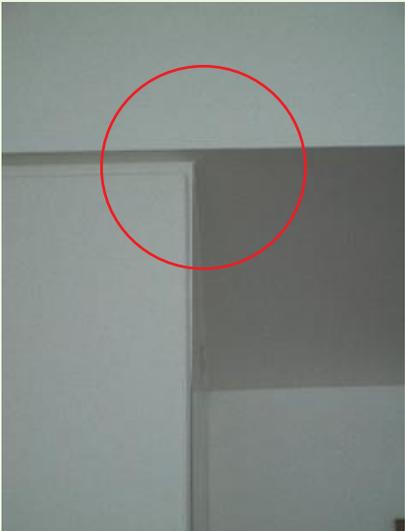
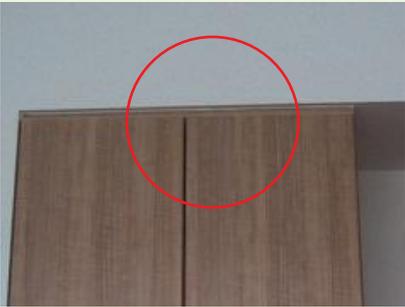
Work sequence	Good practices
<p data-bbox="177 293 469 320">2. Installation of carcass</p> <p data-bbox="177 365 584 392">2.5. Install shelving and accessories</p> 	<ul data-bbox="1011 365 1409 645" style="list-style-type: none"> • Upon completion of all internal finishes, install the shelving, appliances and accessories according to approved drawings and specifications. • Ensure the shelving are properly adjusted and rests firmly on the shelf studs.
<p data-bbox="177 1039 683 1066">2.6. Install door panels, drawers and handles</p> 	<ul data-bbox="1011 1039 1409 1196" style="list-style-type: none"> • Check the alignment of door panels and handles. • Verify smooth operation of door panels and drawers.

Work sequence	Good practices
2. Installation of carcass	
<p>2.7. Cleaning and touch up</p> 	<ul style="list-style-type: none"> • Use clean cloth to wipe the cabinet. Caution should be exercised to avoid scratches to the glass cabinet doors during cleaning. • Touch up of nail holes. • Precaution must be taken at the final stage of cleaning or washing of kitchen area by workers to avoid excessive water and chemical, which will cause damage or dampness to the kitchen cabinet, appliances and accessories.

6.3. INSPECTION

In order to achieve high quality workmanship, close supervision should be provided for both in-process and finished cabinet-work.

Table 6.3. Checklist for Final Inspection of Wardrobe and Kitchen Cabinet

Inspection Checklist	
1. CONQUAS 21 Assessment – Joints & Gap	
1.1. Joints between components as well as joints between components and ceiling/wall/floor must be neat.	
	

Inspection checklist

1. CONQUAS 21 Assessment - Joints & Gap

1.2. No gap or uniform gap size throughout.



2. CONQUAS 21 Assessment - Alignment & Evenness

2.1. Wardrobe and kitchen cabinet should be properly aligned to the wall/ ceiling/ floor.



2.2. Individual door panels for wardrobes and cabinets shall be aligned vertically and horizontally.



Inspection checklist

2. CONQUAS 21 Assessment - Alignment & Evenness (cont'd)

2.3. Shelving should be aligned horizontally.



3. CONQUAS 21 Assessment - Material & Damages

3.1. No stain mark (mortar droppings, paint, rust) on wardrobe or cabinet.



3.2. No chip, crack, dent, scratch and other visible damages on wardrobe and kitchen cabinet.



Inspection checklist

4. CONQUAS 21 Assessment - Accessories Defects

4.1. No missing accessories.



5. CONQUAS 21 Assessment - Functionality

5.1. The door panel, drawer and lock should be in good working condition.



7. Protection

Protection should start in the factory and should remain throughout the construction process until the wardrobe and kitchen cabinets are scheduled for handing over (see Table 7.1).

The best protection is to install the wardrobe and kitchen cabinet after completion of all internal trades. However, this is often not the case due to tight time schedule. Hence, proper co-ordination among various construction trades is critical in preventing damages to the wardrobes and kitchen cabinets. Once wardrobe and kitchen are installed, access to the room should be restricted.

Table 7.1 Protection of cabinet components

Components	Protection
1. Protection after fabrication	
1.1. Timber products	<ul style="list-style-type: none">• Timber products should be packed via “shrink-wrapping” or “strap-wrapping” method. 

Components	Protection
2. Protection of other trades	
2.1. Wall tiles	<ul style="list-style-type: none"> Edge of wall tiles should be wrapped with plastic sheet. This is to prevent damage during installation of wardrobe or kitchen cabinet. 
2.2. Flooring	<ul style="list-style-type: none"> The flooring should be protected with plastic sheet. 

Components	Protection
3. Protection after completion of wardrobe / kitchen cabinet installation	
<p>3.1. Completed wardrobe / kitchen cabinet</p>	<ul style="list-style-type: none"> • Proper site control of environment condition should be maintained. The area should be well ventilated to maintain regular air flow. • The exposed face of kitchen cabinets should be wrapped with plastic sheet. 
<p>3.2. Ironmongery</p>	<ul style="list-style-type: none"> • Ironmongery should be wrapped with plastic sheet after installation. • Kitchen worktop and stove should be wrapped with plastic sheet. 

Sample of Inspection and Test Plan (ITP)

Project: _____

Scope of Work: Supply and Installation of Wardrobe

Appendix A

S/No	Activity	Responsibility	Inspection Method	Requirement Reference	Acceptance Criteria	Frequency	Records
1 SUBMISSION							
1.1	Shop drawings	MC/ADO	Review	-	Approved	Initial stage	Approved submissions
1.2	Sample submission	MC/ADO	Review	-	Conform to specifications	Initial stage	Approved submissions
1.3	Quality plan	MC/ADO	Review	-	Conform to specifications	Initial stage	Approved submissions
2 INCOMING MATERIALS INSPECTION							
2.1	Carcass	MC	Visual/ Measurement	Section 5.1	As per approved samples	Each delivery	Delivery document
2.2	Door panel	MC	Visual/ Measurement	Section 5.1	As per approved samples	Each delivery	Delivery document
2.3	Ironmongery	MC	Visual/ Measurement	Section 5.2	As per approved samples	Each delivery	Delivery document
3 IN - PROCESS INSPECTION							
3.1	Setting out (i.e. Height & Level)	MC	Visual/ Measurement	Section 6.1	Conform to specifications	Each item	Checklist @ Appendix B
3.2	Installation of carcass	MC	Visual/ Measurement	Section 6.1	Conform to specifications	Each item	Checklist @ Appendix B
3.3	Installation of filler	MC	Visual	Section 6.1	Conform to specifications	Each item	Checklist @ Appendix B
3.4	Installation of door panels	MC	Visual	Section 6.1	Conform to specifications	Each item	Checklist @ Appendix B
3.5	Touch up and handover	MC	Visual	Section 6.1	Conform to specifications	Each item	Checklist @ Appendix B
Prepared by _____		Verified by _____		Approved by _____			
Date _____		Date _____		Date _____			
LEGEND		MC – Main contractor/ Installer		ADO – Architect/ Designer/ Owner			

Appendix A

Sample of Inspection and Test Plan (cont'd)

Project: _____

Scope of Work: Supply and Installation of Wardrobe

S/No	Activity	Responsibility	Inspection Method	Requirement Reference	Acceptance Criteria	Frequency	Records
4 FINAL INSPECTION							
4.1	Cleaning	MC	Visual	Section 6.1	Surface is clean	At completion	-
4.2	Protection	MC	Visual	Section 7	Protect finished wardrobe	At completion	-
4.3	Work acceptance	MC	Visual	Section 6.1	As per specifications	At completion	Inspection records
5 WORK HAND-OVER							
5.1	Inspection by owner	MC/ADO	-	-	-	At hand-over	-
Prepared by _____		Verified by _____		Approved by _____			
Date _____		Date _____		Date _____			
LEGEND		MC – Main contractor/ Installer		ADO – Architect/ Designer/ Owner			

Sample of Inspection and Test Plan (ITP)

Project: _____

Scope of Work: Supply and Installation of Kitchen Cabinet

Appendix A

S/No	Activity	Responsibility	Inspection Method	Requirement Reference	Acceptance Criteria	Frequency	Records
1 SUBMISSION							
1.1	Shop drawings	MC/ADO	Review	-	Approved	Initial stage	Approved submissions
1.2	Sample submission	MC/ADO	Review	-	Conform to specifications	Initial stage	Approved submissions
1.3	Quality plan	MC/ADO	Review	-	Conform to specifications	Initial stage	Approved submissions
2 INCOMING MATERIALS INSPECTION							
2.1	Carcass	MC	Visual/ Measurement	Section 5.1	As per approved samples	Each delivery	Delivery document
2.2	Door panel	MC	Visual/ Measurement	Section 5.1	As per approved samples	Each delivery	Delivery document
2.3	Ironmongery	MC	Visual/ Measurement	Section 5.2	As per approved samples	Each delivery	Delivery document
3 IN - PROCESS INSPECTION							
3.1	Setting out (i.e. Height & Level)	MC	Visual/ Measurement	Section 6.1	Conform to specifications	Each item	Checklist @ Appendix B
3.2	Installation of carcass	MC	Visual/ Measurement	Section 6.1	Conform to specifications	Each item	Checklist @ Appendix B
3.3	Installation of filler	MC	Visual	Section 6.1	Conform to specifications	Each item	Checklist @ Appendix B
3.4	Installation of worktop	MC	Visual/ Measurement	Section 6.1	Conform to specifications	Each item	Checklist @ Appendix B
3.5	Installation of accessories	MC	Visual/ Measurement	Section 6.1	Conform to specifications	Each item	Checklist @ Appendix B
3.6	Installation of door panels	MC	Visual	Section 6.1	Conform to specifications	Each item	Checklist @ Appendix B
3.7	Touch up and handover	MC	Visual	Section 6.1	Conform to specifications	Each item	Checklist @ Appendix B
Prepared by _____		Verified by _____		Approved by _____		_____	
Date _____		Date _____		Date _____		_____	
LEGEND							
MC – Main contractor/ Installer				ADO – Architect/ Designer/ Owner			

Appendix A

Sample of Inspection and Test Plan (cont'd)

Project: _____

Scope of Work: Supply and Installation of Kitchen Cabinet

S/No	Activity	Responsibility	Inspection Method	Requirement Reference	Acceptance Criteria	Frequency	Records
4 FINAL INSPECTION							
4.1	Cleaning	MC	Visual	Section 6.1	Surface is clean	At completion	-
4.2	Protection	MC	Visual	Section 7	Protect finished wardrobe	At completion	-
4.3	Work acceptance	MC	Visual	Section 6.1	As per specifications	At completion	Inspection records
5 WORK HAND-OVER							
5.1	Inspection by owner	MC/ADO	-	-	As per specifications	At hand-over	-
Prepared by _____		Verified by _____		Approved by _____			
Date _____		Date _____		Date _____			
LEGEND		MC – Main contractor/ Installer	ADO – Architect/ Designer/ Owner				

Sample Checklist for In-Process Inspection of Wardrobe

Project: _____

Location: _____

Checklist	Acceptance criteria/ Requirement reference	Date of Inspection	Remarks
PREPARATORY WORKS			
1. Check condition of floor	Floor must be leveled, dry and free from debris		
2. Check condition of wall behind wardrobe.	Wall areas behind wardrobe should be painted before installation of wardrobe		
3. Check position and levelness of plywood plinth	Plywood plinth must be positioned at approved location		
INSTALLING WARDROBE			
4. Check dimensions of wardrobe carcass	Conform to approved shop drawing		
5. Install wardrobe	Refer to Table 6.1		
6. Check alignment and plumb of wardrobe carcass	Wardrobe carcass is horizontally and vertically aligned		
7. Install filler	Refer to Table 6.1		
8. Install drawer compartments	Smooth operation		
9. Install shelves	Shelving are properly adjusted and rests firmly on the shelf studs		
10. Install door panel	Refer to Table 6.1		
11. Check alignment and plumb of door panel and consistent gap between door panel and wardrobe carcass	Door panel is horizontally and vertically aligned. Consistent gap between door panel and wardrobe carcass		
12. Check correct type of ironmongeries	Conform to specifications		
13. Patch nail holes	All nail holes are properly patched		
PROTECTION			
14. Protect completed door panel & ironmongery	Protective materials to remain intact after installation		

Sample Checklist for In-Process Inspection of Kitchen Cabinet

Project: _____

Location: _____

Checklist	Acceptance criteria/ Requirement reference	Date of Inspection	Remarks
PREPARATORY WORKS			
1. Check condition of ceiling	Ceiling should be painted		
2. Check condition of wall and floor	Wall behind upper kitchen cabinet should be plastered Kitchen wall and floor tiles should be completed		
3. Check location of M&E services	Concealed M&E services must be clearly marked		
4. Check pressure test on gas and water pipes	Pressure test on gas and water pipes running behind the cabinet must be successfully completed		
5. Check water inlets and outlets	Water inlets and outlets should be plugged off		
6. Check levelness of concrete plinth	Concrete plinth must be leveled		
7. Check site measurements	Conform to approved drawings		
8. Check routing of electrical cabling, water and gas pipes	Conform to approved drawings		
INSTALLING KITCHEN CABINET			
9. Check dimensions of cabinet carcass	Conform to approved shop drawings		
10. Install kitchen cabinet	Refer to Table 6.2		
11. Check alignment and plumb of cabinet carcass	Cabinet carcass is horizontally and vertically aligned		
12. Install worktop base panel and cut out opening for installation of appliances	Conform to approved shop drawings		
13. Install top kitchen cabinet	Refer to Table 6.2		
14. Install filler	Refer to Table 6.2		
15. Install shelves and accessories	Shelving are properly adjusted and rests firmly on the shelf studs. Conform to approved shop drawings		

Sample Checklist for In-Process Inspection of Kitchen Cabinet

Project: _____

Location: _____

Checklist	Acceptance criteria/ Requirement reference	Date of Inspection	Remarks
INSTALLING KITCHEN CABINET (CONT'D)			
16. Install door panel, drawer, and handle	Smooth operation		
17. Check alignment and plumb of door panel and consistent gap between door panel and cabinet carcass	Door panel is horizontally and vertically aligned. Consistent gap between door panel and cabinet carcass		
18. Check correct type of ironmongeries	Conform to specifications		
19. Patch nail holes	All nail holes are properly patched		
PROTECTION			
20. Protect completed door panel & ironmongery	Protective materials to remain intact after installation		

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