



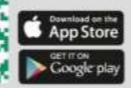
WHITE HORSE CERAMIC INDUSTRIES SDN. BHD.
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APRIL 2017
CLTH10000002

WHITE HORSE CERAMIC TILE HANDBOOK

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AN INTRODUCTION

As a leading tile manufacturer in Malaysia, White Horse Ceramic Industries Sdn Bhd produces high quality tiles encompassing a full range of products for every corner of your beautiful home. These include full concept wall and floor tiles, porcelain and glazed porcelain tiles, high end multi-effect granite tiles, as well as borders and accessories.

Tile usage has gained popularity through the years. At present, tiles form part of a trendy fashion for interior design in homes. To benefit our valued customers who have chosen White Horse tiles for their renovation and decoration projects as well as potential customers, we have produced this "Tile Handbook". Therefore, if you have decided to join other astute homeowners in using White Horse tiles, we recommend that you read this handbook carefully before proceeding with your renovation or decoration project.

With the right tiles, your home will never go out of style.



WHITE HORSE HEAD OFFICE
PASIR GUDANG, JOHOR

OUR CARE AND CONCERN

In view of the fact that Ceramic Tiles are manufactured using natural minerals and fired at temperatures exceeding 1000°C, it is inevitable that the shade, size, texture, effect, appearance, design, colour and other features of the tiles may vary slightly from batch to batch and even within the same batch (subject to tolerance). Unfortunately, this has often been misunderstood as "defects" by end-users due to lack of knowledge about tiles and their usage, thereby causing much distress to the end-users after the tiles have been laid in their homes or premises.

As a responsible ceramic tile manufacturer, we feel honoured to be able to share some valuable information with our valued customers through the publication of this handbook. It focusses on the various aspects of ceramic tiles such as characteristics of the tiles, tips for choosing the appropriate tiles prior to purchase, types of checks to be made before laying the tiles, methods of laying the tiles as well as care and maintenance of the tiles.

This handbook is our form of appreciation and heartfelt thanks to our valued customers for their continuous support and our way of showing them our care and concern. With this handbook, we also hope to achieve our objective of assisting our valued customers make the most informed decisions when selecting our tiles for their homes or premises.



TYPES OF TILES

Ceramic tiles are recommended as the best choice for decorating your house simply because they are :

- Hygienic & mite-free
- Easy to maintain and clean
- Available in a wide range of colours, sizes and finishes
- Versatile
- Affordable
- More durable and lasting longer

CATEGORY



GLAZED WALL TILES

Wall tiles with a layer of clear or coloured glaze, suitable for interior use and is not expected to withstand excessive impact, temperature or trying conditions. Available in various aesthetic designs and subsizes for decoration and functionality.



GLAZED FLOOR TILES

Similar to glazed wall tiles, but more hardwearing to withstand higher and more constant impact, pressure and wear. Also available in various designs and subsizes for an aesthetic yet functional effect.



PORCELAIN AND GLAZED PORCELAIN TILES

These dense, fine-grained tiles are fired in excess of 1000°C, resulting in strong and durable floor tiles which are suitable for both interior and exterior use. They are available in polished variants for high-shine and glazed, for luminosity and translucency as well as matt and rough surface for slip resistance and for decorative purposes.



DECORATIVE PORCELAIN TILES

Also known as Multi-Effect Granite Tiles, the patterns and texture on these tiles attempt to emulate the appearance of natural stone such as granite, marble and travertine. They are harder and more resistant to stains, hence they are more durable than natural stone. They are available as both floor and wall tiles, and are suitable for both indoor and outdoor use.

CHARACTERISTICS

SUBSIZE

Ceramic tiles go through firing in a kiln and therefore a certain level of shrinkage is expected causing the dimensions of the tiles to differ slightly from one to another. The shrinkage level will vary according to the types of tiles and the production batches.

SHADE / TONALITY

The chemical characteristics of the natural raw materials used and the firing process will produce tiles with a slight variation in shade both within a batch and between batches. This is an inherent characteristic of ceramic tiles.

SLIP RESISTANCE

The parameter used for slip resistance is called the Coefficient of Friction (COF). The higher the COF, the better the slip resistance of the tiles. Unglazed tiles, mosaic tiles (with many grout joints) and rough surfaced tiles are less slippery when compared with smooth and glossy glazed tiles. Therefore, these tiles are more slip resistant and are recommended to be used in industrial, kitchen, bathroom floors and swimming pool areas.

SURFACE ABRASION RESISTANCE

This characteristic shows the resistance of glaze to wear caused by intentional or unintentional movement of surfaces or materials in contact with the tiles. Porcelain tiles are more surface abrasion resistant and have higher durability.

WATER ABSORPTION

Tiles with low water absorption usually have higher mechanical strength. Firing a tile at high temperatures makes it less porous and less water absorbent.

MECHANICAL STRENGTH

Mechanical strength (MOR) is an indication of the compactness of the ceramic tile and the maximum stress it can withstand without breaking. The greater the MOR, the denser the structure of the body. Hence, the mechanical strength of the various types of ceramic tiles provide you with a good guide in selecting the right tile that will fit your purpose.

STAIN AND CHEMICAL RESISTANCE

Tiles that are stain resistant are hygienic and easily cleaned. Glazed ceramic tiles resist stains because of their glazed surface. Porcelain tiles are made stain resistant because of their compactness or low water absorption characteristics.

CHOOSING THE RIGHT TILES



RESIDENTIAL SETTING

• LIVING & DINING

Non-slip tiles are recommended especially if you have small children and elderly persons at home. Alternatively, you can consider smaller tiles with more grout lines that would be less slippery. Low maintenance tiles on the dining room floor will make for easy cleaning.

• KITCHEN

You have to choose low maintenance tiles with higher chemical and slip resistance as they only require regular cleaning with household detergents. Counter tops could be tiled for hot pots to sit on. Work tops and food preparation areas should be protected with high mechanical strength tiles for easy maintenance.

• BATHROOM

Choose non-slip tiles with low water absorption properties and high chemical resistance to bath foams, soap, shampoo, chemical cleaners and disinfectants to ensure low maintenance. Use tiles for creative colour combinations on walls and floor to give you the best visual relaxation.

• BEDROOM

You should use tiles with pleasant colour combinations that help create a comfortable and relaxing environment. It will relax you and ease your mind from a long hard working day.

• CAR PORCH & DRIVEWAY

Not only should non-slip, high mechanical strength tiles be considered, smaller-sized tiles with more grout lines may provide additional slip resistance and can be another option.

• POOL & GARDEN

Your garden can be improved with easy maintenance tiles. Tiles with low water absorption and high slip resistance are suitable for the pool area.

COMMERCIAL & PUBLIC AREAS

Tiles for commercial and public areas should be durable, non-slip, easy to maintain and look clean.

THE RIGHT TILES FOR YOUR PURPOSE

DESIGN & INSTALLATION IDEAS

FROM CONCEPT AND DESIGN TO INSTALLATION



COMMON DESIGNS

- Different colour of the same size, shape and finishing.
- Different sized or shaped tiles with the same colour and finishing.
- Different surface textures with the same color
- Mural design using mosaic tiles.

PLANNING

- You should study and determine the environment of the area in which the tiles are to be installed and the technical characteristics of the tiles required.

DETERMINE

- Any special treatment needed for the area that needs to be tiled such as water proofing, special bedding or leveling of the base.
- Width of joints and type of grout needed.

ORGANIZE & CHECK

- The straightness of floors and walls.
- The tiles for the different subsize and shades.
- The sequence of the whole tiling job.

LAYING OUT

- Dry-lay the tiles first to minimize the number of cut tiles and to ensure that the shades are harmonious.
- Mark the working lines using the wall as a guide.
- Apply the adhesives according to the manufacturer's instructions.
- Carefully lay the tiles section by section, leveling each with its neighbour.
- Lay the border tiles, leave a grout line between the border tiles and the wall .



COMMON DEFECTS AND ITS CAUSES

After the tiles have been laid on your floors and walls - you may find some common defects. We will explain these common defects and their causes, so that both the home/building owner and the contractor can pay special attention to these factors.

EFFLORESCENCE

This is a whitish discolouration or a formation of a whitish crust on the tiles, caused by soluble salts when moisture evaporates. This happens when soluble salts and moisture are present in the sand or cement in each construction layer. When the moisture evaporates, the dissolved salts will surface, resulting in efflorescence.

Although this is a common problem, it can be minimized.

- Observe Interval Cure Time:
RC = 6 weeks; Brick / Block
Wall = 4 weeks; Cement - Sand Render & Screed = 2 - 3 weeks etc.
- Provide shelter against weathering.
- Building Design - Eliminate penetration of water into the back of the installation eg. Damp Proofing, Capping of Parapet Walls etc.
- Use Latex Modified Adhesive & Grout System - Less permeable to water. Ensure tile is fully bedded & grout is well compacted. If possible use water impervious Epoxide Resin-Based grout.
- Reduce Water to Cement ratio. Modify Cement-Sand Mortar with Latex Admixture - Less permeable to water & contain less excess water.
- Eliminate Soluble Salt / Impurities in Sand. Use washed sand. Never use sea or channel sand.
- Use clean water for mixing of mortars. Do not use excessive water during cleaning.



DEBONDING / ADHESION FAILURE



The initial symptoms of debonding are the development of sporadic hollow sections and the appearance of continuous crack lines across tile finishes. Then you will see the protruding, buckling or vaulting of some tiles, finally resulting in the total separation of tile from the floor or wall surface. This is usually caused by :-

- **SETTING MOVEMENT (DRYING SHRINKAGE / HYDRAULIC SHRINKAGE) :**
Tiling onto substrates (eg. Render / Screed) that has not fully cured (unstable).
- **ABSENCE OF MOVEMENT JOINTS (CONTROL JOINT) TO CATER FOR :**
 - Setting Movement
 - Thermal Movement
 - Moisture Movement
- **BUTT-JOINTING OF TILES**
- **INCORRECT FIXING SPECIFICATION :**
 - Fixing System Not Compatible with Tiles / Stone Slabs and / or Substrate
 - Poor / Weak / Unstable / Unsuitable Substrate
- **WORKMANSHIP (Good Site Practices)**
 - Abuse of Products (Adulteration / Dilution)
 - Poor Substrate Preparation / Contaminated Surface
 - Contaminated Tile Back
 - Wrong Fixing System
- **SETTLEMENT MOVEMENT / IN-ELASTIC DEFORMATION / CREEP / ACT OF GOD**

CRACKING OF TILES



This can happen in 2 different situations. Sometimes the tile is well bonded to the substrate, then cracks are linked to the behaviour of the substrates (shrinkage, excessive loading, no bridging of construction joint, tiling over junction of 2 different substrates, differential movement etc.).

If you tap and hear a hollow sound along or near the crack line, the cracks are caused by lack of adhesive or mortar under the tile, lack of adhesive transfer, weak point and poor shock resistance. When there is a lack of adhesive under the tile, it means that there is a wrong notched trowel, no back buttering (for large tiles) or the substrate is uneven.

If there is low adhesion or poor transfer, then open time expires (Skin Over). It means that there is too little or too much water in the adhesive or mortar mix which affects transfer to tile back. Cracking also happens when the newly laid tiles are subject to traffic too soon (before adhesive forms initial strength).

TILE CRAZING

The defect of crazing is defined as fine cracks in the glaze, sometimes one or two long ones but most often a fine web-like network akin to cracked ice. Glaze is in effect a thin layer of glass on the surface of the tile which is impervious to moisture, the clay is porous and can absorb moisture, when it does it expands a little. The glaze cannot expand and so cracks finely - this is crazing.

It is caused by installing ceramic wall tiles with "neat cement mortar" which have high shrinkage during curing or soaking of ceramic wall tiles in water thus resulting in moisture movement.



COMMON GROUT DEFECTS



- Fungus / Mould / Algae Growth
- Peeling & Cracking of Grout
- Staining / Discolouration of Grout
- Inconsistent Colour & Cracking

Solution : Choose grout that is semi flexible, anti-crack, water repellent, fungus resistant and resistant to domestic cleaning material.



To indoor and outdoor, to wall and floor.



2 - 6mm Coloured grout



Semi-Flexible



Water repellent



Anti Cracks



Fungus Resistant



Resist to domestic materials



CARE AND MAINTENANCE FOR TILES



IMPORTANT POINTS TO REMEMBER

- Mop regularly with clean water for daily maintenance or generic detergents for routine cleaning.
- Avoid using highly abrasive materials such as scouring pads on glazed tiles as it might scratch and wear out the glaze.
- Wipe and clean away any spills on tiled surfaces to prevent scratching the glaze on tiles.
- Gently sweep away sand or debris on tiled surfaces as it can scratch the glaze on tiles.
- Do not drag heavy objects such as crates across floors which are laid with tiles not specified for heavy duty use.

ENSURING LASTING APPEAL

- Refrain from using cleaning agents which contain hydrofluoric compounds as they are damaging to the surface of ceramic tiles.
- Follow carefully all manufacturer's instructions on the application of cleaning agents, to ensure that maximum results are obtained and damage to the tile surface is minimized.



FREQUENTLY ASKED QUESTIONS

1. Why are polished tiles easily stained?

Polished tiles are usually less stain resistant, as the polishing process exposes microscopic pores. Spills can be trapped in the micro pores that are difficult to dislodge, and the result is the same as though the tile has been stained. It is important to clean the spill quickly before it dries. Most manufacturers incorporate the finish polishing process with nano-glaze which eliminates stain problems.

2. Why did my tile get chipped?

Tiles are fired at high temperatures, making them hard and relatively brittle i.e. non resilient. It is best to avoid impact from hard objects.

3. Why did my tile crack at the corner?

This is usually due to insufficient coverage of adhesive under the tile corners.

4. What causes hollowness?

Hollowness can be due to:
 a) Insufficient adhesive coverage under the tile.
 b) Wrong adhesive has been used resulting in poor bonding.
 c) Incorrect installation, allowing the adhesive to 'skin' before the tiles are installed.
 d) Using the buttering system instead of trowelling system.

5. Why do my tiles appear to be in a different shade from the ones I selected at the showroom?

Please do take note that in the showroom, lighting and the environment affect the visual appearance, shades and colour tone of tiles significantly.

6. What is the average lifespan of tile surfaces?

If tiles are properly installed, regularly upkept and maintained (regularly cleaned with normal household cleaning agents, removing stains and preserving appearance), tiles can last a lifetime.

7. Why is cement not recommended as a grout?

- A cement mix is very rigid and do not meet the minimum performance criteria in accordance with the standards of BS EN 13888 and ISO 13007-3.
- A proper grout is formulated to have properties of good abrasion resistance, compressive and flexural strength, low shrinkage and low water absorption.

8. Possible factors contributing to tile debonding/ buckling

- Setting movement (drying shrinkage /hydraulic shrinkage)
- Tiling onto substrates (eg: Render/Screed) that has not fully cured.
- Absence of movement joints (control joint) to cater for :
 I. Setting Movement
 II. Thermal Movement
 III. Moisture Movement
- Butt-jointing of tiles
- Incorrect fixing specification :
 I. Fixing System Not Compatible with Tiles / Stone Slabs and / or Substrate
 II. Poor / Weak / Unstable / Unsuitable Substrate
- Workmanship (Good Site Practices) :
 I. Abuse of Products (Adulteration / Dilution)
 II. Poor Substrate Preparation / Contaminated Surface
 III. Contaminated Tile Back
 IV. Wrong Fixing System
- Settlement movement / in-elastic deformation / creep

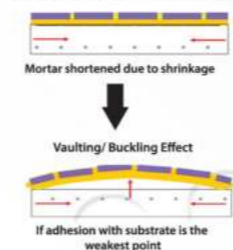
Example: Buckling



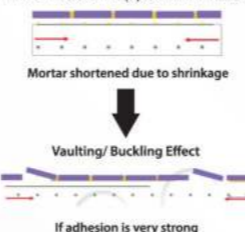
Example: Buckling



What would happen with tiles?



What would happen with tiles?



9. Why are fine cracks appearing on the glaze of my tiles?

Known as 'crazing', these fine hairline cracks on the glazed surface of the tile could be due to :

1. Manufacturing defect - low quality of glaze.
2. Excessively thick adhesive application during installation.
3. Possible cause is the mortar having a high cement content, which will cause high shrinkage during curing.

10. Why have deep cracks appeared across several of my tiles?

If the cracks run in lines across several tiles, then it is very likely due to excessive movement in the substrate during shrinking and curing, or underlying structural issue.

*Cracking of Wall Tiles *Cracking of Floor Tiles



11. There is a white powdery substance appearing on my floor / wall tiles:

This white powdery substance is an effect known as efflorescence, where soluble salts rise to the surface of a cement based substrate.

- 3 Factors that result in efflorescence:
- Presence of Soluble Salts in Sand and / or cement in each construction layer.
 - Presence of Moisture / Water. Prolonged Dampness in the construction layers.
 - Evaporation Process / Capillary Action to aid migration of Dissolved Salts to surface.

*Efflorescence on External Wall *Efflorescence on Natural Stone



12. Why are my tiles in different shades and tonality / have different sub-sizes?

Ceramic tiles are made of natural materials that are compressed under high pressure and kiln-fired, some variation will definitely occur. Each batch of tiles will have tonality variations, even from within the same batch. The tolerances for such variations are specified in the MS ISO13006 standard. It should be noted that for some tiles, these variations are purposely incorporated in the design to give tiles their 'natural' character and charm. Dry lay the tiles to ensure the shades are harmonious before fixing. Always observe good installation practice to allow minimum 3mm tiling gap to accommodate sub size variations.

13. What is Optical Hazing?

Whilst polished porcelain has a glossy surface, this does not mean it has the characteristics of a mirror. In fact, it is subject to a natural phenomenon known as optical hazing, presenting a smoky haze when the surface of the tile is struck by oblique light sources, for example early morning sun, halogen and white lights. The effects of optical hazing can be minimized by careful design planning, such as, the use of curtains and blinds, and the careful placement of furniture. Optical hazing is not considered a fault in the tile and does not affect the technical characteristics of the tile.

14. Why can't tiles be butt jointed?

Grout joints (or tiling gaps) are required :

- I. To accommodate substrate movement underneath the tiles
- II. Minor tile size variations
- III. To allow shrinkage of cement
- IV. To accommodate or provide allowance in workman tiles
- V. To serve as 'vents' for the adhesive to cure.

15. Porcelain or Homogeneous?

- The terminology, Homogeneous tiles is commonly used to describe porcelain tiles.
- Homogeneous tiles are porcelain tiles where the tiles have the same colour throughout the whole piece of tile.
- To assess whether a tile is homogeneous – check for a consistent colour/material throughout the entire tile.
- Homogeneous tiles are considered porcelain tiles since the water absorption is less than 0.5%.

RESPONSIBILITY



TILE MANUFACTURER

We have to emphasize the fact that Ceramic Tiles originate from natural mineral materials. Their shade, size, texture, effect, appearance and other features may vary from one batch to another or from one production period to another.

All our dealers/contractors and customers are advised to check for consistency in the shade, size, texture, effect, appearance and other features as well as for any visible defects on our tile products before laying. Should there be any doubts pertaining to our products, you should approach or call us for further assistance.

Our wide range of ceramic products strictly conform to MS ISO 13006 standard which carries the conditions as stated from page 18 to 20. It is a standard set by the Department of Standards Malaysia (DSM) and certified by SIRIM (Standards and Industrial Research Institute of Malaysia).

Note :

Tiles of a different batch tend to have different degrees of shades. Users are advised to check if these differences in shade from the approved samples are acceptable.

It is recommended that joints for wall tiles be at least 1.5mm wide and for floor tiles at least 3mm. Tile work with butt-joints may have problems of breakage and buckling due to differential movement and is not recommended.

Our liability in any circumstances is strictly limited to replacement of unlaied tiles. Based on our Disclaimer Notice to our dealers/contractors and customers, no complaints will be entertained after laying of our ceramic tiles and no compensation for any damages whatsoever will be made due to improper usage or laying of our ceramic tiles.



RESPONSIBILITY

DEALER / CONTRACTOR

Our White Horse Ceramic Tiles have conformed to the standard and quality requirements under MS ISO 13006:2003 and duly certified by SIRIM and therefore all parties are deemed to accept the aforesaid standard and quality. We encourage our dealers and contractors to acquire good knowledge of ceramic tiles / products in order to impart knowledge and advice to the customer. All our dealers and contractors should be well aware of their responsibilities towards customers when selling White Horse Ceramic Tiles to them.

We advise that when introducing various types of tiles to customers, our dealers and contractors should at the same time, **enlighten the customers about the characteristics, designs and methods of installation** of such tiles to the customers so that they will be able to select the right tiles to fit their purpose. It is important to highlight to the customers any specific treatment needed for the areas that will be tiled such as water-proofing, special bedding or leveling of the base to avoid unnecessary misunderstanding or argument after the sale.

CONSUMER

We pamper our customers with this tile handbook to **enhance their general knowledge on ceramic tiles**; before preparing to lay their tiles, our customers are advised to take note of the following main points:

- That the tiles are not damaged in any way and sufficient to complete the task
- That colour and tonality, size and thickness are consistent to the approved samples
- That you are able to accept variation in sizes
- That you ensure the tiles used in the place are compatible to their usage
- That if artificial light is being used, the light should be adequate and the intensity of temporary lighting to be as similar as possible to the final lighting
- That colour and shade variation are acceptable
- That the type of coloured grout used do not stain or scratch the tiles
- That only a neutral sulphate-free detergent is used to clean the tile after laying
- That the correct type of sand, adhesives, grout, primers and cements are used
- That the tiles are free from all defects before they are laid.

Should there be any doubts pertaining to our tiles/products, please approach our nearest dealer or call us at 1800-88-1880 (toll-free), for further assistance.



CERAMIC WORLD

Created by White Horse Ceramic Industries Sendirian Berhad, CERAMIC WORLD is recognized by the Malaysian Book Of Records as Malaysia's largest tile showroom. The first CERAMIC WORLD opened in Bandar Baru Selayang, in 2003, filling 3 storeys and 30,000 square feet with over 200 simulations of interiors and exteriors tiled with White Horse tiles. The following one in Johor Bahru opened in 2004, also at an extensive 30,000 square feet. Both are public galleries and visitors are encouraged by the ambience, to linger and browse.

Fueled by the success of Ceramic World in both our nation's capital and in the fast-growing city of Johor Bahru, White Horse Ceramic Industries opened a 45,000 square feet Ceramic World in Butterworth, Penang and a 12,000 square feet Ceramic World in Alor Setar, Kedah - in 2006 and 2007 respectively. The latest addition was completed in 2008 - the Ceramic World in Klang, at 40,000 square feet.

Within CERAMIC WORLD, visitors will find over 200 actual and completed combinations of floor and wall tiles, with complementary trim pieces. These are professionally designed and built to simulate actual bathrooms, living rooms, kitchens and more. CERAMIC WORLD also offers free consultation from design selection to calculating the quantity of tiles needed and cost estimation.

CERAMIC WORLD is created with the objective of helping the customer visualize the exciting combinations and possibilities of using White Horse Ceramic tiles in their homes.



JOHOR BAHRU, CERAMIC WORLD



KLANG, CERAMIC WORLD

CERAMIC WORLD
THE **BIGGEST**
TILE SHOWROOM IN MALAYSIA



BANDAR BARU SELAYANG, CERAMIC WORLD



BUTTERWORTH, CERAMIC WORLD



ALOR SETAR, CERAMIC WORLD









BANDAR BARU SELAYANG, CERAMIC WORLD





TILE STANDARD

DIMENSIONS AND SURFACE QUALITY	PORCELAIN TILES - GROUP BIa		CERAMIC FLOOR TILES - GROUP BIIa		CERAMIC WALL TILES - GROUP BIII	
	ISO 13006 Standard	White Horse Tiles (Test Result By SIRIM)	ISO 13006 Standard	White Horse Tiles (Test Result By SIRIM)	ISO 13006 Standard	White Horse Tiles (Test Result By SIRIM)
Length and Width	± 0.6%	Passed	± 0.6%	Passed	± 0.5%	Passed
Thickness	± 5%	Passed	± 5%	Passed	± 10%	Passed
Straightness of Sides	± 0.5%	Passed	± 0.5%	Passed	± 0.3%	Passed
Rectangularity	± 0.5%	Passed	± 0.5%	Passed	± 0.5%	Passed
Flatness of Surface Centre Curvature	± 0.5%	Passed	± 0.5%	Passed	± 0.5% - 0.3%	Passed
Edge Curvature	± 0.5%	Passed	± 0.5%	Passed	± 0.5% - 0.3%	Passed
Warpage	± 0.5%	Passed	± 0.5%	Passed	± 0.5%	Passed
Surface Quality	A minimum of 95% free from visible defects	Passed	A minimum of 95% free from visible defects	Passed	A minimum of 95% free from visible defects	Passed

TILE STANDARD

PHYSICAL PROPERTIES	PORCELAIN TILES - GROUP BIa		CERAMIC FLOOR TILES - GROUP BIIa		CERAMIC WALL TILES - GROUP BIII	
	ISO 13006 Standard	White Horse Tiles (Test Result By SIRIM)	ISO 13006 Standard	White Horse Tiles (Test Result By SIRIM)	ISO 13006 Standard	White Horse Tiles (Test Result By SIRIM)
 Water Absorption	Maximum 0.5%	Average 0.07% Individual Maximum 0.10%	3% < E < 6%	Average 5% Individual Maximum 5.6%	Minimum 10%	Average 12.8% Individual Maximum 13.8%
 Breaking Strength	Not Less Than 1300N	Average 2000N	Not Less Than 1000N	Average 1280N	Not Less Than 600N	Average 990N
 Modulus of Rupture	Minimum 35N/mm ²	Average 63N/mm ² Individual Minimum 56N/mm ²	Minimum 22N/mm ²	Average 40N/mm ² Individual Minimum 39N/mm ²	Minimum 15N/mm ²	Average 32N/mm ² Individual Minimum 30N/mm ²
 Resistance to Deep Abrasion of Unglazed Tiles	Maximum 175mm ³	126mm ³	N/A	N/A	N/A	N/A
 Resistance to Surface Abrasion of Glazed Tiles	Class 3: For Normal Footwear Class 4: For Regular Traffic With Some Scratching Dirt	Class 4	Class 3: For Normal Footwear Class 4: For Regular Traffic With Some Scratching Dirt	Class 4	Class 3: For Normal Footwear Class 4: For Regular Traffic With Some Scratching Dirt	Class 3
 Crazing Resistance	No Crazing Observed	Passed	No Crazing Observed	Passed	No Crazing Observed	Passed

TILE STANDARD

CHEMICAL PROPERTIES	PORCELAIN TILES - GROUP BIa		CERAMIC FLOOR TILES - GROUP BIIa		CERAMIC WALL TILES - GROUP BIII	
	ISO 13006 Standard	White Horse Tiles (Test Result By SIRIM)	ISO 13006 Standard	White Horse Tiles (Test Result By SIRIM)	ISO 13006 Standard	White Horse Tiles (Test Result By SIRIM)
 Chemical Resistance To Household Chemical Of Glazed Tiles	Minimum GB	No Visible Effect (GA)	Minimum GB	No Visible Effect (GA)	Minimum GB	No Visible Effect (GA)
 Chemical Resistance To Swimming Pool Salts Of Glazed Tiles	Minimum GB	No Visible Effect (GA)	Minimum GB	No Visible Effect (GA)	Minimum GB	No Visible Effect (GA)
 Chemical Resistance To Hydrochloric Acid (3%) Of Glazed Tiles	GLA: No Visible Effect	GLA	GLA: No Visible Effect	GLA	GLA: No Visible Effect	GLA
 Chemical Resistance To Citric Acid (100g/l) Of Glazed Tiles	GLB: Definite Change In Appearance	GLA	GLB: Definite Change In Appearance	GLA	GLB: Definite Change In Appearance	GLA
 Chemical Resistance To Potassium Hydroxide (30g/l) Of Glazed Tiles	GLC: Partial Or Complete Loss Of The Original Surface	GLA	GLC: Partial Or Complete Loss Of The Original Surface	GLA	GLC: Partial Or Complete Loss Of The Original Surface	GLA
 Staining Resistance Test Of Glazed Tiles	Minimum Class 3	Class 5 (Stain Can Be Easily Removed With Running Hot Water)	Minimum Class 3	Class 5 (Stain Can Be Easily Removed With Running Hot Water)	Minimum Class 3	Class 5 (Stain Can Be Easily Removed With Running Hot Water)

WHITE HORSE CERAMIC APP

DOWNLOAD NOW!



Scan QR Code



White Horse Ceramic App lets you quickly and easily view our latest ceramic wall tiles, ceramic floor tiles and porcelain tiles. All of them are available in an extensive range of texture surfaces, patterns and styles to fit in with your tastes and requirements.