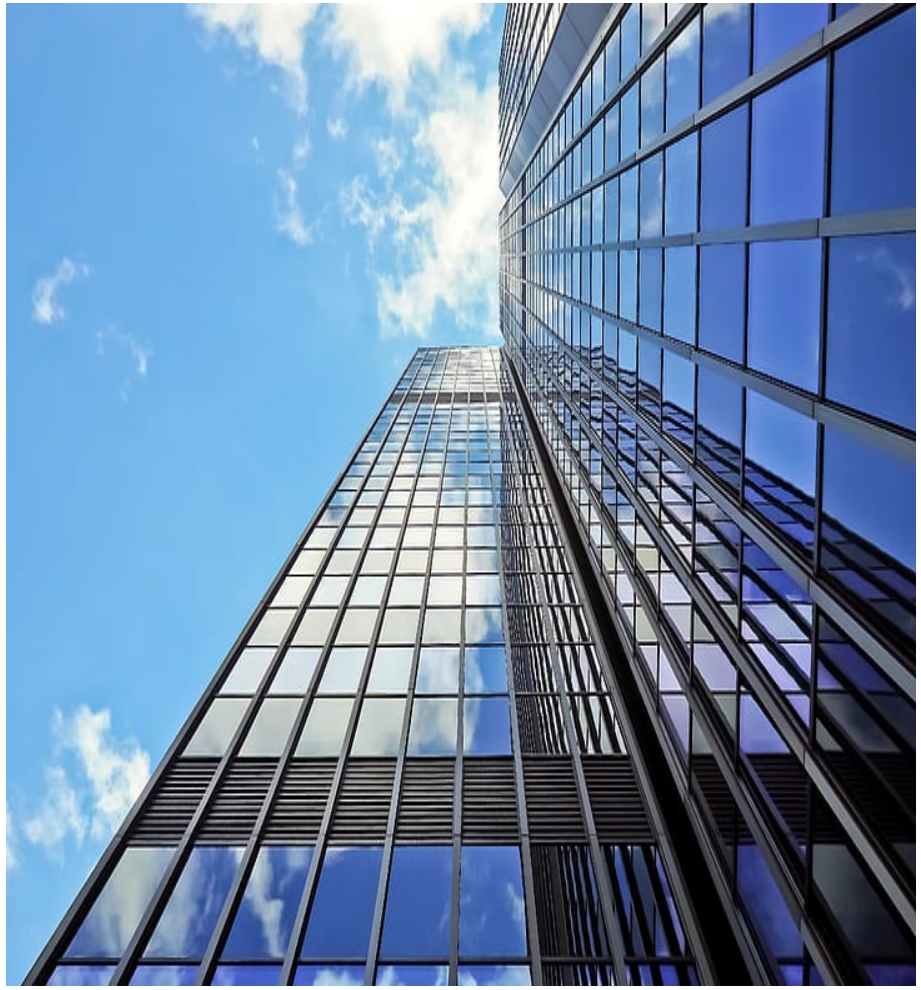
What's New?
Updates to the Draft Code of Practice for Use of Glass in Buildings (DMS 2753)



Ar. Hue Chiun Hau
APAM, LAM
Council Member, PAM (2025/26)
Chairman, Professional Practice Committee (2025/26)
PAM Representative at Jab. Standard Malaysia
Building Inspector, Architect Centre Sdn Bhd

PAM CPD SEMINAR : PRACTICE TALK
Date : 14-June 2025
Venue : Gurney Bay Hotel, Penang

Materials ☑
Aluminium,Alloy

Glazing ☑
IGU, Gaskets, Sealants

Performance ☑
Air, Water, Wind

Testing ☑
Structural, Air, Water, Operation

MS 832:2022
MS 1017:2022

Draft- Code of Practice
Use of Glass In Building (DMS2753)

Recap

1-Sept 2023 : Enforcement of MS832:2022 and MS1017:2022
(Fourth Schedule of CIDB Act520)

14-Oct 2023

25-May 2024

Overview

1) Department of Standards Malaysia

2) Overview – Use of Glass

3) Draft COP - DMS 2753

Department of Standards Malaysia

Overview of Department of Standards Malaysia (DSM / JSM)

Introduction

- Established 28-Aug 1996
- Governed by Standards of Malaysia Act 1996 [Act 549]
- Under the Ministry of Investment, Trade, and Industry (MITI)

Key Roles

1 National Standards Body

MALAYSIAN STANDARD

Develop and promote MS

2 National Accreditation Body

STANDARDS MALAYSIA ACCREDITED

Test Lab
Certification body
Inspection body

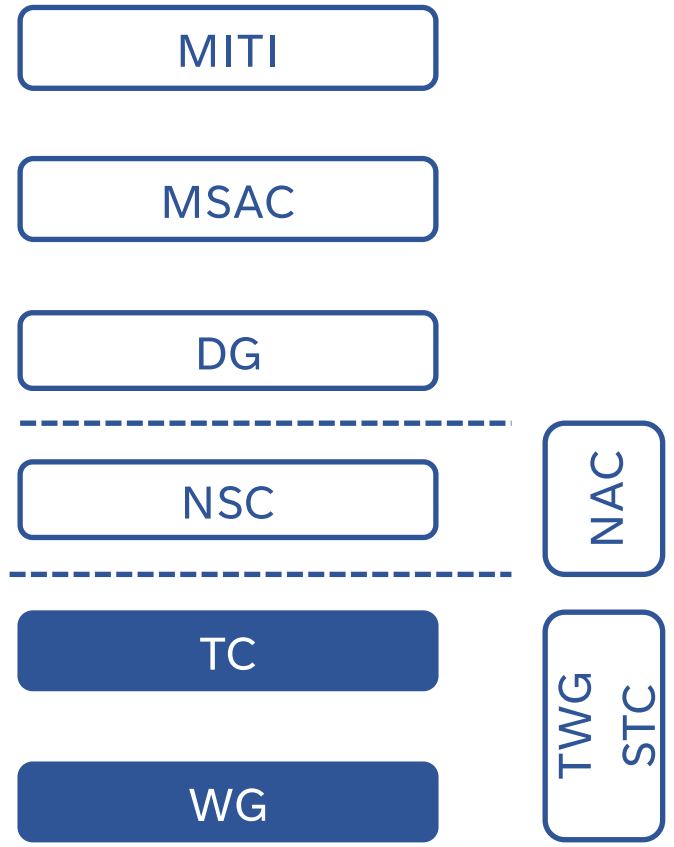
Overview of Department of Standards Malaysia (DSM / JSM)

OTHER STANDARD DEVELOPING BODIES IN MALAYSIA			
Standard Developing Body	**Ministry**	**Standards**	**Focus Area**
SIRIM Berhad (Standards and Industrial Research Institute)	Ministry of Investment, Trade and Industry (MITI)	SIRIM Standards	Industrial standards
Construction Industry Development Board (CIDB)	Ministry of Works (KKR)	Construction Standards	Building materials, construction methods, safety
Energy Commission (Suruhanjaya Tenaga)	Ministry of Natural Resources, Environment and Climate Change (NRECC)	Electrical Standards	Electrical safety and efficiency
Department of Occupational Safety and Health (DOSH)	Ministry of Human Resources (KSM)	Safety and Health Standards	Occupational safety and health
Department of Environment (DOE)	Ministry of Natural Resources, Environment and Climate Change (NRECC)	Environmental Standards	Environmental protection (air, water, waste)

Overview of Standard Development Process (DSM)

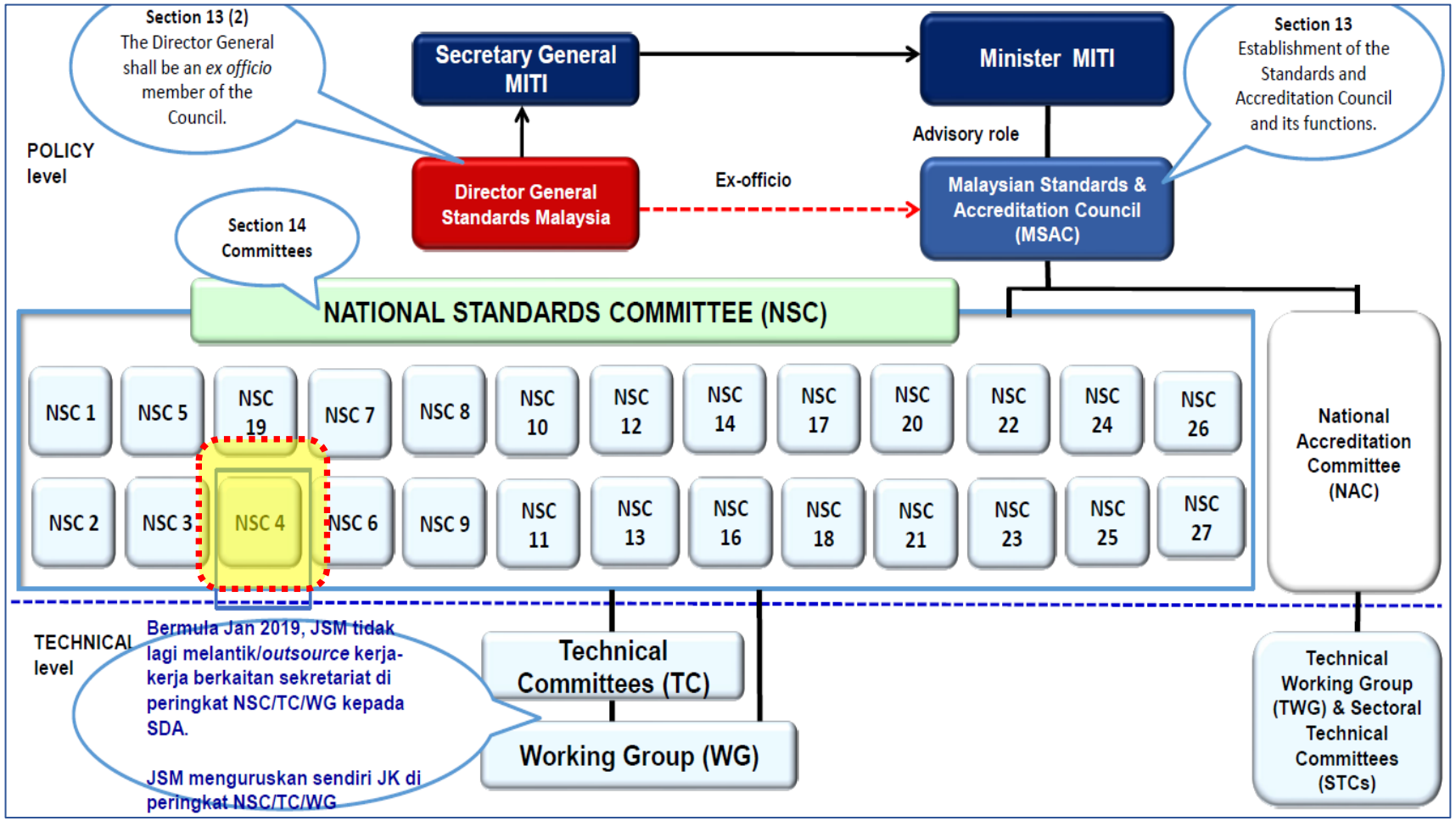
National Standards and Accreditation Governance Structure

Component	Responsibilities
Minister of International Trade and Industry (MITI)	▪ Provides strategic direction and oversight for standards and accreditation activities.
Malaysian Standards & Accreditation Council (MSAC)	▪ Advises the Minister on standards and accreditation. ▪ Formulates policies and strategies.
Director General of Standards Malaysia	▪ Manages implementation of MSAC policies. ▪ Ensures alignment with national priorities and international practices.
National Standards Committee (NSC)	▪ Develops, reviews, and approves national standards. ▪ Coordinates with technical committees and working groups.
Technical Committees (TC) & Working Groups (WG)	▪ Consist of sector experts. ▪ Draft, review, and update standards.
National Accreditation Committee (NAC)	▪ Oversees accreditation processes. ▪ Ensures competence of conformity assessment bodies.
Technical Working Group (TWG) & Sectoral Technical Committees (STCs)	▪ Provide technical expertise and sector-specific insights. ▪ Assist in evaluation and accreditation of conformity assessment bodies.



Overview of Standard Development Process (DSM)

National Standards and Accreditation Governance Structure



NSC 04
Building, Construction and Civil Engineering

[24 x TCs]
TC 9
Household Fittings and Building Accessories

[4 x WGs]
WG 6
Code of Practice for Glass

Source : Bengkel Halatuju NSC 04 (Mar 2024)

Overview of Standard Development Process (DSM)

Malaysian Standards (MS) Development Process

1) PROPOSAL PHASE – NEW PROJECT PROPOSAL

2) APPROVAL OF PROJECT BY NSG

3) DRAFTING OF MS BY TC / WG

4) PUBLIC COMMENT (30/60 days)

5) REVIEW AND FINAL EDIT

6) APPROVAL AND PUBLICATION

Overview of Malaysian Standards (MS)

General Types of Malaysian Standards (MS)

Type of Standard	Typical Title Used	Key Purpose	Examples
Code of Practice	Code of Practice	**Guidelines for safe and effective practices** in various activities or industries.	MS 1184: Universal Design and Accessibility in the Built Environment – Code of Practice
Specification	Specification	**Detailed requirements** for materials, products, systems, or services to ensure they are fit for their intended purpose.	MS 1064: Part 1: 2011 Fire Grading of Buildings – Specification for Fire Resistant Doorsets and Shutters
Guideline	Guidelines	**Recommendations or instructions** to assist compliance with specifications or regulations.	MS 1525: Energy Efficiency and Use of Renewable Energy for Non-Residential Buildings - Code of Practice
Terminology	Vocabulary/Glossary	**Standardized** definitions of terms used in specific fields or industries.	MS 966: Glossary of Terms Used in Building and Civil Engineering
Method of Test	Test Methods	**Procedures for testing** products or systems to ensure they meet required specifications.	MS 544: Methods of Test for Concrete

Overview of Malaysian Standards (MS)

General Types of Malaysian Standards (MS)

Type of Standard	Typical Title Used	Key Purpose	Examples
Classification	Classification	**Systematic arrangement** of products, services, or systems into categories based on common characteristics.	MS 1064: Part 2: 2011 Fire Grading of Buildings – Classification of Fire Resistance of Building Elements
Performance Requirements	Performance Requirements	**Criteria** that products or systems must meet under specified conditions to be considered acceptable.	MS 1477: Performance Requirements for External Thermal Insulation Composite Systems (ETICS) with Rendering
Safety Requirements	Safety Requirements	**Criteria and guidelines** to ensure the safety of products, services, and systems.	MS 1933: Safety in Building Construction
Environmental Requirements	Environmental Requirements	**Criteria and guidelines** to ensure products, services, or systems do not harm the environment.	MS 2095: Environmental Requirements for Building Construction Sites

Overview
Use of Glass

Use of Glass in Buildings – Essential Material

Why Glass?

Critical Component
Beauty and function in modern buildings

Structural Integrity
Strength and stability to building structures..

Versatility
Available in many types to suit various design needs.

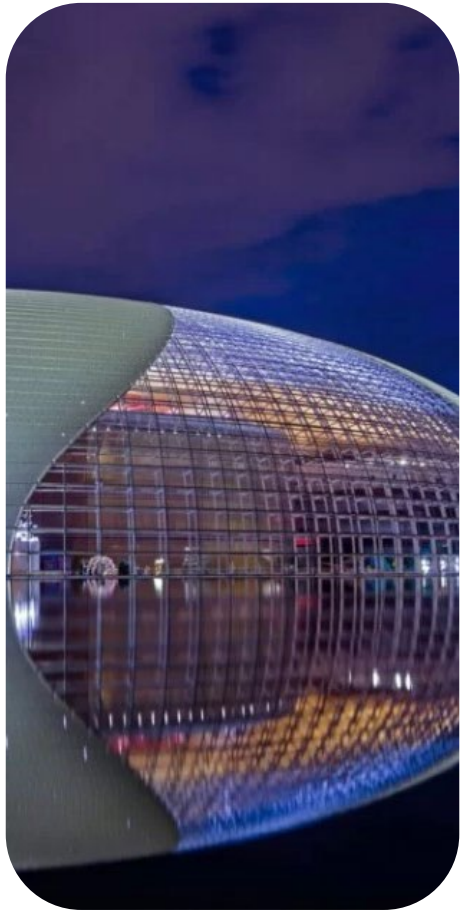
Safety and Performance
Helps protect against impact and fire, and improves energy use.

Design Flexibility
Supports creative designs with light and space.

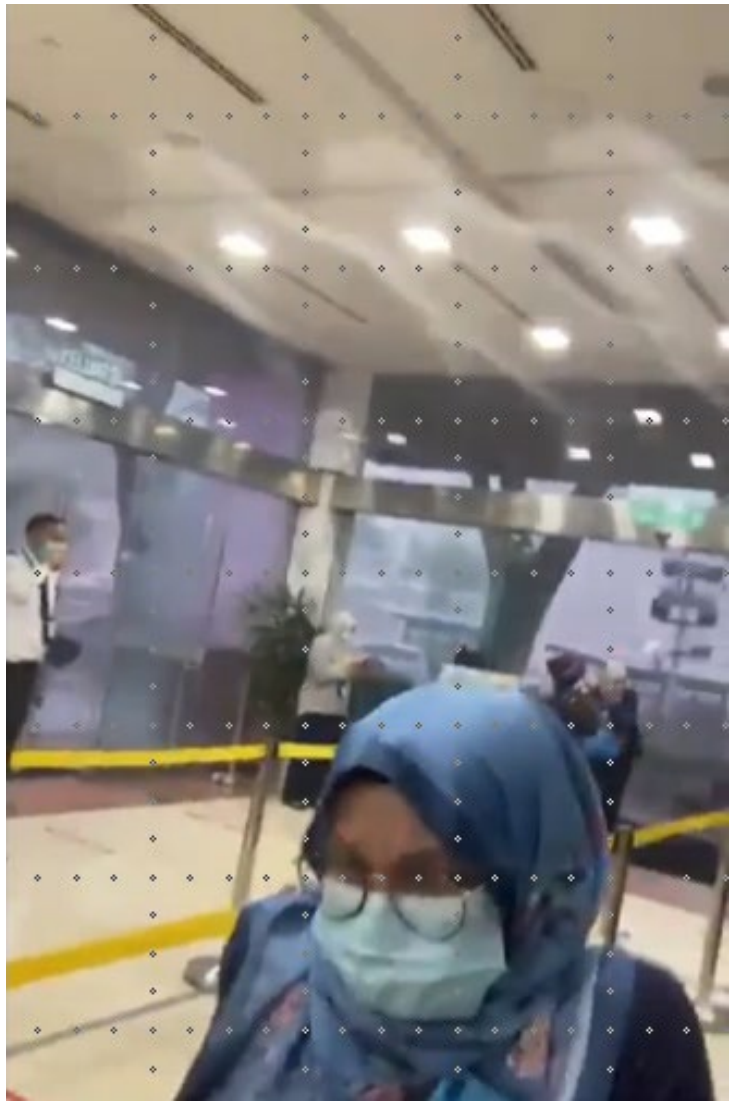
Use of Glass in Buildings – Essential Material







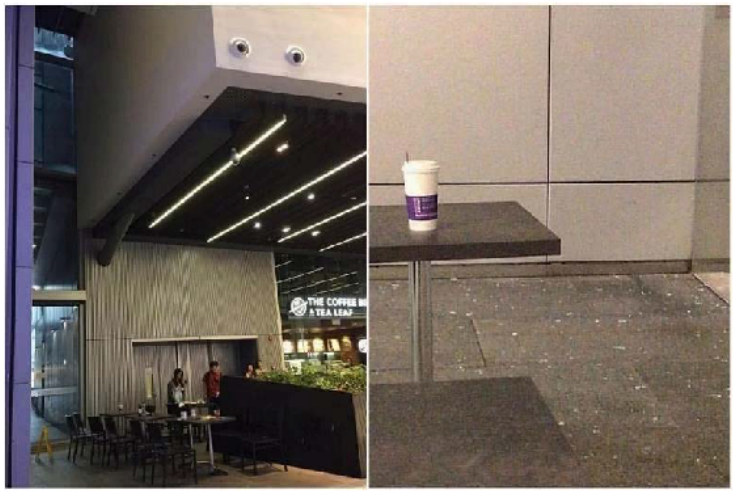
Issues & Challenges



Issues & Challenges

THE STRAITS TIMES

Glass panel breaks in Orchard Central, scaring patrons



Part of the glass panel (top left) above the entrance next to The Coffee Bean and Tea Leaf outlet at Orchard Central shattered, causing glass to fall onto patrons sitting nearby. PHOTOS: LOW LI PING, TNP READER

Kok Yufeng

UPDATED OCT 24, 2018, 08:22 AM

SINGAPORE (THE NEW PAPER) - Patrons at Orchard Central shopping mall were given a shock on Tuesday afternoon (Oct 23) when a skylight panel broke, causing pieces of glass to rain down.

Ms Low Li Ping, 22, told The New Paper that she was sitting on one of the ground-level benches across from The Coffee Bean and Tea Leaf outlet at the mall when she heard a cracking sound, which she thought was thunder.

A few seconds later, there was another crack and a part of the glass panel above the entrance next to the cafe shattered, causing glass to fall onto patrons sitting nearby.

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MALAYSIA

In Miri, shopping mall's glass ceiling collapses, no one hurt

The glass ceiling of a shopping mall in Lutong suddenly collapsed on Sunday. — Borneo Post Online pic

*Join us on our **WhatsApp Channel**, follow us on **Instagram**, and receive **browser alerts** for the latest news you need to know.*

Monday, 14 Feb 2022 4:13 PM MYT

MIRI, Feb 14 — A section of the glass ceiling in front of a shopping mall in Lutong collapsed yesterday morning.

However, mall authorities confirmed that nobody was injured

Owner charged with negligence over glass bridge that shattered, killing tourist

INDONESIA

Thursday, 02 Nov 2023 11:56 AM MYT

One person died when the glass bridge shattered beneath a group of visitors on Oct 25. - The Jakarta Post

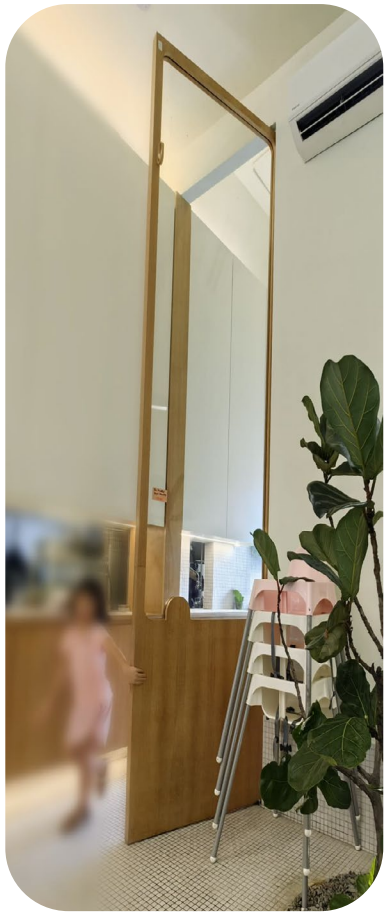
JAKARTA: The Banyumas City Police have charged Edi Suseno, the owner and manager of the Geong glass bridge, with negligence over a recent fatal accident at the Central Java tourist site and have found that he owns two other similar attractions in the area.

"We have determined that the manager is a suspect and he has since been detained," said Banyumas City Police chief Edy Suranta Sitepu on Oct 25.

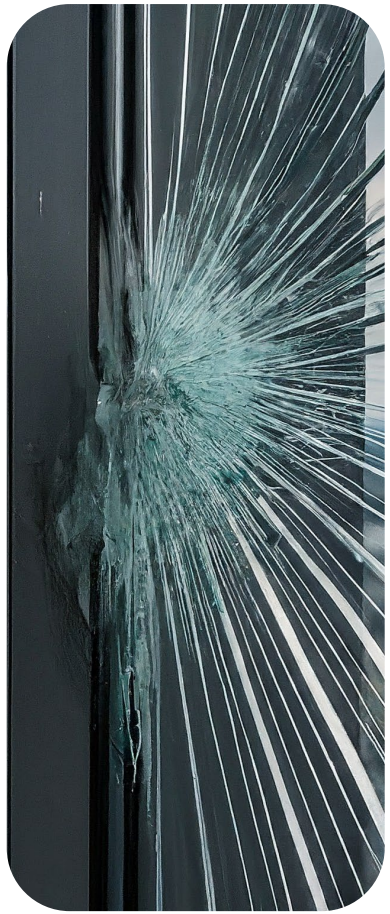
Issues & Challenges

Incorrect glass selection

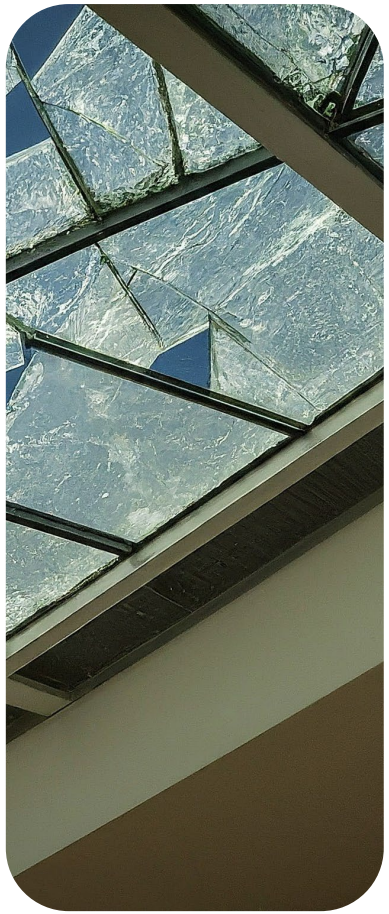
Inadequate load calculations



Non-Compliance with Safety Standards



Improper Installation Techniques



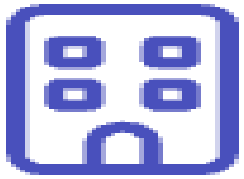
Lack of Quality Assurance

Insufficient Documentation

What is Safety Glass ??

Engineered Safety

Specially designed glass that reduces injury risk when broken, either by **resisting breakage** or **breaking in a safer manner** than regular glass



Code Mandated

Required by building codes in hazardous locations such as doors, areas near floor level, balconies, and overhead installations

Certified Performance

Must meet **stringent safety standards and testing requirements**, typically bearing permanent markings or labels as certification

Issues & Challenges

What type of glass is best here?

What standards to refer?

What thickness of glass should be used?

How thick to use?

What is the maximum size allowable?

How do I calculate loads on glass?

What tests ensure glass strength and durability

Can we use glass materials from overseas?

Solution – Engineering Calculation

To check whether the original design is adequate; the following parameters are established:

1. Glass Balustrade is cantilevered from RC kerb. Embedment of glass measured on site is 100mm and modelled to access stresses and deflection at top of glass.
2. Height glass protruding above concrete = 1,100mm
3. Type of glass = 12mm thk. Tempered Glass (non-heat-soaked)

STANDARDS & CODE OF PRACTICE

The following standards and codes of practices are adopted for the design:

4. BS6399-1:1996 – Part 1. Code of Practice for Dead and Imposed Loads
5. AS1288:2006 – Glass in Buildings – Selection and Installation

DESIGN PARAMETERS

6. Parameters of Glass:
   - Modulus of Elasticity = 73,000MPa
   - Density of Glass = 2,500kg/m³
   - Poisson's ratio for Glass, μgl = 0.23
   - Ultimate Limit State Design Stress for 12mm thk. Tempoered Glass = 63.13N/mm² at Edge
7. As per clause 3.3.3 of AS1288-2006:
   - maximum deflection under serviceability limit state for cantilever glass balustrade shall be 1,100mm/30 = 36.66mm, or maximum of 30mm as per Table 7.1.
8. Dead load is the self-weight of the glass panel; defined by software
9. Imposed load as per Table 4 of BS6399-1:1996:
   - Case I (LL#1) – Infill load of 1.0kN/m²
   - Case II (LL#2) – A horizontal uniformly distributed line load of 0.74kN/m
10. Wind loads of 1.52kN/m² (WL#1) and -1.73kN/m² (WL#2) are adopted as per

A. Design Brief

DESIGN PARAMETERS (CONT'D)

11. Load combinations (refer BS8110-1:1997 Table 2.1):

- *Load Combination #1*
  Service Condition = 1.0DL + 1.0LL#1
  Ultimate Condition = 1.4DL + 1.6LL#1
- *Load Combination #2*
  Service Condition = 1.0DL + 1.0LL#2
  Utlimate Condition = 1.4DL + 1.6LL#2
- Load *Combination* #3
  Service Condition = 1.0DL + 1.0WL#1
  Ultimate Condition = 1.4DL + 1.4WL#1
- *Load Combination #4*
  Service Condition = 1.0DL + 1.0WL#2
  Ultimate Condition = 1.4DL + 1.4WL#2

Table 2.1 — Load combinations and values of γ_f for the ultimate limit state

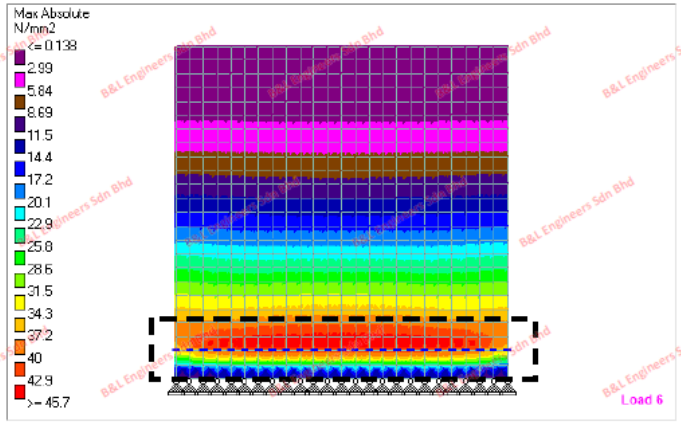
Load combination	Load type					
	Dead		Imposed		Earth and water pressure	Wind
	Adverse	Beneficial	Adverse	Beneficial		
1. Dead and imposed (and earth and water pressure)	1.4	1.0	1.6	0	1.4	—
2. Dead and wind (and earth and water pressure)	1.4	1.0	—	—	1.4	1.4
3. Dead and wind and imposed (and earth and water pressure)	1.2	1.2	1.2	1.2	1.2	1.2

(Credit: B&L Engineers)

Solution – Engineering Calculation

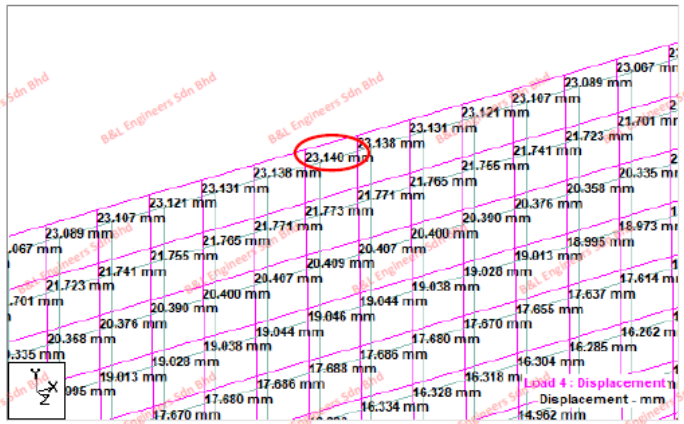
B. Result of Analysis

GLASS STRESS ANALYSIS (LOAD COMBINATION #1)



Ultimate Stress in Glass = 45.7N/mm²

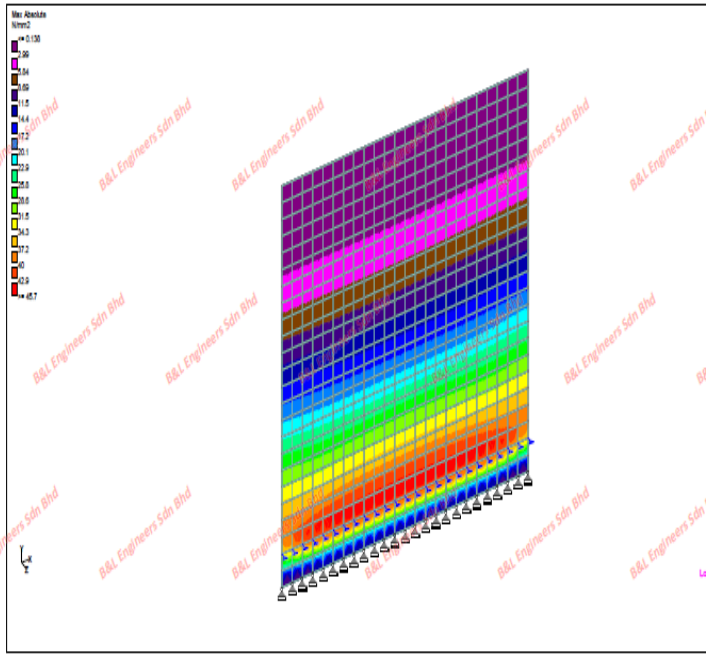
DEFLECTION (LOAD COMBINATION #1)



Deflection = 23.140mm

Plate Center Principal Stress Summary

	Plate	L/C	Principal		Von Mis		Tresca	
			Top (N/mm²)	Bottom (N/mm²)	Top (N/mm²)	Bottom (N/mm²)	Top (N/mm²)	Bottom (N/mm²)
Max (t)	228	7:1.4DL + 1.6LI	64.775	-14.895	58.765	58.835	64.775	64.851
Max (b)	225	13:1.4DL + 1.4I	-15.912	69.147	62.797	62.728	69.223	69.147
Max VM (t)	225	13:1.4DL + 1.4I	-15.912	69.147	62.797	62.728	69.223	69.147
Max VM (b)	225	13:1.4DL + 1.4I	-15.912	69.147	62.797	62.728	69.223	69.147
Tresca (t)	228	13:1.4DL + 1.4I	-15.912	69.147	62.797	62.728	69.223	69.147
Tresca (b)	228	13:1.4DL + 1.4I	-15.912	69.147	62.797	62.728	69.223	69.147



ULTIMATE GLASS STRESS ANALYSIS (CASE#1)

C. Summary of Design Review

ULTIMATE LIMIT STATE DESIGN STRESS (N/MM²)

Load Combination	*Acceptable*	*Result of Analysis*	*Remarks*
#1	*63.13*	*45.7*	*OK*
#2	*63.13*	*64.9*	*FAILED*
#3	*63.13*	*60.8*	*OK*
#4	*63.13*	*69.2*	*FAILED*

DEFLECTION OF GLASS BALUSTRADE (MM)

Load Combination	*Acceptable*	*Result of Analysis*	*Remarks*
#1	*30.0*	*23.14*	*OK*
#2	*30.0*	*41.085*	*FAILED*
#3	*30.0*	*35.172*	*FAILED*
#4	*30.0*	*40.031*	*FAILED*

CONCLUSION

1. Glass balustrade failed against horizontal line load on both stress and deflection.
2. Glass balustrade also failed against wind pressure on both stress and deflection.
3. Thickness of glass balustrade has been insufficiently provided.

(Credit: B&L Engineers)

Any Better Way for The Architect / Designer ?

Code of Practice
Use of Glass in Building
(Draft) (DMS 2753)

Overview of DMS 2537 - Use of Glass in Buildings – COP

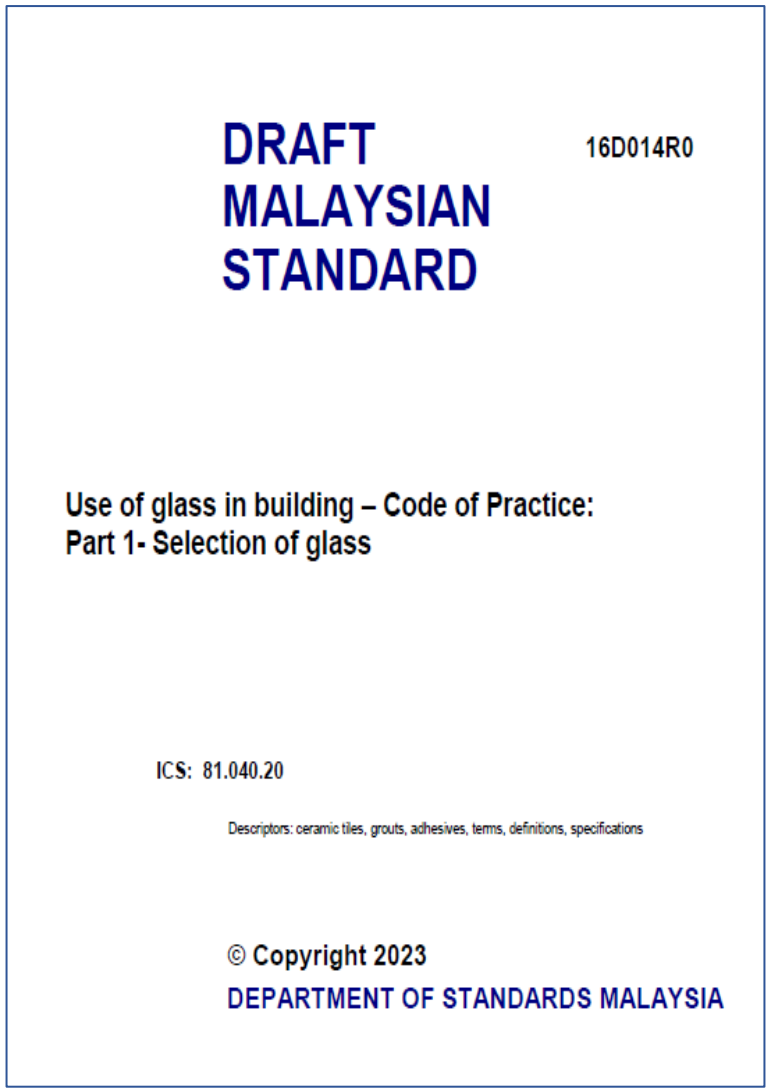
Introduction

- Proposal approved in **2018**
- Title: "**Use of Glass in Buildings – Code of Practice**“
- **Part 1: Selection of Glass**
  - *Criteria for selecting the appropriate type for different applications*
- **Part 2: Design and Analysis**
  - *Guidelines on the design and analysis of glass structures, including load calculations and testing procedures*

Scopes & Objectives

Provides a set of guidelines that help in:

- **Glass Selection** – Functional and performance needs.
- **Structural Design** – Resistance to loads and environmental factors.
- **Performance Testing** – Safety and compliance standards.



DRAFT
MALAYSIAN
STANDARD

16D014R0

Use of glass in building – Code of Practice:
Part 1- Selection of glass

ICS: 81.040.20

Descriptors: ceramic tiles, grouts, adhesives, terms, definitions, specifications

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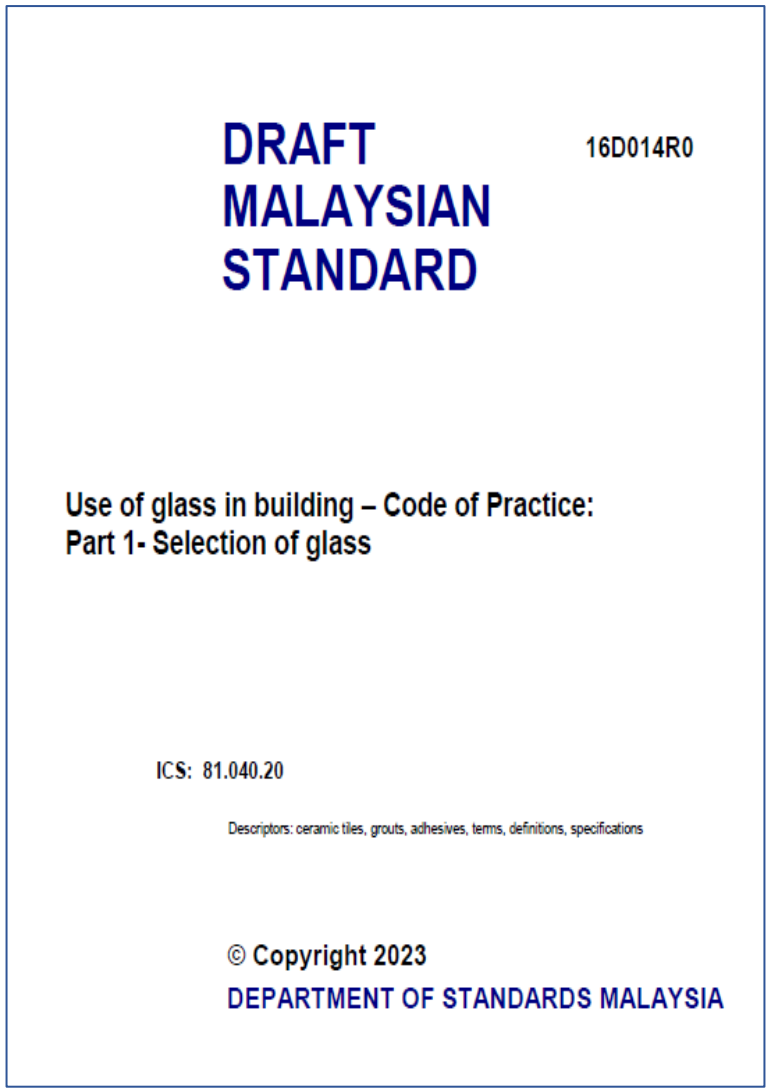
DEPARTMENT OF STANDARDS MALAYSIA

Overview of DMS 2537 - Use of Glass in Buildings – COP

Committee Representation in Working Group (NSC 04/ TC 9/WG 6)

- Department of Standard Malaysia (Secretariat)
- Dewan Bandaraya Kuala Lumpur (DBKL)
- Federation of Malaysian Manufacturers (FMM)
- Fenestra Malaysia Sdn Bhd
- Glass and Glazing Standards Review Association (GGSRA)
- Jabatan Kerja Raya Malaysia (JKR)
- Malaysia Glass Association (MGA)
- Malaysia Green Building Council (MGBC)
- Malaysian Institute of Interior Designers (MIID)
- **Pertubuhan Arkitek Malaysia (PAM)**
- Safety Glass Processors Association of Malaysia (SGPAM)
- SIRIM QAS International Sdn Bhd (SIRIM)
- The Chartered Institute of Building Malaysia (CIOB)
- The Institution of Engineers, Malaysia (IEM)


DRAFT MALAYSIAN STANDARD

16D014R0

Use of glass in building – Code of Practice:
Part 1- Selection of glass

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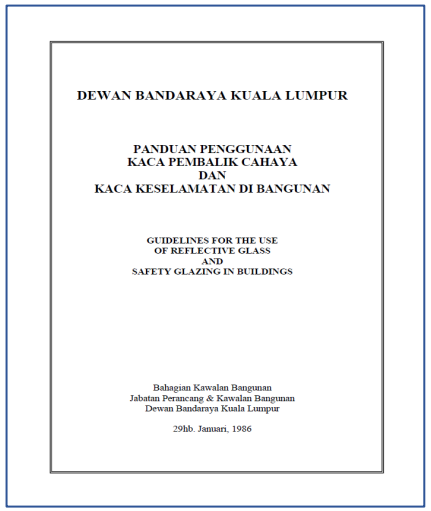
DEPARTMENT OF STANDARDS MALAYSIA

Examples of Standards and Guidelines - Glass

Available Guidelines - Examples

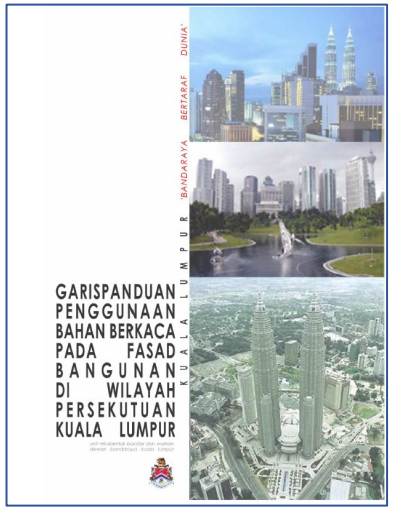

DEWAN BANDARAYA KUALA LUMPUR

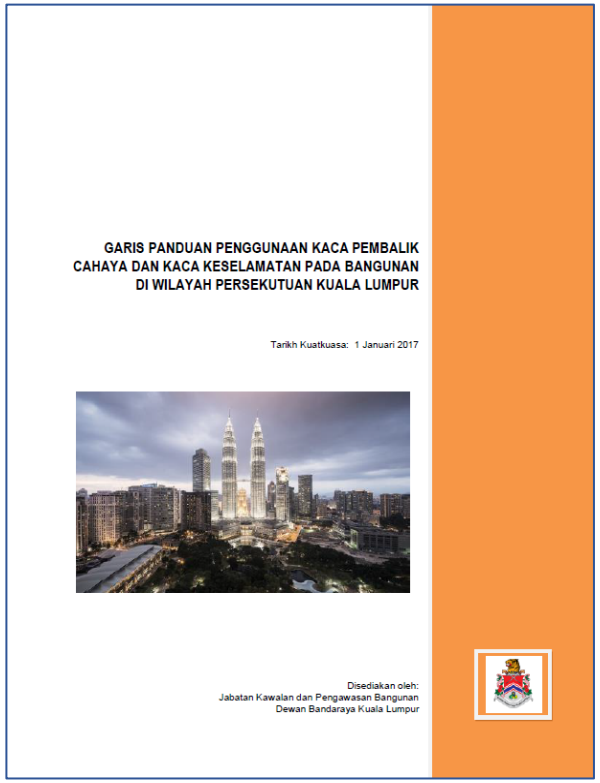
PANDUAN PENGGUNAAN
KACA PEMBALIK CAHAYA
DAN
KACA KESELAMATAN DI BANGUNAN

GUIDELINES FOR THE USE
OF REFLECTIVE GLASS
AND
SAFETY GLAZING IN BUILDINGS

Bahagian Kawalan Bangunan
Jabatan Perancang & Kawalan Bangunan
Dewan Bandaraya Kuala Lumpur

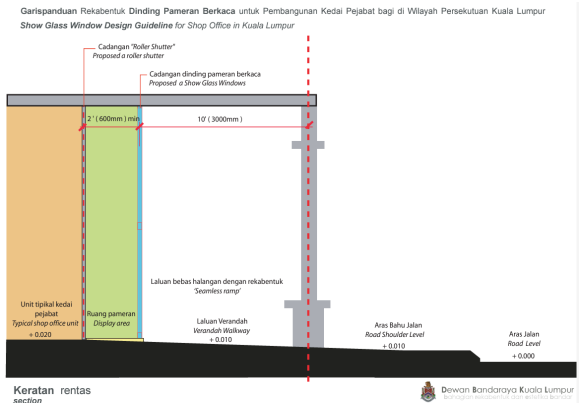
29hb. Januari, 1986




GARIS PANDUAN PENGGUNAAN KACA PEMBALIK CAHAYA DAN KACA KESELAMATAN PADA BANGUNAN DI WILAYAH PERSEKUTUAN KUALA LUMPUR

Tarikh Kuatkuasa: 1 Januari 2017

Disediakan oleh:
Jabatan Kawalan dan Pengawasan Bangunan
Dewan Bandaraya Kuala Lumpur



CIDB Act 520 – Fourth Schedule (Mandatory)

4.	Glass	
(a)	Float glass	
(i)	Clear float glass, non-wired or non-coloured throughout the mass, other than square or rectangular shape (including those with one, two, three or four corners cut)	MS 1135
(ii)	Tinted float glass, coloured throughout the mass (body tinted), opacified, flashed or merely surface ground, other than optical glass	MS 1135
(b)	Coated glass	MS 2397
(c)	Safety glass	MS 1498
(d)	Wired glass	MS 2676

Examples of Standards and Guidelines - Glass

MS 1135	MS 2397	MS 1498	MS 2676	DMS 2753
Float glass specification	Coated glass specification	Safety glass specification	Wired glass specification	Glass selection and structural design
Float glass types/shapes	Coating specs only	Tempered & laminated glass	Embedded wired glass	All key glass design considerations

Overview of DMS 2537 - Use of Glass in Buildings – COP

Purposes

Provides comprehensive guidelines for the design, construction, testing, quality assurance, and installation of glass structures or elements in buildings.

Design Considerations

In the Code, the limit state design principle is adopted for structures using glass with the aim to achieve the following:

Overall Stability and Buckling Resistance	Ensure stability and resistance to buckling under design loads.
Strength Against Collapse	Prevent collapse under design loads and deformations of supporting structures.
Integrity and Robustness	Maintain integrity and robustness to prevent progressive collapse under design loads.
Serviceability	Ensure glass structures remain serviceable under design loads and deformations.
Water and Air Tightness	Guarantee watertight and airtight performance.
Durability	Provide long-lasting performance.
Quality	Maintain high-quality standards in glass production and installation.
Maintainability	Ensure ease of maintenance throughout the design working life.

Overview of DMS 2537 - Use of Glass in Buildings – COP

Design References – Examples:

Reference	Title	Country
AS1288:2006	Glass in Buildings - Selection and Installation	Australia
AS3740:2010	Waterproofing of Domestic Wet Areas	Australia
BS6262:2014	Glazing for Buildings (Part 1 and Part 4)	UK
BS EN14179-1:2016	Glass in Building - Heat Soaked Thermally Toughened Soda Lime Silicate Safety Glass (Part 1)	EU
BS 476-22	Fire Tests on Building Materials and Structures (Part 22)	UK
ISO 9050	Glass in Building - Determination of Light Transmittance, Solar Direct Transmittance, Total Solar Energy Transmittance and Ultraviolet Transmittance	International
Building Department, Hong Kong	Code of Practice for Structural Use of Glass (2018)	Hong Kong
JGJ 113-2015	Technical Specification for Application of Architectural Glass	China
CCPS (India)	Guidelines on Use of Glass in Buildings - Human Safety	India

Overview of DMS 2537 - Use of Glass in Buildings – COP

Normative References – Examples:

Normative references are important documents needed to use the main standard properly. They provide the rules and guidelines that help ensure the standard is followed correctly and consistently

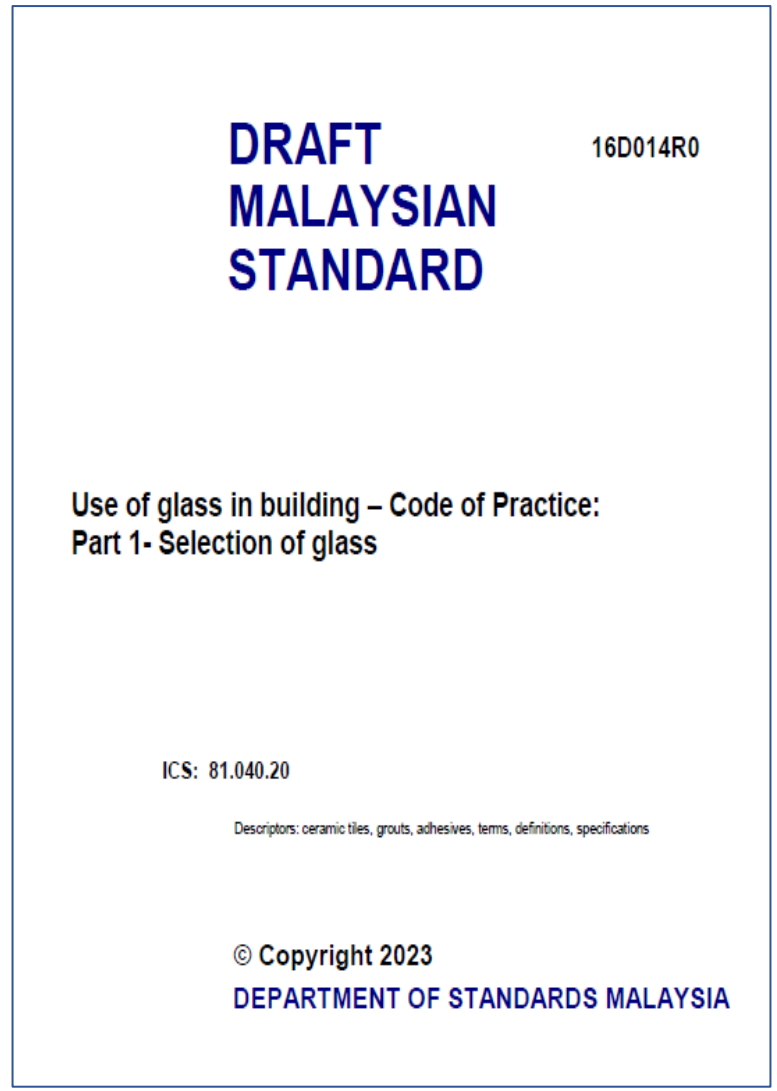
Source	Title
MS 1135	Float Glass – Specification
MS 2753-1:2023	Code of Practice for Use of Glass in Buildings - Part 1: Selection of Glass
MS 1498	Safety Glass in Building – Specification
MS 2397	Coated Glass in Building – Specification
MS 2666	Glass in Buildings - Insulating Glass Unit (IGU) - Performance and Evaluation
MS 2676	Wired Glass – Specification
MS 1057	Specification for Adjustable Louvre Windows
MS 1553	Code of Practice on Wind Loading for Building Structure
MS 1525	Energy Efficiency and Use of Renewable Energy for Non-Residential Buildings - Code of Practice
MS EN 1991-1-4	Eurocode 1: Actions on Structures - Part 1-4: General Actions - Wind Actions

Overview of DMS 2537 - Use of Glass in Buildings – COP

Key Content – Part 1

Types of Glass Usages	Glass Fixing Methods	Glass Installations
▪ Facades ▪ Windows ▪ Doors ▪ Partitions ▪ Balustrade ▪ Roofs, etc	▪ Mechanical fixing ▪ Structural silicone glazing ▪ Point-supported glazing methods, etc	▪ Installation techniques, ▪ Edge clearance, ▪ Setting blocks, ▪ Glazing gaskets, etc

Key Aspects of DMS2537 (Part 1)



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16D014R0

Use of glass in building – Code of Practice:
Part 1- Selection of glass

ICS: 81.040.20

Descriptors: ceramic tiles, grouts, adhesives, terms, definitions, specifications

DEPARTMENT OF STANDARDS MALAYSIA

Key Aspects of DMS2537 (Part 1)

1) Types of Glass and Their Applications

4.2 Glass Types

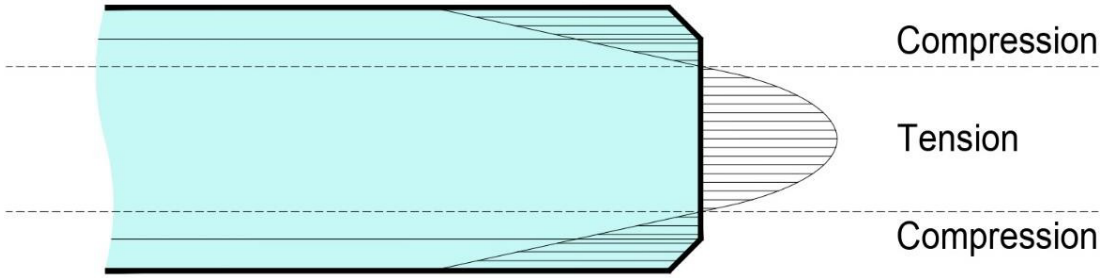
***Annealed glass**, also known sheet, plate, float or rolled glass that is processed to allow residual internal stresses to be relaxed so that it can be freely cut...*

***Heat strengthened glass** is produced from annealed glass by first cutting to shape and put under a thermal cycle...*

***Tempered glass**, also known as "fully tempered" or "thermally toughened" glass, is produced in the same way as heat strengthened glass, except that it is quenched more rapidly...*

4.3 Glass Assembly

***Laminated glass** is formed by two or more glass panes bonded by means of an interlayer....*



Stress Profile in Tempered Glass

Understanding different glass types and their properties helps in selecting the right material for specific uses.

Key Aspects of DMS2537 – Part 1

2) Safety Considerations

6 Criteria for Human Impact Safety

Where any glazing is within 2000 mm above the ground level of all buildings it is considered likely to be subjected to human impact and, hence, shall comply with the human impact safety requirements of this clause....

*"**Glass** is a **brittle** material. The application of this clause requiring the use of either **safety glass or thicker annealed glass** will **reduce the risk** of injury from human impact. However, this does not assume that the glass will not be broken under all human impact conditions, but rather **it will not be broken under the most likely forms of human impact**. When broken, the likelihood of **cutting or piercing injuries will be minimized** by virtue of the **protection given to the glass**, or by the **limited size or increased thickness**, or by the **fracture characteristics of the glass**...."*

- **Glass is brittle.**
- **Safety glass or thicker annealed glass reduces injury risk.**
- **Glass may not withstand all impacts but handles common human impacts.**
- **Breakage aims to minimize cutting or piercing injuries.**
- **Achieved through protection, thickness, and fracture characteristics**

Ensuring glass installations meet safety standards, focusing on impact and fire resistance.

Key Aspects of DMS2537 (Part 1)

2) Safety Considerations (Cont'd)

6.2 Doors

Glazing in doors shall be Class 1 – Safety glass that complies with the maximum areas of safety glazing as set out in Table 6.1.

6.3 Side Panels

Glazing in side panels, with the nearest vertical sightlines less than 300 mm from the nearest edge of the doorway opening shall be glazed in accordance with...

6.8 Bathroom, Ensuite and Spa Room Glazing

Glazing, including mirrors, within 2000 mm above the floor level in bathrooms, ensuites, and rooms or enclosures containing bath tub or spa pools shall be Class 1 safety glass or Class 2 safety glass in accordance with...

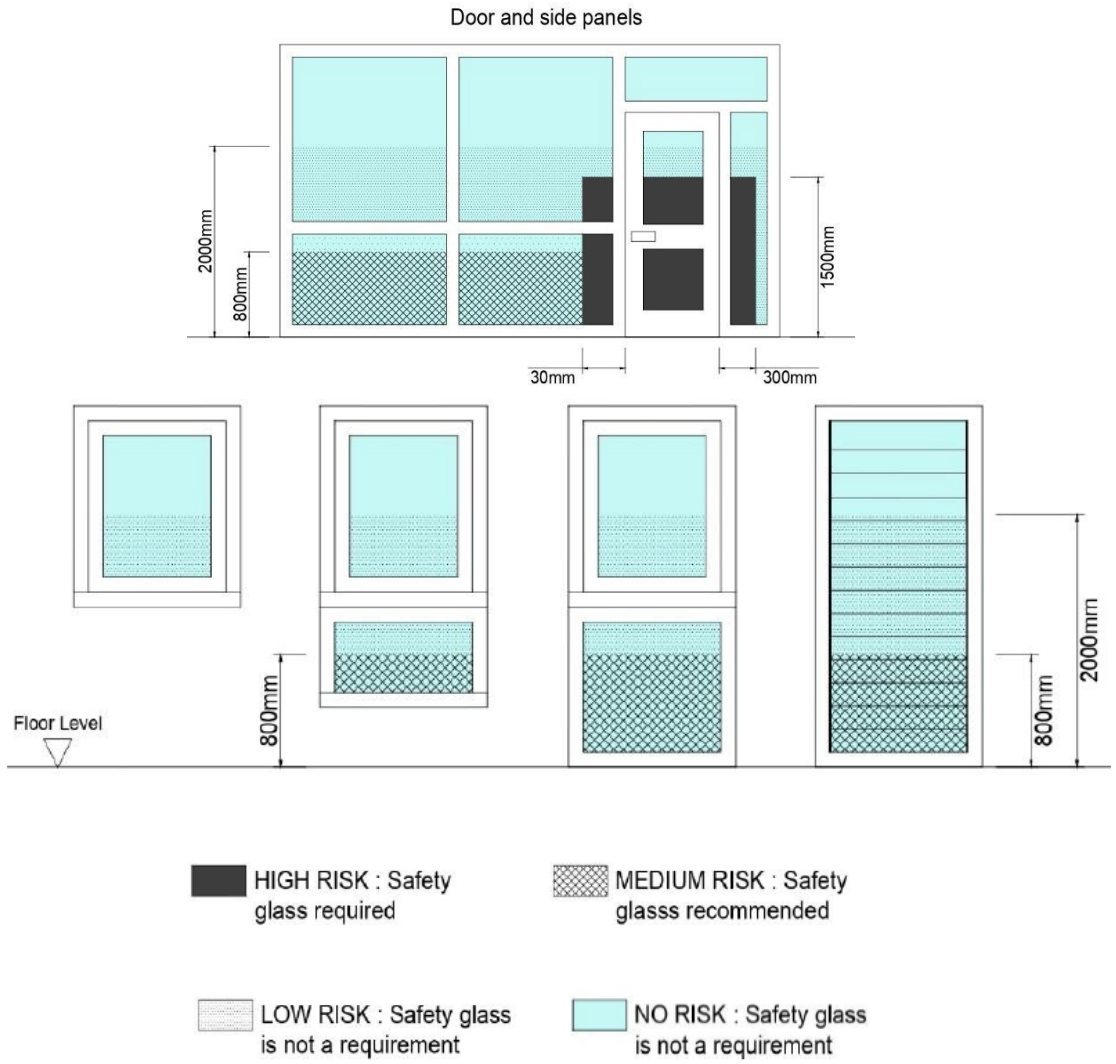


Figure 6.1. Critical locations

Key Aspects of DMS2537 (Part 1)

3) Selection Criteria

4.4 Strength of glass

The strength of glass varies greatly depending on the particular heating and cooling cycle(s) (heat treatment) that are applied in its production resulting in different types of glass. The types of glass commonly used for construction are outlined in clause....

5.1 Energy

Glazed areas in buildings should be designed so that account is taken of the overall energy balance...

5.2 Light

5.3 Sound

Noise, i.e. unwanted sound, can be attenuated by employing thick glazing, insulating units, secondary glazing, laminated glass...

Table 4.2. Ultimate design strength (p_y) for different glass types under short-term load duration

Type of glass	Ultimate design strength (p_y) under short-term load duration (MPa)
Annealed	20
Heat strengthened	40
Tempered	80

Table 4.3. Strength reduction factor (γ_d) applied to p_y for different load durations and glass types

Type of glass	Strength reduction factor (γ_d)		
	Short-term load duration	Medium-term load duration	Long-term load duration
Annealed	1.00	0.53	0.29
Heat strengthened	1.00	0.73	0.53
Tempered	1.00	0.81	0.66

Guidelines for choosing the right type of glass based on project-specific requirements.

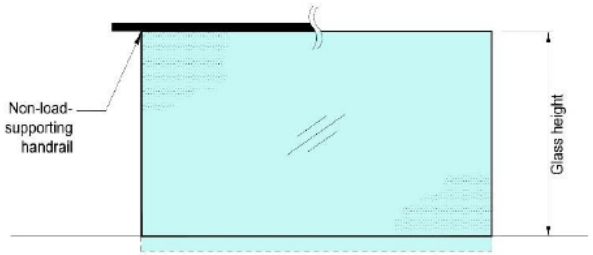
Application of the COP - Example

Designing Glass Balustrade

Step	Action	Details	Clauses (Draft)
1	**Identify Classification**	Determine if the glass balustrade is a structural panel or an infill panel.	Clause 9.1
2	**Determine Load Requirements**	Identify the types of loads, including live loads, wind loads, and accidental loads.	Clause 9.2.1 and 9.2.2
3	**Select Appropriate Glass Type**	Select Class 1 safety glass for the balustrade.	Clause 9.3.1
4	**Calculate Nominal Thickness**	Determine the standard nominal thickness of the glass based on the specific situation.	Clause 9.3.2 and Table 9.1,
5	**Design Handrails**	Classify handrails as load-supporting or non-load-supporting, and design accordingly.	Clause 9.2.3
6	**Ensure Compliance with Standards**	Verify compliance with relevant standards for stability, strength, and serviceability.	MS EN 1991-1-1 and MS 1553, referenced in Clause 9.2.1
7	**Review Safety Requirements**	Ensure all safety requirements, including impact resistance and fire safety, are met.	Clause 6

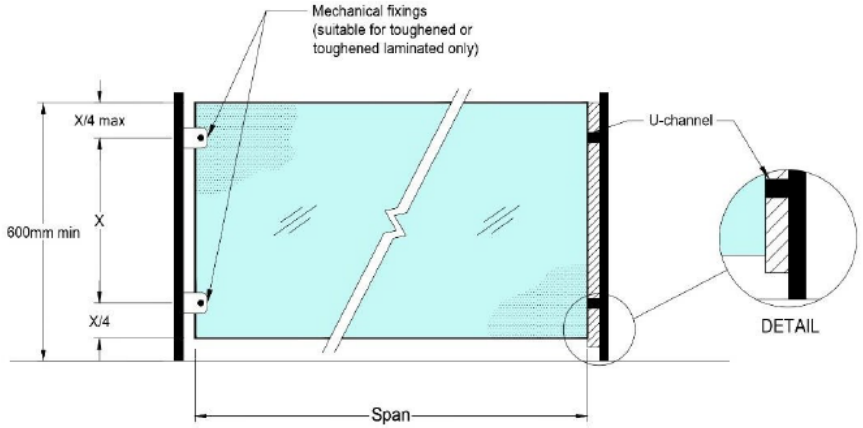
Application of the COP - Example

Designing Glass Balustrade



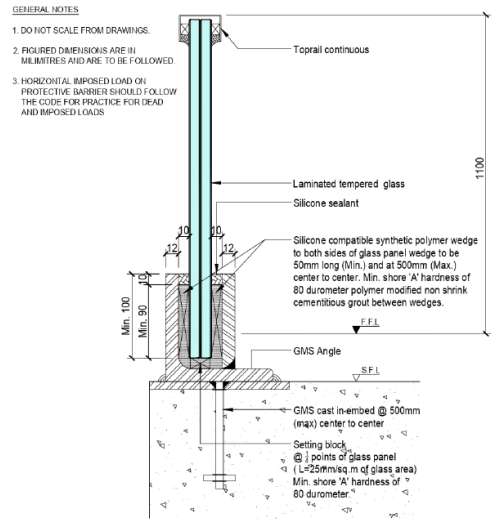
This requires the bottom of the panels to be fully and rigidly fixed for the full length of the panel, usually into a grouted channel. Mechanical fixing method is not covered under this clause.

Figure 9.1. Structural balustrades - Cantilevered glass protecting a difference in level



The glazing panels are supported in a channel or by fixings to vertical posts at each side

Figure 9.2. Structural balustrades - Two-edges support



TYPICAL CLAMPING DETAIL FOR FREE STANDING GLASS PROTECTIVE BARRIER

Table 6.1 Maximum areas of safety glass

Class	Type of glazing	Nominal thickness (mm)	Maximum area (m^2)
Class 1 safety glass*	Tempered glass	4	2.2
		5	3
		6	4
		8	6
		10	8
		12	10
		> 12	Extrapolate
	Tempered laminated glass	8	6
		10	8
		12	10
		> 12	Extrapolate
	Laminated Glass*	6	3
		8	5
		10	7
		12	9
		> 12	Extrapolate
	Heatstrengthened laminated glass*	6	3
		8	5
		10	7
		12	9
		> 12	Extrapolate

Table 9.1 Structural balustrade - Cantilevered glass

Design load (kN/m)	Maximum glass height for tempered laminated glass (mm)			
	10	12	16	20
0.35	1 070	1 320	1 750	2 210
0.75	820	1 020	1 360	1 710
1.50	460	630	1 040	1 360
3.00	230	310	520	780
0.60kN*	640	1 020	1 490	2 060

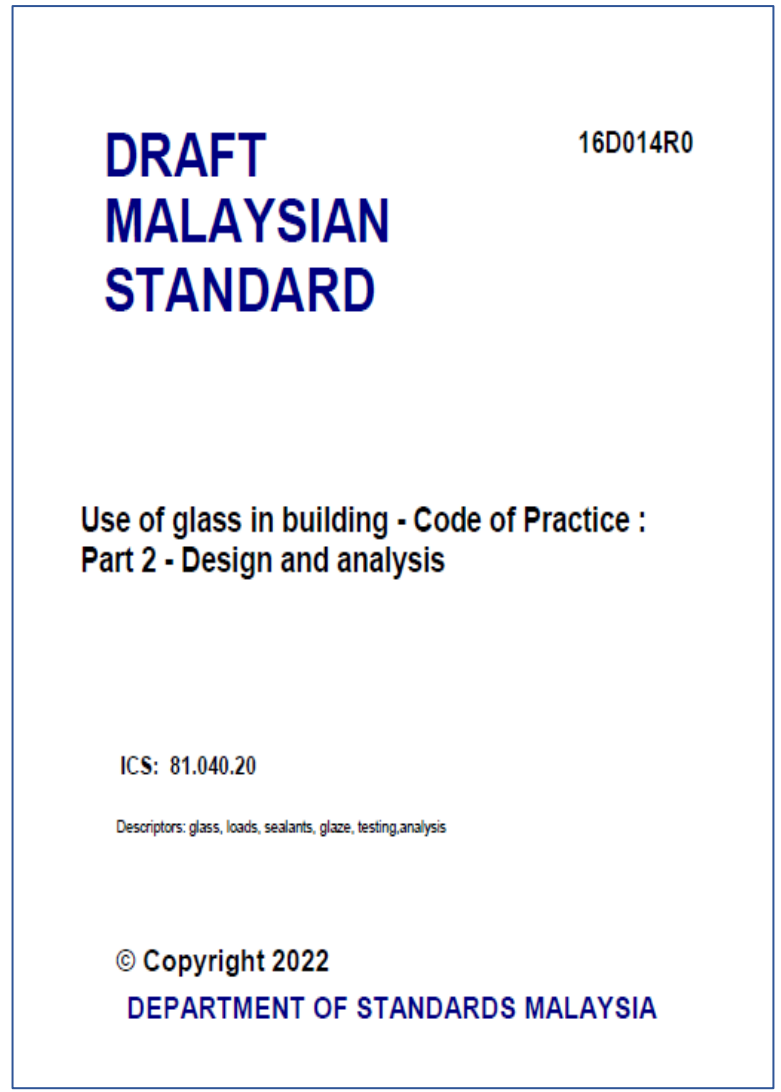
* Point load

Application of the COP - Example

Designing Glass Window

Step	Action	Details	Clauses (Draft)
1	**Identify Glazing Type**	Determine if single, laminated, or insulating glass is appropriate for the window.	Clause 3.19, 3.20
2	**Consider Design Requirements**	Review design considerations including stability, strength, integrity, and serviceability.	Clause 1.1
3	**Evaluate Environmental Factors**	Assess environmental impacts such as wind loads and temperature variations.	Clause 7.5.3
4	**Determine Safety Requirements**	Ensure compliance with safety standards for impact resistance and fire safety.	Clause 6
5	**Calculate Glass Thickness**	Determine the appropriate glass thickness based on load and deflection criteria.	Clause 6.4
6	**Select Appropriate Glass Type**	Choose between annealed, heat-strengthened, tempered, or laminated glass.	Clause 4.2
7	**Review Installation Requirements**	Ensure proper installation methods including edge clearance, cover, and rebates.	Clause 10

Key Aspects of DMS2537 (Part 2)



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Use of glass in building - Code of Practice :
Part 2 - Design and analysis

ICS: 81.040.20

Descriptors: glass, loads, sealants, glaze, testing,analysis

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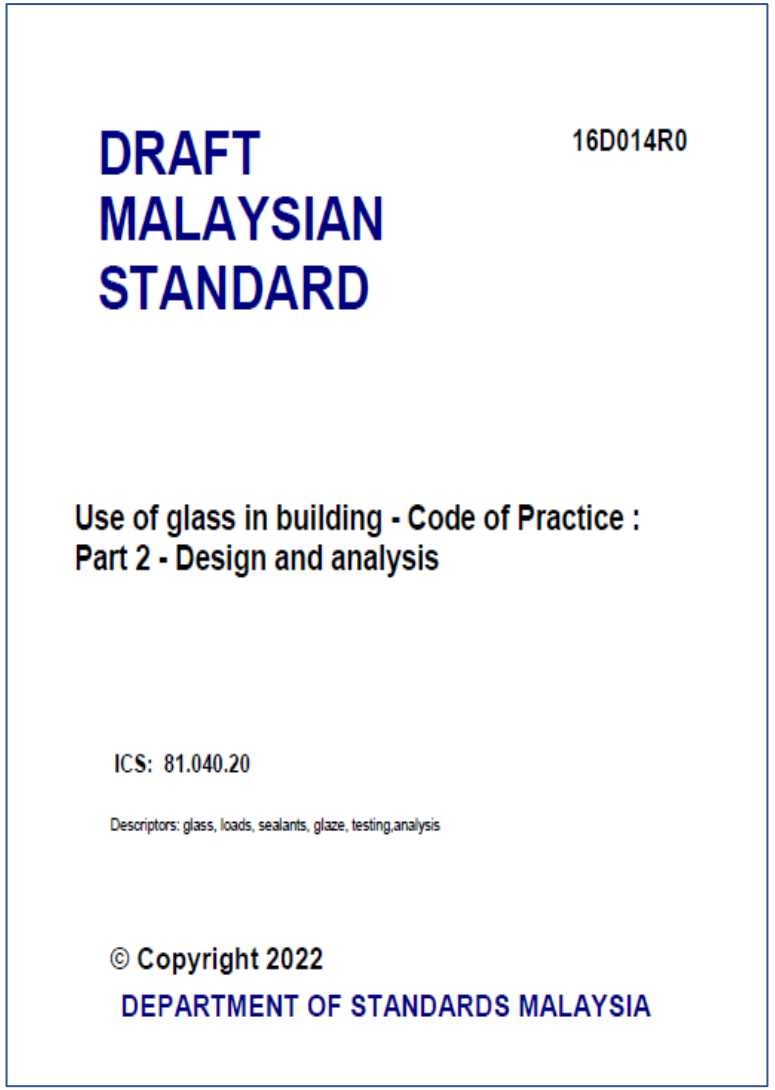
Key Aspects of DMS2537 (Part 2)

Key Content – Part 2 – Design & Analysis

Key Content	Subject
Limit State Design	Principles and criteria for limit state design.
Loads	Types and calculations of loads considered in design.
Analysis and Design of Glass Pane	Methods for analyzing and designing glass panes.
Design for Glass Connection	Guidelines for designing connections for glass elements.
Testing and Measurement	Procedures for testing and measuring performance.
Quality Assurance	Ensuring quality and consistency in glass products.
Limit State Design	Principles and criteria for limit state design.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Key Aspects of DMS2537 (Part 2)

Key Content – Part 2 – Design & Analysis

4.1 Limit State Design

The limit state design considers the functional limits of strength, stability and serviceability of both structural elements and the structure as a whole

5 Loads

All relevant loads should be considered separately and in such realistic combinations as to give the most critical effects on the structural elements and the structure as a whole ...

8.1 Glass

For compliance purpose, the glass shall comply with the below standards:

Table 8.1. Glass type compliance requirements

TYPE OF GLASS	RELATED STANDARD
Float Glass	MS 1135
Coated Glass	MS 2397
Safety Glass	MS 1498
Wired Glass	MS 2676
Insulated Glass Unit (IGU)	MS 2666
Heat Soak	BS EN 14179-1 and BS EN 14179-2
Fire Rated Glass	BS 476 Part 22

6.3.3 Analysis of laminated glass

Generally, laminated glass should be analysed and designed without the composite action, and the individual glass panes is to resist load shared in accordance with the stiffness of the individual panes.

The strength and stiffness of each individual glass pane shall be checked where the proportion of the total load to be resisted by each pane is k_{pane}.

$$K_{pane} = \frac{t_{pane}^3}{\Sigma_i t_i^3} \quad (6.1)$$

6.3.4 Analysis of IGU

The load sharing between the panes of an IGU can be determined by their relative stiffness. However, such assumption is not valid for glass panes separated by deep cavities. Deep cavities mean the air gap is greater than the sum of the thicknesses of the glass panes. Since the IGU is sealed, it is affected by temperature changes and atmospheric pressure changes. The loads on each glass pane of the IGU have to be increased by 25 % to account for the effects due to temperature changes and atmospheric pressure changes.

The strength and stiffness of each individual glass pane shall be checked where the proportion of the total load to be resisted by each pane is k_{pane}.

$$K_{pane} = \frac{1.25 \times t_{pane}^3}{\Sigma_i t_i^3} \quad (6.3)$$

6.4 Ultimate limit state design

Ultimate design loads Q_{ult} are obtained by multiplying the characteristic loads Q_{char} by a partial load factor (γ_f):

$$Q_{ult} = \gamma_f Q_{char} \quad (6.4)$$

Design load effects S_{ult} are obtained from the ultimate design loads

$$S_{ult} = f(\text{effects of } Q_{ult}) \quad (6.5)$$

Key Aspects of DMS2537 (Part 2)

LOAD CALCULATIONS AND STRUCTURAL ANALYSIS	SAFETY REQUIREMENTS	QUALITY ASSURANCE AND TESTING
Dead loads Live loads Wind loads Thermal loads	Impact and fire resistance Safety glass in hazard zones	Defect-free Installation
Safety and durability	**Protection for occupants and property**	**Reliability and standards compliance**

MS2753 – What's Next?

Status

1) NEW PROJECT - PROPOSAL (YEAR 2018)

2) NEW PROJECT - APPROVED

3) FUNDING - APPROVED

4) DRAFTING – WORKING GROUP

5) PUBLIC COMMENT (60D)
1-AUG ~ 30-SEP 2024

4A) RE-DRAFT – COMMENTS
TARGET : JUN 2025

5A) PUBLIC COMMENT (30D)
TARGET : AUG 2025

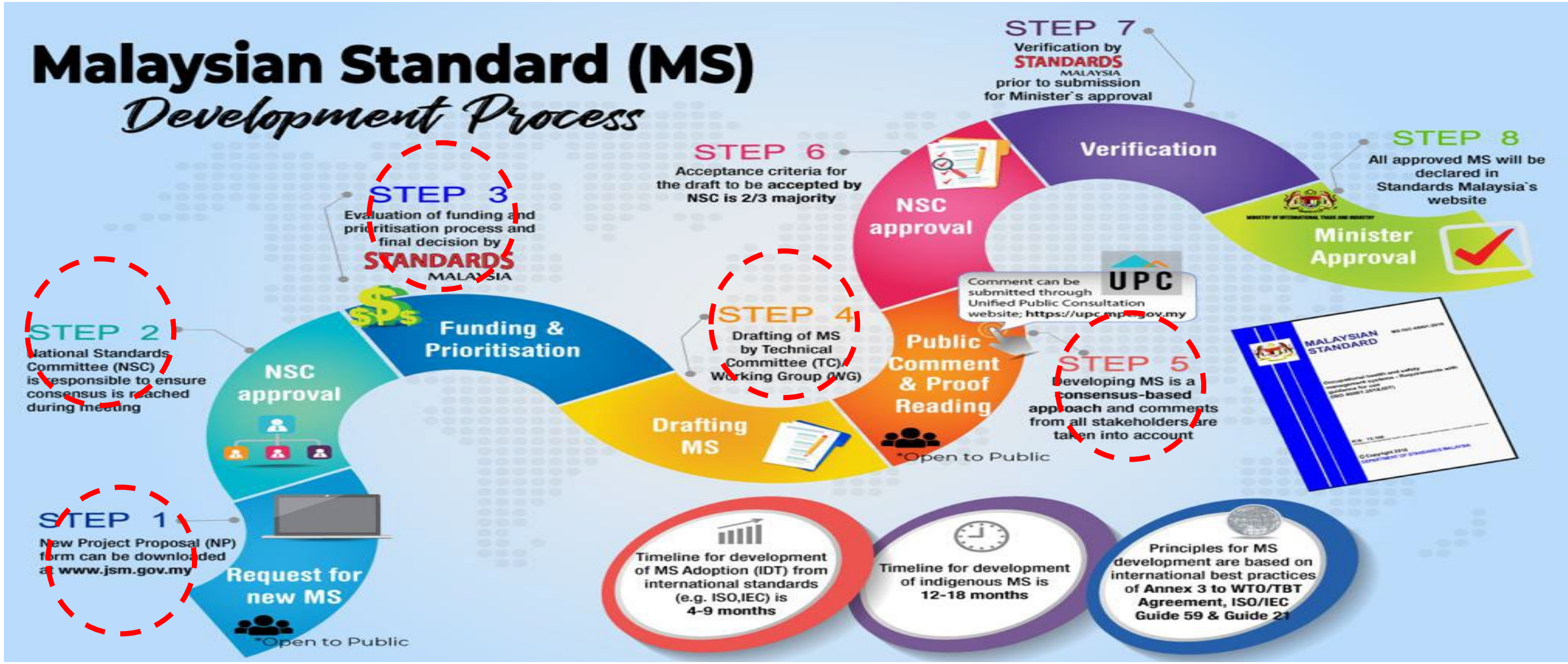
6) NSC APPROVAL
TARGET : SEPT 2025

7) MINISTRY APPROVAL
TARGET : OCT 2025

8) PUBLICATION
TARGET : OCT 2025

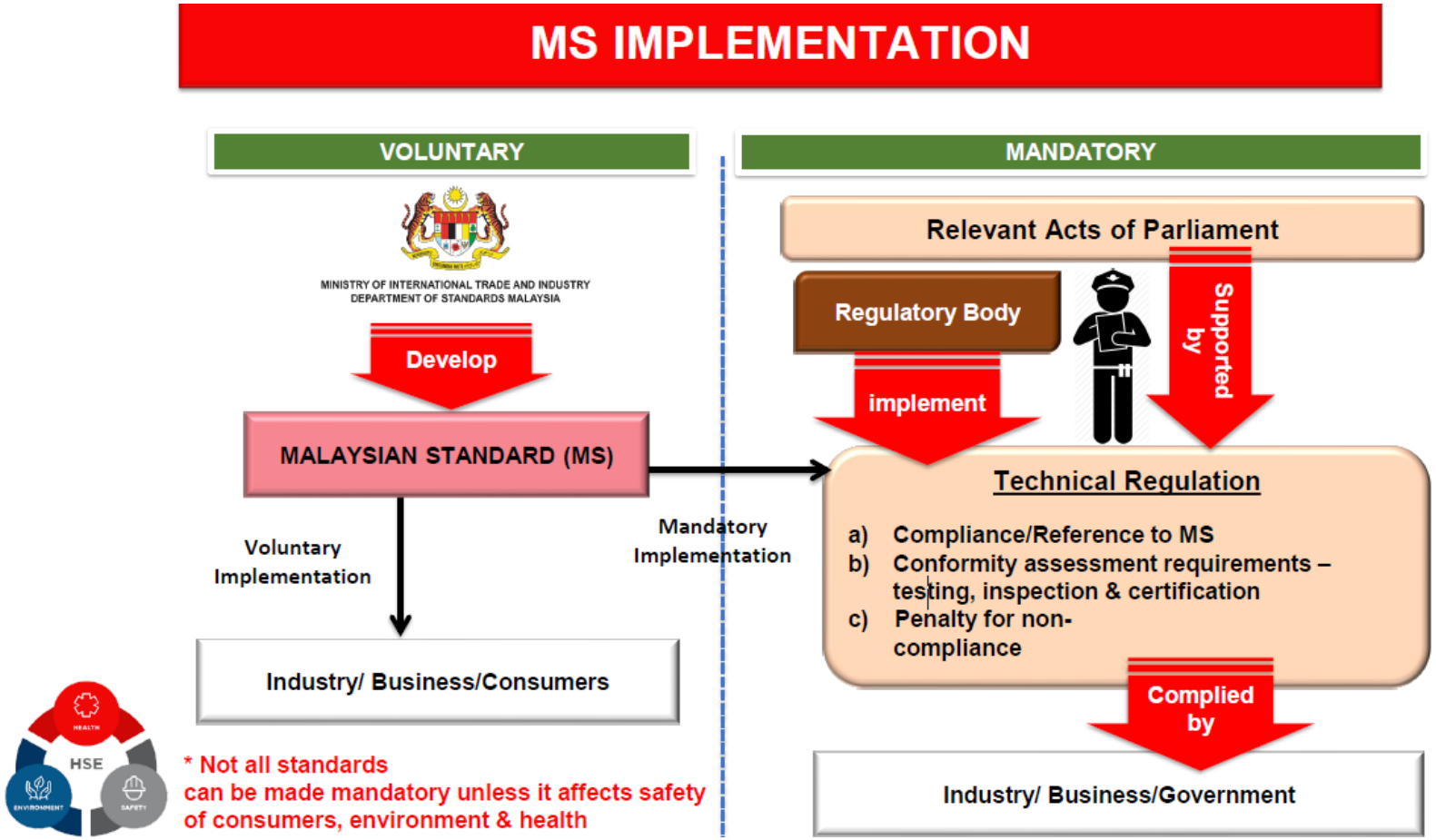
MS2753 – What's Next?

Progress



MS2753 – What's Next?

Will this New MS be Mandatory?



Source : Bengkel Halatuju NSC 04 (Mar 2024)

MS2753 – What's Next?

How Architect & Designer Can Use the New COP?

Guideline for Glass Selection	**Use criteria** for selecting appropriate glass types based on project requirements.
Design and Analysis	**Follow procedures** for load calculations and structural analysis.
Safety Compliance	Ensure **installations comply with safety standards** for impact resistance and fire performance.
Quality Assurance	Implement **testing procedures** to verify performance and reliability.
Documentation	Maintain **documentation** to demonstrate compliance with MS2753.

Benefits of Using the COP

Enhanced Safety	**High level of safety** for building occupants, reducing risks of injuries and accidents.
Improved Performance	Ensure glass strength, durability, and thermal efficiency, contributing to overall building effectiveness.
Regulatory Compliance	**Meet national and international regulations**, facilitating project approvals and inspections.
Cost Efficiency	**Reduce costly errors and rework**, ensuring projects are completed on time and within budget.
Professional Reputation	**Demonstrate commitment** to quality and safety, enhancing professional reputation. /E

THANK YOU