Legal and Regulatory Frameworks of 195 Countries around the World with Provisions related to Wind-Resistant Design of Buildings Part 1. Africa, Americas and Asia

Akira HAYAKAWA*¹ Masahiro MATSUI*² Yukio TAMURA*³

1. Introduction

Laws and regulations and their supplemental documents related to wind-resistant design of buildings for 195 countries have been collected, surveyed and screened to compile the worldwide picture on the establishment of a legal and regulatory framework related to wind-resistant design of buildings. This article gives an overview of the legal and regulatory frameworks for 137 countries of Africa, the Americas and Asia.

The findings of this study are posted on the website (URL: <https://werc.t-kougei.ac.jp/TPUdatabase.html>) of the Wind Engineering Research Center, Tokyo Polytechnic University, and will be updated regularly.

2. Study Policy and Source

2.1 Study policy

Laws and regulations and their supplemental documents related to wind-resistant design of buildings for a total of 195 countries, 193 of which are member states of the United Nations (UN) and 2 of which are observer states at the UN General Assembly, were targeted in this study. Among inhabited territories, Western Sahara, where sovereignty has not yet been determined, was untargeted in this study.

For each country, desk research for this collected information was carried out down to two levels of legal and regulatory system hierarchies from the national (first) level to the state or provincial (second) level. Overseas territories are included in the second level. However, if no law or regulation

was identified even at the first and second levels, laws and regulations and their supplemental documents at the city (third) level were targeted only if the city was a political or economic center.

2.2 Study source

Online libraries of laws and regulations, official gazettes and study reports powered by national or international agencies were the main study sources. Codes, standards, guidelines and manuals developed by various authorities and institutions such as governmental agencies and academic or professional bodies were also targeted. Documents on administrative guidance and from technical consultations with authorities, project-related specification documents of public works, academic writings of every kind, and internet articles including Facebook posts were referenced as well. Furthermore, questionnaires and email interviews were conducted with related parties including consultants, researchers and officials if required.

3. Legal and regulatory frameworks

Legal and regulatory frameworks including provisions regarding wind-resistant design of buildings were identified in 89 of the 137 countries of Africa, the Americas and Asia. These 89 countries are shown by check marks “✓” in Table 1, and their breakdown is shown for each region and subregion in Table 2. The numerical value in parentheses in these tables shows the number of countries that lie within each region and subregion. The divisions of region and subregion follow in principle the

*1 Senior Engineer, EHS & S Research Center, NTT Facilities, Inc. akira.hayakawa.bv@ntt-f.co.jp

*2 Professor, Faculty of Engineering, Tokyo Polytechnic University

*3 Professor, School of Civil Engineering, Chongqing University

United Nations geoscheme¹⁾.

The legal and regulatory frameworks for 89 countries are summarized into 3 regions: 4. Africa, 5. Americas and 6. Asia. The numbers of countries in each region are 24, 28 and 37, respectively. Furthermore, each region is organized into subregions. There are 5 subregions in Africa: 4.1 Eastern Africa, 4.2 Central Africa, 4.3 Northern Africa, 4.4 Southern Africa and 4.5 West Africa. The numbers of countries in each subregion are 9, 1, 3, 5 and 6, respectively. There are 4 subregions in the Americas: 5.1 Caribbean, 5.2 Central America, 5.3 Northern America and 5.4 South America. The numbers of countries in each subregion are 8, 8, 2 and 10, respectively. There are 5 subregions in Asia: 6.1 Central Asia, 6.2 Eastern Asia, 6.3 South-eastern Asia, 6.4 Southern Asia and 6.5 Western Asia. The numbers of countries in each subregion are 5, 4, 7, 7 and 14, respectively.

An outline of the legal and regulatory framework is given for each country. However, if the legal and regulatory framework is identified in a superordinate legislative jurisdiction, it is not described in the subordinate legislative jurisdiction. Additionally, if the legal and regulatory framework is identified in many second and third legislative jurisdictions, it is described for only main states or provinces, overseas territories and political or economic center cities.

The document code here is unique for this study and not always the same as the official document code. For example, because the European Union (EU) standard²⁾: Eurocode 1: Actions on structures - Part 1-4: General actions - Wind actions was published after it was translated into each mother tongue and newly numbered as a national standard of each country with its content and style unchanged, the newly numbered standards by country are represented by EN'05 to simplify the notation in sentences as well as the citation of references in this study.

Table 1. List of countries in which the legal and regulatory framework was identified

Africa (54)		Algeria	✓	Antigua and Barbuda	✓	Colombia	✓	Timor-Leste	-
Eastern Africa (18)		Egypt	✓	Bahamas	✓	Ecuador	✓	Vietnam	✓
Burundi	-	Libya	-	Barbados	-	Guyana	-	Southern Asia (9)	
Comoros	-	Morocco	✓	Cuba	✓	Paraguay	✓	Afghanistan	-
Djibouti	-	Sudan	-	Dominica	✓	Peru	✓	Bangladesh	✓
Eritrea	-	Tunisia	-	Dominican Republic	-	Suriname	✓	Bhutan	✓
Ethiopia	✓	Southern Africa (5)		Grenada	✓	Uruguay	-	India	✓
Kenya	-	Botswana	✓	Haiti	-	Venezuela	✓	Iran	✓
Madagascar	✓	Eswatini	✓	Jamaica	✓	Asia (48)		Maldives	✓
Malawi	✓	Lesotho	✓	St. Kitts and Nevis	✓	Central Asia (5)		Nepal	✓
Mauritius	-	Namibia	✓	St. Lucia	-	Kazakhstan	✓	Pakistan	✓
Mozambique	✓	South Africa	✓	St. Vincent and the Grenadines	✓	Kyrgyzstan	✓	Sri Lanka	-
Rwanda	✓	Western Africa (16)		Tajikistan	✓	Western Asia (18)			
Seychelles	✓	Benin	-	Trinidad and Tobago	-	Turkmenistan	✓	Armenia	✓
Somalia	-	Burkina Faso	-	Central America (8)		Uzbekistan	✓	Azerbaijan	✓
South Sudan	-	Cabo Verde	✓	Belize	✓	Eastern Asia (5)		Bahrain	-
Tanzania	✓	Cote d'Ivoire	✓	Costa Rica	✓	China	✓	Cyprus	✓
Uganda	✓	Gambia	-	El Salvador	✓	Japan	✓	Georgia	✓
Zambia	-	Ghana	✓	Guatemala	✓	Mongolia	✓	Iraq	✓
Zimbabwe	✓	Guinea-Bissau	-	Honduras	✓	North Korea	-	Israel	✓
Middle Africa (9)		Guinea-Conakry	-	Mexico	✓	South Korea	✓	Jordan	✓
Angola	✓	Liberia	-	Nicaragua	✓	South-eastern Asia (11)		Kuwait	-
Cameroon	-	Mali	-	Panama	✓	Brunei	✓	Lebanon	✓
Central African Republic	-	Mauritania	✓	Northern America (2)		Cambodia	-	Oman	-
Chad	-	Niger	-	Canada	✓	Indonesia	✓	Palestine	✓
Congo-Brazzaville	-	Nigeria	✓	United States	✓	Laos	-	Qatar	✓
Congo-Kinshasa	-	Senegal	✓	South America (12)		Malaysia	✓	Saudi Arabia	✓
Equatorial Guinea	-	Sierra Leone	-	Argentina	✓	Myanmar	-	Syria	✓
Gabon	-	Togo	-	Bolivia	✓	Philippines	✓	Turkey	✓
Sao Tome and Principe	-	Americas (35)		Brazil	✓	Singapore	✓	United Arab Emirates	✓
Northern Africa (6)		Caribbean (13)		Chile	✓	Thailand	✓	Yemen	-

The numerical value in parentheses shows the number of countries that lie within each region and subregion.

Table 2. Number of countries in which the legal and regulatory framework was identified

Region	Subregion	Number of countries
Africa (54)	Eastern Africa (18)	9
	Middle Africa (9)	1
	Northern Africa (6)	3
	Southern Africa (5)	5
	Western Africa (16)	6
Americas (35)	Caribbean (13)	8
	Central America (8)	8
	Northern America (2)	2
	South America (12)	10
Asia (48)	Central Asia (5)	5
	Eastern Asia (5)	4
	South-eastern Asia (11)	7
	Southern Asia (9)	7
	Western Asia (18)	14

The numerical value in parentheses shows the number of countries that lie within each region and subregion.

4. Africa

4.1 Eastern Africa

(1) Ethiopia

The national standard³⁾ is authorized as mandatory in accordance with the Standards Agency Establishment Council of Ministers Regulation⁴⁾.

(2) Madagascar

The Rules for Wind Resistant Constructions⁵⁾, which require compliance with the French (FR) reference document⁶⁾: NV 65'00, are enforced in accordance with the Wind Resistant Building Construction Regulations⁷⁾.

(3) Malawi

The Building Bylaws, which require buildings to withstand wind loads, are enforced in the center of commerce, Blantyre under the Local Government Act⁸⁾,⁹⁾ However, the national standard¹⁰⁾ is not mandatory in the Bylaws.

(4) Mozambique

The General Regulation of Urban Buildings¹¹⁾ requires consideration of wind actions on metal structures. In addition, the Portuguese (PT) ministerial ordinance¹²⁾, which was enacted to extend the PT ministerial regulation¹³⁾ to overseas territories at the time of the PT overseas territory, is still inherited.¹⁴⁾

(5) Rwanda

The Urban Planning and Building Regulations¹⁵⁾, which provide the Building Code¹⁶⁾, are enforced under the Urban Planning and Building Law¹⁷⁾. Compliance with the Code is established through the national standard¹⁸⁾.

(6) Seychelles

The Town and Country Planning Regulations¹⁹⁾, which

require compliance with the United Kingdom (UK) national standard²⁰⁾: BS CP3 CV2'72, are enacted under the Town and Country Planning Act²¹⁾.

(7) Tanzania

The Urban Planning Regulations²²⁾ are enforced under the Urban Planning Act²³⁾. Compliance with the Regulations is established through the Technical Guideline²⁴⁾, which accepts BS CP3 CV2'72.

(8) Uganda

The Building Control Regulations²⁵⁾, which require compliance with the Structural Design Guidelines²⁶⁾, are enforced under the Building Control Act²⁷⁾.

(9) Zimbabwe

The Building By-laws²⁸⁾ are enforced in the capital, Harare under the Urban Councils Act²⁹⁾. The By-laws adopt the Model Building By-laws³⁰⁾, which require compliance with the Central African standard³¹⁾.

4.2 Middle Africa

(1) Angola

The General Regulation of Urban Buildings³²⁾, which requires building walls to withstand winds, is enforced under the Land and Urban Planning Law³³⁾. However, the Regulation does not define any wind-resistant requirements. EN'05 is not mandatory.

4.3 Northern Africa

(1) Algeria

The Snow and Wind Regulations³⁴⁾ are enforced in accordance with the governmental decree³⁵⁾, which establishes the powers of the responsible minister.

(2) Egypt

The Code of Practice for Calculating Loads and Forces³⁶⁾ is enforced under the Law on Basis of Design and Conditions³⁷⁾.

(3) Morocco

The Aseismic Construction Regulations³⁸⁾, which require consideration of the most unfavorable conditions including wind effects, are enforced under the Law on Town Planning³⁹⁾. However, the Regulations do not define any wind-resistant requirements. The draft Construction Code⁴⁰⁾, which is supposed to require compliance with EN'05 with the draft national annex⁴¹⁾, is not officialized.

4.4 Southern Africa

(1) Botswana

The Building Control Regulations⁴²⁾, which accept BS CP3 CV2'72 and the ZA Standard Building Regulations⁴³⁾: SBR'70,

are enforced under the Building Control Act⁴⁴). The national standard⁴⁵) is not mandatory.

(2) Eswatini

The Standard Building Regulations⁴⁶), which require compliance with the ZA Standard Building Regulations⁴⁷): SBR'66, are enforced under the Building Act⁴⁸). Their revised editions⁴⁹)⁵⁰), which adopt the ZA national standard⁵¹): SANS 10160-3'18, have not yet superseded the Act and the Regulations.

(3) Lesotho

The Building Control Regulations⁵²), which require buildings to withstand winds, are enforced under the Building Control Act⁵³). However, the Regulations do not define any wind-resistant requirements.

(4) Namibia

The Building Regulations are enacted in at least 2 municipalities under the Local Authorities Act⁵⁴). Of these, the Building Regulations⁵⁵), which require consideration of wind forces, are enforced in the capital, Windhoek but do not define any wind-resistant requirements. On the other hand, the Building Regulations⁵⁶), which adopt SBR'70, are enforced in the largest commercial port, Walvis Bay, in accordance with section 14bis of the Standards Act⁵⁷).

(5) South Africa

The National Building Regulations⁵⁸), which require compliance with the national standard⁵¹): SANS 10160-3'18, are enforced under the National Building Regulations and Building Standards Act⁵⁹).

4.5 Western Africa

(1) Cabo Verde

The Technical Building Code⁶⁰), which requires building walls to withstand winds, is enforced under the General Regulation of Construction and Urban Housing⁶¹). The Code does not define any wind-resistant requirements but places top priority on compliance with PT regulations.

(2) Cote d'Ivoire

The Code of Construction and Housing⁶²) requires constructions to withstand strong winds. However, no relevant regulation is identified under the Code.

(3) Ghana

The National Building Regulations⁶³) under the Local Governance Act⁶⁴) and the Building Code⁶⁵) is accepted under the Land Use and Spatial Planning Act⁶⁶). The Regulations require compliance with the UK national standard⁶⁷): BS CP3 CV2'70.

(4) Mauritania

The General Construction Regulations⁶⁸), which require constructions to withstand extreme climatic loads, are enforced in accordance with the ministerial decree⁶⁹), which establishes the powers of the responsible minister. However, the Regulations do not define any wind-resistant requirements.

(5) Nigeria

The Building Control Regulation⁷⁰), which requires compliance with the National Building Code⁷¹), is enforced in metropolitan Lagos under the Urban and Regional Planning and Development Law⁷²). The national standard⁷³) is not mandatory.

(6) Senegal

The Construction Code (Regulatory part)⁷⁴), which requires constructions to withstand extreme climatic loads, is enforced under the Construction Code (Legislative part)⁷⁵). However, the national standard⁷⁶) is not located under the Codes.

5. Americas

5.1 Caribbean

(1) Antigua and Barbuda

The Land Development and Control Regulations⁷⁷) are enforced under the Physical Planning Act⁷⁸). Compliance with the Regulations is established through the Building Code⁷⁹), which accepts the Caribbean Building Code⁸⁰): CUBiC'85. The Organization of Eastern Caribbean States (OECS) Building Code⁸¹): OECS-BC'16, which accepts CUBiC'85, the draft Bajan (BD) national standard⁸²): BNS DPC'10, the United States (US) academic society standards⁸³)⁸⁴): ASCE 7'05 and ASCE 7'10, is not mandatory.

(2) Bahamas

The Building Code⁸⁵), which requires compliance with the US academic society standard⁸⁶): ASCE 7'88, is enforced under the Buildings Regulation Act⁸⁷).

(3) Cuba

The national standard for seismic effects⁸⁸), which requires consideration of the most unfavorable conditions including wind effects, is authorized as mandatory under the Decree-Law of Standardization and Quality⁸⁹). However, the national standard for wind effects⁹⁰) is not located under the Decree-Law.

(4) Dominica

The Physical Planning Act⁹¹) requires hurricane precautions for buildings. However, the draft Building Code⁹²), which requires compliance with CUBiC'85, is not officially located under the Act. OECS-BC'16 is not mandatory either.

(5) Grenada

The ministerial order⁹³⁾, which adopts the OECS Building Code⁹⁴⁾: OECS-BC'15, is enforced under the Physical Planning and Development Control Act⁹⁵⁾. OECS-BC'15 accepts CUBiC'85, BNS DPC'10, ASCE 7'05 and ASCE 7'10.

(6) Jamaica

The national standard⁹⁶⁾, which was developed for the adoption of the US model code⁹⁷⁾: IBC'12, is enforced as one of the National Building Codes under the Building Act⁹⁸⁾.

(7) St. Kitts and Nevis

The Building Regulations⁹⁹⁾, which require compliance with the BD professional society standard¹⁰⁰⁾: BNS CP 28'81, are enforced under the Development Control and Planning Act¹⁰¹⁾. OECS-BC'16 is not mandatory.

(8) St. Vincent and the Grenadines

The Building Regulations¹⁰²⁾, which require compliance with CUBiC'85, are enforced under the Town and Country Planning Act¹⁰³⁾. OECS-BC'16 is not mandatory.

5.2 Central America

(1) Belize

The Building Act¹⁰⁴⁾ requires hurricane precautions for buildings. However, no relevant regulation is identified under the Act.

(2) Costa Rica

The Construction Regulations¹⁰⁵⁾ are enforced under the Urban Planning Law¹⁰⁶⁾.

(3) El Salvador

The Regulations for Structural Safety of Buildings¹⁰⁷⁾, which require compliance with the professional society standard¹⁰⁸⁾, are enforced under the Urban Planning and Construction Law¹⁰⁹⁾.

(4) Guatemala

The Disaster Reduction Standard¹¹⁰⁾, which requires compliance with the academic society standard¹¹¹⁾, is enacted under the Law of the National Coordinator for Disaster Reduction¹¹²⁾.

(5) Honduras

The professional society standard¹¹³⁾ is adopted under the Construction Code¹¹⁴⁾.

(6) Mexico

Laws or regulations that define wind-resistant requirements for buildings are enforced in at least 6 of 32 states. Of these, the Complementary Technical Standards¹¹⁵⁾, which are provided in Mexico City¹¹⁶⁾, are also adopted in Baja California¹¹⁷⁾, Baja

California Sur¹¹⁸⁾, Oaxaca¹¹⁹⁾¹²⁰⁾ and Tamaulipas¹²¹⁾. The Building Regulations¹²²⁾ are enforced in Tabasco.

(7) Nicaragua

The Construction Regulations¹²³⁾ are enforced under the Law of Organization, Competence and Procedures of the Executive Power¹²⁴⁾.

(8) Panama

The Structural Design Regulations¹²⁵⁾, which require compliance with ASCE 7'05, are enforced under the Law by which the exercise of the engineering and architecture professions is regulated¹²⁶⁾.

5.3 Northern America

(1) Canada

Either or both of the 2010 and 2015 editions of the National Building Codes¹²⁷⁾¹²⁸⁾, which require each user's guide¹²⁹⁾¹³⁰⁾, are accepted in all provinces and territories under respective acts and regulations.¹³¹⁾

(2) United States

Any edition of the International Building Codes¹³²⁾⁹⁷⁾¹³³⁾¹³⁴⁾: IBC'03, IBC'12, IBC'15 or IBC'18, which requires any edition of the academic society standards¹³⁵⁾⁸⁴⁾¹³⁶⁾: ASCE 7'02, ASCE 7'10 or ASCE 7'16, is accepted in at least 43 states and the District of Columbia under respective acts and regulations.¹³⁷⁾ Furthermore, any one of the old and new editions is also adopted in 5 unincorporated territories. Of these, in American Samoa, the Uniform Building Code¹³⁸⁾, which requires compliance with the Uniform Building Code¹³⁹⁾: UBC'64, is enacted as a public law. In Guam and Northern Mariana Islands, the Building Code¹⁴⁰⁾ and the Building Safety Code Rules and Regulations¹⁴¹⁾, both of which require compliance with the International Building Code¹⁴²⁾: IBC'09, are regarded as a public law, respectively. IBC'09 requires ASCE 7'05. In the Virgin Islands, the Building Code¹⁴³⁾, which requires compliance with IBC'03 and any subsequent updates, is enforced as a public law. In Puerto Rico, the Building Code¹⁴⁴⁾, which was developed for the adoption of IBC'18, is enacted under the Law for the Reform of Permitting Process¹⁴⁵⁾.

5.4 South America

(1) Argentina

The National Safety Regulations for Civil Works¹⁴⁶⁾, which include the Regulation of Wind Action on Constructions¹⁴⁷⁾, are enforced in accordance with the presidential decree¹⁴⁸⁾, which establishes the powers of the responsible ministry.

(2) Bolivia

The Code of Urban Planning and Works¹⁴⁹, which accepts the municipal and national standards¹⁵⁰¹⁵¹, is made obligatory in metropolitan Santa Cruz de la Sierra under the Framework Law on Autonomy and Decentralization¹⁵².

(3) Brazil

The Simplified Works and Buildings Code¹⁵³, which requires compliance with national standards including the national standard for wind forces¹⁵⁴, is enforced to supplement the ordinary and complementary laws for metropolitan Rio de Janeiro¹⁵⁵¹⁵⁶.

(4) Chile

The General Ordinance of Urban Planning and Constructions¹⁵⁷, which requires design reviews through the withdrawn national standard¹⁵⁸, is enforced under the General Law of Urban Planning and Constructions¹⁵⁹. The current national standard¹⁶⁰ is not mandatory.

(5) Colombia

The Seismic Resistant Construction Regulations¹⁶¹, which also define wind forces, are enacted under the Law by which norms on Earthquake Resistant Constructions are adopted¹⁶².

(6) Ecuador

The ministerial agreement¹⁶³, which endorses the Construction Standard¹⁶⁴, is enforced in accordance with the Statute of Administrative Legal Regime of the Executive Function¹⁶⁵.

(7) Paraguay

The General Construction Regulations¹⁶⁶, which require compliance with national standards including the national standard for wind actions¹⁶⁷, are enforced in the capital, Asuncion under the Municipal Organic Law¹⁶⁸.

(8) Peru

The National Building Regulations¹⁶⁹ are enacted under the Law of Organization and Functions of the Ministry of Housing, Construction and Sanitation¹⁷⁰.

(9) Suriname

The Building Ordinance¹⁷¹ and Decree¹⁷², which were enacted at the time of the Dutch constituent country, have still been enforced.

(10) Venezuela

The national standard for seismic effects¹⁷³, which requires consideration of the national standard for wind effects¹⁷⁴, is made obligatory under the Organic Law of the National System for Quality¹⁷⁵.

6. Asia

6.1 Central Asia

(1) Kazakhstan

The list of normative documents¹⁷⁶, which includes EN'05 with the national annex¹⁷⁷, is promulgated under the Law on Architectural, Urban Planning and Construction Activities¹⁷⁸¹⁷⁹.

(2) Kyrgyzstan

The order from the responsible state agency¹⁸⁰, which endorses the Russian (RU) national standard¹⁸¹: SNiP 2.01.07'05, is promulgated under the Law on Technical Regulations "Safety of Buildings and Structures"¹⁸².

(3) Tajikistan

The governmental decree¹⁸³, which endorses SNiP 2.01.07'05, is promulgated for compliance with the Law on Technical Regulations¹⁸⁴.

(4) Turkmenistan

The Construction Norms¹⁸⁵, which include the ministerial standard¹⁸⁶, apply under the Law on Architectural Activity¹⁸⁷.

(5) Uzbekistan

The list of normative documents¹⁸⁸, which includes the national standard¹⁸⁹, is promulgated under the Law on Technical Regulations¹⁹⁰.

6.2 Eastern Asia

(1) China

The national standard¹⁹¹ is enforced as one of the compulsory standards under the Standardization Law¹⁹². At the same time, legislation is independently implemented in 2 special administrative regions. Of these, in Hong Kong, the Building (Construction) Regulations¹⁹³ are enforced under the Buildings Ordinance¹⁹⁴, and compliance with the Regulations is established through the Practice Notes¹⁹⁵, which accept the Code of Practice on Wind Effects¹⁹⁶. In Macau, the existing Regulations on Safety and Actions in Structures of Buildings and Bridges¹⁹⁷ have not yet been superseded by the revised edition¹⁹⁸. In Taiwan, the Building Technical Regulations¹⁹⁹, which require compliance with the Specifications for Wind Resistant Design of Buildings²⁰⁰, are enforced under the Building Act²⁰¹.

(2) Japan

The Building Standard Law Enforcement Order²⁰², which accepts two ministerial stipulations²⁰³²⁰⁴, is promulgated under the Building Standard Law²⁰⁵. The academic society standard²⁰⁶ is not mandatory.

(3) Mongolia

The Code on Loads and Reactions²⁰⁷ and the Climatic and

Geophysical Parameters for Construction²⁰⁸) become a part of the General System of Norms and Normative Documents for Construction²⁰⁹) under the Law on Construction²¹⁰). The national standard²¹¹) and EN'05 are not mandatory.

(4) South Korea

The Building Structural Standards Rules²¹²), which require compliance with the Building Structural Standards²¹³), are enacted under the Building Law²¹⁴).

6.3 South-eastern Asia

(1) Brunei

The Building Control Regulations²¹⁵) are enforced under the Building Control Order²¹⁶). Compliance with the Regulations is established through the Building Guidelines and Requirements²¹⁷), which accept BS CP3 CV2'72, the UK national standard²¹⁸); BS 6399.2'97 and EN'05 with the UK national annex²¹⁹).

(2) Indonesia

The Implementing Regulations²²⁰) are enforced under the Law on Buildings²²¹). Compliance with the Regulations is established through the Guidelines for Building Technical Requirements²²²), which accept the withdrawn national standard²²³). The current national standard²²⁴) is not mandatory.

(3) Malaysia

Ordinances or by-laws that define wind-resistant requirements for buildings are enforced in at least 5 of 16 states and federal territories under the Street, Drainage and Building Act²²⁵). Of these, the Uniform Building By-Laws²²⁶), which require compliance with BS CP3 CV2'72, are adopted in Johor²²⁷) and the Federal Territory of Kuala Lumpur²²⁸), and the Buildings Ordinance²²⁹), which requires compliance with BS 6399.2'97, is enforced in Sarawak. The Uniform Building By-Laws, which require compliance with the national standard²³⁰), are enforced in Melaka²³¹) and Selangor²³²). EN'05 is not mandatory.

(4) Philippines

The National Building Code²³³), which requires compliance with the professional society code²³⁴), is enforced in accordance with its Implementing Rules and Regulations²³⁵).

(5) Singapore

The Building Control Regulations²³⁶) are enforced under the Building Control Act²³⁷). Compliance with the Regulations is established through the Approved Document²³⁸), which accepts BS CP3 CV2'72, BS 6399.2'97 and EN'05 with the national annex²³⁹).

(6) Thailand

The ministerial regulations²⁴⁰) are enforced under the Building Control Act²⁴¹). The ministerial standard²⁴²) is not mandatory.

(7) Vietnam

The Building Code²⁴³), which requires compliance with the national standard²⁴⁴), and the National Technical Regulations²⁴⁵) are enacted in accordance with the governmental decree²⁴⁶), which establishes the functions and tasks of the responsible ministry. EN'05 is not mandatory.

6.4 Southern Asia

(1) Bangladesh

The National Building Code²⁴⁷) is enforced under the Building Construction Act²⁴⁸).

(2) Bhutan

The Building Regulation²⁴⁹) is enforced under the Local Government Act²⁵⁰). Compliance with the Regulation is established through the Building Code²⁵¹), which accepts the Indian national standard²⁵²); IS 875.3'87.

(3) India

Bye-laws or rules that define wind-resistant requirements for buildings are enacted in at least 8 of 36 states and union territories. Of these, the National Building Code²⁵³) and the national standard²⁵⁴); IS 875.3'15 are adopted in Andhra Pradesh²⁵⁵), Karnataka²⁵⁶), Maharashtra²⁵⁷), Tamil Nadu²⁵⁸), West Bengal²⁵⁹) and the National Capital Territory of Delhi²⁶⁰). The withdrawn National Building Code²⁶¹) and the withdrawn national standard²⁵²); IS 875.3'87 are still enforceable in Bihar²⁶²) and Jharkhand²⁶³).

(4) Iran

Compliance with the National Building Regulations²⁶⁴) is deemed to be equivalent to compliance with the Law on Engineering System and Building Control²⁶⁵). The national standard²⁶⁶) is not mandatory.

(5) Maldives

The National Building Code²⁶⁷), which requires buildings to withstand winds, is enforced under the Construction Act²⁶⁸). The draft Approved Document²⁶⁹), which accepts BS 6399.2'97, is not endorsed as mandatory for compliance with the Code.

(6) Nepal

The National Building Code²⁷⁰), which requires compliance with IS 875.3'87, is enforced under the Building Act²⁷¹).

(7) Pakistan

Regulations or bye-laws that accept one or more of the US

model codes, the UK national standards and the ministerial code²⁷²⁾ are enacted in at least 5 of 7 provinces, and autonomous and federal territories. For example, the UK national standard²⁷³⁾: BS CP3 CV'52 and the ministerial code are accepted in the Islamabad Capital Territory²⁷⁴⁾²⁷⁵⁾, and the US model codes or the UK national standards approved by the responsible authority are commonly accepted in Khyber Pakhtunkhwa²⁷⁶⁾ and Sindh²⁷⁷⁾. In Punjab, where multiple responsible authorities are established, the requirements of UBC'97, the US model code²⁷⁸⁾: IBC'06 and the ministerial code shall be met in metropolitan Lahore²⁷⁹⁾. In Azad Jammu and Kashmir, the ministerial code, UBC'97, IBC'03 and IBC'06 shall apply with proper engineering judgment.²⁸⁰⁾ IBC'06 requires ASCE 7'05.

6.5 Western Asia

(1) Armenia

The Normative Acts Regulations²⁸¹⁾, which require compliance with the RU national standard²⁸²⁾: SNiP 2.01.07'88, and the Construction Norms²⁸³⁾ are enforced under the Law on Urban Development²⁸⁴⁾.

(2) Azerbaijan

The list of normative documents²⁸⁵⁾, which includes the construction standard²⁸⁶⁾, is promulgated under the Urban Building and Construction Code²⁸⁷⁾.

(3) Cyprus

The Road and Building Regulations²⁸⁸⁾, which require compliance with EN'05 with the national annex²⁸⁹⁾, are enforced under the Road and Building Regulations Law²⁹⁰⁾.

(4) Georgia

The Construction Norms and Rules²⁹¹⁾, which require compliance with SNiP 2.01.07'88, and the Design Norms on Construction Climatology²⁹²⁾ are enforced under the Law on Normative Acts²⁹³⁾ and the Law on Construction Activities²⁹⁴⁾, respectively. EN'05 is not mandatory.

(5) Iraq

The Code of Loads and Forces²⁹⁵⁾ is enacted as one of the Building Codes under the Law on Central Organization for Standardization and Quality Control²⁹⁶⁾.

(6) Israel

The Planning and Building Regulations²⁹⁷⁾, which require compliance with the national standard²⁹⁸⁾, are enforced under the Planning and Building Law²⁹⁹⁾.

(7) Jordan

The National Building Code³⁰⁰⁾ are enacted in accordance

with the Instructions of Codes Application³⁰¹⁾ under the National Construction Law³⁰²⁾.

(8) Lebanon

The Public Safety Law³⁰³⁾, which accepts standards and specifications of EU countries, the US and Canada, is enforced under the Construction Law³⁰⁴⁾. The national standard³⁰⁵⁾ is not mandatory.

(9) Palestine

The Regulation on Multistory Buildings³⁰⁶⁾, which requires buildings to withstand winds, is enforced in the Gaza Strip under the Town Planning Law³⁰⁷⁾. However, the Regulation does not define any wind-resistant requirements.

(10) Qatar

The Construction Specifications³⁰⁸⁾, which accept ASCE 7'05, IBC'12, BS 6399.2'97 and EN'05 with the UK national annex, are enforced under the Law on Building Regulations³⁰⁹⁾.

(11) Saudi Arabia

The Building Code³¹⁰⁾ is enforced in accordance with the Implementing Regulations³¹¹⁾.

(12) Syria

The Building Code³¹²⁾ is enforced in the capital, Damascus under the Local Administration Law³¹³⁾. Compliance with the Code is established through the professional society codes³¹⁴⁾³¹⁵⁾.

(13) Turkey

The Regulations for Buildings to be built in Disaster Areas³¹⁶⁾, which require consideration of the most unfavorable conditions of seismic or wind effects, are enforced under the Law on Aid and Measures to be taken due to Disasters affecting Public Life³¹⁷⁾. However, the municipal regulations for metropolitan Istanbul³¹⁸⁾, the national standard³¹⁹⁾ and EN'05 are not mandatory.

(14) United Arab Emirates

Codes or regulations that define wind-resistant requirements for buildings are enforced in at least 3 of 7 emirates. Of these, in Abu Dhabi³²⁰⁾³²¹⁾ and Ras Al Khaimah³²²⁾, the Building Codes both accept ASCE 7'05. In Dubai, the municipal regulations³²³⁾ and circular³²⁴⁾ accept the municipal Wind Code³²⁵⁾, BS 6399.2'97, and ASCE 7'05 and its subsequent editions.

7. Summary

Laws and regulations and their supplemental documents related to wind-resistant design of buildings for 195 countries have been investigated to compile the worldwide picture on the establishment of the legal and regulatory framework related to wind-resistant design of buildings. This article gives an

overview of the legal and regulatory frameworks for 137 countries of Africa, the Americas and Asia. The findings are summarized as follows.

- Legal and regulatory frameworks including provisions regarding wind-resistant design of buildings were identified in 89 of the 137 countries of Africa, the Americas and Asia.
- For Africa, 24 of 54 countries have established legal and regulatory frameworks. This comprises just 44% of the regional total. In particular, in Middle Africa, no legal and regulatory framework was identified in 8 of 9 countries.
- For the Americas, 28 of 35 countries have established legal and regulatory frameworks. This accounts for 80% of the regional total.
- For Asia, 37 of 48 countries have established legal and regulatory frameworks. This accounts for 77% of the regional total.

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For continuous information updates, the authors would appreciate receiving new information on laws, regulations, codes or standards related to wind-resistant design of buildings by email to jurc_office@arch.t-kougei.ac.jp.

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