

Earthquake Resistance Standards for Communications Equipment

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1. INTRODUCTION

This document specifies earthquake resistance standards for communications equipment in NTT DOCOMO, INC. (NTT DOCOMO) node-related communications buildings (node buildings).

2. DEFINITIONS OF TERMS

Terms used in this document are defined as follows.

Table 1 Definition of Terms

Term	Definition
Node building	Buildings owned by NTT DOCOMO that have their principal aim the housing of telecommunications equipment (NTT DOCOMO specialized and off-the-shelf equipment).
Communications equipment	Communications equipment and facilities with specifications decided by NTT DOCOMO (equipment built to NTT DOCOMO specifications), off-the-shelf communications equipment and facilities, and cabinets and racks.
NTT communications buildings	Buildings owned by Nippon Telegraph and Telephone East Corporation and Nippon Telegraph And Telephone West Corporation, and that have as their aim the housing of telecommunications equipment.
Earthquake resistance strength rank	The maximum excitation level that meets earthquake resistance test conditions conforming to "Earthquake Resistance Test Specifications for Communications Equipment [1]".
Seismic isolation structure	A structure that incorporates an isolation layer cushion referred to as a laminated rubber bearing between the building and foundation, in order that horizontal earthquake motion is not directly transmitted to the building.
Damping structure	Structure that uses a device within, but not connected to the structure that absorbs seismic force in the building, and that lessens motion.
Earthquake-resistant structure	Structure that uses structural solidity and strength to withstand seismic force entering a building.
Upper floors	Floors from the middle of the total floors in the building and upwards (including the middle floor)
Lower floors	Floors up to the middle of the total floors in the building (not including the middle floor)

3. SCOPE OF APPLICATION

Communications equipment housed in NTT DOCOMO node buildings (equipment built to NTT DOCOMO specifications, off-the-shelf equipment, cabinets, racks, etc.)

Applying this standard to off-the-shelf equipment is recommended.

4. EARTHQUAKE RESISTANCE STANDARDS FOR COMMUNICATIONS EQUIPMENT

Communications equipment housed in NTT DOCOMO node buildings must be able to withstand an earthquake of seismic intensity a little over 6.

Additionally, equipment built to NTT DOCOMO specifications should take into account being housed not only in NTT DOCOMO node buildings, but also in NTT communications buildings, and should be capable of withstanding an earthquake of seismic intensity of 7.

5. EARTHQUAKE RESISTANCE STRENGTH REQUIREMENTS FOR COMMUNICATIONS EQUIPMENT

In order to meet the earthquake resistance standards in Section 4, the earthquake resistance strength of communications equipment housed in NTT DOCOMO node buildings must fulfill the conditions in Table 2.

Table 2 Earthquake Resistance Strength Requirements For Communications Equipment

Scope	Earthquake Resistance Strength Requirements ¹
Communications equipment housed in NTT DOCOMO node buildings (except cabinets and racks)	<u>Meeting earthquake resistance strength ranking R10 (Criteria F2, P2)</u> , using earthquake resistance testing methods and earthquake resistance strength determinations conforming to "Earthquake Resistance Test Specifications for Communications Equipment [1]" Furthermore, equipment built to NTT DOCOMO specifications is to meet the 2 excitations for R08 (F1, P1) and R10 (F2, P2), and R12 (P3).
cabinets, racks	<u>Meeting earthquake resistance strength ranking R10 (Criteria P2)</u> , using earthquake resistance testing methods and earthquake resistance strength determinations conforming to "Earthquake Resistance Test Specifications for Communications Equipment [1]" Furthermore, equipment built to NTT DOCOMO specifications is to meet the 2 excitations for R08 (F1, P1) and R10 (F2, P2), and R12 (P3).

However, if selection of communications equipment that meets the aforementioned earthquake resistance strength requirements is not possible, then installation of communications equipment with earthquake resistance strength, installation building structure/floors, and seismic isolation measures that meet requirements as shown in

¹ If this has met earthquake resistance test specifications other than those in "Earthquake Resistance Test Specifications for Communications Equipment [1]", then please consult with NTT DOCOMO.

Table 3 in NTT DOCOMO node buildings will be permissible.

Table 3 Installation Requirements in accordance with Earthquake Resistance Strength, Installation Building Structure/Floors, and Seismic Isolation Measures

Installation Building Structure	Earthquake resistance strength ranking	R02 ²	R04 ²	R06 ²	R08 ²	R10 or above
	Installation floors					
Seismic isolation structure	All floors	Y	Y	Y	Y	Y
Damping structure	All floors	N	Y	Y	Y	Y
Earthquake-resistant structure	1st floor, basement floors	N	Y	Y	Y	Y
	Lower floors	N	N	Y	Y	Y
	Upper floors	N	N	N	N	Y

Y: Installation possible

N: Installation possible after implementation of seismic measures such as seismic isolation mounts or floors, and verification of earthquake resistance strength.

6. BIBLIOGRAPHY

[1] Earthquake Resistance Test Specifications for Communications Equipment: NTT DOCOMO, INC.

7. OTHER

All descriptions and details specified herein are subject to change without prior notice as a result of any revision or alteration of applicable laws and/or other standards, etc., development of any new technologies and/or introduction of any new research results.

8. INQUIRIES ABOUT THIS DOCUMENT

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² Criteria for earthquake resistance strength rankings are based upon R08 (F1, P1), R06 (F2, P2), R04 (F2, P2), and R02 (F1, P1).