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# Recent Seismic Deliberations Devised in National Building Regulations of Iran (NBRI)

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# About NBRI

- *The aim of National Building Regulations of Iran is to ensure public health, safety, general welfare, and sustainable development related to construction and occupancy of buildings. Its act was approved in 1996 by the Iranian parliament and inaugurated since. The regulations set out performance standards that all building works must meet. It covers aspects such as structural stability, mechanical integrity, fire safety, energy conservation, services and facilities.*
- *Presently NBRI has 22 parts with relevant technical committee for each.*



## National Building Regulations of Iran

*Its council and its technical committees were renewed in 2013 in their 7<sup>th</sup> mission period when they moved to the **Road, Housing & Urban Development Research Center**, a national research center.*

*Thus a full collaboration with the **national research laboratories** was further facilitated. Here a brief description of the seismic provisions newly devised (since 2013) in the national regulation is presented.*

# Recent Seismic Deliberations Devised in NBRI

## NBRI-3: Building Fire Protection

*Edition-95 (2016) enforced seismic regulations for:*

- Seismic considerations and structural strength in shaft enclosures for staircases and elevators and related materials*
- Requirements for fire protection of seismic isolation systems*



# Recent Seismic Deliberations Devised in NBRI

## NBRI-4: General Building Requirements

*This part provides architectural standards and aspects such as minimum lighting and ventilation etc.*

*Edition-96 (2017) enforced seismic regulations for:*

- The means of dwellers egress*
- Major elements and materials used in stairs, slopes, corridors, and false ceilings*
- Nonstructural walls, especially the facade walls*

# Recent Seismic Deliberations Devised in NBRI

## NBRI-5: Building Materials and Products

*Edition-96 (2017) proposes wide usage of:*

- *Lightweight bricks and blocks*
- *Lightweight aggregates*
- *Lightweight concrete*
- *Drywall system*
- *Lightweight facades*
- *Dampers & Base isolators*

# Recent Seismic Deliberations Devised in NBRI

## NBRI-6: Design Loads for Buildings

*This chapter is fully revised for seismic provisions compliant with the 4<sup>th</sup> edition of the Iranian code of practice for seismic resistant design of buildings, Standard-2800.*

*Edition-98 (2019) enforces seismic regulations for:*

- *Inclusion of **vertical seismic load***
- *Accounting for **overstrength** factor of structures.*
- ***compulsory design of nonstructural elements** for buildings of medium importance with 5 stories or more.*

# Recent Seismic Deliberations Devised in NBRI

## NBRI-7: Foundations

*Edition-98 (2019) enforces seismic regulations for:*

- *Dynamic site effects*
- *Liquefaction*
- *Slope stability and landslide*
- *Considerations for surface faulting*
- *Soil-structure interaction*



# Recent Seismic Deliberations Devised in NBRI

## NBRI-8: Masonry Buildings

*Edition-98 (2019) offers:*

- *Comprehensive new chapter on reinforced masonry buildings*
- *Prohibition for unreinforced masonry structures (without ring beams) in all seismic design categories*
- *Enhanced seismic provisions for nonstructural elements in masonry buildings*

# Recent Seismic Deliberations Devised in NBRI

## NBRI-9: Reinforced Concrete Buildings

*Edition-98 (2019) offers :*

- *Revised* seismic design requirements for ordinary, intermediate, and special *moment frames* (including their beams, columns, and joints)
- Requirements for *ordinary and special shear walls*
- Seismic design provisions for *diaphragms and trusses*
- Seismic design provisions for *foundations*
- Provisions for the *members not designated as part of the seismic-force-resisting system*

# Recent Seismic Deliberations Devised in NBRI

## NBRI-10: Steel Structures

*Edition-99 (2020) enforces seismic regulations for:*

- *Composite systems*
- *Special steel plate shear walls*
- *Buckling restrained braced frames*
- *Special truss moment frames*
- *Cantilever column systems*
- *Prequalified connections for intermediate and special moment frames and prequalification provisions (revision)*
- *Pre-tension bolt connections, and critical seismic weld*

# Recent Seismic Deliberations Devised in NBRI

## NBRI-13: Electrical Installations

*Edition-95 (2016) offers:*

- *Electricity automatic cut-off system using earthquake sensors network for terminating selected equipment or building facilities in certain building classes .*



# Recent Seismic Deliberations Devised in NBRI

## Part 14: Mechanical Systems

## Part 16: Plumbing System

*Editions 96 (2017) of the two Parts enforce seismic regulations for:*

- *Design of pipe supports and hangers*
- *Design of mechanical equipment's supports*
- *Design of chimneys*

# Recent Seismic Deliberations Devised in NBRI

## NBRI-15: Elevators and Escalators

*This part of NBRI comprises three main issues: elevators, escalators and auto-walks*

*Edition-98 (2019) enforces seismic regulations for:*

- design of elevators and escalators **supports** against earthquake loads*
- **Safe auto-stop seismic sensor** systems for elevators and escalators for heavy or special traffic buildings*

# Recent Seismic Deliberations Devised in NBRI

## NBRI-17: Natural Gas Piping

*Edition-99 (2020) enforces :*

- *Tougher safety regulations for **large consumers** utilizing newly-defined piping system*
- *Seismic **shut-off gas valves** obligation for a wider range of building classifications.*
- ***Restriction** to gas piping system usage in **tall buildings***

# Recent Seismic Deliberations Devised in NBRI

## NBRI-20: Signs and Symbols

*This part defines systematic order of signs in the buildings.*

*Edition-96 (2017) enforces regulations for:*

- Contents of signs and signboards required for emergency management plan during earthquakes*
- Seismic design of structures supporting large signs and symbols*
- Inspection of signs and symbols after the event of major earthquakes*



# Recent Seismic Deliberations Devised in NBRI

## Part 23 (*Planned*): rural buildings regulations

- *This part ordered by Housing Foundation is under preparation.*
- *It covers the economical and reachable technical regulations for builders applying for special facilitations.*
- ***Simplified seismic provisions*** are to be offered

## Recent Seismic Deliberations Devised in NBRI

### Part 24 (Planned): Evaluation and Retrofit of Existing Buildings

- *This part deals with provisions for **accreditation of existing buildings** generally outdated or built with no known regulation.*
- *These have been historically overlooked in the country until the **Plasco building fire** catastrophe.*
- *It is presently under preparation with **minimum safety requirements** covering service and, seismic loads as well as fire, elevator, gas, passive defense provisions*

# Recent Seismic Deliberations Devised in NBRI

## Part 24 (*Planned*): Evaluation and Retrofit of Existing Buildings

*Seismically the document includes:*

- *Categorization of buildings*
- *Load and target performance determination*
- *Evaluation*
- *Minimum required probable retrofit*
- *Accreditation*

## Recent Seismic Deliberations Devised in NBRI Part 24 (*Planned*): Evaluation and Retrofit of Existing Buildings

- *With priority of **public and large buildings** economical, realistic, and feasible expectations and solutions targeted.*
- *Unlike seismic retrofit documents in Iran, its is planned to be **compulsory for** certain classes of buildings .*





**THANK YOU**