

**RULES**  
**FOR THE CONSTRUCTION AND REPAIRS OF BUILDINGS**  
**IN THE LIGURIAN COMMUNES DAMAGED BY THE**  
**EARTHQUAKES OF 23RD FEBRUARY, 1887.**

Norme per la colnizione e il restanso degli edifici nei Comuni  
Liguri danneggiuti dal terremoto dal 23 Febbrauo, 1887.

DEPARTMNT OF PUBLIC WORKS,  
Rome, 24th March, 1887.

There is no doubt that the earthquake of 23rd February last has caused so much damage to individuals and to property in the provinces of Genoa and Porto Maurizio, chiefly in consequences of the method by which the houses and the public buildings have been constructed.

After such a mournful experience, it is evidently necessary to use, not only for new constructions but also for repairs, those methods and those precautions which give us solid structures in this way obtaining safety for individuals and valuable buildings.

With this object I have ordered experienced engineers to visit those places and to state, in reports, the general rules which might be considered necessary or useful. Such reports have been examined by the higher Council of Public Works, and they will afterwards form a subject of special regulations, when the law on behalf of the sufferers from the earthquake of Liguria, which has been already laid before the Parliament, will be approved.

But now, while the project is before the Chamber, it being urgent that repairs and the constructions of new buildings should be commenced in order to put an end, as soon as possible to the inconvenience of temporary lodgings, I be-

lieve I may do something useful to the unfortunate Ligurian population by communicating to you *the rules for the construction and repairs of buildings*, with a request that you may notify them to the people under your administration. Thus Communes and citizens will then have a knowledge and guide as to the works which must be undertaken.

Confirming the warm and constant interest I take for those regions, please agree in the sentiments of my esteem and consideration.

(Signed)

GENALA,  
Minister for Public Works.

To the Mayor of \* \* \*

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## RULES.

### CHAPTER I.—NEW CONSTRUCTIONS.

Art. 1.—New buildings, which should be isolated, are preferably to be constructed on a square or on an almost square basement. For buildings which are not isolated simple braces must be avoided.

For churches the basilic form, on account of its lighter construction, must be adopted.

Art. 2.—It is prohibited to construct buildings on sloping ground or upon ground of doubtful stability.

On level ground the walls of the foundation must rest upon rocks or upon solid ground, and should this not be found at a convenient depth, the best systems of foundation suggested by science must be adopted, taking care to give in any case to the external walls a greater thickness in proportion to the degree of stability of the ground and of the height of the building.

Constructions must not be built upon sloping ground unless it is ascertained that the soil possesses the necessary stability.

Art. 3.—Houses or other buildings must not have more than three stories over the soil and a basement or cellar.

The total height of the three stories must not exceed 15 mètres, measured from the lowest point of the soil up to the top of the front wall.

Art. 4.—It is prohibited to construct vaults between two stories. Only vaults in the cellar may be used provided they have a sine of at least  $\frac{1}{3}$  of the chord.

The different stories over the soil must be covered by ceilings, preferably of timber.

Under the ceiling a trellis work of lathes may be made, provided they are supported by a net of iron wire nailed on the beams at the planking and at the small beams of the ceiling.

Art. 5.—Should the front wall lean against the wall of a neighbouring house, the spans of windows and of balcony-doors must be at a distance of two mètres from the corners, and of 1m.50 from the axis of the partition wall.

Article 6.—Sand, if from pits, must be freed from any earthy substance, and if from the sea, it must, after its extraction, be exposed to the atmosphere for a long time.

Art. 7.—For slacking of lime and for the formation of mortar, fresh water must be used.

It is prohibited to employ sea water.

Art. 8.—Stones, to be used for walling construction, must be of special quality and consist of pieces roughly squared.

Flints and stones which do not readily consolidate with mortar must be excluded.

Art. 9.—The construction of walls must be executed in horizontal layers, and with pieces roughly squared over the whole thickness of the wall and well joined together.

Walls under the soil must be executed with hydraulic mortar.

Art. 10.—Beams, joists, or “mazzoni” (beams split into two pieces) of each floor, which have to support planking, must also serve as chains of connection between the walls and also, if possible, of union between one floor and the contiguous

one by means of the necessary iron bands and keys ; they must rest upon the whole thickness of the walls lessened by five or six centimètres if it be desired to leave the key visible.

The connecting irons must previously be put in a lead bath or coated twice or more times with *minium*.

Art. 11.—The building must, at every storey over the soil or at the height of the respective floors, be strengthened by a connecting net, which may be formed as follows :—

(a.) By the beams, joists, or by the “binders” of the floor, which have to carry the planking, as in Art. 10 ;

(b.) By a properly arranged series of iron chains disposed in a normal or almost normal directions to the above said parts ;

(c.) By an iron band, which may serve as a frame to the beams, boards, or to the transverse pieces and to the iron chains, and this may be external to the building on the sides where the same is isolated.

Art. 12.—The flat bands of windows and doors in general, although protected by arches, must be furnished underneath by two iron bars of a cramp shape, which extend at least half a mètre deep into the side parapets.

Art. 13.—Chimneys and closets, rain water conductors, etc., must be built in the thickness of the walls, but they might find a convenient place either in the corners of the walls or in posts especially attached to the external or internal walls of the buildings.

Chimneys must be established at a convenient distance from the external walls of the building : anyhow they must be constructed upon a solid base and as low as possible.

Art. 14.—Brick partition walls of a brick thickness or of a brick width must be, all along their height and without interruption, built into the side walls. Those partition walls of a brick thickness must besides be strengthened horizontally and vertically by means of small timber frames, or by iron rods vertically drawn at a distance from each other of at least the

length of a brick, and upon the faces of the partitions before they are coated.

Art. 15.—Cornices must be constructed with the greatest stability.

Therefore the following rules must be observed :—

(a.) The projection of the cornice must not exceed the thickness of the wall to which it is attached ;

(b.) Stone consols, should they be used, and stone plates which support the gutters, must enter the whole thickness of the wall ;

(c.) No part of the roof must rest upon the cornice ;

(d.) The wall must reach up to the highest point possible of the roof, in order to increase the counter-balance of the cornice ;

(e.) The coating of the cornice must be made without plaster ;

(f.) The frame of the cornice on the frontage must be made with the greatest approximation to the desired shape, so that the roughcast may be nearly equal and not excessive in thickness.

(g.) In cornices with consols, angular consols as well for projecting as for reëntering angles, must be adopted.

Art. 16.—Trusses must be complete, with the horizontal beam prolonged up to the external facing of the walls.

Trusses must be put and solidly fixed upon an iron frame made of beams strongly connected with each other and resting upon the external walls. The angles of this frame will be made invariable by means of diagonal beams, so as to form many triangles. Rafters without keys or those which could in any way press against the external walls must consequently be avoided in trusses.

All the parts of the truss must be well connected to each other according to technical rules and the angles must be invariable so that a solid and rigid framing may be obtained.

Art. 17.—Besides the above mentioned rules, all the best methods which are suggested by science and by the art of building, must be strictly observed.

#### CHAPTER II.—REPAIRS.

Art. 18.—In repairs or in partial reconstructions of already existing buildings, as far as possible, the rules contained in Chapter I. must be observed.

Art. 19.—If a vault has fallen down or has suffered severe damage it must be replaced by a ceiling constructed according to the rules contained in Art. 10. Only in cases where urgent circumstances may require it, may a new vault be constructed, adopting, however, all the precautions of stability and security which are technically deemed necessary.

In churches or other public places the vault must be replaced by a timber ceiling connected with the walls, according to Art. 10. Should the vault of the apse have a spherical form and be in a good condition of stability, it may be preserved.

Rome, 24th March, 1887.

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### DECREE AND REGULATIONS FOR THE ENFORCEMENT OF ARTICLE 7 OF THE LAW OF 31ST MAY, 1887.

#### HUMBERT I.

BY THE GRACE OF GOD AND BY THE WILL OF THE NATION KING  
OF ITALY.

Considering the law of 31st May last No. 4,511 (series 3rd) concerning the sufferers from the earthquake; having heard the opinion of the Committee instituted by Our Royal Decree of 12th May last No. 4,561; on the proposal of Our Minister for Home Affairs and of those of Finances, of Public Works, and of Agriculture, Industry and Commerce;

We have decreed and do decree:—

SOLE ARTICLE.

The hereunto annexed regulations concerning the rules to be observed in the construction and repairs of buildings in enforcement of Article 7 of the said Law of 31st May last, No. 4,511, are sanctioned.

The aforesaid regulations must have the visa and the signatures of Our Minister for Home Affairs, and of those of Finance, of Public Works, and of Agriculture, Industry, and Commerce.

Our Minister of Home Affairs, President of the Ministry, is entrusted with the enforcement of the present Decree, which must be registered at the Court of Accounts.

Given at Rome, on the 13th November, 1887.

(Signed)

HUMBERT.

(Countersigned)

CRISPI.

MAGLIANI.

SARASU.

GRIMALDI.

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