Saimaa University of Applied Sciences
Technology, Lappeenranta
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Determination of wear and tear of the building according to Russian standard VSN 53-86 (r) "Rules estimates of physical wear and tear of residential buildings".

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Abstract

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Determination of wear and tear of the building according to Russian standard VSN 53-86 (r) "Rules estimates of physical wear and tear of residential buildings”
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Degree Programme in Civil Engineering
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The purpose of the present study was to estimate an actual condition of a building, with calculation of its wear rate and the determination of the service life.

Data for this study was collected during the survey of the building and also from literature and the Internet. The actual wear of structural components was determined on the basis of VSN 53-86 (r) "Rules estimates of physical deterioration of residential buildings”.

The results of the study show how to determine the remaining life-span of the building and its actual wear and tear. This process is suitable for all buildings.

Keywords: wear and tear, service life, life-span

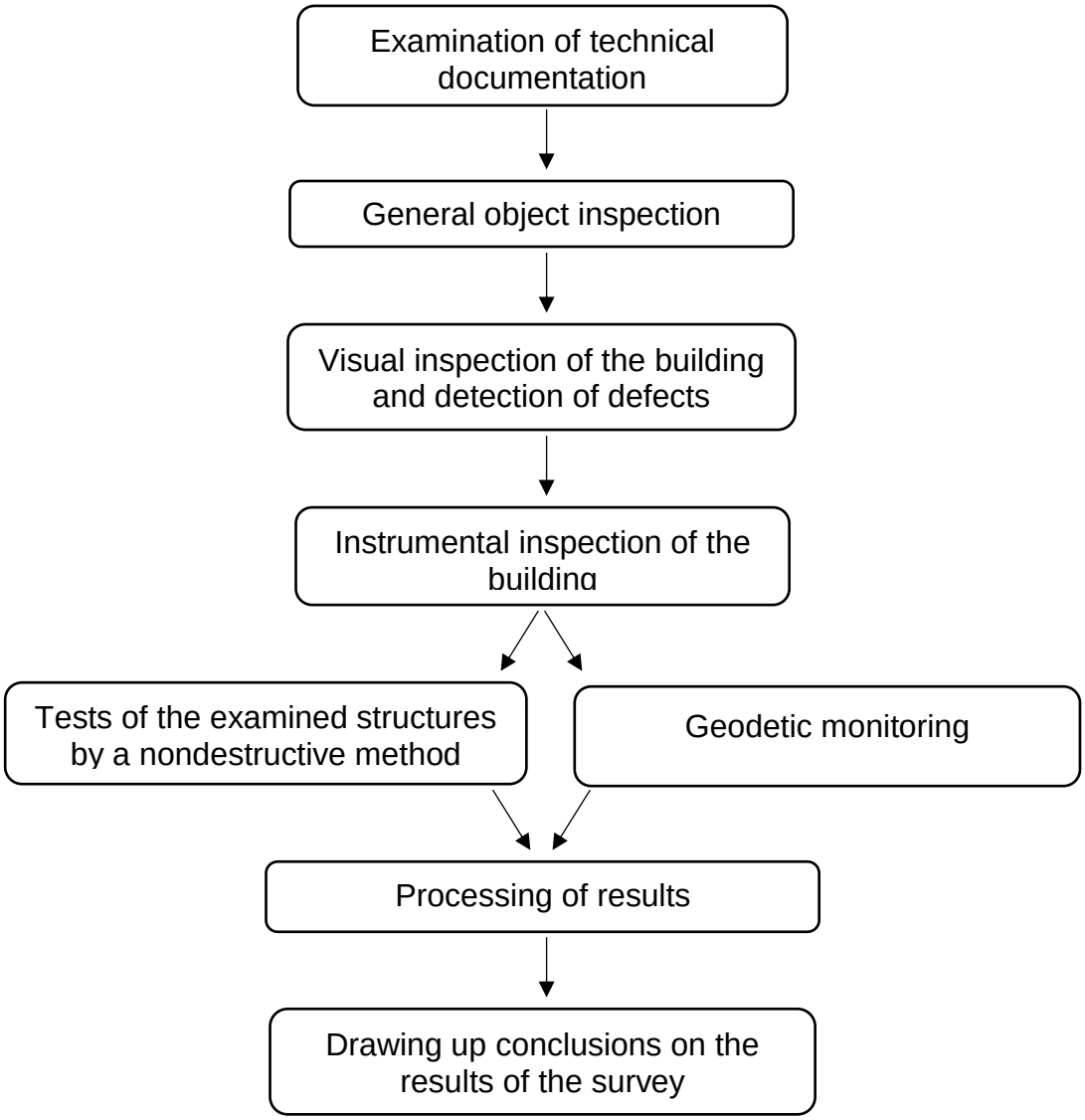
CONTENTS

1 INTRODUCTION

For any structure, there comes a time when it is necessary to conduct a survey. Whether it is a large structure, which accommodates thousands of people, or a single-family house. There are many reasons for this event. From the desire to sell the building, to the demand of public services.

The main goal of this work is to present the sequence and composition of work on the inspection of buildings, as well as to determine its wear and tear rate and the service life.

This flowchart will show the sequence of work, and in the work itself the details of this survey will be described.



As an example, the building will be presented. The survey was conducted in reality, but due to publicity this particular building can not be shown.

2 INITIAL INFORMATION FOR RESEARCH

Before the actual research, information about the building must be obtained.

All available design and technical documentation must be examined, including:

1. Technical passports with floor plans
2. Working and executive drawings
3. Acts for concealed works
4. Acts of transfer into operation
5. Work logs
6. Passports and certificates for materials and finished structures
7. Information on previously conducted repairs and inspections
8. Defective statements
9. Instructions of inspecting state bodies

Usually this data is transferred by the customer or organization that built the facility. If this data was not transferred, then additional work should be done to determine it. The main documents, such as acts of transfer into operation and defective statements must be received. The rest can either be determined, or they are not so important as to preclude further work.

After this, the following complex of works should be implemented:

1. Preliminary inspection of the facility
2. Familiarization with its volumetric and planning and constructive solutions
    - This is the main aspect that affects the cost of work
3. Identification of possible emergency sites
4. Determination of the actual age
5. Availability of technical documentation

6. Study of operating conditions, production technology, temperature and humidity regime, environmental aggressiveness
7. Anticipated changes in operation.

These are the minimum requirements before starting the plan and organizing the survey.

At this stage, the following technical characteristics of the building must be sorted out to be clear to the customer.

Example:

Table 1. Technical characteristics of the building

The size of the building, its form, the presence of a cellar and attic	The building is 6 storey, square in shape with the main dimensions in terms of 36m x 68m / 32 m (height), with a basement arranged under the building part and an attic floor
The structural scheme of the building	The building is decided in mixed constructive scheme with bearing walls and columns
Total building volume	44000 m^3
Total area	10200 m^2
Purpose of the building	Non-residential, administrative
Degree of fire resistance	2
Group of capitality	1 (service life is 175 years)
Year of construction	1836
Whether capital, current and other repairs	2011 - the reconstruction was carried out with a partial reconstruction of the main facade
Technical surveys before	No data

Such parameters of buildings as the durability of foundations and walls, determine the overall operational life of structures, as well as their group of capitality.

The structural scheme of the building is mixed with bearing reinforced concrete and brick walls and cast-in-place reinforced concrete columns.

The spatial rigidity of the building is ensured by the joint work of cast-in-place reinforced concrete walls, columns, brick walls and cast-in-place reinforced

concrete floors, as well as stiffening core, whose function is performed by staircases and lift shafts.

The foundations of the building are driven piles, foundation beams. The dimensions of the foundations of the building have not been determined.

External and internal load-bearing walls are made of cast-in-place reinforced concrete.

Floors - cast-in-place with thickness from 150 to 250 mm.

The roof of the building is operated with the presence of slopes. Bearing coating structures are reinforced concrete slabs. There is a roof slope towards the main facade. Bearing structures of roof slopes are metal rafters and beams. The roofing material is sheet steel.

The drainage from the roof is internal.

Stairs - cast-in-place reinforced concrete

After information about the building was sorted out, preparation of a survey program with mandatory safety measures during work can be implemented.

3 VISUAL AND INSTRUMENTAL INSPECTION OF THE BUILDING

3.1 Visual inspection of the building

Visual inspection of load-bearing and enclosing building structures, measurement of structures, assemblies and elements for establishing the conformity of the project documentation object need to be done.

Identification of visible defects and damage (the presence of cracks, leaks, detachments of the protective layer in reinforced concrete elements, corrosion of metal elements, deflections and deviations from the planned position, the state of joints and joints, etc.).

Defects or damages should be written floor by floor for clearer understanding of the problem.

General photos of the object, its structures and joints and photos of damages are the main goals at this stage.

Example:

Table 2. Comparison of design plans and actual execution of building structures

№	Name of the element	Project	Actual execution	Notes
1st floor				
1	Column on the axis "D-F / 5-6" on the 1st floor	-	+	
2nd floor				
2	Partition on the axis "B-C/8-9"	-	+	-
3rd floor				
3	Partitions in the axes "F-H / 12-14"	-	+	New restaurant.

Conclusion: based on the correspondence of the bearing and enclosing structures to the project, the remaining changes, such as re-planning in the form of self-supporting partitions, do not affect the actual wear and life time of the building as a whole.

Defects and damages on the surface of the external and internal walls, columns, ceilings, staircases:

- Multidirectional hair cracks along facial above window openings.

Basement:

- Multidirectional cracks with opening width up to 5 mm on walls, in mating walls and ceiling

- Heaving of the finishing layer on the walls

1st floor:

- Traces of leaks in the area of the engineering networks
- Heaving of the finishing layer on the walls

2nd floor:

- Multidirectional hair cracks on the ceiling, walls

3rd floor:

- Visible defects not detected

4th floor:

- Destruction of the plaster layer of partitions

5th, 6th floor:

- Visible defects not detected

Table 3. Photo fixation of defects and damages

Basement	
Photo 1	Photo 2
	
Defects: heave	Defects: crack along the angle of up to 1.5 mm

Photo 3	Photo 4
	
Defects: traces of soaking on the ceiling	Defects: crack up to 3 mm

3.2 Instrumental inspection of the building

Determination of the strength of concrete structures was carried out by the shock pulse method using an electronic strength meter of concrete. This means that non-destructive testing was executed.

Non-destructive testing is control of the properties and parameters of the object, in which the suitability of the object for use and operation should not be impaired.

The ultrasonic method consists of recording the velocity of transmission of ultrasonic waves. According to the testing technique, end-to-end ultrasonic sounding can be distinguished, when the sensors are placed on different sides of the test sample, and surface sounding when the sensors are located on one side. In this case, surface sound was used.

The calibration dependence between the velocity of ultrasound propagation and concrete compressive strength was previously determined for a particular concrete composition (Figure 6). This is due to the fact that the use of 2 calibration dependencies for concretes of other or unknown compositions can lead to errors in determining the strength.

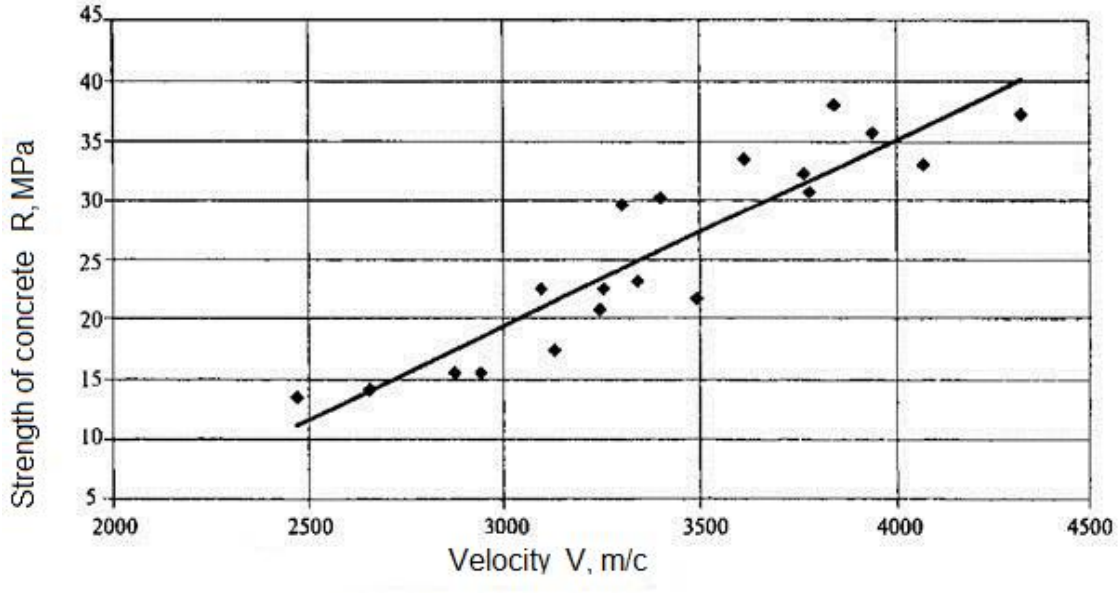


Figure 6. Calibration dependence between the velocity of ultrasound propagation and concrete compressive strength

The ultrasonic method for determining the strength is available for mass multiple testing of structures of any shape, and allows for a continuous monitoring of the increase or decrease in strength.

The disadvantages of the method include the error obtained during the transition of acoustic characteristics to strength. It is impossible to control the quality of high-strength concrete with ultrasonic devices, that is, the range of concrete strengths is limited by brands from B7.5 to B35 or from 10 to 40 MPa.

In order to get the correct value at least 10 tests must be conducted on the same surface and then weed out values that are stand out among the others. At least 5 values must be obtained from tested structure. Surface must be cleared before the start of the test.

To perform a full survey, as many bearing elements as possible need to be examined. In the event that this is not possible, it is desirable to take this into account and reduce the values obtained at your discretion, as there is no proper sequence of actions for such a case.

4 PROCESSING OF SURVEY RESULTS

4.1 Determination of the strength of concrete structures

The static processing of the concrete strength measurement results was carried out according to the following formulas:

Average Strength:

$$R = \frac{1}{n}\sum_{i=1}^{n} R_i \qquad (4.1)$$

Mean square deviation:

$$S = \sqrt{\frac{1}{n-1}\sum_{i=1}^{n}(R_i - R)^2} \qquad (4.2)$$

Mean square deviation characterizes the measure of the dispersion of data.

The coefficient of variation:

$$V = \frac{S}{R} \cdot 100\% \qquad (4.3)$$

The coefficient of variation is the measure of the relative spread of a random variable; shows what proportion of the average value of this value is its average spread.

Student's test:

t_a-depends on the number of tests.
t_a = 2,01 – take equal for 5 tests.

Grade of concrete:

$$B = R \cdot (1 - t_a \cdot V) \qquad (4.4)$$

Table 4. Determination of the strength of concrete columns.

№	Place	R_i, MPa	R, MPa	S	V	The least controlled strength value(R_b), MPa
1	2	3	4	5	6	7
1	Column in the "C / 7" axes at the basement level	28,6	29,72	2,06	0,07	28,6
		29				
		30,1				
		31,5				
		29,4				
2	Column in the "G / 9" axes at the basement level	31,2	30,96	2,75	0,09	29,6
		30,6				
		29,6				
		30,2				
		33,2				

Table 5. Determination of the strength of reinforced concrete floor slabs.

№	Place	R_i, MPa	R, MPa	S	V	The least controlled strength value(R_b), MPa
1	2	3	4	5	6	7
1	Floor slab in the “F / 4” axes at the first floor level	34,8	33,96	3,72	0,11	31,2
		36,2				
		33,1				
		31,2				
		34,5				
2	Floor slab in the “C / 7” axes at the first floor level	33,6	33,86	3,49	0,1	31,8
		34,6				
		36,4				
		31,8				
		32,9				

Conclusion: according to the results of statistical processing, the average strength of concrete is 30,3 MPa, which corresponds to a class of concrete not lower than B20.

The correspondence between real strength and projected strength must be checked. In case this is not observed, it is necessary to recalculate the main load-bearing structures in the most dangerous areas.

4.2 Estimation of actual wear and life of the building

The evaluation of the wear and tear of the building's structures was carried out in accordance with the procedure in accordance with VSN 53-86 (p) "Rules for the assessment of physical wear of residential buildings".

The physical wear and tear of the structure, element or system having different wear and tear rates of the individual sections should be determined by the formula:

$$F_k = \sum_{i=1}^{i=n} F_i \frac{P_i}{P_k} \qquad (4.5)$$

Where,

F_k- physical wear and tear of the structure, element or system,%;

F_i - physical wear and tear of the section of the structure, element or system, defined in Table 1 in Appendix 1,%;

P_i - dimensions (area or length) of the damaged area, sq.m or m;

P_k - dimensions of the whole structure, sq.m or m;

n - the number of damaged sections.

Table 6. Tear and wear of building elements.

№	Structural element		Description of structural elements (material, construction, finishing, etc.)	Technical condition (precipitation, cracks, rot, etc.)	Dimension of the element to whole structure,	Correction to dimension, %	Dimension of a structural element with corrections, %	Wear and tear, %	Percentage of wear and tear to the structure, %
1	Foundations		Driven piles with foundation beams	-	5	-	5	10	0.5
2	Walls and their external finishings		Facades - brick, internal – cast-in-place reinforced concrete	Hair cracks in the attic area; partial destruction of the painting layer, as well as the plaster layer in the area of the engineering networks	18	-	18	10	1.8
	Partitions		Dry plaster on metal frames, plaster	Partial destruction of the paint layer in the area of the engineering networks, small cracks with a width of opening up to 2 mm	6	-	6	14	0.84
3	Floor slabs	Attic	Cast-in-place reinforced concrete	Traces of leaks, partial destruction of the painting layer in the zone of location engineering networks, cracks on the floor surface up to 1.5 mm	11		11	12	1,32
		Interstorey							
		Over basement							
4	Roof		Steep slopes - the roof is steel; flat - soft roll; wooden rafters - steel roofing	Part of the wooden rafters have signs of leaks in the joints of the roof	5		5	17	0,85
5	Floors		Solid carpet; parquet, carpet, tiles	Minor damages	12		12	5	0,6

6	Openings	Window	Wooden double-faced; aluminum frames with powder coating	Minor damages	13		13	5	0,65
		Door	Steel boxes with solid doors						
7	Interior finish		Walls - wallpaper, tiles; suspended ceilings, in warehouses - painting with water-emulsion compounds	Minor damages	9		9	5	0,45
8	Sanitary and electrical devices	Heating	From own boiler-house	Slight weakening of individual packings and gaskets, partial damage to the elasticity of the cables	7		11	6	0,66
		Water pipes	From the city central network						
		Sewerage	Reset to the urban network						
		Hot water supply	From own boiler-house						
		Baths	Enameled						
		Electric lighting	Hidden Posting		4				
		Phone	Open posting						
		Ventilation	Forced, natural						
		Elevator	3 passengers, 3 service						
		Garbage chute	Yes						
9	Other work		Stairs: reinforced concrete, steps on metal guides	Small cracks in the steps at the interface with the wall	10		10	11	1,1
				Total	100		100	0	7,43

As it can be seen, when determining the wear and tear of a building, an important role is played not only by the wear of the element itself, but also its volume dimension relative to the size of the building.

Sometimes, it is difficult to determine the deterioration of the building, since its values are in the border zone. In this case, you need to take the worst possible scenario. Also, you need to take into account the date of construction and add a few percent, because it is not always possible to get to some of the building elements.

4.3 Geodetic monitoring

The Inquiries and Final reports on the results of work on monitoring the settlement of the building for the total period of observations were analyzed.

The monitoring work was carried out using a level. In order to do this, sedimentary marks are laid in the supporting structures, on which basic measurements are carried out - the so-called "zero cycle". All other measurements, in subsequent cycles, will be compared to "zero". Measurement processing is performed in special engineering programs. In addition, install gypsum beacons on cracks are installed, monitoring the behavior of cracks complements the overall picture of deformation processes. The purpose of the gypsum beacon is to give a signal about the occurring increase in the crack opening width.

If monitoring of a building for which it had already been conducted is carried out, it is necessary to obtain information about previous studies, as already mentioned in Chapter 2.

Based on the results of observations of deformations of buildings and structures, a technical conclusion is made about the state and the forecast of the development of the deformities revealed, recommendations are being developed on the management of appropriate measures to prevent the harmful consequences of critical deformations.

The total observation period was from the beginning of the building's exploitation. But this was possible due to the fact that information was received from previous surveyors.

Considering the results of observations of the building, it should be concluded that during the entire observation period, there was a slight rise and settlement within 5 mm, and the total vertical displacements of most marks were 0 mm. Based on this, it should be concluded that the settlement of this building is stabilized.

5 CONCLUSIONS AND RECOMMENDATIONS

A visual and instrumental survey of the building was performed to assess the actual state. Based on visual and instrumental surveys, no indirect signs (banks, cracks, etc.) of development of uneven settlements were found.

The condition of the building, depending on wear and tear, is assessed as good (wear from 0-10%).

Wear and tear of the building at the time of the survey is 7,43%.

Taking into account the normative period of operation of public buildings for a 1st group of capitality of 175 years, the theoretical residual life of the building by linear interpolation, taking into account wear and tear, is 162 years.

The main factors affecting the index of physical deterioration of the building and its residual service life are:

1. The frequency of the repair work;
    - The more often repairs are carried out, the longer the building will serve
2. Quality of design solutions for capital and any current repairs;

- In the event that a qualitative repair has not been carried out, the structure of the building will deteriorate more quickly, and, accordingly, its remaining service life will be reduced

3. The quality of construction materials used in the work;
4. Quality of technical operation;
5. Density of "population" of the building.
    - If a large number of people walk through the building daily, or if it is densely populated, wear will occur faster. In this case, repair work should be carried out more often

For the purpose of further safe operation and observance of the calculated residual life of the building, it is necessary to take into account these factors and adhere to the following recommendations:

1. Do not allow any leakage of utilities in the building;
    - This is usually applicable for all buildings and structures, since humidity is a dangerous factor in increasing wear and tear
2. To perform geodetic monitoring on previously established settlement marks and to observe the cracks during the period of any construction works and dynamic influences near the building;
    - This mainly depends on the location of the surveyed building, since for small buildings this information is not so important
3. Carry out periodic technical inspection of the building in accordance with the frequency and regulations established by the regulatory documents;
    - This is usually done quite often for buildings that are densely populated, while for small buildings (cottage, single-family house, garage, ect.) this is done at the discretion of the inhabitants or owners
4. Any re-planning of premises or change of their functional purpose to be carried out only on the basis of specially developed and coordinated project documentation and executed by professionals;
5. Carry out scheduled routine repairs of the individual structural elements of the building and its engineering systems.

- this recommendation is usually given for buildings that are densely populated

As a result, it can be said that sooner or later the time for survey comes for any building. This procedure is necessary for large and small buildings.
The most important thing that should be revealed is the correspondence between the design drawings and reality. This should be given more attention during the survey. In the same way, it is necessary to carry out a more detailed inspection in places where the external environment can have access to the structures. It is necessary to pay more attention to the humidity indoors overall.

Of course, it is important to identify the location of cracks and defects, but often, most of them do not have a big impact on the design, until a certain point, when they become larger than a certain value.

Based on my experience in conducting this research, I can say that the most difficult thing is to get access to the structures that can already be lined. Owners, of course, will not be happy if you damage the finish of the building.

From my point of view, one of the main omissions in the survey of the building is the lack of verification of the radon content in the building. In Russia there is little talk about this problem in principle, but I believe that this information should also be provided to the customer. In some institutions, there will be no access to the premises, which must be accessed for a reliable and complete report.

It was a very interesting and useful study. I realized that behind a good appearance can hide a lot of problems that can not be seen with the naked eye. Even if we see a problem, it can be more important than we think and vice versa. Also, the interpretation of the seen may not be as perceived as it should be.

FIGURES

TABLES

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Table 1. Physical wear and tear of constructions and elements

Signs of wear	Quantification	Physical wear and tear, %	Approximate composition of work
Foundations			
Cracks in the basement of the building	Opening width of cracks up to 1.5 mm	0-20	Grouting of cracks
Curvature of horizontal cap lines without signs of increased sediment deformations	Uneven sediment with wall deflection up to 0.01 from the wall length	21-40	Grouting of cracks, elimination of damages of a finishing layer of a basement
Through cracks in the basement, the spread of cracks to the entire height of the building. Curvature and significant sediment of individual sections of the walls. The development of sediments is not observed	The width of crack opening is up to 10 mm. Uneven sediment with wall deflection and more than 0.01 of the wall length	41-60	Strengthening foundations and walls
The development of through cracks in the walls of the building, the destruction of the basement, the development of deformations of foundations	-	61-80	-
Walls			
Individual cracks and potholes	Width of crack up to 1 mm	0-10	Filling cracks and potholes
Deep cracks and loss of plaster in places, weathering of seams	The width of the cracks is up to 2 mm, the depth is up to 1/3 of the wall thickness, the joints are broken down to a depth of 1 cm in the area up to 10%	11-20	Repair of plaster or jointing, facade cleaning
Separation and falling off of plaster of walls, cornices and crosspieces, weathering of seams, easing of a bricklaying, loss of separate bricks, cracks in cornices and crosspieces, humidification of a surface of walls	The depth of destruction of joints to 2 cm at the half to 30%. Width of crack more than 2 mm	21-30	Repair of plaster and brickwork, grouting of seams, cleaning of the facade, repair of the cornice and lintels

Mass falling off of plaster, weathering of seams, weakening of brickwork of walls, cornices, crosspieces with falling out of separate bricks, high and traces of humidification	Depth of joint destruction up to 4 cm in area up to 50%	31-40	Repair of damaged sections of walls, cornices, crosspieces
Through cracks in the lintels and under the window apertures, loss of bricks, slight deviation from the vertical and buckling of the walls	Deviation of the wall from the vertical within a room more than 1/200 of the length of the deformable section	41-50	Fastening of walls with belts, strings, etc., reinforcement of piers
Mass progressive progressive cracks, weakening and partial destruction of masonry, noticeable curvature of walls	Buckling with a deflection of more than 1/200 of the length of the deformable portion	51-60	Relocation of up to 50% of the wall volume, reinforcement and fastening of the remaining sections of the walls
Destruction of the masonry in different places	-	61-70	Full wall rebuilding
Partitions			
Small cracks in the interfaces of partitions with overlapping, rare chips	The width of cracks is up to 2 mm. Damage area up to 10%	0-20	Sealing and sealing of junctions
Deep or through cracks in places of mating with adjacent structures	Cracks width up to 10 mm	21-40	Surface cleaning, sealing and cracking
Potholes and chips, broken connections between individual slabs of partitions. Deformation of the frame	Area of damage up to 50%	41-60	Filling of potholes and chips, strengthening of individual slabs and adjoining to outer walls. Frame repair.
Mass cracks in plates of partitions Large buckling and appreciable deviations from a vertical	Deviations from vertical more than 1/100 of the height of the room	61-80	Complete replacement of partitions
Floor slabs			
Cracks in the places of abutments to the walls	Cracks width up to 0.5 mm	0-10	Fracture sealing

Cracks in plates (shrinkage or along a working span)	The width of cracks is up to 2 mm. The total length of shrinkage cracks per 1 m^2 to 0.8 m	11-20	Fixing of single cracks or grouting of shrinkage cracks
Cracks in slabs across the working span or multiple shrinkage	Width of crack openings up to 2 mm. The total length of shrinkage cracks per 1 m2 to 1.5 m	21-30	The same with the restoration of the protective layer of concrete
Cracks, deflections, traces of leaks or freezing in places adjacent to the outer walls	Cracks are more than 2 mm. Deflections up to 1/150 span	31-40	Fixing cracks, eliminating the causes of wet plates
Developing cracks in the support sections of slabs, deflections	Deflections up to 1/100 span	41-50	Strengthening of plate support sections. Fracture sealing
Increase in cracks and deflections in time	Deflections up to 1/100 span. Cracks 3 mm	51-80	Reinforcement of plates or their replacement
Roof			
Weakening of fastenings: bolts, collars, staples; damage to the details of the dormer windows	-	0-20	Repair of fastenings and details of dormer windows
The defeat of the rotting of the curb plate and the ends of the rafters, the weakening of cuttings and joints	Area damage up to 20%	21-40	Change of the curb plate and strengthening of the ends of the rafter legs, rigging of structures, fastening of cuttings
Defeat of the rotten wood of the curb plate, rafters, crates; the presence of additional temporary fastenings of rafter legs; humidification of wood	Area damage up to 50%	41-60	Change of the curb plate, part of the rafters and the continuous lathing under the wall chute, partial replacement of the ordinary lathing
Deflections of rafter legs, damage to rot and bug of wood of roof parts		61-80	Full replacement of the wooden structure

Floors			
Minor damage and insignificant shrinkage of individual parquet rivets, crevices between rivets up to 3 mm, warping of individual rivets	-	0-20	Cycling of individual sections, reinforcement of plinth
The gapping of individual rivets from the base; chipped, worn, cracked and heavily warped; absence of staves in groups of 5-10 pcs. in certain places; slight damage to the base	-	21-40	Replacement of riveting and insertion of cracks in places, flooring. Littering parquet in separate places up to 10% of the floor area
Gapping of the rivets from the base over a large area (noticeable swellings, creak and dull noise when walking); the absence of clasps in places up to 0.5 m2; severe wit; mass warpage, individual subsidence and damage to the base	-	41-60	Replacement of parquet using old materials up to 50% of the floor area and repair of the basement
The complete disruption of the solidity of the parquet coating, the massive absence of rivets, significant subsidence and damage to the base		61-80	Complete replacement of parquet
Openings			
Small cracks in the junction of boxes with walls, worn or crevices in the vestibules. Putty in places has gapped behind, there are partially no glazing beads, glass cracks, minor damage to tin	-	0-20	The caulk is the interface between the boxes and the walls. Restoration of missing glazing beads, putty, glass, casting with the addition of new material up to 15%
The bindings have dried up, twisted and shattered, in the corners; some devices are damaged or missing; absence of glazing	-	21-40	Repair of binders; reinforcement of joints with overlays, restoration of glazing with the addition of new material up to 30%

The lower frame of the window sill and the sill panel are affected by rot, the wood is stratified, the bindings are shattered	-	41-60	Repair of binders, boxes and sill boards with the addition of new material
Bindings, a box and a window board are completely amazed with decay and a beetle, shutters do not open or drop out; all interfaces are broken	-	61-80	Full replacement of window and door blocks
Interior finish			
Local single damage to the paint layer, hair cracks in the rust, at the interfaces between ceilings and walls Gapping and damage of edges in places	-	0-20	Adhesion of individual edges
Cracks, dirt and breaks in the corners, places of installation of electrical appliances and near the doorways; discoloration	-	21-40	Rinsing the surface and painting in one go Pasting of individual places
Burnout, contamination on the area up to 50%, gap behind the base	-	41-60	Flushing of the surface, plastering of individual places up to 10%, painting twice Pasting of walls with wallpaper without surface preparation
Burnout, backlog of wallpaper and paper backing, cracks and tears on the entire surface	-	61-80	Complete replacement with surface preparation
Stairs			
Small potholes and cracks in the steps, separate damage to the handrail	-	0-20	Filling cracks and potholes, repairing handrails
Potholes and repulsed seats with through cracks in individual steps, the surfaces of the steps are worn out, the rails are sometimes missing	Damage on the area up to 20%	21-40	Re-laying of steps with the addition of new ones, embedding of potholes, replacement of handrails

The steps are erased, and the places are broken, the through cracks in the sites, the enclosing grid is shattered	Damage on the area up to 50%	41-60	Re-laying of steps with the addition of new ones, installation of a cement floor with a metal mesh on the site, shotcrete areas from the bottom, repair of the fencing grid
The steps and platforms of the worn, part of the steps and the enclosing grid are missing. String in some places have bent, communication of strings with platforms is weakened. Using the stairs is dangerous	Damage on the area more than 50%. The deflection of strings more than 1/150 span	61-80	Complete replacement of stairs