APPENDIX A. CALCULATION PROCESSOR INPUT FILE FORMAT

A.1 INPUT DATA DESCRIPTION FORM

The input data of the calculation processor is a text file divided into functional parts - *documents*, each of which has a unique number and is responsible for a certain set of characteristics.

The *document* area is defined by open «(» and closed «)» parentheses. All data that is outside the document areas will be ignored by the processor. The open parenthesis is followed by the *document* number and the "/" character.

Each *document* consists of *lines*, the end of each of which is indicated by the "/" character. In the document area, you can set a comment by framing it with the characters "*" and "/". The comment must not contain characters that define the area of the document, as well as the end of the line.

Several can be formatted as one line of a text editor, and for easier perception and reading, one document lines can consist of several lines of a text editor.

Example:

```
( 1/
     7 1 1 2 /* 1st element / 7 2 2 3      /* 2nd element /

     7 1 3 4 /* 3rd element /

     7 1
     4 5      /* 4th element /
)
```

A text file *document* has a strictly formatted look, as does each of its *lines*. *Lines* within the same *document* may have the same form or differ from each other in the presence of a certain identifier.

The list of *documents* can be conditionally divided into the following categories: general characteristics, nodes, elements, loads and actions and combinations (Table A.1).

Table A.1 Documents of the text file

Category	**Document Number**	**Assignments**
1	**2**	**3**
General characteristics	0	General characteristics of the problem
	13	Binary info
	27	Text file version and checksums
Nodes	4	Coordinates of nodes
	5	Restraints of nodes and Displacement Unification
	12	Local coordinate system
	25	Absolutely rigid bodies

Table A.1(continuation)

1	**2**	**3**
Elements	1	Elements (types and node list)

	2	Hinges
	9	Axes of stress alignment
	11	Relative inelastic strain factor for seismic design according to Uzbekistan regulations (KMK 2.01,03-96)
	14	Rigid inserts
	17	Local Axes/Axes of Orthotropy
	19	Elastic Foundation
	21	Floors
	39	Assembly tables
	41	Cross-Sections and Materials (Rigidity)
	44	Equivalent elements
	48	Grids Coordination
Loads and action	6	Loadings and Loads
	7	Load Values
	10	Considerations of Coefficients to the elastic Modulus and compression Strength at mounting Stages (for ASSEMBLAGE+ system)
	15	Dynamic actions
	16	Parameters of nonlinear loadings or montage stages
	20	Stability
	22	Creep
	23	Eccentricity of floors
	24	Consideration of concurrent static loadings at mounting Stages
	28	Time-depend dynamic
	30	Influence Surfaces/Lines Topology (BRIDGE)
	31	Motion paths (BRIDGE)
	34	Description of moving loads and motions paths (BRIDGE)
	35	Moving loads values (BRIDGE)
	36	Coefficients of combinations for moving loads (BRIDGE)
	40	PushOver
	43	Condensation of Masses
	47	Parameters of generalized loadings
	49	Initial temperature
Combinations	8	Design combination of loads (DCL)
	29	Combinations factors by impact degree
	37	Coefficients to loadings (for normative loads, for design loads and share of duration) for DCF
	38	DCF

A.2 GENERAL CHARACTERISTICS

The text document of the task must begin with *document 0*, each *line* of which has its own number and is responsible for a specific data set (Table A.2).

Document line 0 begins with its number, followed by the character ";". The same character can appear before the end of a *line*, and it can also be used to separate data within a single *line* (for example, in *lines* 4, 39)

Example:

```
( 0/
     1; Untitled/
     2; 7/
     4;
          3 : 1-5 ;
          4 : 6-10 ;
     /
     9;
          1 : 133-135 ;
          2 : 195-197 ;
     /
     10; 1 4 5-10 /
     11; 1 2 3 4 5 6 7 8 : 1 3 4-10 /
     12;
          11 : 1 3 ;
          21 : 2 4 ;
          32 : 5 7 ;
          42 : 6 8 ;
     /
     13; 1 3 4-10 /
     16; 2 1/
     17;
          1: 1-99 ;
          2: 100-198 ;
     /
     18; 1 3 4-10 /
     19; 11/
     20; 7 5 1 0.1   0 7 0 0 /
     21; 5 0 0.85 0 2 /
     39;
          1 : 1. Static loading;
          2 : 2. Static loading;
     /
)
```

Table A.2 Lines of document 0

Number of line of document 0	Assignment
1	Project name
2	Type of created project
4	Number of Design Sections in Bars
9	Coupled AK Loads in elements for system BRIDGE
10	Design Nodes list for system BRIDGE
11	Design Elements list for system BRIDGE
12	DCL Unification

Table A.2 (continuation)

13	Ignoring Elements in Buckling Analysis
16	Limits for quantity of Cranes and Brakes loads, included in DCL
17	Element groups with applied coefficients to mounting stages
18	Elements with one-sided elastic foundation
19	Consideration of additional loads
20	Control parameters
21	Parameters of DCL
39	Loading names

Lists of elements or nodes in lines of the 0th document can be given s using the "-" character for consecutive numbers.

The 1st line contains the name of the task, which cannot include the characters "(", ")", ":", "?", "*", "/", "\", ",", since these characters are not allowed in filenames, or are line and document separators in a text file.

The 2nd line contains one number - model's attribute (Table A.3).

Table A.3 Types of created project

Type of created project	Used directions	Description
1	X, Z	Plane truss or beam-wall
2	X, Z, UY	Plane frame
3	Z, UX, UY	Flat plate or grillage
4	X, Y, Z	Spatial truss or solid array
5	X, Y, Z, UX, UY, UZ	The spatial structure
7	X, Y, Z, UX, UY, UZ, W	The spatial structure considering warping or bars

line 4 - Number of Design Sections in Bars which is set as follows: the first is the number of calculated sections, after - the character ":", then goes the list of bar numbers and at the end the symbol ";", which indicates the end of the data for a specific number of calculated sections.

line 9 - information about coupled AK Loads in elements in system BRIDGE which is set as follows: the first goes a number that indicates where the coupled loads should be taken into account (1 - in the first section, 2 - in the last), after - the symbol ":", then - the list of bar numbers and at the end the symbol ";".

line 10 - design Nodes list for system BRIDGE.

line 11 - design Elements list for system BRIDGE which are set as follows: at the beginning there is a list of stress codes (should be equal to 1 2 3 4 5 6 7 8) that need to be calculated, after goes the symbol ":", then, a list of element numbers.

line 12 - Unification of elements for DCL. It is set as follows: the first is a number that indicates the number of the unification group (up to the last digit) and its type (the last digit: 1 - a single section for the entire group, 2 - unification for individual sections), after - the symbol ":", then - a list of element numbers that are included in this group and at the end the “;” symbol, indicating the end of the data for a particular unification group.

line 13 - a list of elements for which the stability matrix is not calculated during the stability calculation.

line 16 consists of two numbers: 1st - the number of vertical crane loads to be considered, 2nd - the number of brake crane loads to be considered.

line 17 - element groups with applied coefficients to mounting stages. It is specified as follows: the group number comes first, followed by the ":" symbol, then the list of element numbers and the ";" symbol at the end. The coefficients for the installation stages themselves, related to a particular group, are specified in document 10 (for details, see item A.5 "Loads and impacts").

line 18 - list of elements with one-sided elastic foundation.

line 19 is necessary in case of calculation taking into account intermediate nodes and contains one number, the number of the last "non-intermediate" node.

When calculating with intermediate nodes, the numbers of intermediate nodes must be placed at the end of the list.

Line 20 consists of eight numbers: *the 1st* is the decomposition accuracy, *the 2nd* is the dynamics accuracy, the *3rd* is the modal mass contribution threshold, the *4th* is the accuracy of summing the forms with multiple frequencies, the *5th* is the decomposition method, the *6th* - optimization method, the *7th* - whether to use 6 degrees of freedom in the shell and the *8th* - whether to use one processor core.

The *21st line* consists of five numbers: 1st - regulatory document (0 - do not calculate DCL, 1 - SNiP 2.01.07-85*, 2 - DBN V.1.2-2:2006, 3 - SP 20.13330.2011 , 4 - SP 20.13330.2016; 5 - EN 1990:2002), the following 4 numbers are needed only for the normative document EN 1990:2002 and denote: 2nd - 0 - use formula (6.10) or 1 - use max{(6.10 a),(6.10b)}; 3rd is the value of the reduction factor in formula (6.10b); 4th - choice between 0 – ψ11 or 1 – ψ21 for accidental loading cases; 5th - which table to use: 1 — EQU(group A), 2 — STR/GEO(group B), 4 — STR/GEO(group C), 3 — EQU(group A), STR/GEO(group B), 5 — EQU(group A), STR/GEO(group C), 6 — STR/GEO(group B), STR/GEO(group C), 7 — EQU(group A), STR/GEO(group B) and STR/GEO(group a C).

The *39th* line is the names of the load cases, which are specified as follows: the first is the number of the load case, after the symbol ":", then the name of the load case, and at the end the symbol ";", indicating the end of the data for a specific name of the load case.

Document 13 is binary information written to a text file and used when importing from a text file.

Document 27 is a text file version and checksums, is mandatory and has only one line, the first number of which corresponds to the version number and changes to the text file and is calculated by formula:

$$\begin{cases} A = V \cdot 10000 + R \cdot 100, \text{ for vervion 10.12 and newer} \\ A = V \cdot 1000 + R \cdot 100, \text{ for older versions} \end{cases} \tag{A.1}$$

where A — the first number of *27th document*,

V=10 — number of text file version,

R=4 — number of text file change.

All other numbers are checksums for individual parts of the calculation scheme; these numbers are used to check the compliance of the calculation results with the original data.

A.3 NODES

Document 4 - node coordinates. The line contains three coordinates of the node, which are specified in meters in the directions in the order: X, Y, Z. All three coordinates are mandatory even for flat tasks. The line number is equal to the node number in the scheme.

Example:

```
Nodes
( 4/
     17.05000 -0.85000    -2.85000 /* 1 /
     17.05000 15.15000    -2.85000 /* 2 /
     -0.85000 15.15000    -2.85000 /* 3 /
     -0.85000 -0.85000    -2.85000 /* 4 /
     5.00000  1.00000     -2.85000 /* 5 /
 )
```

Document 5 - Restraints of nodes and Displacement Unification. The first number in the line is the node number, followed by the corresponding numbers of directions (1 - X, 2 - Y, 3 - Z, 4 - UX, 5 - UY, 6 - UZ, 7 - W, 700 - T (zero temperature in the node), 800 - F (zero pressure in the node)), along which the node will be fixed or combined by displacement.

No displacement unification is provided for degrees of freedom T and F.

To set restraints it is enough to specify the number of the node and the desired directions. To specify displacement unification, after specifying the node number and directions, specify the numbers of nodes with which displacements are combined in the following *lines* (one *line* contains one node number).

Example:

```
Restraint & UnionDOF
     ( 5/
     1 4 5 6 /
     3 4 5 6 7 /
     5 4 5 6 7 700/
     13 1 2 3 4 5 6 /
     13 7 /
     1 1 2 3 /3 /5 /7 /
     2 1 2 3 4 5 6 /4 /6 /
     2 7 /4 /6 /
)
```

Nodes fixed: 1st - along UX, UY, UZ, 3rd - along UX, UY, UZ, W, 5th - along UX, UY, UZ, W, F, 13th - in all directions and combined movements: 1st, 3rd, 5th and 7th nodes in X, Y, Z, as well as 2nd, 4th and 6th nodes in all directions.

✍ *Document line 5 has a limit of 7 numbers (subject to node number). Therefore, for* restraints *or unification of all 7 directions, the last direction must be specified using a new line.*

Document 12 describes the local coordinate system of nodes. The first number in the line is the node number, then 6 numbers are given - two normalized vectors (X and Y). The Z vector is defined in the processor as a cross product, as for a right-handed coordinate system.

Example:

```
( 12/
     2 -0.857142857 -0.428571428 -0.285714285 0.447213595 -0.89442719 0  /
     3 -1 0 0 0 -0.7071067812 0.7071067812 /
     4 -0.99388373 0.11043152 0 -0.0780868809 -0.702781928 0.707106781   /
)
```

25th document describes the creation of Absolutely Rigid Bodies. Each *line* — list of nodes numbers of one rigid body; the first node in the list — the base node of the rigid body.

Example:

```
( 25/
     1 2 3 4 5 /
     10 11 13 18 20 /
     31 32 33 41 42 /
)
```

✍ *The number of nodes for one rigid body is limited to 501. The list of nodes is not allowed to be specified through the "-" character, even if the node numbers are consecutive.*

A.4 ELEMENTS

1st document is used to set types and node numbers of elements. The order in which the elements are presented is their numbering. *Document line 1* is specified in the following sequence:

• Elements type;
• hardness number (should be a positive number), which will be defined in the processor;
• node indexes.

The number of nodes in one line is limited to 4, therefore, to specify a larger number of nodes, it is necessary to use additional lines in which instead of the element type and stiffness number there will be zeros, and then the remaining nodes.

Example:

```
Elements
( 1/

     * 1st element of type 56 (one-noded) /
     56 1 1 /
     * 2nd element of type 10 (bar) /
     10 1 2 3 /

     * 3rd element of type 43 (3-noded plate) /
     43 1 4 5 6 /

     * 4th element of type 50(4-noded plate) /
     50 1 7 8 10 9 /

     * 5th element of type 38 (tetrahedron) /
     38 1 11 12 13 14 /

     * 6th element of type 39 (triangular prism) /
     39 1 15 16 17 22 / 0 0 23 24 /

     * 7th element of type 37(hexahedron) /
     37 1 18 19 21 20 / 0 0 25 26 28 27 /
)
```

In the case of calculation with consideration of the intermediate nodes, plates and solid elements must have the corresponding type (see Chapter 19),while bars and single-node elements remain with the same types as without intermediate nodes.

Example of creating of the *1st document* considering additional nodes (28 is number of the last additional node):

```
Elements

( 1/

     * 1st element of type 56 (one-noded) /
     56 1 1 /
     * 2nd element of type 10 (bar) /
     10 1 2 3 29 /

     * 3rd element of type 43 (3-noded plate) /
     43 1 4 5 6 32 /  0 0 31 30 /

     * 4th element of type 50 (4-noded plate) /
     50 1 7 8 10 9 /  0 0 33 34 36 35 /

     * 5th element of type 38 (tetrahedron) /
     38 1 11 12 13 14 /  0 0 40 38 37 39 /  0 0 41 42 /

     * 6th element of type 39 (triangular prism) /
     39 1 15 16 17 22 /  0 0 23 24 46 44 / 0 0 43 59 58 57 / 0 0 45 47 48 /

     * 7th element of type 37 (hexahedron) /
     37 1 18 19 21 20 / 0 0 25 26 28 27 / 0 0 49 50 54 52 /
     0 0 60 61 63 62 / 0 0 51 53 56 55 /
)
```

To explain the order of submission of element nodes in *document 1*, figures A.1-A.6 are given below, where the elements and numbers of their nodes are schematically shown, taking into account intermediate ones.

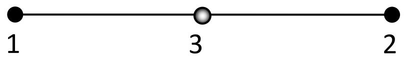


Fig. A.1. Node numbering of bar

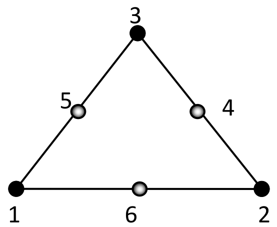


Fig. A.2. Node numbering of 3-noded plate

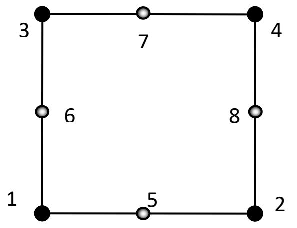


Fig. A.3. Node numbering of 4-noded plate

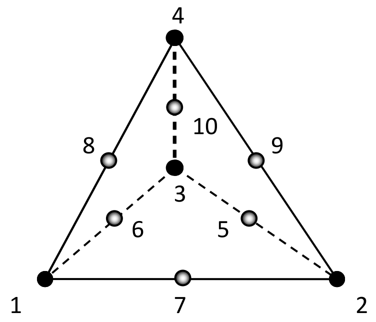


Fig. A.4. Node numbering for tetrahedron

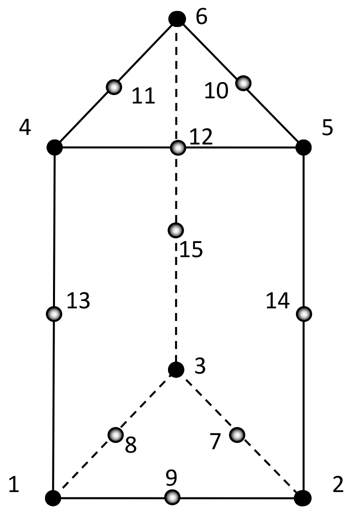


Fig. A.5. Node numbering for triangular prism

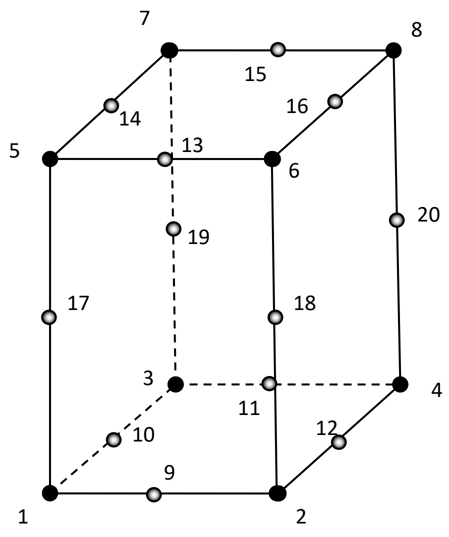


Fig. A.6. Node numbering for hexahedron

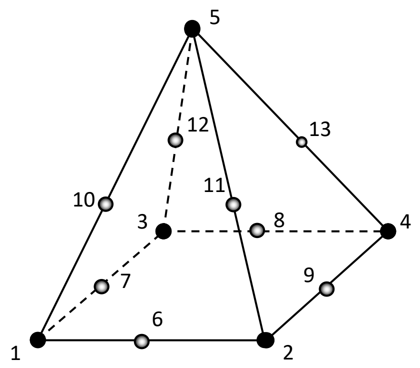


Fig. A.7. Node numbering for pyramid

Document 2 describes hinge data. Each *line* of document 2 contains information about the hinge for one bar node in a specific direction and is given by:

- For ideal and elastic hinges via 4 numbers:
  1. Bar number.
  2. Local number of node (1 or 2, according to *document 1*).
  3. Number of direction (1 — X, 2 — Y, 3 — Z, 4 — UX, 5 — UY, 6 — UZ, 7 — W).
  4. Rigidity (tf/m or tf·m/Rad) — is applied only for elastic hinge, for ideal hinge is applied 0 or not set at all.
- For nonlinear hinge via 7−19 numbers:
  1. Bar number.
  2. Local number of node (1 or 2, according to *document 1*).
  3. Number of direction (1 — X, 2 — Y, 3 — Z, 4 — UX, 5 — UY, 6 — UZ).
  4. Law (for linear direction: displacement, (m) – force, (tf) or for rotation: angle, (Rad) — momentum, (tf·m)), minimal number of law couples — 2, maximal — 8. Point (0, 0) in the law is not set.

By deplanation, a hinge can only be created an ideal.

Example:

```
Hinge
( 2/
     * ideal hinge at 1st element at the 1st node along Z direction /
     1 1 3/

     * Elastic hinge with rigidity 100 tf·m/rad at 2nd element at 1st node
       along UZ direction /
     2 1 6 100/

     * ideal hinge at 3rd element at 2nd node along X direction /
     3 2 1/

     * nonlinear hinge at 4th element at 2nd node along UY direction /
     4  2  5  -0.0017453  -11  -0.00087266  -9  -0.00043633  -7  -0.00017453  -5
     0.00017453 5 0.00043633 7 0.00087266 9 0.0017453 11 /
)
```

Document 9 describes the axes for equalizing forces and stresses and is defined as follows:

1 Index of element.

2. For rods, a normalized vector is specified along the Y1 direction (the X vector for rods is always directed from the 1st node to the 2nd one, the Z vector is determined in the processor by the vector product, as for a right-handed coordinate system), for plates - the rotation angle, for solid elements — two normalized vectors along the directions X1 and Y1.

Example:

```
Axis of Stress
( 9/
     * axes of force alignment for bar with number 1 /
     1 0 0.525322 0.8509035 /
     * axes of stress alignment for plate with number 2 /
     2 90 /
     * axes of stress alignment for solid element with number 3 /
     3 1 0 0 0 1 0 /
)
```

11th document describes relative inelastic strain factor for seismic design according to Uzbekistan regulations (KMK 2.01,03-96). Each *line* of *11 document* contains relative inelastic strain value. The order of submission corresponds to the elements.

The number of document lines 11 must match the number of elements.

Document 14 describes a rigid insertion of elements and is defined as follows:

1. Index of element.
2. Type of axes in which a rigid insert is specified (for bars: 3 — global axes, 0 — local axes; for plates: always in local axes).
3. Rigid insert values, for rods — 6 numbers (increments in X1, Y1, Z1 for the 1st and 2nd nodes), for plates — increments in Z.

Example:

```
Offset
( 14/
     * Rigid Inserts in global axes for bar with index 1 /
     1 3 0 0 0 2 1 0 /

     * Rigid Inserts in local axes for plate with index 2 /
     2 0 1 /
)
```

Rigid inserts are specified in meters.

Document 17 describes the local bar axes, as well as the orthotropy axes for plates and solids. It is set in the following way:

1. For rods, only the normalized vector Y is specified (vector X for rods is always directed from the 1st node to the 2nd, the vector Z is determined in the processor by the vector product, as for a right-handed coordinate system).
2. The rotation angle is specified for the plates.
3. For solid elements, two normalized vectors are specified along the X1 and Y1 directions.

The first number on *line* 17 of the document should be the element number, followed by the description of the axes.

Example:

```
Axis of Orthotropy
( 17/
     1 -0.707 0 0.707     /* local coordinate system of bar /
     2 14.036             /* axis of orthotropy for plate /
     4 0 1 0 0.56 0 -0.83 /* axis of orthotropy for solid element /
)
```

19th document describes elastic foundation and have the next structure:

1. For one-noded contour elements (type 54) the next characteristics are required:
   1.1. Shear coefficient C2, (tf/m), is required for consideration of peripheral of elastic foundation.
   1.2. Wedge angle of elastic foundation, (°).
2. Two variants exist for bars:
   2.1. For contour elements (type 53) the next characteristics are required:
      2.1.1. Bedding coefficient C1, (tf/m^3).
      2.1.2. Shear coefficient C2, (tf/m), is required for considering of peripheral of elastic foundation.
   2.2. For general case the next characteristics are required:
      2.2.1. Width from cross section, (m).
      2.2.2. Bedding coefficient C1, (tf/m^3).
      2.2.3. Shear coefficient C2, (tf/m).
      2.2.4. Width from cross section (m) along axis Y1.
      2.2.5. Bedding coefficient yC1, (tf/m^3) along axis Y1.
      2.2.6. Shear coefficient yC2, (tf/m) along axis Y1.
      2.2.7. Bar cross section perimeter or contact width, (m) along axis X1.
      2.2.8. Bedding coefficient Cx, (tf/m^3).
3. For plates the next characteristics are required:
   3.1. The compression ratio of the elastic foundation C1, (tf/m^3).
   3.2. Shear coefficient C2,x along axis X1, (tf/m).
   3.3. Shear coefficient C2,y along Y1, (tf/m).
   3.4. Shear coefficient C2,xy of the elastic foundation with anisotropic properties, (tf/m).
   3.5. Bedding coefficient Cx, (tf/m^3).
   3.6. Bedding coefficient Cy, (tf/m^3).

Each line of the 19th document must begin with an element number.

Example:

```
Elastic Basis
```

```
( 19/
     1 800 90 /* for one-noded element of type 54 /

     2 800 1000 /* for bar of type 53 /

     3 0.4 800 1000 0.4 500 700 1.6 800 /* general case for bar /

     4 900 1000 1000 0 630 630 /* for plates /
)
```

Document 21 describes the floors of the building. It is specified in this way: the floor number, then the numbers of elements included in this floor are specified through the colon character (it is allowed to specify the list through «-» character).

Example:

```
( 21/
     1 : 241-484 1529 2334 2335-2533 2870-2953 3098-3133 3214-3283 /
     2 : 485-728 1530 2134 2135-2333 2786-2869 3062-3097 3194-3213 3284-3333
          /
     3 : 729-972 1531 1934 1935-2133 2702-2785 3026-3061 3174-3193 3334-3383
          /
     4 : 973-1216 1532 1734 1735-1933 2618-2701 2990-3025 3154-3173 3384-3433
          /
     5 : 1217-1460 1533-1733 2534-2617 2954-2989 3134-3153 3434-3483 /
 )
```

Document 39 describes the tasks of mounting/dismantling elements at specific stages of mounting. The line indicates the number of the stage of construction, installation (1) or dismantling (4), a list of elements.

Lists of elements in the lines of the 39th document can be specified using the «-» symbol for consecutive numbers.

Example

```
Mounting stages
( 39/
     * first mounting stage - assembling of elements/
     1  1 : 1-64 /

     * second mounting stage - assembling of elements/
     2  1 : 65-128 /

     * second mounting stage - disassembling of elements/
     2  4 : 3 /
 )
```

2 stages a specified:

1. Mounting of elements with indexes 1 – 64.
2. Mounting of elements with indexes 65 – 128 and demounting of element with index 3.

41th document describes rigidity of elements (materials and cross sections).

Line of 41 document is specified in the following sequence:

1. Section number.
2. Group number.
3. Rigid characteristics.
4. Symbol «:».
5. List of elements (creating of the list via «-» is allowed).
6. Symbol «;».
7. Symbol at the string end «/».

Sections of *document 41:*

1. Materials (Table A.4–A.7).
2. Sections (Table A.8–A.10).
3. Soils
4. Special elements (Table A.11).
5. Additional characteristics.
6. Arbitrary nonlinear cross sections.

Materials (section 1 of 41th document)

Table A.4 Groups of the 1st section of 41th document

Section number	Group number	Description
1	1	Isotropic material
1	3	Orthotropic Material
1	4	Nonlinear base material
1	5	Nonlinear material of reinforcement
1	7	Creep
1	8	Strength theory for physical nonlinearity
1	9	Rules for consideration of plastic hinges
1	11	Isotropic parameters of material for heat transfer problem
1	13	Orthotropic parameters of material for heat transfer problem
1	14	Damping coefficients
1	15	Parameters of layers of multilayer plates

Isotropic material is specified in the following sequence:

1. Specific weight, (tf/m^3).
2. Modulus of elasticity, (tf/m^2).
3. 3. Poisson's ratio.

Orthotropic material is specified in the following sequence:

1. Specific weight, (tf/m^3).
2. Modulus of elasticity E1, (tf/m^2).
3. Modulus of elasticity E2, (tf/m^2).
4. Modulus of elasticity E3, (tf/m^2).
5. Poisson’s ratio Nu12.

6. Poisson's ratio Nu21.
7. Poisson's ratio Nu13.
8. Poisson's ratio Nu23.
9. Poisson's ratio Nu31.
10. Poisson's ratio Nu32.
11. Shear modulus G12, (tf/m^2).
12. Shear modulus G13, (tf/m^2).
13. Shear modulus G23, (tf/m^2).

For non-linear base material (given by laws 11, 13, 15, 14, 18) and reinforcing material (given by laws 11, 13, 15, 14), after setting the section and group number, the law number is given (Table A.5).

For the nonlinear basic material Specific Weight, Modulus of elasticity and Poisson's ratio are specified via section 1 of group 1.

Table A.5 Laws for nonlinear material

Law index	**Description**
11	Exponentially Dependent Material
13	Trilinear Dependence
14	Piecewise Linear Description
15	Exponentially Dependent Concrete
18	Concrete by Geniev Theory

11th, *13th* and *15th laws* are specified in the fallowing sequence:

1. Modulus of elasticity E, (tf/m^2).
2. Limit strenght σ-, (tf/m^2).
3. Elastic limit σ0-, (tf/m^2).
4. Limit relative strain ε-.
5. Limit strenght σ+, (tf/m^2).
6. Elastic limit σ0+, (tf/m^2).
7. Limit relative strain ε+.

For *14th law* the diagram points are specified (strain – stress, (tf/m^2)). Point with coordinate (0,0) is skipped.

18th law is specified in the following sequence:

1. Modulus of elasticity E, (tf/m^2).
2. Limit strenght σ-, (tf/m^2).
3. Limit relative strain, ε-.
4. Limit strenght σ+, (tf/m^2).
5. Limit relative strain ε+.

Creep can be specified via two laws (index of law is specified after numbers of section and group):

1. 44th Piecewise-linear creep law is described by a graph, each point of which has two coordinates: T - Loading time (concrete age) and φ (T) - Creep factor corresponding to the number of days;

2. 41th Power law creep is described via two values: φ0 is conditional creep factor and βH is coefficient that considers relative humidity of air and conditional element size.

The graph for the 44th law of creep must start from the point (0, 0).

Strength theory is specified in the following sequence (after numbers of section and group):

1. Theory identifier (Table A.6).
2. Limit compressive strenght, (tf/m^2).
3. Limit tensile strenght, (tf/m^2).
4. Number 0 (necessarily).

Table A.6 Strength theory

Strength theory identifier	Description
1	Maximum principal stresses
2	Maximum principal strains
3	Maximum shear stresses
4	Energy of Huber-Henkey-von Mises
5	Mohr theory
9	Drucker-Prager theory
11	Pisarenko-Lebedev theory
18	Geniev theory

The norms for accounting for plastic hinges are set in the following order (after the section and group number):

1. Rules identifier (Table A.7).
2. ε- for the base material.
3. ε+ for the base material.
4. ε+ for the material of reinforcement.

Table A.7 Rules for consideration of plastic hinges

Rules identifier for plastic hinges	Description
0	SNiP 2.03.01-84*
1	Ignoring of plastic hinges
2	Eurocode 2
3	SP 52-101-2003
4	DSTU B V.2.6-156:2010

Isotropic parameters of material for heat transfer problem:

1. Thermal conductivity factor, (W/(m*^{o}C)).

2. Specific heat, (J/(kg*^{o}C)).

Orthotropic parameters of material for heat transfer problem:

1. Thermal conductivity factor K11, (W/(m*^{o}C)).
2. Thermal conductivity factor K12, (W/(m*^{o}C)).
3. Thermal conductivity factor K13, (W/(m*^{o}C)).
4. Thermal conductivity factor K22, (W/(m*^{o}C)).
5. Thermal conductivity factor K23, (W/(m*^{o}C)).
6. Thermal conductivity factor K33, (W/(m*^{o}C)).
7. Specific heat, (J/(kg*^{o}C)).

Damping factor:

1. α, (1/s).
2. β, (s).

Parameters of multilayer plates by layers (by one layer are set):

1. Specific weight, (tf/m^3).
2. Modulus of elasticity, (tf/m^2).
3. Poisson’s ratio.
4. Coefficient of thermal expansion.
5. Thermal conductivity factor, (W/(m*^{o}C)).
6. Specific heat, (J/(kg*oC)).
7. α, (1/s).
8. β, (s).

The number of layers in a multilayer plate is limited to 10.

Example of groups specifying for the first section:

```
( 41/
     * Isotropic material /
     1 1 2.5 3060000 0.2 : 1-10 /

     * Orthotropic material /
     1 3 2.5 3061000 3062000 3063000 0.12 0.21 0.13 0.23 0.31 0.32 1200000
         1300000 2300000 : 11-20 /

     * 11th law for base material and reinforcement /
     1 4  11 3060000 -1890 -950 -0.002 163 90 0.0002  : 21-30 /
     1 5  11 21000000 -40000 -35000 -0.02 40000 35000 0.02  : 21-30 /

     * 13th law for base material and reinforcement /
     1 4  13 3060000 -1890 -950 -0.002 163 90 0.0002  : 31-40 /
     1 5  13 21000000 -40000 -35000 -0.02 40000 35000 0.02  : 31-40 /

     * 14th law for base material and reinforcement /
     1 4  14 -0.002 -1890 -0.0003 -950 2.9E-05 90 0.0002 163  : 41 /
     1 4  14 -0.02 -40000 -0.00167 -35000 0.00167 35000 0.02 40000  : 41 /

     * 15th law for base material and reinforcement /
     1 5  15 3060000 -1890 -950 -0.002 163 90 0.0002  : 42-50 /
     1 5  15 21000000 -40000 -35000 -0.02 40000 35000 0.02  : 42-50 /
```

```
* 18th law for base material /
1 4  18 3060000 -163 -0.002 1890 0.0002  : 51-60 /
* 44th law for creep /
1 7 44 0 0 100 1.1 200 1.2 300 1.3 : 21-30 /

* 41th law for creep /
1 7 41 1.1 1.3 : 31-40 /

* Strength theory of maximum principal stresses /
1 8 1 1000 1500  0 : 21-30 /

* Strength theory of maximum principal strains /
1 8 2 1000 1500  0 : 31-40 /

* Strength theory of maximum shear stresses /
1 8 3 1000 1500  0 : 41 /

* Energy of Huber-Henkey-von Mises strength theory/
1 8 4 1000 1500  0 : 42-50 /

* Mohr strength theory /
1 8 5 1000 1500  0 : 51-60 /

* Drucker-Prager strength theory/
1 8 9 1000 1500  0 : 61-70 /

* Pisarenko-Lebedev strength theory/
1 8 11 1000 1500  0 : 71-80 /

* Geniev strength theory /
1 8 18 1000 1500  0 : 81-90 /

* Consideration of plastic hinges according to SNiP 2.03.01-84 /
1 9 0 -0.002 0.0002 0.02 : 21-30 /

* Consideration of plastic hinges according to Eurocode 2 /
1 9 2 -0.002 0.0002 0.02 : 31-40  /

* Consideration of plastic hinges according to SP 52-101-2003 /
1 9 3 -0.002 0.0002 0.02 : 41 /

* Consideration of plastic hinges according to DSTU Б В.2.6-156:2010 /
1 9 4 -0.002 0.0002 0.02 : 42-50 /

* Isotropic parameters of material for heat transfer problem /
1 11 0.00017233204 880 : 21-30 /

* Orthotropic parameters of material for heat transfer problem /
1 13 0.0001019716213 0.0004078864852 0.0006118297278 0.0002039432426
     0.0003059148638 0.0005098581065 880 : 8 9 /

* Damping coefficients /
1 14 0.136263 0.013626 : 8 9 /
* Parameters of layers of multilayer plates /
1 15 2.5 3060000 0.2 1E-05 0.00017233204 880 0.136263 0.013626
     2.5 3070000 0.2 1E-05 0.00017233204 880 0.136263 0.013626
     2.5 3080000 0.2 1E-05 0.00017233204 880 0.136263 0.013626 : 10 /
```

)

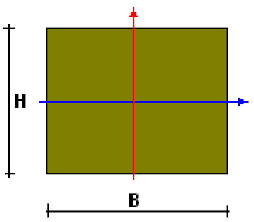
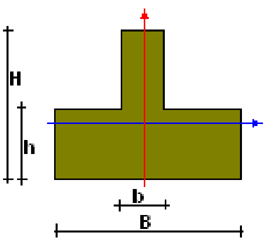
Cross-Sections (section 2 of 41th document)

Table A.8 Groups of 2nd section of 41th document

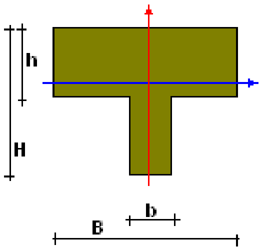
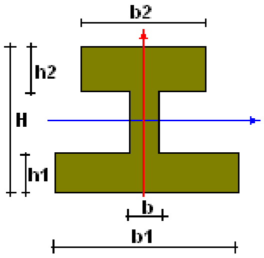
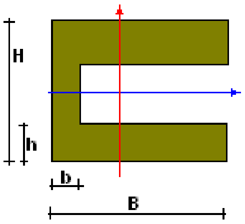
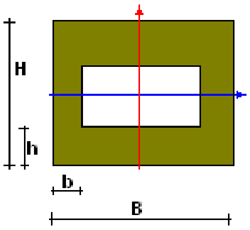
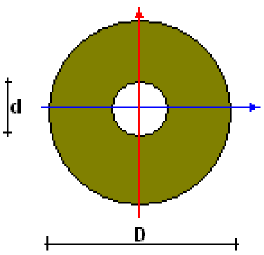
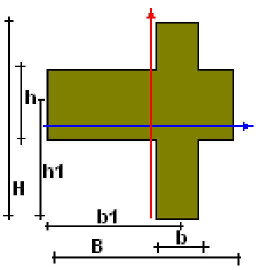
Section number	Group number	Description
2	1	Plate thickness, for multilayer plates: amount of layers, list of thicknesses along local axis Z (are specified in meters)
2	2	Cross section of bar (dimensions are specified in centimeters)
2	3	Reinforcement inclusions for solid elements and wall-beam
2	4	Reinforcement inclusions for bars
2	5	Reinforcement inclusions for shells
2	6	Fragmentation into primitive rectangles for bars
2	7	Numeric description of bar section
2	8	Kern distances
2	9	Additional data for buckling analysis of bars and mismatch of center of rigidity and center of gravity
2	10	Coefficients for bar with variable section
2	11	Stiffness reduction coefficients for plates
2	12	Stiffness reduction coefficients for bars

A bar in the 2nd group of the 2nd section can have one of 11 parametric sections (Table A.9), the identifier of which must be indicated after the section and group number, or its stiffness must be specified numerically.

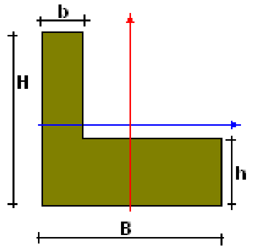
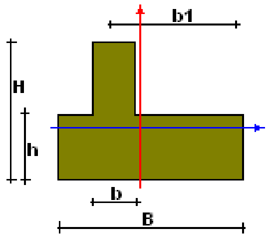
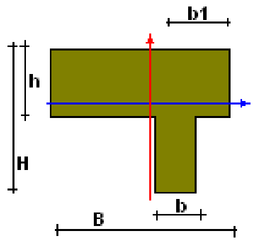
Table A.9 Parametric cross sections of bars

Cross-section identifier	Sketch	Cross-section name	Sequence of specifying of dimensions
1	**2**	**3**	**4**
0		Rectangular Bar	B H
1		Symmetrical T-beam (Bottom Flange)	b H B h

Continuation of Table A.9.

1	2	3	4
2		Symmetrical T-beam (Top Flange)	b H B h
3		I-beam	b H b1 h1 b2 h2
4		Channel Bar	b H B h
5		Rectangular Hollow Section (RHS)	B H b h
6		Circular Hollow Section (CHS)	D d
9		Cross	b H B h B-b1 h1

Continuation of Table A.9

1	2	3	4
10		Angle	B H b h
11		Asymmetrical T-beam (Bottom Flange)	b H B h b1
12		Asymmetrical T-beam (Top Flange)	B H B h b1

Example of specifying of cross-sections of plates and bars (*1st and 2nd groups of 2nd section*):

```
( 41/
     * plate thickness /
     2 1  0.2 : 1/

     * thicknesses of multilayer plate /
     2 1  3 0.2 0.3 0.2 : 2 /

     * Rectangular bar /
     2 2  0 40 60 : 3 /

     * Symmetrical T-beam (Bottom Flange) /
     2 2  1 20 50 40 10 : 4 /

     * Symmetrical T-beam (Top Flange) /
     2 2  2 20 50 40 10 : 5 /

     * I-Beam /
     2 2  3 15 60 40 10 50 13 : 6 /

     * Channel /
     2 2  4 10 50 40 15 : 7 /

     * Rectangular hollow section /
     2 2  5 40 50 10 15 : 8 /

     * Circular hollow section /
     2 2  6 40 10 : 9 /
```

```
        * Cross /
        2 2  9 20 50 40 10 27 25 : 10 /

        * Angle /
        2 2  10 50 40 20 10 : 11 /

        * Asymmetrical T-beam (Bottom Flange) /
        2 2  11 10 50 40 20 25 : 12 /

        * Asymmetrical T-beam (Top Flange) /
        2 2  12 10 50 40 15 25 : 13 /
)
```

Reinforcement inclusions for beam-walls and solid elements (section 2 group 3) are specified in the following way:

1. For beam-wall:
   1.1. Type of reinforcement inclusion (must equal 0).
   1.2. Reinforcement percentage upon X.
   1.3. Reinforcement percentage upon Y.
2. For solid elements:
   2.1. Reinforcement percentage upon X.
   2.2. Reinforcement percentage upon Y.
   2.3. Reinforcement percentage upon Z.

Example:

```
( 41/
        * reinforcement inclusion for beam-wall /
        2 3  0 20 20 : 1 /

        * reinforcement inclusion for solid element /
        2 3  0 3 3 5 : 2 /
)
```

Reinforcement bar inclusions (Section 2 Group 4) can be specified for the first 7 sections from Table A.9.

For the first six sections (for rectangular bar, Symmetrical T-beam (Bottom Flange), Symmetrical T-beam (Top Flange), I-beam and Rectangular Hollow Section), reinforcement inclusions can be of three types:

1. Spot reinforcement.
2. Horizontal distributed reinforcement.
3. Vertical distributed reinforcement.

Reinforcement inclusions for the first six sections are specified in the following order (after section and group numbers):

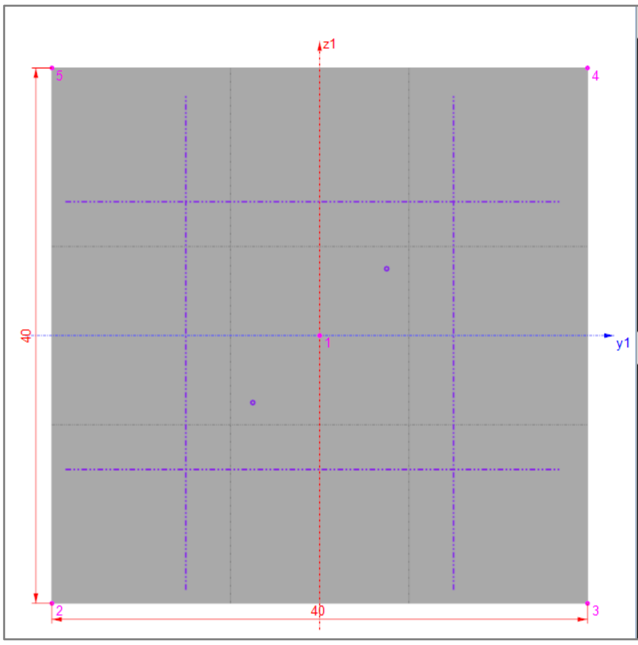
1. The type of reinforcement inclusions can take on the value:

   1.1. 3 — Spot reinforcement.

   1.2. 6 — horisontal distributed reinforcement.
   1.3. 7 — vertical distributed reinforcement
2. Reinforcement inclusion parameters:
   2.1. For spot reinforcement:
      2.1.1. Area (cm^2).
      2.1.2. Ly — reference along axis Y (cm).
      2.1.3. Lz — reference along axis Z (cm).
   2.2. For distributed horizontal reinforcement:
      2.2.1. Area (cm^2).
      2.2.2. L — reference along axis Z (cm).
      2.2.3. a1 — offset along axis Y from the left side (cm).
      2.2.4. a2 — offset along axis Y from the right side (cm).
   2.3. For distributer vertical reinforcement:
      2.3.1. Area (cm^2).
      2.3.2. L — reference along axis Y (cm).
      2.3.3. a1 — offset along axis Z from the bottom side (cm).
      2.3.4. a2 — offset along axis Z from the top side (cm).
3. Symbol «:».
4. List of elements.

Items 1–2 are repeated as many times as the number of times reinforcement inclusions are specified.

In the **Cross Sections/Stiffness Editor**, reinforcement inclusions are defined relative to any of the selected points. In the text file for rectangular bar, Symmetrical T-beam (Bottom Flange), Symmetrical T-beam (Top Flange), I-beam and Rectangular Hollow Section, reinforcement inclusions fall into the coordinate system, where the Y axis goes along the bottom side of the section, and the axis Z - in the middle of the same side. For channel bar, the Z axis goes along the outside of the channel wall.
Specifying of reinforcement inclusions for a bar in **Cross Sections/Stiffnesses Editor** is shown in fig. A.8.



Spot

#	Point	Ly, cm	Lz, cm	Area, cm^2
1	2	15	15	10
2	2	25	25	10
3	1			

Smeared

#	Point	Type	L, cm	a1, cm	a2, cm	Area, cm^2
1	1	||Z1	10	1	2	20
2	1	||Z1	-10	1	2	20
3	1	||Y1	-10	1	2	20
4	1	||Y1	10	1	2	20
5	1	||Y1				

Fig. A.8. Example for specifying of reinforcement for rectangular bar in **Cross Sections/Stiffnesses Editor**

The shown reinforcement inclusions for the beam will be seen in the text file as:

```
( 41/
     * reinforcement inclusions for rectangular bar/
     2 4   3 10 -5   15
           3 10  5   25
           7 20  10   1 2
           7 20 -10   1 2
           6 20  10   1 2
           6 20  30   1 2 : 1-10 /
)
```

Specifying of reinforcement inclusions for Symmetrical T-beam (Bottom Flange) in the **Cross Sections/Stiffnesses Editor** is shown in the Fig. A.9.

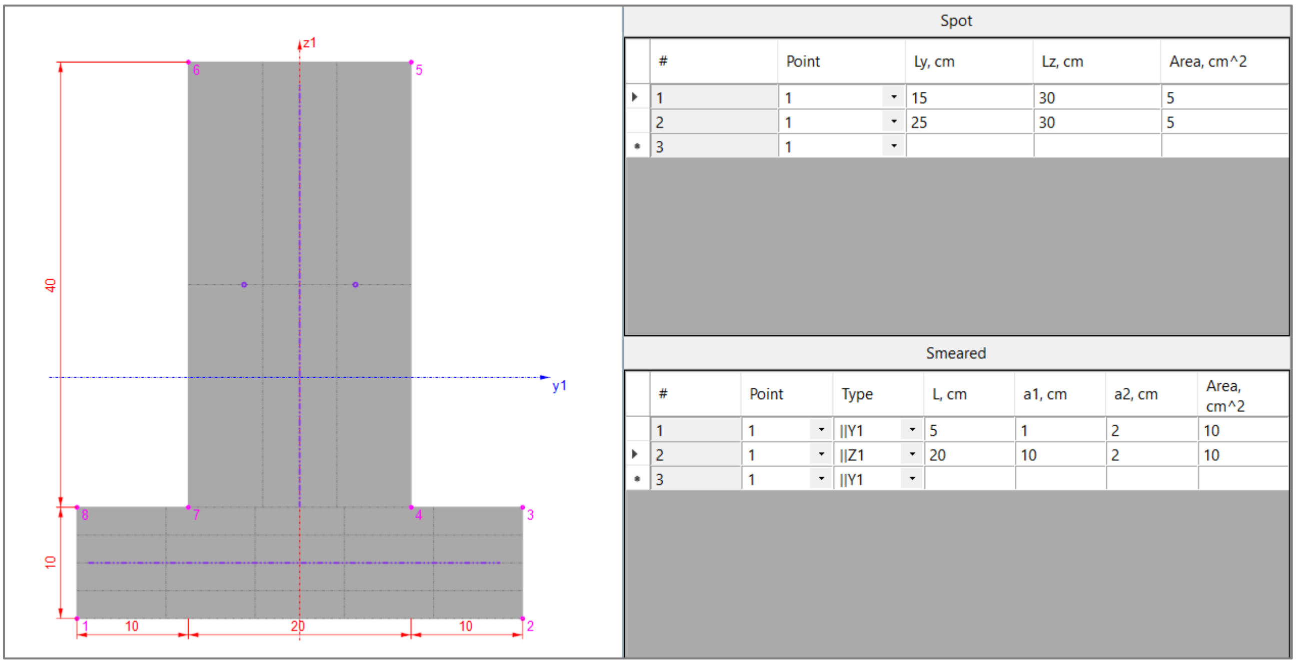


Fig. A.9. Example for specifying of reinforcement for Symmetrical T-beam (Bottom Flange) in **Cross Sections/Stiffnesses Editor**

The shown reinforcement inclusions for a symmetrical T-beam (bottom flange) will be seen in the text file as:

```
( 41/
     * reinforcement inclusion for Symmetrical T-beam (Bottom Flange) /
     2 4   3  5 -5 30
           3  5  5 30
           6 10  5  1 2
           7 10  0 10 2 : 11-20 /
)
```

Specifying of reinforcement inclusions for Symmetrical T-beam (Top Flange) in the **Cross Sections/Stiffnesses Editor** is shown in the Fig. A.10.

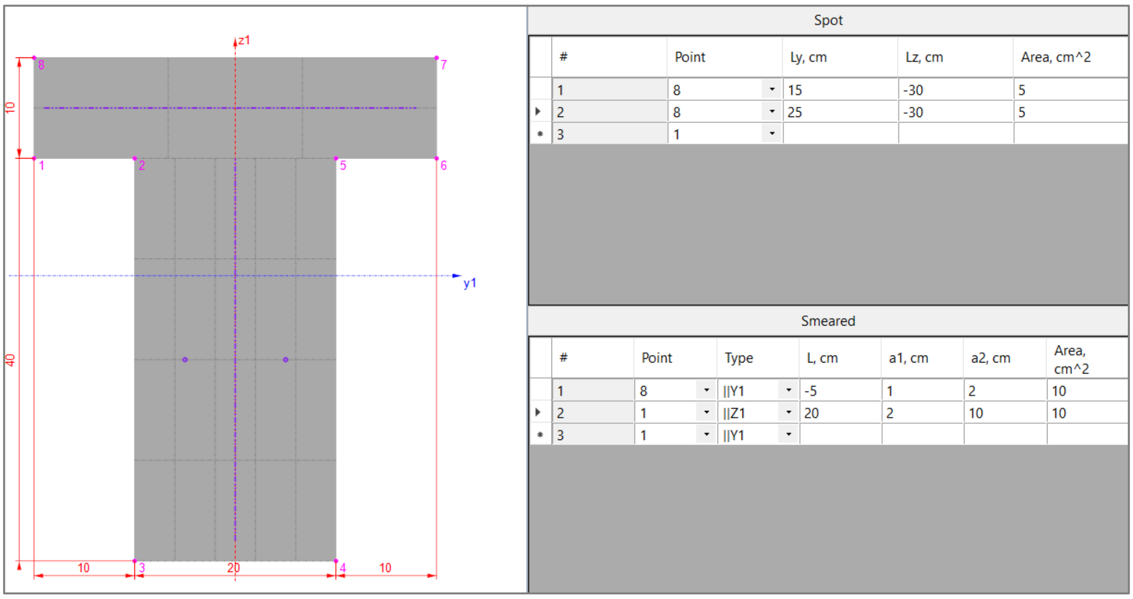


Fig. A.10. Example for specifying of reinforcement for Symmetrical T-beam (Top Flange) in **Cross Sections/Stiffnesses Editor**

The shown reinforcing inclusions for a symmetrical T-beam (Top Flange) will be seen in the text file as:

```
( 41/
     * reinforcement inclusion for Symmetrical T-beam (Top Flange) /
     2 4  3  5 -5 20
          3  5  5 20
          6 10 45  1  2
          7 10  0  2 10 : 21-30 /
)
```

Specifying of reinforcement inclusions for I-Beam in the **Cross Sections/Stiffnesses Editor** is shown in the Fig. A.11.

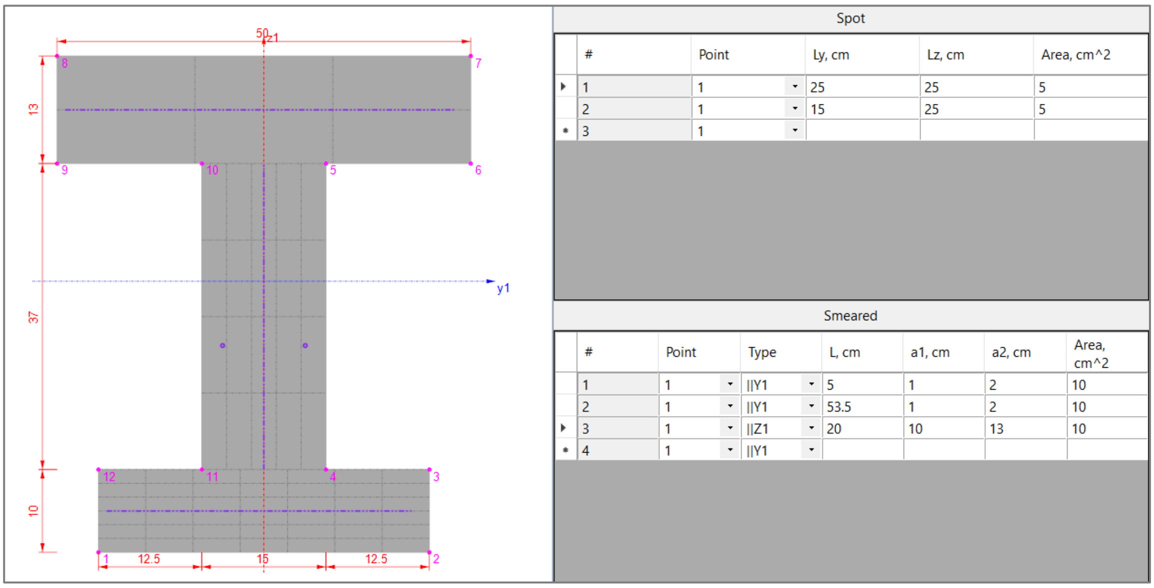


Fig. A.11. Example for specifying of reinforcement for I-beam in **Cross Sections/Stiffnesses Editor**

The shown reinforcement inclusions for a symmetrical I-beam) will be seen in the text file as:

```
( 41/
     * reinforcement inclusions for I-beam /
     2 4   3  5  5   25
           3  5 -5   25
           6 10  5    1  2
           6 10 53.5 1  2
           7 10  0   10 13: 31-40 /
)
```

Specifying of reinforcement inclusions for Channel bar in the **Cross Sections/Stiffnesses Editor** is shown in the Fig. A.12.

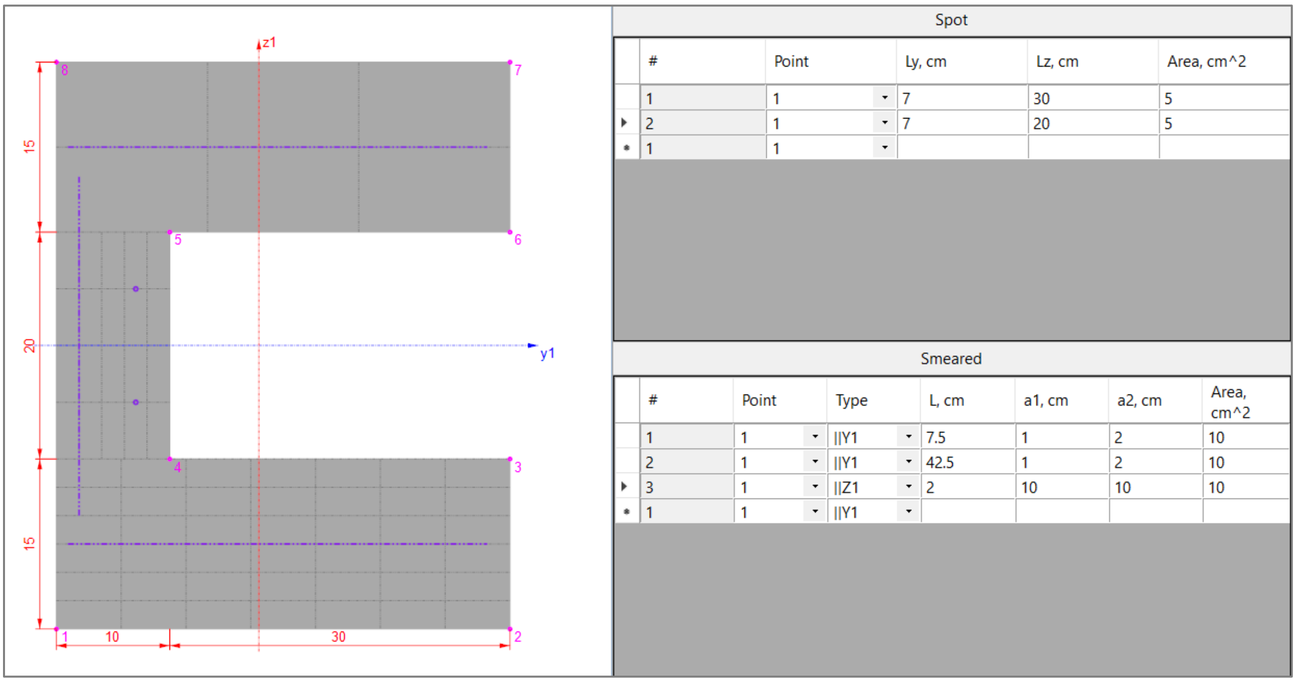
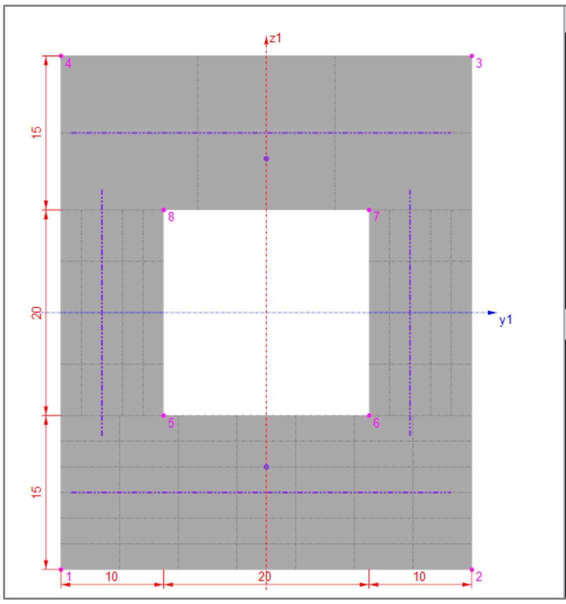


Fig. A.12. Example for specifying of reinforcement for Channel bar in **Cross Sections/Stiffnesses Editor**

The shown reinforcement inclusions for a channel bar will be seen in the text file as:

```
( 41/
     * reinforcement inclusions for channel bar /
     2 4   3  5  7    30
           3  5  7    20
           6 10  7.5   1  2
           6 10 42.5   1  2
           7 10  2    10 10 : 41-50 /
)
```

Specifying of reinforcement inclusions for Rectangular Hollow Section in the **Cross Sections/Stiffnesses Editor** is shown in the Fig. A.13.



Spot

#	Point	Ly, cm	Lz, cm	Area, cm^2
1	1	20	10	0
2	1	20	40	0
1	1			

Smeared

#	Point	Type	L, cm	a1, cm	a2, cm	Area, cm^2
1	1	‖Y1	7.5	1	2	0
2	1	‖Y1	42.5	1	2	0
3	1	‖Z1	4	13	13	0
4	1	‖Z1	34	13	13	0
1	1	‖Y1				

Fig. A.13. Example for specifying of reinforcement for Rectangular Hollow Section in **Cross Sections/Stiffnesses Editor**

The shown reinforcement inclusions for rectangular hollow section will be seen in the text file as:

```
( 41/
     * reinforcement inclusions for rectangular hollow section /
     2 4  3 5 0 10
          3 5 0 40
          6 10   7.5  1  2
          6 10  42.5  1  2
          7 10 -16   13 13
          7 10  14   13 13 : 51-60 /
)
```

Reinforcement inclusions for the ring can be of two types:

1. Spot reinforcement.
2. Distributed around the circumference reinforcement.

Reinforcement inclusions for the ring are specified in the following order (after section and group numbers):

1. Type of reinforcement inclusion (10 — spot reinforcement, 8 — distributed reinforcement).
2. Parameters of reinforcement inclusions:
   2.1. For spot reinforcement:
      2.1.1. Area (cm^2).
      2.1.2. Diameter (cm).
      2.1.3. Angle (degree).
   2.2. For distributed reinforcement:
      2.2.1. Diameter (cm).
      2.2.2. Ring thickness (cm).
3. Symbol «:».
4. List of elements.

Items 1–2 are repeated as many times as the number of times reinforcing inclusions are specified.

For the ring, reinforcement inclusions are set relative to the center - point 1, and the angle from the Y1 axis is counterclockwise (Fig. A.14).

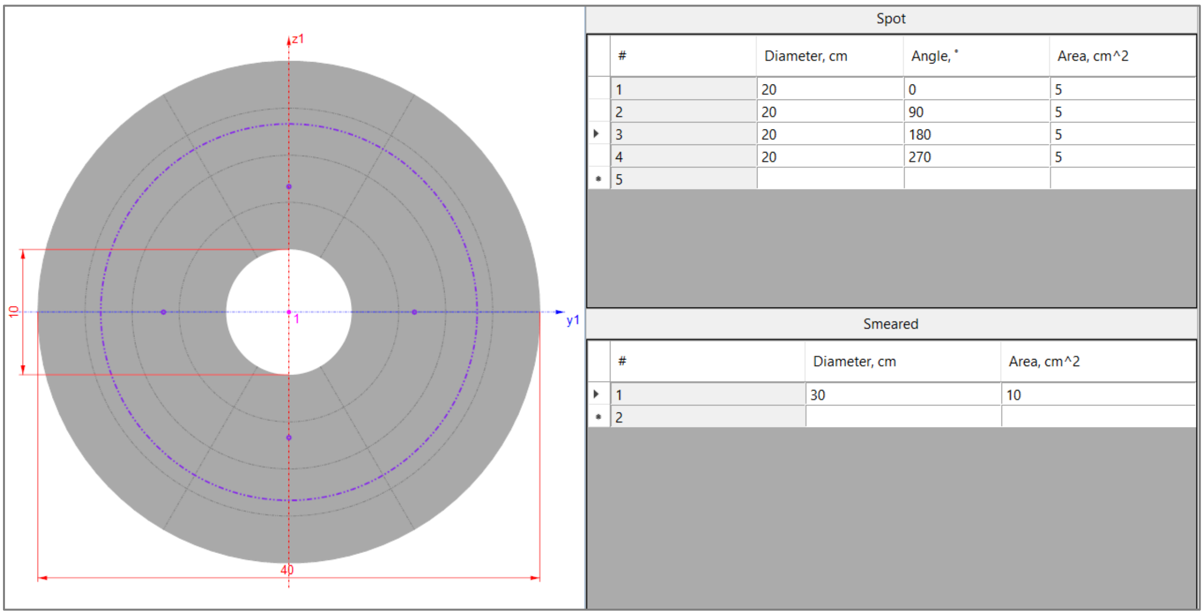


Fig. A.14. Example for specifying of reinforcement for Circular Hollow Section in **Cross Sections/Stiffnesses Editor**

The shown reinforcement inclusions for the ring will be seen in the text file as:

```
( 41/
     * reinforcement inclusions for circular hollow section /
     2 4
     10   5 20    0
     10   5 20   90
     10   5 20  180
     10   5 20  270
      8  30 0.1061 : 61-70 /
)
```

Reinforcing inclusions of shells (*Section 2 Group 5*) in the form of sheets are specified as follows:

1. Type of reinforcement inclusion (must equal 2).
2. Thickness of equivalent sheet along axis X1 (cm).
3. Thickness of equivalent sheet along axis Y1 (cm).
4. Reference (cm) relative to the central line of cross-section.

Items 2–4 are repeated as many times as the number of times reinforcement inclusions are specified.

✍ *In the case of specifying the reinforcement inclusions in the form of a grid, item 2 is responsible for Ax - the reinforcement area in X (cm^2/m), and item 3 is responsible for the reinforcement area in Y (cm^2/m).*

Example:

```
( 41/
     * reinforcement inclusions for shell /
     2 5  2 3 3 7 3 3 -7 0.1 0.1 0 : 3-10 /
)
```

Bar fragmentation parameters (*Section 2 Group 6*) describe fragmentation for the first 7 sections from Table A.9. For clarity, examples of specifying fragmentations are schematically shown and described in Table A.10.

The fragmentation line is specified in the following order (after the section and group numbers):

1. Fragmentation type (3 — for circular hollow section, 2 — for other cases).
2. Fragmentation parameters.
3. Symbol «:».
4. List of elements.

Table A.10 Fragmentation of bar cross-sections

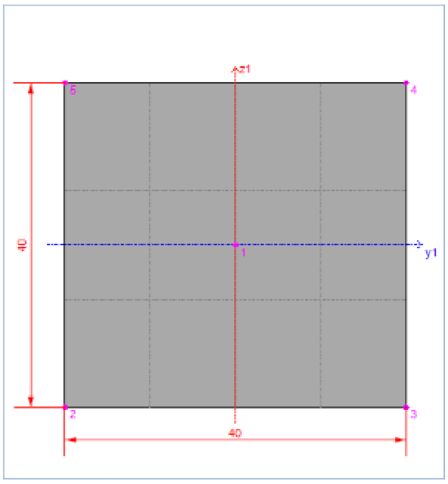
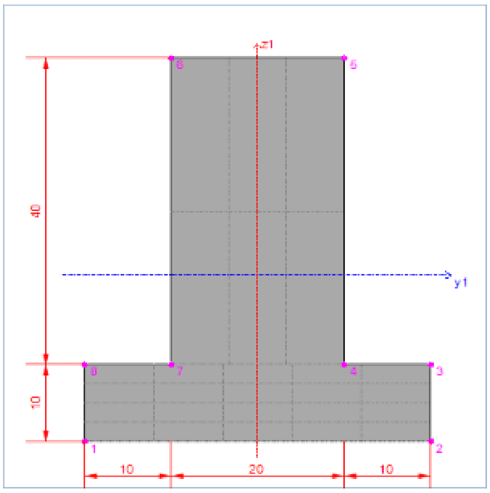
Cross-section name	Sketch	Description and specifying sequence of fragmentation parameters
1	2	3
Rectangular Bar		NZ — fragmentation along axis Z NY — fragmentation along axis Y In this Example: NZ = 3 NY = 4
Symmetrical T-beam		NZ1 — fragmentation of flange along axis Z NZ2 — fragmentation of wall along axis Z NY1 — fragmentation of flange along axis Y NY2 — fragmentation of wall along axis Y In this Example: NZ1 = 4 NZ2 = 2 NY1 = 5 NY2 = 3

Table A.10 (continuation)

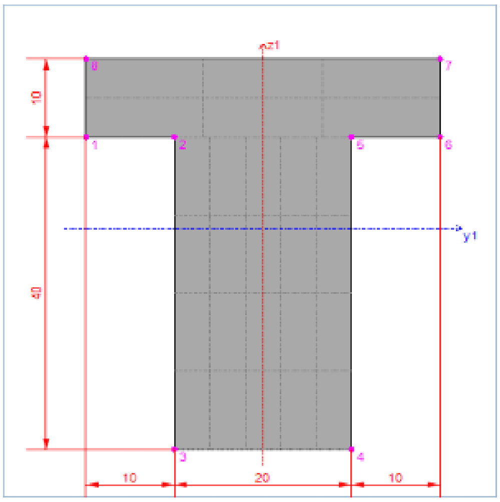
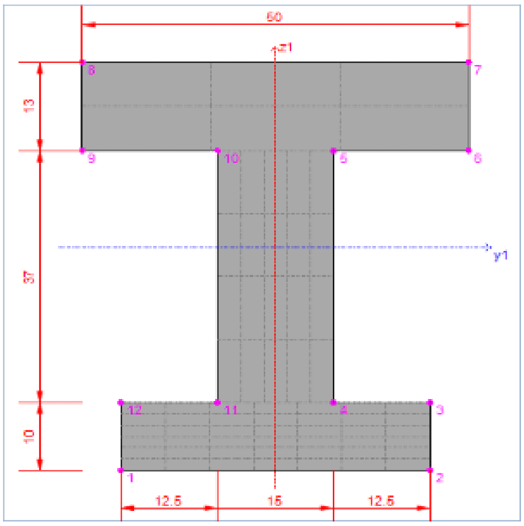
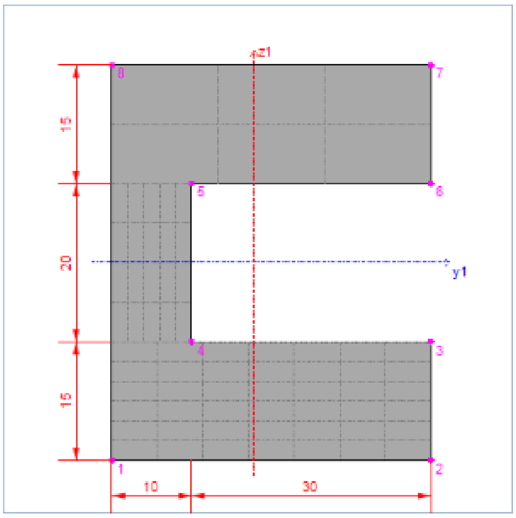
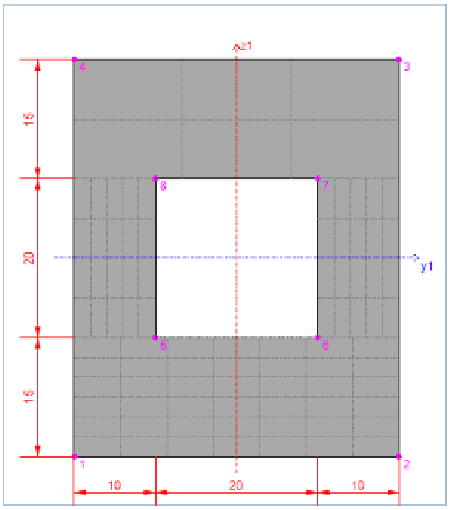
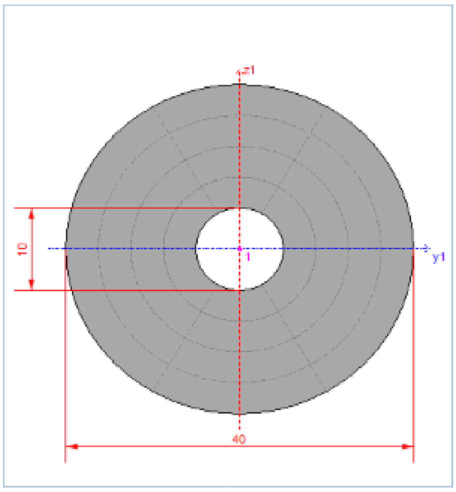
1	2	3
Symmetrical T-beam		NZ1 — fragmentation of flange along axis Z NZ2 — fragmentation of wall along axis Z NY1 — fragmentation of wall along axis Y NY2 — fragmentation of flange along axis Y In this Example: NZ1 = 4 NZ2 = 2 NY1 = 5 NY2 = 3
I-beam		NZ1 — fragmentation of bottom flange along axis Z NZ2 — fragmentation of wall along axis Z NZ3 — fragmentation of top flange along axis Z NY1 — fragmentation of bottom flange along axis Y NY2 — fragmentation of wall along axis Y NY3 — fragmentation of top flange along axis Y In this Example: NZ1 = 6 NZ2 = 4 NZ3 = 2 NY1 = 7 NY2 = 5 NY3 = 3
Channel		NZ1 — fragmentation of bottom flange along axis Z NZ2 — fragmentation of wall along Z NZ3 — fragmentation of top flange along axis Z NY1 — fragmentation of bottom flange along axis Y NY2 — fragmentation of wall along axis Y NY3 — fragmentation of top flange along axis Y In this Example: NZ1 = 6 NZ2 = 4 NZ3 = 2 NY1 = 7 NY2 = 5 NY3 = 3

Table A.10 (continuation)

1	2	3
RHS		NZ1 — fragmentation of bottom flange along axis Z NZ2 — fragmentation of wall along axis Z NZ3 — fragmentation of top flange along axis Z NY1 — fragmentation of bottom flange along axis Y NY2 — fragmentation of wall along axis Y NY3 — fragmentation of top flange along axis Y In this Example: NZ1 = 6 NZ2 = 4 NZ3 = 2 NY1 = 7 NY2 = 5 NY3 = 3
CHS		NK — amount of segments in the sector NS — sector amount In this Example: NK = 4 NS = 6

Example of fragmentation specifying:

```
( 41/
     * fragmentation of rectangular bar /
     2 6  2  3 4 : 1 /

     * fragmentation of symmetrical T-beam (bottom flange /
     2 6  2  4 2 5 3 : 2 /

     * fragmentation of symmetrical T-beam (top flange /
     2 6  2  4 2 5 3 : 3 /

     * fragmentation of I-beam /
     2 6  2  6 4 2 7 5 3 : 4 /

     * fragmentation of channel bar /
     2 6  2  6 4 2 7 5 3 : 5 /

     * fragmentation of rectangular hollow section /
     2 6  2  6 4 2 7 5 3 : 6 /
     * fragmentation of circular hollow section /
     2 6  3  4 6 : 7 /
)
```

The numerical description of the bar section (*Section 2*, *group 7*) can be used as both geometric and stiffness characteristics. In the case of a numerical description of the geometric characteristics are specified as:

1. Area A (m^2).
2. Moment of inertia Iy1 (m^4).
3. Moment of inertia Iz1 (m^4).
4. Moment of inertia Ix1 (m^4).
5. Shear area Ay1 (m^2).
6. Shear area Az1 (m^2).

In the case of a numerical description of the stiffness characteristics are specified as:

1. EA (tf).
2. EIy1 (tf*m^2).
3. EIz1 (tf*m^2).
4. GIx1 (tf*m^2).
5. GAy1 (tf).
6. GAz1 (tf).

Kern distances (*section 2 group 8*) are specified in meters in the following sequence: Y1-, Y1+, Z1-, Z1+.

Additional data for the calculation of the stability of the bars (5 numbers) and the discrepancy between the center of rigidity and the masses (7 numbers) (*Section 2 Group 9*) are specified in the following order:

1. Sectorial stiffness (Iw — sm^6, in the case of specifying a numerical description of geometric characteristics, EIw — tf*m^4, in the case of specifying a numerical description of stiffness characteristics);
2. RuY — Center of twist coordinates (m);
3. RuZ — Center of twist coordinates (m);
4. KfY — Factor of cross stion asymmetry consideration;
5. KfZ — Factor of cross stion asymmetry consideration;
6. McY — y-center of mass coordinates (m);
7. McZ — z- center of mass coordinates (m);
8. McFi — Rotation angle of principal central axes of masses;
9. McIy3 — Principal moment of inertia of masses (m^4);
10. McIz3 — Principal moment of inertia of masses (m^4);
11. McIw — Sectorial moment of inertia of masses (m^6);
12. A — Area (m^2).

Example of specifying of section with numerical description (*section 2, groups 7, 8, 9*):

```
( 41/
     * Numeric description of geometric characteristics /
     2 7 0.13 0.0021083 0.001816 0.00087083 0 0 : 4 /
     2 8 0.066037 0.074123 0.08109 0.08109 : 4 /
     2 9 7.24892E-08 -0.228079 0 0.026783 0 0 0 0 0.0021083 0.001816
0.00028877 0.13 : 4 /
```

```
          * Numeric description of stiffness characteristics /
          2 7 397800 6451.5 5557.038462 1024.389962 36384.31828 128845.9705 : 2/
          2 8 0.06603729604 0.07412349555 0.08108974359 0.08108974359 : 2 /
          2 9 122.8871678 -0.2280792482 0 0.02678324147 0 0 0 0 0.002108333333
0.001816025641 0.0002887699314 0.13 : 2 /
     )
```

Coefficients for a variable section bar (*Section 2 Group 10*) are described by two numbers: initial and final coefficients for considering the variable section.

Example:

```
( 41/
     2 10  0.8 0.5 : 1-10 /
)
```

The coefficients of stiffness changing for a plate (*Section 2 Group 11*) are described by 11 numbers:

Dxxxx, Dyyyy, Dxxyy, Dxyxy, Kxxxx, Kyyyy, Kxxyy, Kxyxy, Hxx, Hyy and flag, the first 10 numbers are interpreted as coefficients to the elements of the membrane, bending and shear stiffness matrices.

Membrane stiffness matrix

$$\begin{bmatrix} \mathrm{Dxxxx} & \mathrm{Dxxyy} & 0 \\ \mathrm{Dxxyy} & \mathrm{Dyyyy} & 0 \\ 0 & 0 & \mathrm{Dxyxy} \end{bmatrix}.$$

Bending stiffness matrix

$$\begin{bmatrix} \mathrm{Kxxxx} & \mathrm{Kxxyy} & 0 \\ \mathrm{Kxxyy} & \mathrm{Kyyyy} & 0 \\ 0 & 0 & \mathrm{Kxyxy} \end{bmatrix}.$$

Shear stiffness matrix

$$\begin{bmatrix} \mathrm{Hxx} & 0 \\ 0 & \mathrm{Hyy} \end{bmatrix}.$$

Parameters of check: 0 — are specified stiffness reduction coefficients, 1 — are specified stiffness reduction coefficients considering equivalent thickness (is used for plates with ribs).

Example:

```
( 41/
    2 11  0.9 0.9 0.8 0.9  0.7 0.7 0.6 0.7  0.5 0.5  0 : 1 /
)
```

Stiffness reduction coefficients for bars (*section 2 group 12*) are specified via 7 numbers:

K_EF, K_EIy, K_EIz, K_GIx, K_GFy, K_GFz, K_EIw, which are interpreted as coefficients to the corresponding stiffnesses EF, EIy, EIz, GIx, GFy, GFz, EIw.

Example:

```
( 41/
    2 12 1 0.9 0.9 0.9 0.8 0.8 0.7 : 1 /
```

)

Soils (section 3 of 41th document)

Section 3 describes the following characteristics:

1. Group 1 — soils of plane strain, for which the following characteristics are specified:
   1.1. Ke — coefficient of transition to modulus of deformation by the branch of secondary loading.
   1.2. Shear strength condition (1 — Coulomb-Mohr, 2 — analytical failure theory).
   1.3. C — Adhesion (tf/m^2).
   1.4. Rt — Limit tensile stress (tf/m^2).
   1.5. Fi — Angle of internal friction (◦).
   1.6. σx —Initial stress along the x-axis (tf/m^2).
   1.7. σz — Initial stress along the z-axis (tf/m^2).
   1.8. Rp — Limit compressive stress (tf/m^2).
2. Group 2 — soils of 3D problem.
   2.1. Shear strength condition (1 — Botcin, 2 — Drucker-Prager, 3 — Coulomb-Mohr, 4 — — analytical failure theory).
   2.2. C — Adhesion (tf/m^2).
   2.3. Rt — Limit tensile stress (tf/m^2).
   2.4. Fi — Angle of internal friction (◦).
   2.5. Ke — The transition coefficient for modulus of deformation along a branch of sondary load.
   2.6. σx — Initial stress along the x-axis (tf/m^2).
   2.7. σy — Initial stress along the y-axis (tf/m^2).
   2.8. σz — Initial stress along the z-axis (tf/m^2).
   2.9. Rp — Limit compressive stress (tf/m^2).
3. Group 3 — parameters of material for problem «Filtration».
   3.1. Kf — Filtration factor (m/24-hour day).
   3.2. Ro —Density of percolating fluid (tf/m^3).
   3.3. e — Porosity ratio.

Example:

```
( 41/
    * soils of plane strain /
    3 1  1.5 2 2 0.5 30 1 3 10 : 1 /
    3 3  0.00011667 1 0.6 : 1 /

    * soils of 3D problem /
    3 2  4 2 0.5 30 3 1 2 3 10 0  : 7 /
    3 3  0.00011667 1 0.6 : 7 /
)
```

Special elements (section 4 of 41th document)

Section 4 describes the characteristics of special elements (Table A.11). Each group belongs to a specific type of special elements.

Table A.11 Groups of 4th section of the 41th document

Section number	Group number	Elements types			Description
		Single-noded	Bars	Plates	
4	2	263	264	–	Friction elements
4	4	56	55	94, 97	Elastic link
4	6	256	255	–	Elastic links considering limit stresses
4	8	266	265	–	One-sided elastic links
4	9	54	53	–	Peripheral elastic foundation
4	10	151	168	162, 163	Surface heat transfer coefficient for temperature field analysis
4	11	–	178	172, 173	Filtration coefficient of shielding layer
4	12	–	–	194, 197	Plate of inelastic link

For *Group 1 Section 4* (one-direction elastic link FE 51), the necessary parameters are:

1. Direction (1 — X, 2 — Y, 3 — Z, 4 — UX, 5 — UY, 6 — UZ).
2. Rigidity per unit length (for tension-compression along the global axes for the first three directions (tf/m) or for rotation around the global or local axes of the node for the last three directions (tf*m).

The section exists only for a text file (cannot be specified via the graphical system)).

For *Group 2 Section 4* (friction elements), the necessary parameters are:

1. R — Axial stiffness of link under tension-compression (tf/m).
2. Q — In length stiffness for adhesion (tf/m).
3. γ — coefficient of static friction.
4. 1 — Operates under compression, –1 — Operates under tension;
5. b — Gap (m).
6. Direction (for single-noded element: 1 — X, 2 — Y, 3 — Z, for double-noded always 0).

For *Group 4 Section 4* (elastic link), the necessary parameters are:

1. Rx — Axial stiffness of the link under tension-compression along the global X axis (tf/m).
2. Ry — Axial stiffness of the link under tension-compression along the global Y axis (tf/m).
3. Rz — Axial stiffness of the link under tension-compression along the global Z axis (tf/m).
4. Rux — Rotational stiffness of link under rotation along the global UX axis (tf/m).
5. Ruy — Rotational stiffness of link under rotation along the global UY axis (tf/m).
6. Ruz — Rotational stiffness of link under rotation along the global UZ axis (tf/m).
7. For *Group 5 Section 4* (elastic link, considering the one-direction elastic link FE 251, 252), the necessary parameters are:

1. R — Axial stiffness of the link R - Axial stiffness of the link (for tension-compression along the global axes for the first three directions (tf / m) or for rotation for the last three directions (tf * m).
2. N- — limit negative force value (tf).
3. N+ — limit positive force value (tf).
4. Direction (1 — X, 2 — Y, 3 — Z, 4 — UX, 5 — UY, 6 — UZ).

The section exists only for a text file (cannot be specified via the graphical system).

For *Group 6 Section 4* (elastic link with regard to limit forces), the necessary parameters are (3 numbers for each degree of freedom):

1. R — Axial stiffness of the link (for tension-compression along the global axes for the first three directions (tf/m) or for rotation for the last three directions (tf*m)).
2. N- — limit negative force value (tf).
3. N+ — limit positive force value (tf).

For *Group 8 Section 4* (one-sided elastic link), the necessary parameters are (3 numbers for each degree of freedom):

1. R — Axial stiffness of the link (for tension-compression along the global axes for the first three directions (tf/m) or for rotation for the last three directions (tf*m)).
2. 0 — elastic kink, 1 — elastic under tension, -1 — elastic under compression.
3. Gaps (along linear directions — in meters, along rotation directions — in radians).

For *Group 9 Section 4* (contour elements of an elastic foundation), only the list of elements is a necessary parameter.

For *Group 10 Section 4* (surface heat transfer coefficient for temperature field analysis), the required parameters are

1. Kt — Heat transfer coefficient tf/(m*s*°C),
2. H — width for bar element or area for single-noded element (cm, cm^2).

For *Group 11 Section 4* (Filtration coefficient of shielding layer) the required parameters are

1. R0 — Filtration coefficient of the shielding layer (m/s)/(tf/m^2).
2. H — Width of bar element (cm).

For *Group 12 Section* 4 (plate of inelastic link) number of variable length parameters

1. The overall value of numbers of the graph along the X-axis.
2. Pair graph: strain-response (tf/m^2).
3. The overall value of numbers of the graph along the Y-axis.
4. Pair graph: strain-response (tf/m^2).
5. The overall value of numbers of the graph along the Z-axis.
6. Pair graph: strain-response (tf/m^2).
7. The overall value of numbers of the graph along the UX-axis.
8. Pair graph: strain-response ((tf*m)/m).
9. The overall value of numbers of the graph along the UY-axis.
10. Pair graph: strain-response ((tf*m)/m).

11. The overall value of numbers of the graph along the UZ-axis.
12. Pair graph: strain-response ((tf*m)/m).

If in some direction it works elastically, then the overall value of numbers of graph is equal to one, followed by the reaction value, if it is a graph, then the minimum value is four.

An example of specifying the groups of the *Section 4:*

```
( 41/

    * single-noded friction element  /
    4 2  100 30 0.3 1 0.01 3 : 2 /

    * Bar friction element /
    4 2  100 30 0.3 -1 0.012 0 : 3 /

    * Elastic link /
    4 4  1000 1100 750 560 300 150 : 4 /

    * Elastic link considering limit internal forces along direction Y /
    4 6  100 -15 10 2 : 5 /

    * Elastic link considering limit internal forces /
    4 6  100 -15 10 150 -14 12 130 -13 11 95 -4 5 75 -8 7 55 -3 6 : 6 /

    * One-sided elastic link along direction Z /
    4 8  100 -1 0 3 : 7 /

    * One-sided elastic link /
    4 8  100 -1 0.005 150 1 0.005 240 0 0.01 50 0 0.17 45 0 0.26
         75 0 0.44: 8 /

    * Elements of peripheral elastic foundation /
    4 9  : 9 10 /

    * Elements of peripheral elastic foundation /
    4 10  0.0008055758083: 11 /
    4 10  0.0008055758083 100 : 12 /
    4 10  0.0008055758083 10000 : 13 /

    * Filtration coefficient of shielding layer /
    4 11  0.0034 100 : 14 /

    * plate of inelastic link (elastic work along axial directions)
    4 12  1 10000  1 10000  1 10000  1 0  1 0  1 0 : 2 / 4 15

    * plate of inelastic link (inelastic work along axial directions)
    4 12  8 -1 -10000 -0.6 -900 0.6 900 1 10000 8 -1 -10000 -0.6 -900 0.6
      900 1 10000 8 -1 -10000 -0.6 -900 0.6 900 1 10000 1 0 1 0 1 0 : 16 /
    )
```

Additional characteristics (section 5 of 41th document)

Table A.12 Groups of 5th section of 41th document

Section number	Group number	Description
5	1	Plane strain
5	2	String
5	3	Membrane
5	4	Large displacement
5	5	Coefficients of thermal expansion
5	6	Thick plate and shell
5	7	Consideration of shear in bars
5	9	Limit force for Rope

For *Groups 1, 2, 3, 4, 6 and 7 Section 5*, only the list of elements is specified, without additional characteristics.

Group 5 Section 5 specifies the coefficients of thermal expansion*:*

- for a bar 1 coefficient is enough;
- for a plate — 2;
- for a solid element — 3.

Group 9 Section 5 specifies Limit force for Rope:

- for jack — compression (tf);
- for turnbuckle — tension (tf).

An example of specifying the groups of the *Section 5*:

```
( 41/
     * Plane strain /
     5 1  : 1-10 /

     * String /
     5 2  : 11-20 /

     * Membrane /
     5 3  : 21-30 /

     * Elements of large displacements (Landau-Lifshits) /
     5 4  : 31-40 /

     * Thermal expansion coefficients /
     5 5  1E-05 1E-05 1E-05 : 41-50 /

     * Thick plate and shell /
     5 6  : 31-40 /

     * Shear consideration in bars /
     5 7  : 31-40 /

     * Limit compression force for jack /
```

```
          5 9 -150 : 1 /

          * Limit tension force for turnbuckle /
          5 9 100 : 2 /
     )
```

Arbitrary nonlinear cross-sections (*section 6 of 41th document*)

Table A.13 Groups of section 6 of 41th document

Section number	Group number	Description
6	2	Plane strain
6	3	String

Group 2 Section 6 specifies the coordinates of the vertices for describing the section geometry:

- array of vertices (2 coordinates per vertex (Y1 and Z1));
- colon;
- list of elements.

Group 2 Section 6 specifies the topology of elementary sections of the section:

- number of vertices;
- material (not used in version 10.12);
- list of vertices;
- section or area for sites with 2 or one vertex (not used in version 10.12);
- colon;
- list of elements.

An example of specifying the groups of the Section 6

```
 ( 41/
* I-section beam №18 according GOST 8239-72* I-beam with unparallel edges of
shelves /
6 2   0 0.09 -0.045 0.09 -0.045 0.087947 -0.0448287 0.0868654 -0.0443316
0.0858897 -0.0435572 0.0851154 -0.0425816 0.0846183 -0.01155 0.0803043
-0.0087688 0.0798638 -0.0062599 0.0785855 -0.0042688 0.0765944 -0.0029905
0.0740855 -0.00255 0.0713043 -0.00255 0 0 0 -0.0225 0.09 0 0.045 -0.0270658
0.0824613 -0.03375 0.09 -0.01125 0.09 -0.00255 0.03565215 0 0.0675
-0.0348237 0.0835398 0 0.0225 -0.00255 0.053478225 0 0.07875 -0.00255
0.017826075 0 0.03375 0 0.05625 -0.00255 0.0445651875 -0.00255 0.0623912625
0 0.073125 0 0.01125 -0.00255 0.0267391125 0 0.039375 0 0.050625 0 0.061875
-0.00255 0.05793474375 -0.00255 0.06684778125 0 0.0703125 -0.00255
0.0089130375 0 0.016875 0 0.028125 -0.00255 0.02228259375 -0.00255
0.03119563125 -0.00255 0.04010866875 0 0.0365625 -0.00255 0.04902170625 0
0.0534375 0 0.0590625 0 0.005625 -0.00255 0.01336955625 0 0.0309375
-0.00255 0.00445651875 0 0.0084375 0 0.0140625 -0.039375 0.09 -0.043 0.09
-0.0427440067524424 0.0877499313223989 -0.00936665440422799
0.0850892351327154 -0.03870265 0.08407905 -0.0363049813339083
0.0871053180386393 -0.0397776310979338 0.0869556303074345 -0.005625 0.09
-0.0084375 0.09 0 0.086 -0.002 0.09 -0.03094475 0.08300055 -0.028125 0.09
-0.0324403585712807 0.086463008905759 -0.0253125 0.0865514012807248
-0.0288695340660628 0.0859511825858023 -0.0193079 0.0813828
```

-0.0207894634964795 0.0857338096420981 -0.02318685 0.08192205 -0.016875 0.09
-0.0196875 0.09 -0.0157366953517825 0.0850265805013637
-0.0184414868057635 0.0841055712153729 -0.01542895 0.08084355
-0.0125377838057684 0.0836456147902513 -0.0129696170181917
0.0870408145409351 -0.0046683178929942 0.0853902560879769
-0.00714384444035359 0.0872119464329603 -0.00685665495540432
0.0827294915765957 0 0.082375 -0.00317974095113341 0.0805625 0 -0.09 -0.045
-0.09 -0.045 -0.087947 -0.0448287 -0.0868654 -0.0443316 -0.0858897
-0.0435572 -0.0851154 -0.0425816 -0.0846183 -0.01155 -0.0803043 -0.0087688 -
0.0798638 -0.0062599 -0.0785855 -0.0042688 -0.0765944 -0.0029905
-0.0740855 -0.00255 -0.0713043 -0.0225 -0.09 0 -0.045 -0.0270658 -0.0824613
-0.03375 -0.09
-0.01125 -0.09 -0.00255 -0.03565215 0 -0.0675 -0.0348237 -0.0835398 0
-0.0225 -0.00255
-0.053478225 0 -0.07875 -0.00255 -0.017826075 0 -0.03375 0 -0.05625
-0.00255 -0.0445651875 -0.00255 -0.0623912625 0 -0.073125 0 -0.01125
-0.00255 -0.0267391125 0 -0.039375 0
-0.050625 0 -0.061875 -0.00255 -0.05793474375 -0.00255 -0.06684778125 0
-0.0703125 -0.00255 -0.0089130375 0 -0.016875 0 -0.028125 -0.00255
-0.02228259375 -0.00255 -0.03119563125 -0.00255 -0.04010866875 0 -0.0365625
-0.00255 -0.04902170625 0 -0.0534375 0 -0.0590625 0 -0.005625 -0.00255
-0.01336955625 0 -0.0309375 -0.00255 -0.00445651875 0 -0.0084375 0
-0.0140625 -0.039375 -0.09 -0.043 -0.09 -0.0427440067524424
-0.0877499313223989 -0.00936665440422799 -0.0850892351327154 -0.03870265
-0.08407905 -0.0363049813339083 -0.0871053180386393 -0.0397776310979338
-0.0869556303074345 -0.005625 -0.09 -0.0084375 -0.09 0 -0.086 -0.002 -0.09 -
0.03094475 -0.08300055 -0.028125 -0.09 -0.0324403585712807
-0.086463008905759 -0.0253125 -0.0865514012807248 -0.0288695340660628
-0.0859511825858023 -0.0193079 -0.0813828 -0.0207894634964795
-0.0857338096420981 -0.02318685 -0.08192205 -0.016875 -0.09 -0.0196875
-0.09 -0.0157366953517825 -0.0850265805013637 -0.0184414868057635
-0.0841055712153729 -0.01542895 -0.08084355 -0.0125377838057684
-0.0836456147902513 -0.0129696170181917 -0.0870408145409351
-0.0046683178929942 -0.0853902560879769 -0.00714384444035359
-0.0872119464329603 -0.00685665495540432 -0.0827294915765957 0 -0.082375
-0.00317974095113341 -0.0805625 0.045 0.09 0.045 0.087947 0.0448287 0.0868654
0.0443316 0.0858897 0.0435572 0.0851154 0.0425816 0.0846183 0.01155 0.0803043
0.0087688 0.0798638 0.0062599 0.0785855 0.0042688 0.0765944 0.0029905
0.0740855 0.00255 0.0713043 0.00255 0 0.0225 0.09 0.0270658 0.0824613 0.03375
0.09 0.01125 0.09 0.00255 0.03565215 0.0348237 0.0835398 0.00255 0.053478225
0.00255 0.017826075 0.00255 0.0445651875 0.00255 0.0623912625 0.00255
0.0267391125 0.00255 0.05793474375 0.00255 0.06684778125 0.00255 0.0089130375
0.00255 0.02228259375 0.00255 0.03119563125 0.00255 0.04010866875 0.00255
0.04902170625 0.00255 0.01336955625 0.00255 0.00445651875 0.039375 0.09 0.043
0.09 0.0427440067524424 0.0877499313223989 0.00936665440422799
0.0850892351327154 0.03870265 0.08407905 0.0363049813339083
0.0871053180386393 0.0397776310979338 0.0869556303074345 0.005625 0.09
0.0084375 0.09 0.002 0.09 0.03094475 0.08300055 0.028125 0.09
0.0324403585712807 0.086463008905759 0.0253125 0.0865514012807248
0.0288695340660628 0.0859511825858023 0.0193079 0.0813828 0.0207894634964795
0.0857338096420981 0.02318685 0.08192205 0.016875 0.09 0.0196875 0.09
0.0157366953517825 0.0850265805013637 0.0184414868057635 0.0841055712153729
0.01542895 0.08084355 0.0125377838057684 0.0836456147902513
0.0129696170181917 0.0870408145409351 0.0046683178929942 0.0853902560879769
0.00714384444035359 0.0872119464329603 0.00685665495540432
0.0827294915765957 0.00317974095113341 0.0805625 0.045 -0.09 0.045 -0.087947
0.0448287 -0.0868654 0.0443316 -0.0858897 0.0435572
-0.0851154 0.0425816 -0.0846183 0.01155 -0.0803043 0.0087688 -0.0798638
0.0062599 -0.0785855 0.0042688 -0.0765944 0.0029905 -0.0740855 0.00255

```
-0.0713043 0.0225 -0.09 0.0270658 -0.0824613 0.03375 -0.09 0.01125 -0.09
0.00255 -0.03565215 0.0348237 -0.0835398 0.00255 -0.053478225 0.00255
-0.017826075 0.00255 -0.0445651875 0.00255 -0.0623912625 0.00255
-0.0267391125 0.00255 -0.05793474375 0.00255 -0.06684778125 0.00255
-0.0089130375 0.00255 -0.02228259375 0.00255 -0.03119563125 0.00255
-0.04010866875 0.00255 -0.04902170625 0.00255 -0.01336955625 0.00255
-0.00445651875 0.039375 -0.09 0.043 -0.09 0.0427440067524424
-0.0877499313223989 0.00936665440422799 -0.0850892351327154 0.03870265
-0.08407905 0.0363049813339083 -0.0871053180386393 0.0397776310979338
-0.0869556303074345 0.005625 -0.09 0.0084375 -0.09 0.002 -0.09 0.03094475
-0.08300055 0.028125 -0.09 0.0324403585712807 -0.086463008905759 0.0253125 -
0.0865514012807248 0.0288695340660628 -0.0859511825858023 0.0193079
-0.0813828 0.0207894634964795 -0.0857338096420981 0.02318685 -0.08192205
0.016875 -0.09 0.0196875 -0.09 0.0157366953517825 -0.0850265805013637
0.0184414868057635 -0.0841055712153729 0.01542895 -0.08084355
0.0125377838057684 -0.0836456147902513 0.0129696170181917
-0.0870408145409351 0.0046683178929942 -0.0853902560879769
0.00714384444035359 -0.0872119464329603 0.00685665495540432
-0.0827294915765957 0.00317974095113341 -0.0805625 : 2 3 /

6 3  3 0 3 59 58 3 0 25 29 38 3 0 9 60 8 3 0 18 75 71 3 0 39 37 22 3 0 5 6
59 3 0 59 6 7 3 0 33 41 55 3 0 36 48 17 3 0 5 59 4 3 0 58 2 3 3 0 61 23 62 3
0 68 72 70 3 0 70 69 19 3 0 67 64 83 3 0 46 17 30 3 0 34 43 45 3 0 32 26 12
3 0 66 83 86 3 0 74 16 71 3 0 26 87 11 3 0 26 11 12 3 0 24 27 42 3 0 76 78
82 3 0 27 24 44 3 0 46 21 47 3 0 29 25 49 3 0 13 32 12 3 0 37 39 31 3 0 32
13 40 3 0 51 54 15 3 0 28 45 53 3 0 46 47 35 3 0 30 17 48 3 0 38 50 31 3 0
37 31 50 3 0 22 40 39 3 0 13 39 40 3 0 41 33 52 3 0 27 52 42 3 0 43 34 24 3
0 44 24 34 3 0 45 28 21 3 0 35 17 46 3 0 47 21 28 3 0 48 36 25 3 0 49 25 36
3 0 50 38 29 3 0 14 15 54 3 0 56 42 52 3 0 53 45 43 3 0 54 51 41 3 0 55 41
51 3 0 56 52 33 3 0 61 63 7 3 0 62 23 70 3 0 4 59 3 3 0 59 57 58 3 0 26 86
87 3 0 60 65 20 3 0 62 19 57 3 0 57 59 63 3 0 57 63 62 3 0 59 7 63 3 0 61 62
63 3 0 64 65 84 3 0 83 66 67 3 0 60 84 65 3 0 67 66 1 3 0 72 69 70 3 0 19 62
70 3 0 70 23 68 3 0 72 18 71 3 0 8 60 81 3 0 71 16 69 3 0 68 18 72 3 0 71 69
72 3 0 74 79 76 3 0 74 75 73 3 0 74 77 16 3 0 8 81 80 3 0 74 71 75 3 0 79 74
73 3 0 77 74 76 3 0 82 81 60 3 0 73 80 79 3 0 78 76 79 3 0 20 82 60 3 0 78
79 80 3 0 78 80 81 3 0 20 76 82 3 0 82 78 81 3 0 85 83 84 3 0 11 87 10 3 0
60 85 84 3 0 83 64 84 3 0 85 60 9 3 0 9 10 85 3 0 86 83 87 3 0 85 87 83 3 0
87 85 10 3 0 90 144 143 3 0 110 114 123 3 0 96 145 95 3 0 103 160 156 3 0
124 122 107 3 0 92 93 144 3 0 144 93 94 3 0 118 126 140 3 0 121 133 102 3 0
92 144 91 3 0 143 89 90 3 0 146 108 147 3 0 153 157 155 3 0 155 154 104 3 0
152 149 168 3 0 131 102 115 3 0 119 128 130 3 0 117 111 99 3 0 151 168 171 3
0 159 101 156 3 0 111 172 98 3 0 111 98 99 3 0 109 112 127 3 0 161 163 167 3
0 112 109 129 3 0 131 106 132 3 0 114 110 134 3 0 100 117 99 3 0 122 124 116
3 0 117 100 125 3 0 136 139 15 3 0 113 130 138 3 0 131 132 120 3 0 115 102
133 3 0 123 135 116 3 0 122 116 135 3 0 107 125 124 3 0 100 124 125 3 0 126
118 137 3 0 112 137 127 3 0 128 119 109 3 0 129 109 119 3 0 130 113 106 3 0
120 102 131 3 0 132 106 113 3 0 133 121 110 3 0 134 110 121 3 0 135 123 114
3 0 14 15 139 3 0 141 127 137 3 0 138 130 128 3 0 139 136 126 3 0 140 126
136 3 0 141 137 118 3 0 146 148 94 3 0 147 108 155 3 0 91 144 90 3 0 144 142
143 3 0 111 171 172 3 0 145 150 105 3 0 147 104 142 3 0 142 144 148 3 0 142
148 147 3 0 144 94 148 3 0 146 147 148 3 0 149 150 169 3 0 168 151 152 3 0
145 169 150 3 0 152 151 88 3 0 157 154 155 3 0 104 147 155 3 0 155 108 153 3
0 157 103 156 3 0 95 145 166 3 0 156 101 154 3 0 153 103 157 3 0 156 154 157
3 0 159 164 161 3 0 159 160 158 3 0 159 162 101 3 0 95 166 165 3 0 159 156
160 3 0 164 159 158 3 0 162 159 161 3 0 167 166 145 3 0 158 165 164 3 0 163
161 164 3 0 105 167 145 3 0 163 164 165 3 0 163 165 166 3 0 105 161 167 3 0
167 163 166 3 0 170 168 169 3 0 98 172 97 3 0 145 170 169 3 0 168 149 169 3
0 170 145 96 3 0 96 97 170 3 0 171 168 172 3 0 170 172 168 3 0 172 170 97 3
0 174 208 207 3 0 192 29 197 3 0 180 209 179 3 0 187 223 219 3 0 198 37 22 3
```

```
0 176 177 208 3 0 208 177 178 3 0 33 199 55 3 0 36 203 17 3 0 176 208 175 3
0 207 173 174 3 0 210 191 211 3 0 216 220 218 3 0 218 217 188 3 0 215 213
231 3 0 202 17 194 3 0 196 43 201 3 0 32 26 183 3 0 66 231 86 3 0 222 186
219 3 0 26 234 182 3 0 26 182 183 3 0 24 193 42 3 0 224 226 230 3 0 193 24
200 3 0 202 190 47 3 0 29 192 49 3 0 184 32 183 3 0 37 198 195 3 0 32 184 40
3 0 51 205 15 3 0 28 201 53 3 0 202 47 35 3 0 194 17 203 3 0 197 50 195 3 0
37 195 50 3 0 22 40 198 3 0 184 198 40 3 0 199 33 204 3 0 193 204 42 3 0 43
196 24 3 0 200 24 196 3 0 201 28 190 3 0 35 17 202 3 0 47 190 28 3 0 203 36
192 3 0 49 192 36 3 0 50 197 29 3 0 185 15 205 3 0 56 42 204 3 0 53 201 43 3
0 205 51 199 3 0 55 199 51 3 0 56 204 33 3 0 210 212 178 3 0 211 191 218 3 0
175 208 174 3 0 208 206 207 3 0 26 86 234 3 0 209 214 189 3 0 211 188 206 3
0 206 208 212 3 0 206 212 211 3 0 208 178 212 3 0 210 211 212 3 0 213 214
232 3 0 231 66 215 3 0 209 232 214 3 0 215 66 1 3 0 220 217 218 3 0 188 211
218 3 0 218 191 216 3 0 220 187 219 3 0 179 209 229 3 0 219 186 217 3 0 216
187 220 3 0 219 217 220 3 0 222 227 224 3 0 222 223 221 3 0 222 225 186 3 0
179 229 228 3 0 222 219 223 3 0 227 222 221 3 0 225 222 224 3 0 230 229 209
3 0 221 228 227 3 0 226 224 227 3 0 189 230 209 3 0 226 227 228 3 0 226 228
229 3 0 189 224 230 3 0 230 226 229 3 0 233 231 232 3 0 182 234 181 3 0 209
233 232 3 0 231 213 232 3 0 233 209 180 3 0 180 181 233 3 0 86 231 234 3 0
233 234 231 3 0 234 233 181 3 0 236 269 268 3 0 253 114 258 3 0 242 270 241
3 0 248 284 280 3 0 259 122 107 3 0 238 239 269 3 0 269 239 240 3 0 118 260
140 3 0 121 264 102 3 0 238 269 237 3 0 268 235 236 3 0 271 252 272 3 0 277
281 279 3 0 279 278 249 3 0 276 274 292 3 0 263 102 255 3 0 257 128 262 3 0
117 111 245 3 0 151 292 171 3 0 283 247 280 3 0 111 295 244 3 0 111 244 245
3 0 109 254 127 3 0 285 287 291 3 0 254 109 261 3 0 263 251 132 3 0 114 253
134 3 0 246 117 245 3 0 122 259 256 3 0 117 246 125 3 0 136 266 15 3 0 113
262 138 3 0 263 132 120 3 0 255 102 264 3 0 258 135 256 3 0 122 256 135 3 0
107 125 259 3 0 246 259 125 3 0 260 118 265 3 0 254 265 127 3 0 128 257 109
3 0 261 109 257 3 0 262 113 251 3 0 120 102 263 3 0 132 251 113 3 0 264 121
253 3 0 134 253 121 3 0 135 258 114 3 0 185 15 266 3 0 141 127 265 3 0 138
262 128 3 0 266 136 260 3 0 140 260 136 3 0 141 265 118 3 0 271 273 240 3 0
272 252 279 3 0 237 269 236 3 0 269 267 268 3 0 111 171 295 3 0 270 275 250
3 0 272 249 267 3 0 267 269 273 3 0 267 273 272 3 0 269 240 273 3 0 271 272
273 3 0 274 275 293 3 0 292 151 276 3 0 270 293 275 3 0 276 151 88 3 0 281
278 279 3 0 249 272 279 3 0 279 252 277 3 0 281 248 280 3 0 241 270 290 3 0
280 247 278 3 0 277 248 281 3 0 280 278 281 3 0 283 288 285 3 0 283 284 282
3 0 283 286 247 3 0 241 290 289 3 0 283 280 284 3 0 288 283 282 3 0 286 283
285 3 0 291 290 270 3 0 282 289 288 3 0 287 285 288 3 0 250 291 270 3 0 287
288 289 3 0 287 289 290 3 0 250 285 291 3 0 291 287 290 3 0 294 292 293 3 0
244 295 243 3 0 270 294 293 3 0 292 274 293 3 0 294 270 242 3 0 242 243 294
3 0 171 292 295 3 0 294 295 292 3 0 295 294 243 : 2 3 /
)
```

If a section is plotted on the basis of these data, then an I-beam with non-parallel edges of shelves No. 18 is obtained (Fig. A.15).

Document 44 describes equivalent elements. The document line specifies:

- number of equivalent element or list of numbers of equivalent elements;
- colon;
- list of element numbers to gain stresses into equivalent elements.

Lists of elements in the lines of the 44th document can be specified using the "-" character for consecutive numbers.

Example:

```
( 44/
     15 : 10 /
     16 : 1-9 /
     43-48 : 19-42 /
)
```

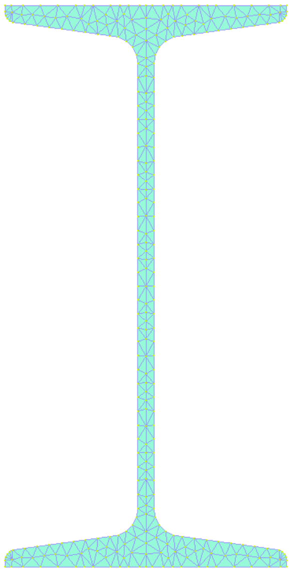


Fig. A.15. I-beam with unparallel edges of shelves № 18

Document 48 describes grids coordination. The document line specifies:

- mesh type (for version 10.12 is always equal to 1);
- bit representation of the degrees of freedom by which the joining occurs (X - 1; Y - 2; Z - 4; UX - 8; UY - 16; UZ - 32; W - 64; Tepl - 128; Filtr - 256 - other combinations of degrees freedoms are obtained by summing the required);
- index of node;
- index of element.

Example:

```
( 48/
     * unification along direction X /
     1 1 131 42/
     * unification along directions X and Y /
     1 3 130 38/
     * unification along axial directions /
     1 7 133 41/
     * unification along rotational directions /
     1 56 132 37/
     * unification along all directions for type of created project 5 /
     1 63 135 34/
     * unification along all directions for type of created project 7 /
     1 127 134 30/
     * unification along all directions for type of created project 7 +
     thermal conductivity/
     1 255 136 27/
     * unification along all directions for type of created project 7 +
     thermal conductivity + filtration /
     1 511 137 23/
)
```

A.5 LOADS AND IMPACTS

Document 6 describes the definition of load cases and loads. Each *line of document 6* consists of 5 numbers:

1. Takes a value depending on the load code:
1.1. Index of element (for element loads).
1.2. Index of node (for nodal loads).
1.3. Loading index (to form the mass matrix or the right side (DYNAMIC+)).
2. Load code (Table A.14-A.22).
3. Direction of load.
4. Line number in document 7 (load parameters).
5. Index of loading, which includes this load.

Document 7 describes the setting of parameters (values) of loads that are specified in document 6. The parameters of loads depend on the specific load (Table A.14–A.22*). Document line* 7 specifies:

1. Line number.
2. Load values.

Table A.14 Nodal loads

Load	**Load code**	**Possible directions**	**Parameters and specifying sequence of loads (document 7)**
1	**2**	**3**	**4**
Concentrated force	0	1 — X 2 — Y 3 — Z	1. Load value P (tf)
Concentrated moment	0	4 — UX 5 — UY 6 — UZ	1. Load value M (tf*****m)
Specified displacement	60	1 — X 2 — Y 3 — Z	1. Load value d (m)
Specified rotation	60	4 — UX 5 — UY 6 — UZ	1. Load value D (Rad)
Concentrated bimoment	0	7 — W	1. Load value B (tf*м^2)
Warping	60	7 — W	1. Load value W (Rad*1e-3/mm)
Weight of nodal mass	0	1 — X 2 — Y 3 — Z	1. Load value P (tf)
Impulse load	0	1 — X 2 — Y 3 — Z	1. Additional nodal mass (tf) 2. Magnitude of the impulse (tf) 3. Impulse shape (Table A.15) 4. Duration of a single impulse (s) 5. Repetition period (s) 6. Number of repetition

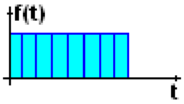
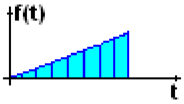
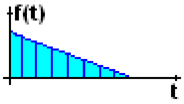
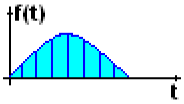
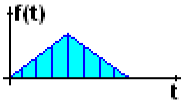
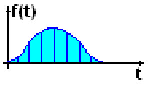
Table A.14 (continuation)

1	**2**	**3**	**4**

Impact load	0	1 — X 2 — Y 3 — Z	1. Weight of impactor (tf) 2. Magnitude of impact value (tf) 3. Impact shape (Table A.15) 4. Duration of a single impact (s) 5. Repetition period (s) 6. Number of repetition
Harmonic load	0	1 — X 2 — Y 3 — Z	1. Additional mass (tf) 2. Amplatude of the action (tf) 3. Load low (0 — SIN, 1 — COS) 4. Phase (Rad)
Polyligonal line with an arbitrary step	0	1 — X 2 — Y 3 — Z 4 — UX 5 — UY 6 — UZ	1. Must be equal to 0 2. Load type: 1 — polyligonal line with an arbitrary step 3. Time (s) 4. Load value (tf) Items 3-4 are repeated for each point of the graph
Sinusoidal	0	1 — X 2 — Y 3 — Z 4 — UX 5 — UY 6 — UZ	1. Must be equal to 0 2. Load type: 2 — sinusoidal 3. Amplitude (tf) 4. Frequency (Rad/s) 5. Phases (Rad) 6. Start time (s) 7. End time (s)
Accelerogram	0	1 — X 2 — Y 3 — Z	1. Must be equal to 0 2. Load type: 3 — accelerogram 3. Start time (s) 4. Time step (s) 5. Conversion factor 6. Load value (m/s^2) Item 6 is repeated for each point of the graph
Polyligonal line with an uniform step	0	1 — X 2 — Y 3 — Z 4 — UX 5 — UY 6 — UZ	1. Must be equal to 0 2. Load type: 4 — polyligonal line with an uniform step 3. Start time (s) 4. Time step (s) 5. Conversion factor 6. Load value (tf) Item 6 is repeated for each point of the graph
Seismogram	0	1 — X 2 — Y 3 — Z	1. Must be equal to 0 2. Load type: 6 — seismogram 3. Start time (s) 4. Time step (s) 5. Conversion factor 6. Load value (m) Item 6 is repeated for each point of the graph
Specified temperate	760	0	Load value T (℃)
Concentrated heat flow	700	0	Load value Q (tf*m/s)
Fluid pressure for filtration	860	0	Load value F (tf/m^2)

All loads on the node are specified in the local coordinate system. The same load codes specified for different types of load cases can correspond to different loads.

Table A.15

Identifier	Impulse/impact form	Description of impulse/impact form
1	**2**	**3**
1		Rectangular
2		Triangular
3		Triangular
4		Sinusoidal
5		Triangular
6		Combined

Example of specifying of document 6 (nodal loads):

```
( 6/
    * Concentrated force /
    1 0 3 1 1 /

    * Concentrated moment /
    2 0 5 2 1 /

    * Specified displacement /
    3 60 2 3 1 /

    * Specified rotation /
    4 60 4 4 1 /

    * Concentrated bimoment /
    5 0 7 5 1 /

    * Warping /
    6 60 7 6 1 /

    * Weight of nodal mass /
    7 0 3 7 2 /

    * Impulse load /
    8 0 2 8 2 /

    * Impact load /
    9 0 2 9 3 /
```

```
        * Harmonic load /
        10 0 2 10 4 /

        * Polyligonal line with an arbitrary step /
        1 0 3 11 5 /

        * Sinusoidal /
        2 0 3 12 3 /

        * Accelerogram /
        3 0 3 13 3 /

        * Polyligonal line with an uniform step /
        4 0 3 14 3 /

        * Seismogram /
        5 0 3 15 3 /
)
```

Example of specifying the *7th document* (parameters of nodal load):

```
( 7/
        * Parameters of concentrated force /
        1 1.5 /

        * Parameters of concentrated moment /
        2 2 /

        * Parameters of specified displacement /
        2 0.02 /

        * Parameters of specified rotation /
        3 0.5235987756 /

        * Parameters of specified bimoment /
        5 0.1 /

        * Parameters of warping /
        6 1.5 /

        * Parameters of weight of nodal mass /
        7 3 /

        * Parameters of impulse /
        8 2.2 5 6 3 10 15 /

        * Parameters of impact /
        9 5 10 1 3 5 10 /

        * Parameters of harmonic load /
        10 5 10 0 45 /

        * Parameters of polygonal load with arbitrary step /
        11 0 1   1 5.5 2 7.5 3 4.6 4 5.1 5 1.2 /
```

```
        * Parameters of sinusoidal load /
        12 0 2   1 2.1 0.7853981634 3 10 /

        * Parameters of accelerogram /
        3 0 3   3 0.01 1.1   1.3 5.3 4.6 7.8 1.2 /

        * Parameters of polygonal load with uniform step /
        14 0 4   5 0.01 1.2   1.3 3.3 7.5 4 1.1 /

        * Parameters of seismogram /
        15 0 6 5 0.01 1.2   0.001 0.003 0.01 0.007 0.0003 /
)
```

Table A.16 Loads of single-noded elements

Load	**Code of load**	**Possible directions**	**Parameters and specifying sequence of loads (document 7)**
1	**2**	**3**	**4**
Ambient temperature	726	Must be equal to 0	1. Load value T (°C)

Example of specifying of *document* 6 (loads on single-noded elements):

```
( 6/
     * Ambient temperature /
     64 726 0 1 1 /
)
```

Example of specifying of *document* 6 (parameters of loads on single-noded elements):

```
( 7/
     * Parameters of ambient temperature /
     1 34 /
)
```

Table A.17 Loads on bar

Load	**Code of load**	**Coordinate system**	**Possible directions**	**Parameters and specifying sequence of loads (document 7)**
1	**2**	**3**	**4**	**5**
Concentrated force	5	Internal forces calculations	1 — X 2 — Y 3 — Z	1. Load value P (tf) 2. Distance A (m) 3. Eccentricity dY (m) 4. Eccentricity dZ (m)
	15	Global		

Table A.17 (continuation)

1	2	3	4	5
Concentrated moment	5	Internal forces calculations	4 — UX 5 — UY 6 — UZ	1. Load value M (tf*m) 2. Distance A (m) 3. Must be equal to 0 4. Must be equal to 0
	15	Global		
Uniformly distributed force	6	Internal forces calculations	1 — X 2 — Y 3 — Z	1. Load value P (tf/m) 2. Consideration of rigid inserts parameter (0 or 1) 3. Eccentricity dY (m) 4. Eccentricity dZ (m)
	16	Global		
	26	Projective		
Uniformly distributed moment	6	Internal forces calculations	4 — UX 5 — UY 6 — UZ	1. Load value M ((tf*m)/m) 2. Consideration of rigid inserts parameter (0 or 1) 3. Must be equal to 0 4. Must be equal to 0
	16	Global		
	26	Projective		
Trapezoidal distributed force	7	Internal forces calculations	1 — X 2 — Y 3 — Z	1. Load value P1 (tf/m) 2. Distance A1 (m) 3. Load value P2 (tf/m) 4. Distance A2 (m) 5. Eccentricity dY (m) 6. Eccentricity dZ (m)
	17	Global		
	27	Projective		
Trapezoidal distributed moment	7	Internal forces calculations	4 — UX 5 — UY 6 — UZ	1. Load value M1 ((tf*m)/m) 2. Distance A1 (m) 3. Load value M2 ((tf*m)/m) 4. Distance A2 (m) 5. Must be equal to 0 6. Must be equal to 0
	17	Global		
	27	Projective		
Uniform heating	18	—	Must equal 1	1. Load value T (℃)
Thermal bending	18	—	5 — direction of gradient along local axe Z1 6 — direction of gradient along local axe Y1	1. Load value T1 (℃) 2. Load value T2 (℃) 3. Reference of load applying (m)
Concentrated bimoment	5	—	Must be equal to 7	1. Load value B (tf*м^2) 2. Reference of load applying (m) 3. Must be equal to 0 4. Must be equal to 0
Uniformly distributed bimoment	6	—	Must be equal to 7	1. Load value B (tf*m) 2. Must be equal to 0 3. Must be equal to 0 4. Must be equal to 0
Trapezoidal distributed bimoment	7	—	Must be equal to 7	1. Load value B1 (tf*m) 2. Distance A1 (m) 3. Load value B2 (tf*m) 4. Distance A2 (m) 5. Must be equal to 0 6. Must be equal to 0
Dynamic mass weight	4	—	Must be equal to 0	1. Load value P (tf/m) 2. 0 — the load is act on the rigid insert if its projection lengthens the flexible part and 1 – if otherwise

Table A.17 (continuation)

1	2	3	4	5
Tension/Jack	9	—	Must be equal to 1	1. Load value P (tf)
Concentrated heat flow	705	—	Must be equal to 0	1. Load value Q (t*m/s) 2. Distance A (m)
Uniformly distributed heat flux	706	—	Must be equal to 0	1. Load value Q (t/s)
Nonuniformly distributed heat flux	707	—	Must be equal to 0	1. Load value Q1 (t/s) 2. Distance A1 (m) 3. Load value Q2 (t/s) 4. Distance A2 (m)
Ambient temperature	726	—	Must be equal to 0	1. Load value T (celsius) 2. Must be equal to 0 3. Must be equal to 0 4. Must be equal to 0

✍ *In bar loads, all bindings are specified relative to the first node in the bar's local axes.*

Example of specifying of *document 6* (loads on bar):

```
( 6/
     * Concentrated force /
     1  5 3 1 1 /
     1 15 3 1 1 /

     * Concentrated moment /
     2  5 5 2 1 /
     2 15 5 2 1 /

     * Uniformly distributed force /
     3  6 2 3 1 /
     3 16 2 3 1 /
     3 26 2 3 1 /

     * Uniformly distributed moment /
     4  6 4 4 1 /
     4 16 4 4 1 /
     4 26 4 4 1 /

     * Trapezoidal distributed force /
     5  7 3 5 1 /
     5 17 3 5 1 /
     5 27 3 5 1 /

     * Trapezoidal distributed moment /
     6  7 6 6 1 /
     6 17 6 6 1 /
     6 27 6 6 1 /

     * Uniform heating /
     7 18 1 7 1 /
```

```
    * Thermal bending /
    8 18 5 8 1 /

    * Dynamic mass weight /
    9 4 0 9 2 /

    * Concentrated bimoment /
    10 5 7 10 1 /

    * Uniformly distributed bimoment /
    11 6 7 11 1 /

    * Trapezoidal distributed bimoment /
    12 7 7 12 1 /

    * Tension/Jack /
    13 9 1 13 3 / )
```

Example of specifying of the *document 7* (parameters of loads on bar):

```
( 7/
    * Parameters of concentrated load /
    1 5 1 0.2 0.1 /

    * Parameters of concentrated moment /
    2 5 1 0 0 /

    * Parameters of uniformly distributed force /
    3 5 0 0.2 0.1 /

    * Parameters of uniformly distributed moment /
    4 7.5 0 0 0 /

    * Parameters of trapezoidal distributed force /
    5 5 0.5 7 1.5 0.2 0.1 /

    * Parameters of trapezoidal distributed moment /
    6 6 0.5 10 1.5 0 0 /

    * Parameters of uniform heating /
    7 55 /

    * Parameters of temperature bending /
    8 55 85 0.1 /

    * Parameters of dynamic mass weight /
    9 10 0 /

    * Parameters of concentrated bimoment /
    10 11 1 0 0 /

    * Parameters of uniformly distributed bimoment /
    11 12 0 0 0 /

    * Parameters of trapezoidal distributed bimoment /
    12 10 0.5 20 1.5 0 0 /
```

```
        * Parameters of jack/turnbuckle tension /
        13 10 /
    )
```

Table A.18 Loads on plate

Load	**Load code**	**Coordinate system**	**Possible directions**	**Parameters and specifying sequence of loads (document 7)**
1	**2**	**3**	**4**	**5**
Concentrated force	5	Local	1 — X 2 — Y 3 — Z	1. Load value P (tf) 2. Reference distance A along axis X (from the 1st ode (m)) 3. Reference distance B along axis Y (from the 1st ode (m)) Eccentricity dZ
	15	Global		
	45	Alignment		
Concentrated moment	5	Local	4 — UX 5 — UY 6 — UZ	1. Load value M (tf*m) 2. Reference distance A along axis X (from the 1st node (m)) 3. Reference distance B along axis Y (from the 1st node (m))
	15	Global		
	45	Alignment		
Uniformly distributed force	6	Local	1 — X 2 — Y 3 — Z	1. Load value P (tf/m^2) 2. Eccentricity dZ
	16	Global		
	26	Projective		
	46	Alignment		
Uniformly distributed moment	6	Local	4 — UX 5 — UY 6 — UZ	1. Load value M ((tf*m)/m^2)
	16	Global		
	26	Projective		
	46	Alignment		
Trapezoidal distributed force	7	Local	1 — X 2 — Y 3 — Z	1. Load value P1 (tf/m^2) 2. Load value P2 (tf/m^2) 3. Load value P3 (tf/m^2) 4. Load value P4 (tf/m^2) 5. Eccentricity dZ
	17	Global		
	27	Projective		
	47	Alignment		
Trapezoidal distributed moment	7	Local	4 — UX 5 — UY 6 — UZ	1. Load value M1 ((tf*m)/m^2) 2. Load value M2 ((tf*m)/m^2) 3. Load value M3 ((tf*m)/m^2) 4. Load value M4 ((tf*m)/m^2)
	17	Global		
	27	Projective		
	47	Alignment		
Arbitrary trapezoidal distributed force	5	Local	1 — X 2 — Y 3 — Z	1. Load value P1 at first point of load applying 2. Binding of the 1st load point along the X axis from the 1st node (m) 3. Snapping of the 1st load point along the Y axis from the 1st node (m) 4. Items 1–3 are repeated according to the number of arbitrary load points. If there are two points, then the dimension of the load is tf/m, if more than 2 — tf/m^2.
	15	Global		
	25	Projective		
	45	Alignment		
Arbitrary trapezoidal distributed moment	5	Local	4 — UX 5 — UY 6 — UZ	1. . Load value M1 at the 1st load point 2. 2. Snapping of the 1st load point along the X axis from the 1st node (m) 3. 3. Binding of the 1st load point along the Y axis from the 1st node (m)
	15	Global		
	25	Projective		

Продолжение таблицы A.18

1	2	3	4	5
	45	Alignment		Items 1–3 are repeated according to the number of arbitrary load points. If there are two points, then the dimension of the load is (tf * m)/m, if more than 2 — (tf*m)/m^2.
Uniform heating (cooling)	18	—	0 — action in all directions 1 — direction of drop along the orthotropy axis X1 2 — direction of drop along the orthotropy axis Y1	1. Load value T (Δ°C) 2. Must be equal to 0 3. Must be equal to 0
Thermal bending	18	—	0 — action in all directions 1 — direction of drop along the orthotropy axis X1 2 — direction of drop along the orthotropy axis Y1	1. Load value (T1+T2)/2 (°C) 2. Load value T1-T2 (°C) 3. Must be equal to 0
Uniformly distributed force along line	9	Local	1 — X 2 — Y 3 — Z	1. 1st node number (local) 2. 2-nd node number (local) 3. Load value P (tf/m) 4. Eccentricity of dZ application
	19	Global		
	29	Projective		
	49	Alignment		
Uniformly distributed moment along line	9	Local	4 — UX 5 — UY 6 — UZ	1. 1st node number (local) 2. 2-nd node number (local) 3. Load value M ((tf*m)/m)
	19	Global		
	29	Projective		
	49	Alignment		
Trapezoidal distributed force along line	10	Local	1 — X 2 — Y 3 — Z	1. 1st node number (local) 2. 2-nd node number (local) 3. Load value P1 (tf/m) 4. Load value P2 (tf/m) 5. Eccentricity of dZ pplication
	20	Global		
	30	Projective		
	50	Alignment		
Trapezoidal distributed moment along line	10	Local	4 — UX 5 — UY 6 — UZ	1. 1st node number (local) 2. 2-nd node number (local) 3. Load value M1 ((tf*m)/m) 4. Load value M2 ((tf*m)/m)
	20	Global		
	30	Projective		
	50	Alignment		
Dynamic mass weight	4	—	Must be equal to 0	1. Load value P (tf/m^2) 2. Must be equal to 0

Продолжение таблицы A.18

1	2	3	4	5
Concentrated heat flow	705	—	Must be equal to 0	1. Load value P (т*m/s) 2. Load snapping A along the X axis from the 1st node (m) 3. Binding load B along the Y axis from the 1st node (m)
Uniformly distributed heat flux	706	—	Must be equal to 0	1. Load value Q (t/(m*s))
Nonuniformly distributed heat flux	707	—	Must be equal to 0	1. Load value Q1 (t/(m*s)) 2. Load value Q2 (t/(m*s)) 3. Load value Q3 (t/(m*s)) 4. Load value Q4 (т/(m*s))
Uniformly distributed heat flux along line	709	—	Must be equal to 0	1. 1st node number (local) 2. 2-nd node number (local) 3. Load value Q1 (т/(m*s))
Nonuniformly distributed heat flux along line	710	—	Must be equal to 0	1. 1st node number (local) 2. 2-nd node number (local) 3. Load value Q1 (т/(m*s)) 4. Load value Q2 (т/(m*s))
Ambient temperature	726	—	Must be equal to 0	1. Load value T (degree)

In the along line forces on the plate, the local nodal numbers must correspond to their setting order in the 1st document.

An example of specifying the *6th document* (load on the plate):

```
( 6/
     * Concentrated force /
     1  5 3 1 1 /
     1 15 3 1 1 /

     * Concentrated moment /
     2  5 6 2 1 /
     2 15 6 2 1 /

     * Uniformly distributed force /
     3  6 3 3 1 /
     3 16 3 3 1 /
     3 26 3 3 1 /

     * Uniformly distributed moment /
     4  6 6 4 1 /
     4 16 6 4 1 /
     4 26 6 4 1 /

     * Trapezoidal distributed force /
     5  7 3 5 1 /
     5 17 3 5 1 /
     5 27 3 5 1 /
```

```
        * Trapezoidal distributed moment /
        6  7 6 6 1 /
        6 17 6 6 1 /
        6 27 6 6 1 /

        * Uniform heating /
        7 18 0 7 1 /

        * Thermal bending /
        8 18 0 8 1 /

        * Uniformly distributed force along line /
        9  9 3 9 1 /
        9 19 3 9 1 /
        9 29 3 9 1 /

        * Uniformly distributed moment along line /
        10  9 6 10 1 /
        10 19 6 10 1 /
        10 29 6 10 1 /

        * Trapezoidal distributed force along line /
        11 10 3 11 1 /
        11 20 3 11 1 /
        11 30 3 11 1 /

        * Trapezoidal distributed moment along line /
        12 10 6 12 1 /
        12 20 6 12 1 /
        12 30 6 12 1 /

        * Dynamic mass weight /
        13 4 0 13 2 /
)
```

Example of specifying of *document 7* (parameters of loads on the plate):

```
( 7/
        * Parameters of concentrated load /
        1 10 1 0.3 /

        * Parameters of concentrated moment /
        2 10 1 0.5 /

        * Parameters of uniformly distributed force /
        3 12 /

        * Parameters of uniformly distributed moment /
        4 17 /

        * Parameters of trapezoidal distributed force /
        5 10 11 12 13 /
        * Parameters of trapezoidal distributed moment /
        6 14 15 16 17 /
```

```
        * Parameters of uniform heating /
        7 70 0 0 /

        * Parameters of temperature bending /
        8 65 -30 0 /

        * Parameters of uniformly distributed force along line /
        9 1 2 15 /

        * Parameters of uniformly distributed moment along line /
        10 2 4 22 /

        * Parameters of trapezoidal distributed force along line /
        11 4 3 10 20 /

        * Parameters of trapezoidal distributed moment along line /
        12 1 2 17 19 /

        * Parameters of the dynamic mass weight /
        13 10 /
    )
```

Table A.19 Loads on solid FE

Load	**Load code**	**Coordinate system**	**Possible directions**	**Parameters and specifying sequence of loads (document 7)**
1	**2**	**3**	**4**	**5**
Concentrated force	5	Local	1 — X 2 — Y 3 — Z	1. Load value P (tf) 2. Binding the load A along the axis X n) 3. Binding the load B along the axis Y n) 4. Binding the load C along the axis Z n)
	15	Global		
	45	Alignment		
Uniformly distributed force	6	Local	1 — X 2 — Y 3 — Z	1. Load value P (tf/m^3) 2. Must be equal to 0 3. Must be equal to 0 4. Must be equal to 0
	16	Global		
	46	Alignment		
Uniformly distributed force on face	6	Local	1 — X 2 — Y 3 — Z	1. Load value P (tf/m^2) 2. Face index (Table A.20) 3. Must be equal to 0 4. Must be equal to 0
	16	Global		
	46	Alignment		
Uniform heating (cooling)	18	—	0 — action in all directions 1 — direction of drop along the orthotropy axis X1 2 — direction of drop along the orthotropy axis Y1 3 — direction of drop along the orthotropy axis Z1	1. Load value T (Δ°C) 2. Must be equal to 0 3. Must be equal to 0 4. Must be equal to 0

Table A.19 (continuation)

1	2	3	4	5
Dynamic mass weight	4	—	Must be equal to 0	1. Load value P (tf/m^2) 2. Must be equal to 0 3. Must be equal to 0 4. Must be equal to 0
Concentrated heat flow	705	—		1. Load value Q (t*m/s) 2. Binding the load A along the axis X n) 3. Binding the load B along the axis Y n) 4. Binding the load C along the axis Z n)
Uniformly distributed heat flux	706	—		1. Load value Q (t/(м^2*s)) 2. Must be equal to 0 3. Must be equal to 0 4. Must be equal to 0
Uniformly distributed heat flux on face	706	—		1. Load value Q (t/(m*s)) 2. Index of face (Table A.20) 3. Must be equal to 0 4. Must be equal

When specifying a concentrated load on a solid element, the bindings are specified relatively to the 1st node in the local system of the element.

Example of specifying of *document 6* (loads on a solid element):

```
( 6/
     * Concentrated force /
     1  5 3 1 1 /
     1 15 3 1 1 /

     * Uniformly distributed force /
     2  6 3 2 1 /
     2 16 3 2 1 /

     * Uniformly distributed force on face /
     3  6 3 3 1 /
     3 16 3 3 1 /
     * Uniform heating /
     4 18 3 4 1 /

     * Dynamic mass weight /
     5 4 0 5 2 /
)
```

Example of specifying of *document 6* (parameters of loads on solid elements):

```
( 7/
     * Parameters of concentrated force /
     1 10 1 1 -1 /
```

```
        * Parameters of uniformly distributed force /
        2 20 0 0 0 /
        * Parameters of uniformly distributed force on face /
        3 18 1 0 0 /

        * Parameters of uniform heating /
        7 70 0 0 0 /

        * Parameters of the dynamic mass weight /
        8 25 0 0 0 /
    )
```

Table A.20 Indexes of faces of solid elements for specifying of load on the face

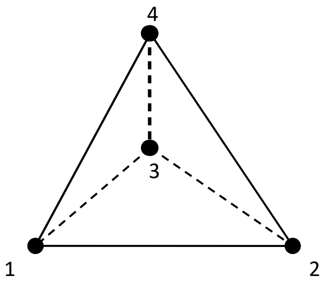
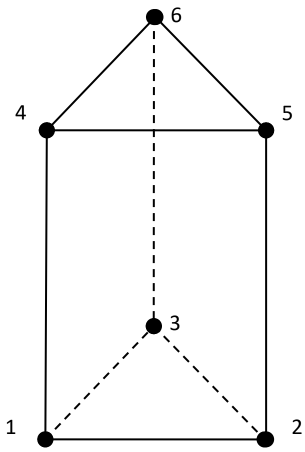
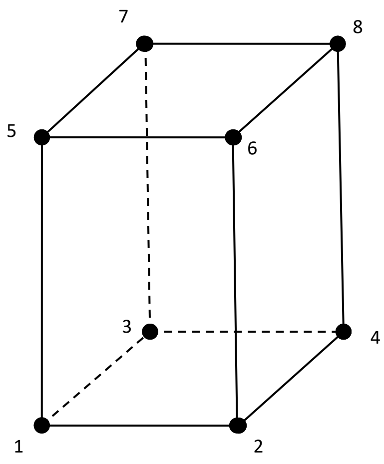
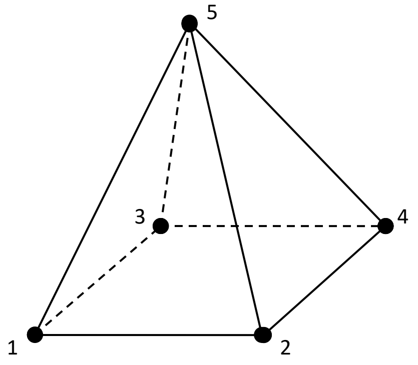
Form of element	**Sketch**	**Indexes of faces**
1	**2**	**3**
Tetrahedron		The edges are formed by such nodes: 1. 1, 3, 4 2. 1, 2, 4 3. 2, 3, 4 4. 1, 2, 3
Triangular prism		The edges are formed by such nodes: 1. 1, 3, 4, 6 2. 1, 2, 4, 5 3. 2, 3, 5, 6 4. 1, 2, 3 5. 4, 5, 6
Hexahedron		The edges are formed by such nodes: 1. 1, 3, 5, 7 2. 2, 4, 6, 8 3. 1, 2, 5, 6 4. 3, 4, 7, 8 5. 1, 2, 3, 4 6. 5, 6, 7, 8

Table A.20 (continuation)

1	2	3
Pyramid		The edges are formed by such nodes: 1. 1, 3, 5 2. 1, 2, 5 3. 2, 4, 5 4. 3, 4, 5 5. 1, 2, 3, 4 6. 5, 6, 7, 8

Example of specifying the *document 7* (mass matrix formation):

```
( 6/
     1 4 1 1 2 /
     1 4 2 2 3 /
)
```

Example of specifying the *document 7* (mass matrix formation):

```
( 7/
     1 1 /
     1 1.2 /
)
```

Table A.21 Formation of the mass matrix

Code of load	Direction	Formation of the mass matrix	Parameters and specifying sequence of loads (document 7)
4	1	From the loading	Conversion coeffition
4	2	From the density of elements	Conversion coeffition

When forming a mass matrix from a load case, the first number in the 6th document is the number of the load case from which the masses will be collected, and the last numbers are the number of the load case for which the masses will be collected.

Example of specifying the *document 6* (right-hand side for dynamic loading):

```
( 6/
     * Even step of polygonal line /
     5 4 4 1 3 /

     * Random step of polygonal line /
     6 4 4 2 3 /
)
```

Example of specifying the *document 7* (right-hand side for dynamic loading):

```
( 7/
     * Parameters of uniform step of polygon /
     1   0 4   2  0.89  1.1   0.909 0.25 -0.594 -0.999 -0.665
                              0.161 0.867 0.933  0.309 -0.544 /

     * Parameters of arbitrary step of polygon /
     2   0 1   0 1.1  2 2  3 1.5  4 2.4  5 1 /
)
```

Table A.22 Right-hand side (dynamic load)

<table>
<tr><th>Code of load</th><th>Direction</th><th colspan="2">Parameters and specifying sequence of loads
(document 7)</th></tr>
<tr><td rowspan="3">4</td><td rowspan="3">Must equal 4</td><td colspan="2">1. Must be equal to 0
2. Law template can take values:
2.1. 1 — random step of polygonal line
2.2. 4 —even step of polygonal line</td></tr>
<tr><td>For random step of polygonal line</td><td>For uniform step of polygonal line</td></tr>
<tr><td>3. Time (s)
4. Coefficient for right-hand side
Items 3-4 are repeated for each point of the graph</td><td>3. Start time applications (s)
4. Sample rate (s)
5. Scale factor for the law
6. Coefficient for right-hand side
Item 6 is repeated for each point of the graph</td></tr>
</table>

When specifying the right side in the 6th document, the first number is the number of the load case with the right side, and the last number is the number of the load case with nodal forces for the dynamic load.

Document 10 describes the specifying of coefficients to the assembling stages and is specified in the following sequence:

1. Number of the *line 17, the 0th document* (see item A.1), which specifies the group numbers and the corresponding lists of elements.
2. Coefficient to deformation modulus.
3. Concrete strength coefficient.

Items 2-3 are repeated for each stage of assembling/disassembling. The number of lines in the 10th document must be equal to the number of groups in the *line 7 of the 0th document*.

The coefficients of assembling stages, referring to groups of elements not yet assembled, must have the same values as the coefficients for the stage at which these elements are assembled.

Example:

```
( 10/
     1  0.75 0.8   0.95 0.9 /
     2  0.95 0.9   0.95 0.9 /
)
```

Document 15 describes the specifying of dynamic actions in the following sequence:

1. Loading index.
2. Index of dynamic calculation module (Table A.23).
3. Number of modes.
4. Number of relevant load case (used only for the average component of the wind action, in other cases it should be equal to zero).
5. Type of mass matrix (1 - consistent, 0 - lumped).
6. Must be zero for all the dynamics modules.
7. To sum the forms with multiple frequencies (1 - sum, 0 - do not sum).
8. Must be equal to zero for all the dynamics modules

Table A.23 Calculation dynamic modules

Index of calculation dynamic module	**Name of calculation dynamic module**	**Parameters and specifying sequence of calculation dynamic modules**
1	**2**	**3**
21	Pulsating component of wind action according to SNiP 2.01.07-85*	1. Correction factor for inertial forces. 2. Building height orientation sign (must be equal to 3) 3. Distance (H) between the ground surface and minimum applicate of design scheme (m) 4. Must be equal to 0 5. Wind area (Table 5) can take values: 5.1. 0 — Ia 5.2. 1 — I 5.3. 2 — II 5.4. 3 — III 5.5. 4 — IV 5.6. 5 — V 5.7. 6 — VI 5.8. 7 — VII 6. Building size (a) along the X-axis (m) 7. Building size (b) along the Y-axis (m) 8. Site type (item 6.5) can take values: 8.1. 1 — A (open sea coasts, coasts of lakes and reservoirs, deserts, steppes, forest-steppes, tundra) 8.2. 2 — B (urban areas, forest and other areas regularly covered by obstacles with the height above 10m) 8.3. 3 — C (urban areas with site development above 25 m) 9. Multistorey building with a constant stiffness along the height, mass and width of windward surface (0 — no, 1 — yes) 10. Logarithmic decrement 11. Must equal 0.
22	Impulse action	1. Inelastic material resistance coefficient
23	Impact action	1. Inelastic material resistance coefficient
24	Harmonic action	1. Inelastic material resistance coefficient 2. Compelled frequency of external impact (Rad/s) 3. Do not consider solo frequencies of the preceding forced frequency (0 — no, 1 — yes)

25	Pulsating component of wind action according to SP 20.13330.2011	1. Correction factor for inertial forces. 2. Building height orientation sign (must be equal to 3) 3. Distance (H) between the ground surface and minimum applicate of design scheme (m) 4. Must be equal to 0 5. Equivalent height can take values: 5.1. 1 — for towers structures, masts, pipes and buildings with constant cross-sectional shape 5.2. 2 — for other buildings 6. Wind area (Table 11.1) can take values: 6.1. 0 — Ia 6.2. 1 — I 6.3. 2 — II 6.4. 3 — III 6.5. 4 — IV 6.6. 5 — V 6.7. 6 — VI 6.8. 7 — VII 7. Site type (Tab. 11.1.6) can take values: 7.1. 1 — A (open sea coasts, coasts of lakes and reservoirs, deserts, steppes, forest-steppes, tundra) 7.2. 2 — B (urban areas, forest and other areas regulary covered by obstacles with high above 10m) 7.3. 3 — C (urban areas with site development above 25 m) 8. Multistorey building with height up to 40 m or a one-storeyed industrial building with height up to 36 m with at least 1.5 heigh-to-span ratio, placed in areas of A and B types (0 - no, 1 - yes) 9. Building size (a) along the X-axis (m) 10. Building size (b) along the Y-axis (m) 11. Building size (d) perpendicularly to designed wind direction 12. Logarithmic decrement 13. Consider amendment №1 to SP 20.13330.2016, affective after January 6, 2019 (0 - no, 1 - yes)
27	Seismic impact according to single-component accelerogram	1. Building height orientation sign (must be equal to 3) 2. Must be equal to 0 3. Relative damping 4. Scaling factor for the accelerogram 5. Direction cosines for the resultant seismic action in GCS — CX 6. Direction cosines for the resultant seismic action in GCS — CY 7. Direction cosines for the resultant seismic action in GCS — CZ 8. Sample rate (s) 9. Integration time (s) Then it is followed by acceleration (m/s^2), with the number of points, equal to the integration time divided by the sampling step (additional first point with time 0)
28	Harmonic action considering frequency sones	1. Inelastic material resistance coefficient 2. Compelled frequency of the external impact (Rad/s) 3. Accuracy of natural frequencies calculation and their possible change in operational process of the structure (frequency zones boundaries)

29	Seismic impact by three-component accelerogram	1. Building height orientation sign (must be equal to 3) 2. Must be equal to 0 3. Relative damping 4. Scaling factor for the accelerogram (radial component) 5. Scaling factor for the accelerogram (tangential component) 6. Scaling factor for the accelerogram (vertical component) 7. Direction cosines for the radial component of the seismic action in GCS — CX 8. Direction cosines for the tangential component of the seismic action in GCS — CY 9. Direction cosines for the vertical component of the seismic action in GCS — CZ (always equals to 1.0) 10. Sample rate (s) 11. Integration time (s) Then it is followed by accelerations (m/s^2) or the radial, tangential and vertical components, the number of points of which is equal to the integration time divided by the sampling step (additional first point with time 0) for each component
30	Seismic action according to SNiP II-7-81* edition from 01.01.1996 (Russian Federation)	1. Correction factor for inertial forces 2. Building height orientation sign (must be equal to 3) 3. Must equal 0 4. Type of the structure can take values: 4.1. 1 — Residential, public and industrial 4.2. 2 — Transport 4.3. 3 — Hydrotechnical 4.4. 4 — Bridge 5. Soil category can take values: 5.1. 10 — I category 5.2. 20 — II and III categories, the layer is <= 30 m 5.3. 21 — II and III categories, the layer is >= 30 m 6. Seismicity of the construction site can take values: 6.1. 7 — intensity degree 7.0 6.2. 8 — intensity degree 8.0 6.3. 9 — intensity degree 9.0 7. Coefficient that takes into account allowable damage of buildings and structures, accepted by table 3: 7.1. 1 — residual deformations and local damage are not allowed (K1 = 1.00) 7.2. 2 – may be allowed residual deformations, cracks, fractures of individual elements, etc. that hinder normal operation, while ensuring the safety of the people and equipment (K1 = 0.25). 7.3. 3 – may be allowed significant residual deformations, cracks, fractures of individual elements, their displacement, etc. that temporarily suspend normal operation, while ensuring the safety of the people and equipment (K1 = 0.12).

		8. Coefficient that takes into account design solutions of buildings and structures, accepted by table 4 or instructions in section 5, can take values: 8.1. 1 — framed buildings, large-block one, with the walls of the complex structure and number of floors *n* more than 5 (K2 = 1+0.1*(n-5)) 8.2. 2 — large-panel buildings or buildings with walls made of reinforced concrete and with number of floors up to 5 (K2 = 0.9) 8.3. 3 — large-panel buildings or ones with walls made of reinforced concrete, with number of floors n more than 5 (K2 = 0.9+0.075*(n-5)) 8.4. 4 — buildings with one or more framework lower floors and overlying floors with load-bearing walls, diaphragms or a frame with filling, if filling in the lower floors is missing or has little effect on their stiffness (K2 = 1.5) 8.5. 5 — buildings with load-bearing walls made of brick or stone masonry, manually performed without additives, that increase the adhesion (K2 = 1.3) 8.6. 6 — framed one-story buildings with a height to the bottom of beams or trusses no more than 8 meters and spans up to18 m (K2 = 0.8); 8.7. 7 — farm buildings on piles-columns constructed on the soils of III category (according to Table. 1*0 (K2 = 0.5) 8.8. 8 — buildings, not specified in paragraphs 1–7 (K2 = 1.0) 9. Coefficient of design seismicity increase for of the construction site, accepted according to table 5, can take values: 9.1. 1 — Residential, public and industrial buildings and structures, except those specified in paragraphs 2–4 9.2. 2 — Especially important buildings and structures 9.3. 3 — Buildings and structures, the damage of which is associated with especially severe consequences (large and medium-sized stations, roofed stadiums, etc.) 9.4. 4 — Buildings and structures, operation of which is necessary to eliminate the consequences of earthquakes (energy and water supply systems, firefighting, fire suppression systems, some communication facilities, etc.) 10. Coefficient accepted according to Table 6 or instructions in section 5, which can take values: 10.1. 1 — tall-, small- sized structures on the plan: towers, masts, chimneys, freestanding elevator shafts and etc. (Kψ = 1.5) 10.2. 2 — framed buildings, wall filling of which has no impact on its deformability with the ratio of the racks - height h to the transverse size b in the direction of designed seismic action equal to or more than 25 (Kψ = 1.5) 10.3. 3 — framed buildings, wall filling of which has no impact on its deformability with ratio of racks height h to transverse dimension b in the direction of designed seismic action equal to or less than 15 (Kψ = 1.0) 10.4. 4 — buildings and structures that are not specified in the paragraphs 1–3 (Kψ = 1.0) 11. Number of floors of the structure 12. Direction cosines for the resultant seismic action in GCS — CX 13. Direction cosines for the resultant seismic action in GCS — CY 14. Direction cosines for the resultant seismic action in GCS — CZ
31	Seismic action according to SP 31-114-2004 (Russian Federation)	15. Correction factor for the seismic forces 1. Building height orientation sign (must be equal to 3) 2. Must equal 0 3. Soil category can take values: 3.1. 1 — I category 3.2. 2 — II category 3.3. 3 — III category 4. Soil category can take values:

		4.1. 0.1 — intensity degree 7.0 4.2. 0.2 — intensity degree 8.0 4.3. 0.4 — intensity degree 9.0 5. Coefficient that takes into account inelastic strains and local damages of elements of the building, which can take values: 5.1. K1 = 1.00 — damages or inelastic strains are not allowed 5.2. K1 = 0.22 — may be allowed residual strains and damages, while ensuring the safety of people, constructed large-panel or monolithic structures made of reinforced concrete 5.3. K1 = 0.25 — may be allowed residual strains and damages, while ensuring the safety of people, constructed with a steel frame without vertical diaphragms or ties 5.4. K1 = 0.22 — may be allowed residual strains and damages, while ensuring the safety of people, constructed with a steel frame with vertical diaphragms or ties 5.5. K1 = 0.35 — may be allowed residual strains and damages, while ensuring the safety of people, constructed with a concrete frame without vertical diaphragms or ties 5.6. K1 = 0.25 — may be allowed residual strains and damages, while ensuring the safety of people, constructed with a reinforced concrete frame with vertical diaphragms or ties 5.7. K1 = 0.35 — may be allowed residual strains and damages, while ensuring the safety of people, made of brick or stone masonry 5.8. K1 = 0.12 — may be allowed significant residual strains, temporarily suspending normal operation, while ensuring the safety of people 6. Energy dissipation coefficient which can take values: 6.1. $K\psi$ = 1.5 — small-size tall structures on the plan 6.2. $K\psi$ = 1.3 — framed buildings, wall filling of which has no effect on their deformability 6.3. $K\psi$ = 1.0 — buildings and structures not specified in positions 1–2 7. The smallest size of the structure on the plane (m) 8. Compositing techniques of contribution of modes: 8.1. 0 — SRSS (Square Root of the Sum of Squares) 8.2. 1 — CQC (Complete Quadratic Combination) 9. Direction cosines vectors of soil foundation rotation in GCS — CUX 10. Direction cosines vectors of soil foundation rotation in GCS — CUY 11. Direction cosines vectors of soil foundation rotation in GCS — CUZ 12. Direction cosines for vectors of acceleration of translational motion in GCS — CX 13. Direction cosines for vectors of acceleration of translational motion in GCS — CY 14. Direction cosines for vectors of acceleration of translational motion in GCS — CZ
32	Seismic action according to SNRA II-6.02-2006 (Armenia),	1. Correction factor for inertial forces 2. Building height orientation sign (must be equal to 3) 3. Must be equal to 0 4. Soil category can take values: 4.1. 1 — I category 4.2. 2 — II category 4.3. 3 — III category 4.4. 4 — IV category 5. Seismic region can take values: 5.1. 1 — 1 Seismic region 5.2. 2 — 2 Seismic region 5.3. 3 — 3 Seismic region 6. Coefficient that takes into account soil conditions of the construction site, accepted by table 4.

		7. Coefficient that takes into account allowable damage of buildings and structures, accepted by table 7. 8. Importance factor of the structures, accepted by table 8. 9. Coefficient of interaction between foundation and structure, accepted by p. 6.8. 10. Ratio of vertical to horizontal soil acceleration 11. Direction cosines for the resultant seismic action in GCS — CX 12. Direction cosines for the resultant seismic action in GCS — CY 13. Direction cosines for the resultant seismic action in GCS — CZ
33	Seismic action according to KMK 2.01.03-96 edited from 01.04.2004 (Uzbekistan)	1. Correction factor for inertial forces 2. Importance factor of the structures, accepted by table 2.3 3. Coefficient that takes into account occurrence frequency of earthquakes, accepted by table. 2.4 4. Storey factor of the structure accepted by table 2.10 5. Regularity coefficient accepted by table. 2.12 6. Coefficient of site seismicity, accepted by table 2.7 7. Index of region can take values: 7.1. 1 — I region 7.2. 2 — II region 7.3. 3 — III region 7.4. 4 — IV region 8. Soil category can take values: 8.1. 1 — I category 8.2. 2 — II category 8.3. 3 — III category 9. Oscillation decrement, accepted by table 2.9 10. Consideration of changes from 01.04.2004 г. (0.0 — no, 1.0 — yes) 11. Direction cosines for the resultant seismic action in GCS — CX 12. Direction cosines for the resultant seismic action in GCS — CY 13. Direction cosines for the resultant seismic action in GCS — CZ
34	Seismic action according to MGSN 4.19-05 (GOS Moscow)	1. Correction factor for inertial forces 2. Building height orientation sign (must be equal to 3) 3. Must equal 0 4. Property of material of the structure can take values: 4.1. 1 — reinforced concrete 4.2. 2 — steel 5. Seismicity of the construction site (5 or 6 magnitude) 6. Coefficient that takes into account permitted damage to buildings and structures, accepted according to з.5.2.1 7. Direction cosines for the resultant seismic action in GCS — CX 8. Direction cosines for the resultant seismic action in GCS — CY 9. Direction cosines for the resultant seismic action in GCS — CZ
35	Seismic action according to SNiP II-7-81* edition from 01.01.2000 (Russian Federation)	1. Correction factor for inertial forces 2. Building height orientation sign (must be equal to 3) 3. Must equal 0 4. Type of the structure can take values: 4.1. 1 — Residential, public and industrial 4.2. 2 — Transport 4.3. 3 — Hydrotechnical 4.4. 4 — Bridge 5. Soil category can take values: 5.1. 1 — I category 5.2. 2 — II category 5.3. 3 — III category 6. Seismicity of the construction site can take values: 6.1. 7 — intensity degree 7.0 6.2. 8 — intensity degree 8.0 6.3. 9 — intensity degree 9.0

		7. Coefficient that takes into account allowable damage of buildings and structures, accepted by table 3 8. Coefficient, factoring in structural design solutions of buildings and structures, accepted according to table 4 or instructions in section 5 9. Direction cosines for the resultant seismic action in GCS — CX 10. Direction cosines for the resultant seismic action in GCS — CY 11. Direction cosines for the resultant seismic action in GCS — CZ
36	Seismic action according to DBN B.1.1-12:2014 (Ukraine)	1. Correction factor for inertial forces 2. Building height orientation sign (must be equal to 3) 3. Must be equal to 0 4. Type of the structure can take values: 4.1. 1 — Residential, public and industrial 4.2. 2 — Transport 4.3. 3 — Hydrotechnical 4.4. 4 — Bridge 4.5. 5 — Slope stability (DBN B.1.1-12:2014, Appendix K) 5. Soil category can take values: 5.1. 1 — I category 5.2. 2 — II category 5.3. 3 — III category 6. Relative soil acceleration 7. Coefficient that takes into account inelastic strains and local damages of elements of the building, accepted according to Table 6.3. 8. Importance factor of the structures, accepted according to table 6.4 9. Coefficient that takes into account nonlinear deformation of soil under intense seismic vibrations, accepted according to table 6.6. 10. Ratio of maximum vertical soil acceleration to horizontal one 11. Storey factor of the structure, accepted by formula 6.2 12. Direction cosines for the resultant seismic action in GCS — CX 13. Direction cosines for the resultant seismic action in GCS — CY 14. Direction cosines for the resultant seismic action in GCS — CZ
37	Seismic action according to DBN B.1.1-12:2006, Appendix E (Ukraine)	1. Correction factor for inertial forces 2. Building height orientation sign (must be equal to 3) 3. Must equal 0 4. Must equal 1 5. Soil category can take values: 5.1. 1 — I category 5.2. 2 — II category 5.3. 3 — III category 6. Relative soil acceleration 7. Coefficient that takes into account inelastic strains and local damages of elements of the building, accepted according to Table. 2.3 8. Importance factor of the structures, accepted by table Table 2.4 9. Coefficient that takes into account nonlinear deformation of soil under intense seismic vibrations, accepted according to Table. 2.6 10. Ratio of maximum vertical soil acceleration to horizontal one 11. Buildings footprint length (L) along the axis XL (m) 12. Buildings footprint width (B) along the axis YL (m) 13. Speed of propagation of transverse seismic waves in soil (m/s) 14. Parameter of considering the vertical ordinate of the oscillation field (0 – not to consider, 1 – to consider 15. Angle between axes X and XL (degrees) 16. Storey factor of the structure, accepted by the equation 2.2 17. Compliance factor (Appendix D) 18. Direction cosines for the resultant seismic action in GCS — CX 19. Direction cosines for the resultant seismic action in GCS — CY 20. Direction cosines for the resultant seismic action in GCS — CZ

38	Seismic action according to SNiP II-7-81* edited from 01.01.2000 considering torsion (Russian Federation)	1. Correction factor for inertial forces 2. Building height orientation sign (must be equal to 3) 3. Applicate of building support system contour (m) 4. Type of the structure can take values: 4.1. 1 — Residential, public and industrial 4.2. 2 — Transport 4.3. 3 — Hydrotechnical 4.4. 4 — Bridge 5. Soil category can take values: 5.1. 1 — I category 5.2. 2 — II category 5.3. 3 — III category 6. Seismicity of the construction site can take values: 6.1. 7 — intensity degree 7.0 6.2. 8 — intensity degree 8.0 6.3. 9 — intensity degree 9.0 7. Coefficient that takes into account allowable damage of buildings and structures, accepted by table 3: 7.1. K1 = 1.00 — damages or inelastic strains are not allowed 7.2. K1 = 0.22 — may be allowed residual strains and damages, while ensuring the safety of people, constructed large-panel or monolithic structures made of reinforced concrete 7.3. K1 = 0.25 — may be allowed residual strains and damages, while ensuring the safety of people, constructed with a steel frame without vertical diaphragms or ties 7.4. K1 = 0.22 — may be allowed residual strains and damages, while ensuring the safety of people, constructed with a steel frame with vertical diaphragms or ties 7.5. K1 = 0.35 — may be allowed residual strains and damages, while ensuring the safety of people, constructed with a concrete frame without vertical diaphragms or ties 7.6. K1 = 0.25 — may be allowed residual strains and damages, while ensuring the safety of people, constructed with a reinforced concrete frame with vertical diaphragms or ties 7.7. K1 = 0.35 — may be allowed residual strains and damages, while ensuring the safety of people made of brick or stone masonry 7.8. K1 = 0.12 — may be allowed significant residual strains, temporarily suspending normal operation, while ensuring the safety of people 8. Coefficient, factoring in structural design solutions of buildings and structures, accepted according to table 4 or instructions in section 5, which can take values: 8.1. $K\psi$ = 1.5 — small-size tall structures on the plan 8.2. $K\psi$ = 1.3 — framed buildings, wall filling of which has no effect on their deformability 8.3. $K\psi$ = 1.0 — buildings and structures that are not specified in p. 1–2, except hydrotechnical structures 9. Smaller size of structures on the plan (m) 10. Direction cosines for the resultant seismic action in GCS — CX (must be equal to 0.0 when the dangerous direction of seismic action is considered automatically) 11. Direction cosines for the resultant seismic action in GCS — CY (must be equal to 0.0 when the dangerous direction of seismic action is considered automatically) 12. Direction cosines for the resultant seismic action in GCS — CZ (must be equal to 0.0 when the dangerous direction of seismic action is considered automatically)

39	Seismic action according to TGN 2.01.08-99 (Turkmenistan)	1. Correction factor for inertial forces 2. Building height orientation sign (must be equal to 3) 3. Must be equal to 0 4. Soil category can take values: 4.1. 10 — I category 4.2. 20 — II and III categories, the layer is <= 30 m 4.3. 21 — II and III categories, the layer is >= 30 m 5. Seismicity of the construction site can take values: 5.1. 7 — intensity degree 7.0 5.2. 8 — intensity degree 8.0 5.3. 9 — intensity degree 9.0 6. Importance factor of the structures, accepted by table 3 7. Factor of structural design solutions, accepted by table 4 8. Coefficient that takes into account occurrence frequency of earthquakes, accepted by table 5 9. Coefficient of damping properties of the structure, accepted by table 6 10. Direction cosines for the resultant seismic action in GCS — CX 11. Direction cosines for the resultant seismic action in GCS — CY 12. Direction cosines for the resultant seismic action in GCS — CZ
41	Seismic according to reaction spectrum of single-mass oscillator	1. Type of graph of spectrum can take values: 1.1. 0 — accelerations 1.2. 1 — velocities 1.3. 2 — displacements 2. Scaling factor for the accelerogram 3. Direction cosines for the resultant seismic action in GCS — CX 4. Direction cosines for the resultant seismic action in GCS — CY 5. Direction cosines for the resultant seismic action in GCS — CZ 6. Frequency (Rad/s) 7. Spectrum values Пункты 6–7 повторяются столько раз, сколько точек на графике
42	Seismic action according to IBC-2012: ASCE 7-10 (USA)	1. Correction factor for inertial forces 2. Building height orientation sign (must be equal to 3) 3. Must equal 0 4. Site type (soil category) table 20.3-1 can take values: 4.1. 1 — A 4.2. 2 — B 4.3. 3 — C 4.4. 4 — D 4.5. 5 — E 5. Acceleration in short period of time Ss p.11.4.1 (in % from «g») 6. Acceleration in 1 second period of time S1 p.11.4.1 (in % from «g») 7. Response modification factor R Table 12.2-1 8. Importance factor of the structure le table 1.5-2 9. Long-term period, accepted by regional maps of USA (22-12)-(22-16), (s). 10. Approximate main mode of the structure in direction of seismic action Ta (s) 11. Factor of elastic strain increment Cd table 12.2-1, 15.4-1 12. Должно быть равным нулю 13. Feature of control of seismic action according to shear in foundation can take values: 13.1. 0 — do not use 13.2. 1 — use set value of equivalent side force in foundation 13.3. 2 — use calculated by Ta value of equivalent side force in foundation 14. Value of equivalent side force in foundation (tf) 15. Compositing techniques of contribution of modes: 14.1.0 — SRSS (Square Root of the Sum of Squares)

		14.2.1 — CQC (Complete Quadratic Combination) 15. Direction cosines for the resultant seismic action in GCS — CX 16. Direction cosines for the resultant seismic action in GCS — CY 17. Direction cosines for the resultant seismic action in GCS — CZ
43	Seismic action according to SNiP RK 2.03-30-2006 (Kazakhstan)	1. Correction factor for inertial forces 2. Building height orientation sign (must be equal to 3) 3. Must be equal to 0 4. Seismicity of the construction site can take values: 4.1. 7 — intensity degree 7.0 4.2. 8 — intensity degree 8.0 4.3. 9 — intensity degree 9.0 4.4. 10 —intensity degree 10.0 5. Soil category can take values: 5.1. 1 — I category 5.2. 2 — II category 5.3. 3 — III category 6. Importance factor of the structures, accepted by table 5.2 7. Reduction factor that takes into account structural design solutions of the building, accepted by table 5.3 and 5.4. 8. Coefficient that takes into account the height of buildings, accepted by formula 5.3 9. Coefficient that takes into account the ability of building to dissipate energy of oscillations by table 5.7, which can take values: 9.1. Kψ = 1.2 — structures such as shelving units without filling 9.2. Kψ = 1.0 — buildings and structures that are not specified in p.1 Table. 5.7 10. Coefficient that takes into account soil conditions of construction site, accepted by table 5.6 11. Direction cosines for the resultant seismic action in GCS — CX 12. Direction cosines for the resultant seismic action in GCS — CY 13. Direction cosines for the resultant seismic action in GCS — CZ
44	Seismic action according to EN 1998-1:2004 (Eurocode 8)	1. Correction factor for inertial forces 2. Building height orientation sign (must be equal to 3) 3. Level of foundation (rigid base). 4. Must equal 0 5. Design soil acceleration (m/s2) 6. Calculation parameters 6.1. By response spectrum 6.2. Shear force in foundation (uniform distribution) 6.3. Shear force in foundation (linearly increasing with height) 6.4. Shear force in foundation (by eigenmode) 7. Use response spectra from national annex can take values: 7.1. 0 — seismic impact according to EN 7.2. 1 — response spectra from national annex 8. Calculation type can take values: 8.1. 1 — elastic 8.2. 2 — project 9. Spectrum type can take values: 9.1. 1 — I type 9.2. 2 — II type 10. Soil type can take values: 10.1.1 — A 10.2.2 — B 10.3.3 — C 10.4.4 — D 10.5.5 — E 11. Horizontal factor of behavior 12. Vertical factor of behavior 13. Damping factor 14. Lower indicator of boundary for the horizontal design spectrum

		15. Number of the storeys for adjustment factor λ determination 16. Index of mode 17. Compositing techniques of contribution of modes: 17.1. 0 — SRSS (Square Root of the Sum of Squares) 17.2. 1 — CQC (Complete Quadratic Combination) 18. Direction cosines for the resultant seismic action in GCS — CX 19. Direction cosines for the resultant seismic action in GCS — CY 20. Direction cosines for the resultant seismic action in GCS — CZ 21. If a spectrum is selected from EN app, **then this is the last value**: Extend the graph for components of the spectrum with values as for $T = 4\ s$. If a spectrum from a national annex is used, then this is a scale factor to the horizontal graph 22. Scale factor to vertical plot 23. Number of pairs of horizontal plot N_x 24. Number of parallels of vertical graphics N_z 25. N_x pairs of $(T_i; S_{ah,i})$ 26. N_z pairs of $(T_i; S_{av,i})$ 27. Limit value between short and medium periods of the horizontal spectrum, s. 28. Extend the graph for components of the spectrum with values as for $T = 4\ s$.
45	Seismic action according to RPA 99 / Version 2003 (**Algeria**)	1. Correction factor for inertial forces 2. Building height orientation sign (must be equal to 3) 3. Must equal 0 4. Seismic region can take values: 4.1. 1 — I 4.2. 2 — IIa 4.3. 3 — IIb 4.4. 4 — III 5. Group of importance can take values: 5.1. 1 — 1A 5.2. 2 — 1B 5.3. 3 — 2 5.4. 4 — 3 6. Soil category can take values: 6.1. 1 — S1 6.2. 2 — S2 6.3. 3 — S3 6.4. 4 — S4 7. Factor of behavior, accepted according to Table. 4.3 8. Quality factor, accepted according to formula 4.4 9. Damping correction factor, accepted according to formula 4.3 10. Direction cosines for the resultant seismic action in GCS — CX 11. Direction cosines for the resultant seismic action in GCS — CY 12. Direction cosines for the resultant seismic action in GCS — CZ
46	Seismic action according to DBN B.1.1-12:2014, Appendix I (Ukraine)	1. Correction factor for inertial forces 2. Building height orientation sign (must be equal to 3) 3. Applicate of building support system contour (m) 4. Type of the structure может принимать значения: 4.1. 1 — Residential, public and industrial 4.2. 2 — Transport 4.3. 3 — Hydrotechnical 4.4. 4 — Bridge 5. Soil category can take values: 5.1. 1 — I category 5.2. 2 — II category 5.3. 3 — III category 6. Relative soil acceleration

		7. Coefficient that takes into account inelastic strains and local damages of elements of the building, accepted according to Table. 2.3 8. Importance factor of the structures, accepted according to table 2.4 9. Coefficient that takes into account nonlinear deformation of soil under intense seismic vibrations, accepted according to Table. 2.6 10. Ratio of maximum vertical soil acceleration to horizontal one 11. Smaller size of structure on the plan (m) 12. Storey factor of the structure, accepted by formula 2.2 13. Compliance factor μ 14. Direction cosines for the resultant seismic action in GCS — CX (should be equal to 0.0 if the dangerous direction of the seismic action is automatically taken into account) 15. Direction cosines for the resultant seismic action in GCS — CY (should be equal to 0.0 if the dangerous direction of the seismic action is automatically taken into account) 16. Direction cosines for the resultant seismic action in GCS — CZ (should be equal to 0.0 if the dangerous direction of the seismic action is automatically taken into account)
47	Seismic action according to NP-031-01 (Russian Federation)	1. Correction factor for inertial forces 2. Building height orientation sign (must be equal to 3) 3. Must be equal to 0 4. Seismicity of the construction site can take values: 4.1. 7 — intensity degree 7.0 4.2. 8 — intensity degree 8.0 4.3. 9 — intensity degree 9.0 5. Logarithmic decrement according to Table. P.3.2 6. Conditions of use factor for atomic power stations by p. 4 Annex 4 7. Direction cosines for the resultant seismic action in GCS — CX 8. Direction cosines for the resultant seismic action in GCS — CY 9. Direction cosines for the resultant seismic action in GCS — CZ
48	Seismic action according to MSC ЧТ 22-07-2007 (Tajikistan)	1. Correction factor for inertial forces 2. Building height orientation sign (must be equal to 3) 3. Must be equal to 0 4. Soil category can take values: 4.1. 1 — I category 4.2. 2 — II category 4.3. 3 — III category 5. Seismicity of the construction site can take values: 5.1. 7 — intensity degree 7.0 5.2. 8 — intensity degree 8.0 5.3. 9 — intensity degree 9.0 5.4. 10 — > intensity degree 9.0 6. Type of the structure can take values: 6.1. 1 — Residential, public and industrial 6.2. 2 — Transport 6.3. 3 — Hydrotechnical 7. Coefficient that takes into account the importance degree of buildings and structures,accepted according to Table. 4.2 8. Coefficient that takes into account structural design solutions of buildings and structures, accepted according to Table. 4.3 9. Coefficient that takes into account the height of buildings, accepted by formula 4.3 10. Coefficient, that takes into account the ability to dissipate energy of oscillation according to Table. 4.4 11. Ratio of maximum vertical soil acceleration to horizontal one 12. Direction cosines for the resultant seismic action in GCS — CX 13. Direction cosines for the resultant seismic action in GCS — CY 14. Direction cosines for the resultant seismic action in GCS — CZ

49	Seismic action according to DBN B.2.2-24:2009 (Ukraine)	1. Correction factor for inertial forces 2. Building height orientation sign (must be equal to 3) 3. Must be equal to 0 4. Relative soil acceleration 5. Relative contribution of RC elements of the building into the potential energy of the 1st mode of natural oscillations 6. Coefficient that takes into account inelastic strains and local damages of elements of the building, accepted according to p.4.16 7. Importance factor of the structure, accepted according to p.4.16 8. Coefficient that takes into account nonlinear deformation of soil under intense seismic vibrations, accepted according to p.4.16 9. Storey factor of the structure, accepted by formula 4.2 10. Ratio of maximum vertical soil acceleration to horizontal one 11. Direction cosines for the resultant seismic action in GCS — CX 12. Direction cosines for the resultant seismic action in GCS — CY 13. Direction cosines for the resultant seismic action in GCS — CZ
50	Seismic action according to AzDTN 2.3-1-2010 (Azerbaijan) with revisions of 01.01.2014г.	1. Correction factor for inertial forces 2. Building height orientation sign (must be equal to 3) 3. Must equal 0 4. Type of the structure can take values: 4.1. 1 — Residential, public and industrial 4.2. 2 — Transport 4.3. 3 — Bridge 5. Soil category can take values: 5.1. 1 — I category 5.2. 2 — II category 5.3. 3 — III category 5.4. 4 — IV category 6. Seismicity of the construction site can take values: 6.1. 7 — intensity degree 7.0 6.2. 8 — intensity degree 8.0 6.3. 9 — intensity degree 9.0 7. Importance factor of the structures, accepted under Table 4, can take values: 7.1. K1 = 2.00 — highly important structures, damage of which is associated with the death of people and damage to the environment 7.2. K1 = 1.50 — buildings and structures of national importance (administrative buildings) 7.3. K1 = 1.40 — buildings and structures with massive presence of people (stations, stadiums, subways, theaters, museums, shopping malls, markers, etc.) 7.4. K1 = 1.20 — buildings and structures , the operation of which is necessary to eliminate the consequences of earthquakes 7.5. K1 = 1.20 — schools, kindergartens, hospitals, nursing homes, barracks, dormitories 7.6. K1 = 1.00 — buildings and structures that are not specified in pp.1–5 and 7 Table. 4 7.7. K1 = 0.50 — low-important buildings and structures, where residual strains and damages do not bring the risk to humans and do not cause the termination of continuous technological processes 8. Factor of structural design solutions, according to Table 5, can take values: 8.1. K2 = 1.00 — damages or inelastic strains are not allowed 8.2. K2 = 0.25 — may be allowed residual strains and damages in buildings and structures, constructed with steel frame 8.3. K2 = 0.35 — may be allowed residual strains and damages in buildings and structures, constructed with concrete frame without vertical diaphragms or ties 8.4. K2 = 0.30 — may be allowed residual strains and damages in buildings and structures, constructed with concrete frame with vertical diaphragms or ties

		8.5. K2 = 0.25 — may be allowed residual strains and damages in buildings and structures, constructed with reinforced concrete large-panel of monolithic structures 8.6. K2 = 0.40 — may be allowed residual strains and damages in buildings and structures, constructed with large stone blocks 8.7. K2 = 0.45 — may be allowed residual strains and damages in buildings and structures, constructed with brick or stone masonry 8.8. K2 = 0.60 — on bearing pillars of seismic isolation systems 8.9. K2 = 0.14 — may be allowed residual strains and damages in buildings and structures with 5 floors or less, regardless of structural design solution of the framework 8.10. K2 = 0.15 — low-important buildings and structures, where residual trains and damages do not bring the risk to humans and do not cause the termination of continuous technological processes 9. Storey factor of the structure, accepted according to formula 2 10. Factor of energy dissipation, accepted according to Table 6 ,can take values: 10.1. Kψ = 1.30 — small-size tall structures on the plan (towers, masts, chimneys, freestanding elevator shafts etc.) 10.2. Kψ = 1.20 — when ratio of the structures to its width >= 4 and largespan buildings and structures (L >= 24 m) 10.3. Kψ = 1.30 — framed buildings, wall filling of which has no impact on its deformability with a ratio of rack height h to the transverse size b in the direction of designed seismic action equal to or more than 25 10.4. Kψ = 1.00 — framed buildings, wall filling of which has no impact on its deformability with a ratio of rack height h to transverse dimension b in the direction of designed seismic action equal to or less than 15 10.5. Kψ = 1.00 — buildings and structures that are not listed in p. 1–4 Table 6; 11. Direction cosines for the resultant seismic action in GCS — CX 12. Direction cosines for the resultant seismic action in GCS — CY 13. Direction cosines for the resultant seismic action in GCS — CZ
51	Seismic action according to SP 14.13330.2014 (Russian Federation)	1. Correction factor for inertial forces 2. Building height orientation sign (must be equal to 3) 3. Must equal 0 4. Type of the structure can take values: 4.1. 1 — Residential, public and industrial 4.2. 2 — Transport 4.3. 3 — Hydrotechnical 4.4. 4 — Bridge 5. Soil category can take values: 5.1. 1 — I category 5.2. 2 — II category 5.3. 3 — III category 6. Seismicity of the construction site can take values: 6.1. 7 — intensity degree 7.0 6.2. 8 — intensity degree 8.0 6.3. 9 — intensity degree 9.0 7. K0 — Coefficient that determines purpose of the structure, accepted according to Table. 3 8. K1 — Coefficient that takes into account permitted damage to buildings and structures according to Table. 5 9. K2 — Coefficient for all types of water-retraining structures 10. Kψ — Coefficient that takes into account the ability of the buildings and structures to dissipate energy according to Table. 6 11. Coefficient to vertical component of seismic action 12. Compositing techniques of contribution of modes: 12.1. 0 — by formula 8 (SRSS) 12.2. 1 — by formula 9

		13. Direction cosines for the resultant seismic action in GCS — CX 14. Direction cosines for the resultant seismic action in GCS — CY 15. Direction cosines for the resultant seismic action in GCS — CZ
52	Seismic action according to Turkish Earthquake Code 2007 (Turkey)	1. Correction factor for inertial forces 2. Building height orientation sign (must be equal to 3) 3. Must be equal to 0 4. Behavior factor of the structure R (table 2.5, section. 3.5) 5. Soil type can take values: 5.1. 1 — Soil Z1 5.2. 2 — Soil Z2 5.3. 3 — Soil Z3 5.4. 4 — Soil Z4 6. Seismic region can take values: 6.1. 1 — 1 Seismic region 6.2. 2 — 2 Seismic region 6.3. 3 — 3 Seismic region 6.4. 4 — 4 Seismic region 7. Importance factor of the structure (table. 2.3) can take values: 7.1. l = 1.5 — structures, that have to be used after the earthquake and structures that contain hazardous materials 7.2. l = 1.4 — long-term buildings intensively used for storage of goods 7.3. l = 1.2 — short term intensively used building 7.4. l = 1.0 — other buildings 8. Compositing techniques of contribution of modes: 8.1. 0 — SRSS (Square Root of the Sum of Squares) 8.2. 1 — CQC (Complete Quadratic Combination) 9. Direction cosines for the resultant seismic action in GCS — CX 10. Direction cosines for the resultant seismic action in GCS — CY 11. Direction cosines for the resultant seismic action in GCS — CZ
53	Seismic action according to PN 01.01-09 (Georgia)	1. Correction factor for inertial forces 2. Building height orientation sign (must be equal to 3) 3. Must equal 0 4. Soil category can take values: 4.1. 1 — I category 4.2. 2 — II category 4.3. 3 — III category 5. Relative soil acceleration 6. Coefficient that takes into account inelastic strains and local damages of structure elements according to Table. 3, can take values: 6.1. K1 = 1.00 — structures in which no damages and strains allowed 6.2. K1 = 0.25 — bearing steel frame 6.3. K1 = 0.35 — concrete frame 6.4. K1 = 0.30 — monolithic RC bearing walls, walls made of RC panel 6.5. K1 = 0.40 — bearing walls made of stone and brick 6.6. K1 = 0.60 — buildings and structures on the bearing supports of seismic isolation system 6.7. K1 = 0.50 — elements of buildings for “local” seismic loads 7. Structural design solution factor of the building according to Table. 4 8. Importance factor, according to Table. 5 can take values: 8.1. K3 = 1.0 — residential, public and industrial buildings 8.2. K3 = 1.4 — stations, theatres, stadiums, shopping malls, educational institutions, hospitals 8.3. K3 = 0.5 — other buildings 9. Coefficient that takes into account nonlinear deformation of soil under intense seismic oscillations, accepted according to Table. 4.1 10. Coefficient, accepted according to Table. 6, can take values:

		10.1. Kψ = 1.5 — high-rise buildings (castles, towers, chimneys) 10.2. Kψ = 1.5 — framed buildings, wall filling of which has no effect on their deformability at (h/b = 25) 10.3. Kψ = 1.0 — framed buildings, wall filling of which has no effect on their deformability at (h/b = 15) 10.4. Kψ = 1.0 — buildings, that are not listed above 11. Direction cosines for the resultant seismic action in GCS — CX 12. Direction cosines for the resultant seismic action in GCS — CY 13. Direction cosines for the resultant seismic action in GCS — CZ
54	Seismic action according to IS 1893(Part 1):2002 [2007] (India)	1. Correction factor for inertial forces 2. Building height orientation sign (must be equal to 3) 3. Must be equal to 0 4. Significance factor of the structure 5. Soil type can take values: 5.1. 1 — I. Rocky 5.2. 2 — II. Medium hardness 5.3. 3 — III. Soft 6. Seismic region can take values: 6.1. 2 — 2 Seismic region 6.2. 3 — 3 Seismic region 6.3. 4 — 4 Seismic region 6.4. 5 — 5 Seismic region 7. The value of the earthquake type (depending on the seismicity zone) 8. Significance factor of the structure 9. Damping factor 10. Compositing techniques of contribution of modes: 10.1. 0 — SRSS (Square Root of the Sum of Squares) 10.2. 1 — CQC (Complete Quadratic Combination) 11. Relative damping for CQC method 12. Direction cosines for the resultant seismic action in GCS — CX 13. Direction cosines for the resultant seismic action in GCS — CY 14. Direction cosines for the resultant seismic action in GCS — CZ
55	Seismic action according to STO NIU MGSU (Russian Federation)	1. Correction factor for inertial forces 2. Building height orientation sign (must be equal to 3) 3. Must equal 0 4. Soil category can take values: 4.1. 1 — I category 4.2. 2 — II category 4.3. 3 — III category 5. Relative soil acceleration can take values: 5.1. 0.08 – 6(A) – 7(B) magnitude 5.2. 0.10 — 7(A) – 7(B) magnitude 5.3. 0.15 — 7(A) – 8(B) magnitude 5.4. 0.20 — 8(A) – 8(B) magnitude 5.5. 0.30 — 8(A) – 9(B) magnitude 5.6. 0.40 — 9(A) – 9(B) magnitude 6. Must equal 1 7. Damping parameter in % of critical one (Table 5.4) 8. Compositing techniques of contribution of modes: 8.1. 0 — SRSS (Square Root of the Sum of Squares) 8.2. 1 — CQC (Complete Quadratic Combination) 9. Direction cosines for the resultant seismic action in GCS — CX 10. Direction cosines for the resultant seismic action in GCS — CY 11. Direction cosines for the resultant seismic action in GCS — CZ
56	Seismic action according to SI 413 Am.3 from 09.2009 (Israel)	1. Correction factor for inertial forces 2. Building height orientation sign (must be equal to 3) 3. Must be equal to 0 4. Site type (soil category) table 1 SI 413 Am.3 can take values: 4.1. 1 — A 4.2. 2 — B

		4.3. 3 — C 4.4. 4 — D 4.5. 5 — E 5. Acceleration in short period of time Ss p.11.4.1 (in dimensions «g») 6. Acceleration in 1 second period of time S1 p.11.4.1 (in dimensions «g») 7. Reduction factor for forces 8. Importance factor of the structure Table. 4 SI 413 Am.3 9. Long period TL (s) 10. Approximate main mode of the structure in direction of seismic action Ta (s) 11. Coefficient of estimated horizontal acceleration of soil 12. Type of the structure can take values: 12.1. 0 — general 12.2. 1 - reservoir 13. Feature of control of seismic action according to shear in foundation can take values: 13.1. 0 — do not use 13.2. 1 — use set value of equivalent side force in foundation 13.3. 2 — use calculated by Ta value of equivalent side force in foundation 14. Value of equivalent side force in foundation (tf) 15. Regularity of the structure can take values: 15.1. 0 — irregular 15.2. 1 — regular 16. Compositing techniques of contribution of modes: 16.1. 0 — SRSS (Square Root of the Sum of Squares) 16.2. 1 — CQC (Complete Quadratic Combination) 17. Direction cosines for the resultant seismic action in GCS — CX 18. Direction cosines for the resultant seismic action in GCS — CY 19. Direction cosines for the resultant seismic action in GCS — CZ
57	Seismic action according to IRANIAN CODE, Standart No.2800, 3 - rd Edition, 2007	1. Correction factor for inertial forces 2. Building height orientation sign (must be equal to 3) 3. Must equal 0 4. Structure's strength properties factor R (Table 6, 8) 5. Site type (Soil category) Table 3 6. Seismic region, Table 2 7. Importance factor of the structure I Table 5 8. Compositing techniques of contribution of modes: 8.1. 0 — SRSS (Square Root of the Sum of Squares) 8.2. 1 — CQC (Complete Quadratic Combination) 9. Direction cosines for the resultant seismic action in GCS — CX 10. Direction cosines for the resultant seismic action in GCS — CY 11. Direction cosines for the resultant seismic action in GCS — CZ
58	Seismic action according to SNiP KR 20-02:2009 (Kyrgyz Republic)	1. Correction factor for inertial forces 2. Building height orientation sign (must be equal to 3) 3. Applicate of building support system contour (Appendix F) 4. Type of the structure 5. Soil category 6. Initial seismicity of the construction site 7. Design seismicity of the construction site 8. Coefficient that considers degree of importance of building or structure, which is accepted according to table 5.3 (for hydraulic structures it is a coefficient reflecting the degree of inadmissibility of damage in the structure) 9. Reduction factor, which depends on building's or structure's design concept specifics and is accepted according to table 5.4 (for hydraulic structures it is a coefficient that takes into account the probability of a seismic event for the assigned service life) 10. Number of floors of the structure (for hydraulic structures = 5)

		11. Coefficient that consider ability of building or structure to dissipate energy and is accepted according to table 5.6 (for hydraulic structures - a coefficient that takes into account the damping properties of the structure) 12. Smaller size of structure on the plan (Appendix F) 13. Consideration of vertical component according to p.5.3.5 14. Take product of dynamic factor by coefficient, that is influenced by mode equal to 5.0 15. Consideration of torsional seismic load (Appendix F), 16. Automatic consideration of the critical direction of the seismic action 17. Must be equal to 0 18. Must be equal to 0 19. Direction cosines for the resultant seismic action in GCS — CX 20. Direction cosines for the resultant seismic action in GCS — CY 21. Direction cosines for the resultant seismic action in GCS — CZ
59	Seismic action according to SP RK 2.03-30-2017 (Kazakhstan)	1. Correction factor for inertial forces 2. Building height orientation sign (must be equal to 3) 3. Must be equal to 0 4. Type of soil conditions 5. Horizontal design acceleration at the construction site, ag 6. Importance coefficient of the building or structure when determining the horizontal seismic loads 7. Importance coefficient of the building or structure when determining the vertical seismic loads 8. Behavior factor 9. Lower indicator of boundary for horizontal design spectrum 10. Must be equal to 0 11. Extend the graph of the vertical component of design spectrum with values as at T= 2 sec. 12. Compositing techniques of contribution of modes: 12.1. 0 — SRSS (Square Root of the Sum of Squares) 12.2. 1 — CQC (Complete Quadratic Combination) 13. Direction cosines for the resultant seismic action in GCS — CX 14. Direction cosines for the resultant seismic action in GCS — CY 15. Direction cosines for the resultant seismic action in GCS — CZ 16. Regularity allong height (in case it is regular, then this is the **final value**): 16.1. 0 — not regular 16.2. 1 — pregular 17. Behavior coefficient along Y 18. Behavior coefficient along Z 19. Array of marks for increasing coefficients in item 7.6.6 20. Array of values of increasing coefficients in item 7.6.6 (should be ≥ 1)
60	Seismic impact by graphs of dynamic factor	1. Correction factor for inertial forces 2. Relative soil acceleration 3. Ratio of maximum vertical soil acceleration to horizontal one 4. Scale factor for the graph of dynamic factor for direction X 5. Scale factor for the graph of dynamic factor for direction Y 6. Scale factor for the graph of dynamic factor for direction Z 7. Compositing techniques of contribution of modes: 7.1. 0 — SRSS (Square Root of the Sum of Squares) 7.2. 1 — CQC (Complete Quadratic Combination) 8. Direction cosines for the resultant seismic action in GCS — CX 9. Direction cosines for the resultant seismic action in GCS — CY 10. Direction cosines for the resultant seismic action in GCS — CZ 11. Number of points for direction X 12. Number of points for direction Y 13. Number of points for direction Z

		his is followed by pairs of points (period (s); coefficient), first for X, Y and Z axis
61	Seismic action according to SP 14.13330.2018 (Russian Federation)	1. Correction factor for inertial forces 2. Building height orientation sign (must be equal to 3) 3. Must equal 0 4. Type of the structure 5. Soil category 6. Acceleration in the foundation level (m/s) 7. Coefficient k0 that takes into account purpose and importance of the structure, accepted according to Table 4.2 8. Coefficient that takes into account permitted damage to buildings and structures k1 Table 5.2 9. Coefficient for all types of water-retraining structures k2 10. Coefficient that takes into account the ability of the buildings and structures to dissipate energy, Table 5.3 11. Coefficient to vertical component of seismic action 12. Compositing techniques of contribution of modes: 12.1. 0 — SRSS (Square Root of the Sum of Squares) 12.2. 1 — CQC (Complete Quadratic Combination) 13. Direction cosines for the resultant seismic action in GCS — CX 14. Direction cosines for the resultant seismic action in GCS — CY 15. Direction cosines for the resultant seismic action in GCS — CZ
62	Seismic action according to SP 268.1325800.2016 (Russian Federation)	1. Correction factor for inertial forces 2. Building height orientation sign (must be equal to 3) 3. Must be equal to 0 4. Type of the structure 5. Soil category 6. Acceleration in the foundation level (in g) 7. Coefficient that takes into account impact of the reduction in stiffness of the structure and increase in dissipation of energy of oscillations because of appearance of cracks and plastic deformations 8. Coefficient specifying initial seismicity by the data of the seismic regime of the terrain 9. Coefficient of engineering-geological conditions of the construction site 10. Local topography coefficient, determined by calculation from research data 11. Coefficient that takes into account the deviation of the decrement of the object oscillations from the standard value, including through the damper's work 12. Coefficient to vertical component of seismic action 13. Compositing techniques of contribution of modes: 13.1. 0 — SRSS (Square Root of the Sum of Squares) 13.2. 1 — CQC (Complete Quadratic Combination) 14. Direction cosines for the resultant seismic action in GCS — CX 15. Direction cosines for the resultant seismic action in GCS — CY 16. Direction cosines for the resultant seismic action in GCS — CZ
63	Seismic action according to SP 267.1325800.2016 (Russian Federation)	1. Correction factor for inertial forces 2. Building height orientation sign (must be equal to 3) 3. Must equal 0 4. Type of the structure 5. Soil category 6. Acceleration in the foundation level (in g) 7. Factor of safety by responsibility of the calculated structure 8. Coefficient that takes into account permitted damage to buildings and structures 9. Coefficient that takes into account the ability of the buildings and structures to dissipate energyи 10. Compositing techniques of contribution of modes: 10.1. 0 — SRSS (Square Root of the Sum of Squares)

		10.2. 1 — CQC (Complete Quadratic Combination) 11. Direction cosines for the resultant seismic action in GCS — CX 12. Direction cosines for the resultant seismic action in GCS — CY 13. Direction cosines for the resultant seismic action in GCS — CZ 14. Number of points in the graph of dynamic coefficients (if 0 - the graph is not assigned and this is the **final value**) 15. An array of points (period (s) - dynamics factor) describing the graph
64	Seismic action according to SN KR 20-02:2018 (Kyrguz Republic)	1. Correction factor for inertial forces 2. Building height orientation sign (must be equal to 3) 3. Must equal 0 4. Type of soil conditions 5. Horizontal design acceleration at the construction site, ag 6. Importance coefficient of the building or structure when determining the horizontal seismic loads 7. Importance coefficient of the building or structure when determining the vertical seismic loads 8. Behavior factor 9. Lower indicator of boundary for horizontal design spectrum 10. Must equal 0 11. Extend the graph of the vertical component of design spectrum with values as at T= 2 sec. 12. Compositing techniques of contribution of modes: 12.1. 0 — SRSS (Square Root of the Sum of Squares) 12.2. 1 — CQC (Complete Quadratic Combination) 13. Direction cosines for the resultant seismic action in GCS — CX 14. Direction cosines for the resultant seismic action in GCS — CY 15. Direction cosines for the resultant seismic action in GCS — CZ 16. Regularity along height (in case it is regular, then this is the **final value**): 16.1. 0 — nor regular 16.2. 1 — regular 17. Behavior factor along Y 18. Behavior factor along Z 19. Array of marks for increasing coefficients 20. Array of marks for increasing coefficients 21. (should be ≥ 1)
65	Seismic action according to SP 14.13330.2018 with revision №1 (Russian Federation)	1. Correction factor for inertial forces 2. Building height orientation sign (must be equal to 3) 3. Must be equal to 0 4. Type of the structure can take values: 4.1. 1 — Residential, public and industrial 5. Soil category can take values: 5.1. 1 — I category 5.2. 2 — II category 5.3. 3 — III category 5.4. 4 — By results of seismic microdistriction 6. Seismicity of the construction site can take values: 6.1. 7 — intensity degree 7.0 6.2. 8 — intensity degree 8.0 6.3. 9 — intensity degree 9.0 7. K0 — importance factor, accepted according to Table 5.3 8. K1 — Coefficient that takes into account ability of buildings and structures for inelastic strain, according to Table. 5.4 9. Kψ — Coefficient that takes into account the ability of the buildings and structures to dissipate energyи according to Table. 6 10. Compositing techniques of contribution of modes: 10.1. 0 — by formula 8 (SRSS) 10.2. 1 — by formula 9 11. Direction cosines for the resultant seismic action in GCS — CX 12. Direction cosines for the resultant seismic action in GCS — CY

		13. Direction cosines for the resultant seismic action in GCS — CZ 14. Availability of a graph: 14.1. 0 — no graph and then this is the **final value** 14.2. 1 — scale factor, but only in the category of soil should be **According to the results of seismic microzoning**) 15. Paired graph (period (s) — value)
100	Modal analysis	Parameters are missing

Example:

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( 15/
* Pulsation component of wind action/
2   21   10 3 1 0 0 0   1.00000 3 0.000 0 1 12.000 8.000 1 0 0.300 0 /
4   25   10 5 1 0 0 0  1.00000 3 0.000 0 2 1 1 0 12.000 8.000 12.000 0.300 0
     /

* Impulse action /
6   22   10 0 1 0 0 0  0.05000 /

* Impact action /
7   23   10 0 1 0 0 0  0.05000 /

* Harmonic action /
8   24   10 0 1 0 0 0  0.05000 10.00000 0 /
9   28   10 0 1 0 0 0   0.05000 10.00000 0.05 /

* Seismic action /
10 27 10 0 1 0 0 0 3 0 0.05000 1.00000 1.0000000 0.0000000 0.0000000 0.78540
     12.56637 0.000000
0.707107 1.000000 0.707107 0.000000 -0.707107 -1.000000 -0.707107 0.000000
     0.707107
1.000000 0.707107 0.000000 -0.707107 -1.000000 -0.707107 0.000000  0 /
11 29 10 0 1 0 0 0 3 0 0.05000 1.00000 1.00000 0.70000 1.0000000   0.0000000
     1.0000000 0.78540
12.56637 0.000000 0.707107 1.000000 0.707107 0.000000 -0.707107 -1.000000 -
     0.707107
0.000000 0.707107 1.000000 0.707107 0.000000 -0.707107 -1.000000 -0.707107
     0.000000
0.000000 0.707107 1.000000 0.707107 0.000000 -0.707107 -1.000000 -0.707107
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     0.000000
0.707107 1.000000 0.707107 0.000000 -0.707107 -1.000000 -0.707107 0.000000
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1.000000 0.707107 0.000000 -0.707107 -1.000000 -0.707107 0.000000 0 /
12 30 10 0 1 0 0 0 1.00000 3 0 1 10 7 2 3 1 4 5 1.0000000 0.0000000 0.0000000
     /
13 31 10 0 1 0 0 0 1.00000 3 0.0 1 0.10000 1.00000 1.50000 25 0 0.0000000
     1.0000000 0.00000
1.0000000 0.0000000 0.0000000 /
14 32 10 0 1 0 0 0 1.00000 3 0 1 1 1.100 0.500 1.200 1.000 1.000 1.0000000
     0.0000000 0.0000000 /
15 33 10 0 1 0 0 0 1.00000 0.800 1.000 0.750 1.000 0.500 1 1 0.150 0.000
     1.0000000 0.0000000
0.0000000 /
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16 34 10 0 1 0 0 0 1.00000 3 0 1 5 0.22000 1.0000000 0.0000000 0.0000000 /
17 35 10 0 1 0 0 0 1.00000 3 0 1 1 7 1.000 1.500 1.0000000 0.0000000 0.0000000
     /
18 36 10 0 1 0 0 0 1.00000 3 0 1 1 0.050 0.200 0.500 1.000 0.700 1.000
     1.0000000 0.0000000 0.0000000 /
19 37 10 0 1 0 0 0 1.00000 3 0 1 1 0.050 0.200 0.500 1.000 0.500 12.000 8.000
     500.000 0 0.000 1.000
1.000 1.0000000 0.0000000 0.0000000 /
20 38 10 0 1 0 0 0 1.00000 3 0.000 1 1 7 1.000 1.500 25.000 1.0000000 0.0000000
     0.0000000 /
21 39 10 0 1 0 0 0 1.00000 3 0 10 7 1.000 1.000 0.8500 1.000 1.0000000
     0.0000000 0.0000000 /
22 41 10 0 1 0 0 0 0 1.00000 1.0000000 0.0000000 0.0000000 0.000000 1.000000
     0.628319 2.313146
1.256637 2.603593 1.884956 0.814000 2.513274 0.800000 213.000000 0.800000 /
23 42 10 0 1 0 0 0 1.00000 3 0 2 40.000 8.000 5.000 1.000 4.000 2.000 2.000
     0 0 0.000 1 1.0000000
0.0000000 0.0000000 /
24 43 10 0 1 0 0 0 1.00000 3 0 7 1 1.000 0.250 1.000 1.200 1.000 1.0000000
     0.0000000 0.0000000 /
25 44 10 0 1 0 0 0 1.00000 3 0 0 0.780 0 0 1 1 1 1.000 1.000 1.000 0.200
     1.000 1 0 1.0000000 0.0000000
0.0000000 1 /
26 45 10 0 1 0 0 0 1.00000 3 0 1 1 1 2.00000 1.00000 0.70000 1.0000000
     0.0000000 0.0000000 /
27 46 10 0 1 0 0 0 1.00000 3 0.000 1 1 0.050 0.200 0.500 1.000 0.700 25.000
     1.000 1.000 1.0000000
0.0000000 0.0000000 /
28 47 10 0 1 0 0 0 1.00000 3 0 7 0.03000 1.000 1.0000000 0.0000000 0.0000000
     /
29 48 10 0 1 0 0 0 1.00000 3 0 1 7 1 1.000 1.000 1.000 1.000 0.700 1.0000000
     0.0000000 0.0000000 /
30 49 10 0 1 0 0 0 1.00000 3 0 0.025 1.000 0.300 1.100 1.000 1.200 0.700
     1.0000000 0.0000000
0.0000000 /
31 50 10 0 1 0 0 0 1.00000 3 0 1 1 7 0.500 0.150 1.000 1.000 1.0000000
     0.0000000 0.0000000 /
32 51 10 0 1 0 0 0 1.00000 3 0 1 1 7 0.750 0.120 1.000 1.500 1.000 0 1.0000000
     0.0000000 0.0000000 /
33 52 10 0 1 0 0 0 1.00000 3 0.0 2.00000 1 1 1.50000 0 1.0000000 0.0000000
     0.0000000 /
34 53 10 0 1 0 0 0 1.00000 3 0.0 1 0.05000 1.00000 0.50000 1.00000 0.75000
     1.50000 1.0000000
0.0000000 0.0000000 /
35 54 10 0 1 0 0 0 1.00000 3 0.0 1.50000 1 2 0.05000 1.50000 1.00000 1 0.05000
     1.0000000 0.0000000
0.0000000 /
36 55 10 0 1 0 0 0 1.00000 3 0.0 1 0.10000 1.00000 5.00000 1 1.0000000
     0.0000000 0.0000000 /
37 56 10 0 1 0 0 0 1.00000 3 0 2 0.500 0.200 1.000 1.000 4.000 2.000 0.100 0
     2 0.000 0 1 1.0000000
0.0000000 0.0000000 /
38 57 10 0 1 0 0 0 1.00000 3 0 3.500 1 1 1.400 1 1.0000000 0.0000000 0.0000000
     /
39 58 10 0 1 0 0 0 1.00000 3 0.00000 1 1 7 7 1.00000 0.25000 5 1.00000
     25.00000 0 0 0 0 0 0 1.0000000
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0.0000000 0.0000000 /
40 59 10 0 1 0 0 0 1.00000 3 0.0 1 0.10000 0.50000 0.50000 1.50000 0.20000 0
    1 1 1.0000000 0.0000000
0.0000000 1 /
41 60 10 0 1 0 0 0 1.00000 0.10000 0.70000 1.00000 1.00000 1.00000 1 1.0000000
    0.0000000
0.0000000 6 6 6
 0.00000 1.00000 0.40000 2.50000 1.20000 2.50000 1.40000 2.00000 2.50000
0.80000 10.00000 0.80000
 0.00000 1.00000 0.40000 2.50000 1.20000 2.50000 1.40000 2.00000
2.50000 0.80000 10.00000 0.80000
 0.00000 1.00000 0.40000 2.50000 1.20000 2.50000 1.40000
2.00000 2.50000 0.80000 10.00000 0.80000 /
42 61 10 0 1 0 0 0 1.00000 3 0 1 1 1.00000 1.000 0.120 1.000 1.500 1.000 0
    1.0000000 0.0000000
0.0000000 /
43 62 10 0 1 0 0 0 1.00000 3 0 1 1 0.10000 0.200 1.000 1.000 1.000 1.000 0.5
    0 1.0000000 0.0000000
0.0000000 /
44 63 10 0 1 0 0 0 1.00000 3 0 1 1 0.10000 1.000 0.220 1.800 0 1.0000000
    0.0000000 0.0000000 0 /
45 64 10 0 1 0 0 0 1.00000 3 0.0 1 0.19000 0.50000 0.50000 1.50000 0.20000 0
    1 1 1.0000000 0.0000000
0.0000000 1 /
46 65 10 0 1 0 0 0 1.00000 3 0 1 1 7 1.000 0.300 1.300 0 1.0000000 0.0000000
    0.0000000 0.0000000 /
)
```

Document 16 describes the specifying of non-linear load cases, as well as the stages of mounting/dis mounting. Each line of the *16th document* is responsible for the parameters of a specific load case.

The specification of the *16th document* is different for:

- nonlinear loadings;
- stages of the structure erection (linear mounting);
- stages of the structure erection (nonlinear mounting);
- bearing capacity spectrum (system PUSHOVER).

The line *of the 16th document* for the stages of non-linear load cases is specified in the following order:

1. Loading index.
2. Methods of load application:
   2.1. 1 — uniform load application;
   2.2. 3 — automatic selection of the step with the search of new equilibrium shapes;
   2.3. 4 — automatic selection of the step.
3. The number of specified coefficients (for the 3rd and 4th methods should be equal to 4).
4. Must be equal to 0.
5. Minimum number of iterations for the physically nonlinear iterative elements.
6. History control (for each first stage of a nonlinear loading in the history, the number 0 must be specified, for the rest - 1).

Next, the coefficients for the load by steps for the 1st method are indicated in the amount specified in paragraph 3, or 4 coefficients for the 3rd and 4th methods (automatic selection of the step), namely:

1. Total coefficient.
2. Permissible error of the step selection.
3. Starting step.
4. Step of results saving.

Example:

```
( 16/
     1  1 10 0 1000 1  0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1   /
     3  3 4  0 1000 1  1 2E-06 2E-05 0.2  /
     4  4 4  0 1000 0  1 1E-05 1E-05 0.1  /
)
```

The line of the 16th document for the stages of construction of structures (linear mounting) is specified in the following order:

1. Loading index.
2. Method of load application: must equal 1.
3. Number of coefficients to be specified: must be equal to one.
4. Must be equal to 0.
5. Minimum number of iterations for the physically nonlinear iterative elements: must equal 1000.
6. Reset displacements (0 — yes, 1 — no), for the *stage 1* always equals to 0.
7. Total coefficient: must equal 1;

Example:

```
( 16/
     1  1 1 0 1000 0 1  /
     2  1 1 0 1000 0 1  /
     3  1 1 0 1000 1 1  /
     4  1 1 0 1000 1 1  /
)
```

The line of the 16th document for the stages of constructions erection (nonlinear mounting) is specified in this order:

1. Loading index.
2. Method of load application can take values:
   2.1. 1 — uniform load application;
   2.2. 4 — automatic selection of the step;
3. The number of specified coefficients (for the 4th method it should be equal to 4).
4. Print management can take on a value:
   4.1. 0 — final result;
   4.2. 1 — displacements after each step;
   4.3. 2 — internal forces after each step;
   4.4. 3 — displacements and internal forces after each step.

5. Minimum number of iterations for the physically nonlinear iterative elements.
6. Reset displacements (0 — yes, 1 — no), for the *stage 1* always equals to 0.

Then the coefficients for the load by steps for the 1st method (uniform load application) are indicated in the amount specified in *paragraph 3*, or *4* coefficients for the 4th method (automatic selection of the step), namely:

1. Total coefficient.
2. Permissible error of the step selection.
3. Starting step.
4. Step of results saving.

Example:

```
( 16/
     1  1 10 0 1000 0 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1   /
     2  1 20 1 1000 1 0.05 0.05 0.05 0.05 0.05
                      0.05 0.05 0.05 0.05 0.05
                      0.05 0.05 0.05 0.05 0.05
                      0.05 0.05 0.05 0.05 0.05 /
     3  4 4  2 1000 0 1 1E-08 1E-05 0.1  /
     4  1 10 3 1000 1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1  /
)
```

Line 16 of the document for the loadability spectrum (in the PUSHOVER system) is specified in the following order:

1. Loading index.
2. Method of load application (must be 104).
3. The number of coefficients to be specified (must be equal to 4).
4. Print management can take on the value:
   4.1.0 — final result;
   4.2. 1 — displacements after each step;
   4.3. 2 — internal forces after each step;
   4.4. 3 — displacements and internal forces after each step.
5. Minimum number of iterations for the physically nonlinear iterative elements.
6. Must equal 1.
7. Limit coefficient of the loading.
8. Permissible error of the step selection.
9. Starting step.
10. Step of results saving.

Example:

```
( 16/
     8  104 4 3 1000 1 10 1.5E-05 1E-05 0.1  /
)
```

Document 20 describes data for stability calculations. There can be no more than two lines in a *document:*

1. To calculate stability by loadings.
2. To calculate the stability of the design combinations of loads.

Document line 20 is specified in the following sequence:

1. The number of load cases/design load combinations in a line.
2. 2. Calculation type, can take the following values:
   2.1. 0 — for loadings;
   2.2. 1 — design combination of loads.
3. Index of load / index of design combination.
4. Number of buckling modes.
5. Perform stability analysis:
   5.1. 0 — considering only axial forces;
   5.2. 1 — considering the impact of all forces.

Items 3-5 are repeated on the same *line* for each load case/result combination for which stability analysis is to be performed in the number specified in item 1

Example:

```
( 20/
     3 0   1 10 0   2 10 0   3 10 1 /
     2 1   1 10 0   2 10 1 /
)
```

The *line 1* specifies the stability calculation for load cases (1, 2 for the longitudinal force and 3 for the longitudinal force, taking into account the influence of moments), and the *line 2* specifies the stability calculation for design combinations of loads (1 for the longitudinal force and 2 for the longitudinal force and taking into account the influence of moments)

Document 22 describes the creep assignment. Document line 22 is specified in the following sequence:

1. Index of the history of nonlinear loading.

The total number of time periods.

Next, the amount of days, passed since the loading of the structure are indicated in accordance with paragraph 2

Example:

```
( 22/
     1 3  100 200 300  /
     2 2  100 200  /
)
```

Document 23 describes floor eccentricities for load cases. Document line 23 is specified in the following sequence:

1. Floor index:
   0 — for the entire scheme.
2. Loading index.
3. Eccentricity of the floor along X.
4. Eccentricity of the floor along Y.

Example:

```
( 23/
     0 2 1 1 /
     1 3 0.1 0.1 /
     2 3 0.2 0.2 /
     3 3 0.3 0.3 /
     4 3 0.4 0.4 /
     5 3 0.5 0.5 /
)
```

Document 24 describes additional static loading at erection stages. *Document line* 24 is specified in the following sequence:

1. Index of stage of the structure erection.
2. Index of the additional static loading at erection stage.
3. Coefficient.

Items 2–3 are repeated for each additional load case that involves the erection stage specified in item 1.

Example:

```
( 24/
     1  5 1.1  6 1.1  /
     2  6 1.2  /
     3  6 1.3  /
)
```

The example describes two additional static load cases at the mounting stage:

1. The 5th load case, which is included in the 1st stage of construction with a coefficient of 1.1.
2. The 6th load case, which is included in the 1st stage of construction with a coefficient of 1.1, in the 2nd stage of construction with a coefficient of 1.2 and in the 3rd stage of construction with a coefficient of 1.3.

Document 28 describes how to specify the parameters for the DYNAMIC+ system. It is allowed to specify only one *line* in the following sequence:

1. Loading index.
2. Calculation results can take the following values:
   2.1. 0 — displacements only;
   2.2. 1 — displacements and internal forces;
   2.3. 2 — displacements, internal forces and DCL;
   2.4. 3 — displacements, internal forces, DCL and stresses;
   2.5. 4 — Temperature field only.
3. Must equal 0.
4. Propagation speed of seismic action (m/s).
5. Integration time (s).
6. Integration step (s).
7. Coefficient α to mass matrix for obtaining of damping matrix.

8. Coefficient β to stiffness matrix for obtaining of damping matrix.
9. Consideration damping properties of the material.

Example:

```
( 28/
     3 2 0 300 35 0.001 0.1 0.01 0 /)
```

Document 30 describes the task of influence surfaces/lines for the BRIDGE system. *Document line 30* is specified in the following sequence:

1. Index of influence surface/line (of the level), which is required for multilevel bridges.
2. Numbers of two or three nodes to describe an elementary section of a line or influence surface.

Example:

```
( 30/
     1   518 528 534      /* 1 /
     1   576 591 594      /* 2 /
     1   573 534 591      /* 3 /
     1   486 597 522      /* 4 /
     1   517 527 533      /* 5 /
)
```

Document 31 describes the trajectories (routes) of movement for the BRIDGE system. *Document line 31* is specified in the following sequence:

1. Path index.
2. Index of influence surface/line (of the level) form *30th document*.
3. The option of the beginning and end of the trajectory, can take the value:
   3.1. 0 — load move in the path and move out the path;
   3.2. 10 — load is located on the path and move out the path;
   3.3. 1 — load move in the path and reach end of the path;
   3.4. 11 — load is located on the path and reach to the end of the path;
4. An array of three-dimensional route coordinates (X, Y, Z).

Example:

```
( 31/
     1 1 1   0.0 0.7125 21.6 308.0 0.7125 21.6 /
     2 1 0   0.0 3.75   21.6 308.0 3.75   21.6 /
     3 1 11  0.0 7.25   21.6 308.0 7.25   21.6 /
     4 1 10  0.0 12.4   21.6 308.0 12.4   21.6 /
     5 1 1   0.0 15.9   21.6 308.0 15.9   21.6 /
)
```

Document 34 describes the types of moving loads (binding of the moving loads to a route) for the BRIDGE system. *Document line 34* is specified in the following sequence:

1.1. 1 — pedestrians;

1.2. 2 — Motor vehicles load AK;
1.3. 5 — tram train load;
1.4. 6 — Tube stock load;
1.5. 7 — Outsized wheeled vehicles load НК.

2. Line number of the *35th document.*
3. Line number of the *36th document.*
4. Numbers of routes from the *31st document (*maximum 20 routes)

Example:

```
( 34/
     1 1 5   1  /
     2 2 6   2 3 4 5  /
     7 3 7   4  /
)
```

Document 35 describes the parameters of moving loads. *Document line 35* is specified in the following sequence:

1. Line number.
2. v — normative distributed load (tf/m^2 — for pedestrians, tf/m — for AK).
3. Sidewalk width (m), only for pedestrians.
4. c — wheel size along moving (m).
5. w — wheel size across moving (m).
6. Number of wheels on the axle (pcs).
7. An array of distances between the wheels (m), in the amount of one less than specified in paragraph 6.
8. Number of axes of moving loads (pcs).
9. Axis binding (m), zero for the first axis
10. P — normative load on the axis (tf).
11. P^* —empty normative load on the axis (tf) for tube stock or train.

Items 9-11 are repeated in the amount of one less than indicated in paragraph 8.

12. Number of wagons or trains (for tube stock or train).
13. Wagon length or distance between the head of the trains (m).

The 0th line specifies the coefficients S1 to the lanes for the AK load (pairs: distributed - tandem on the first lane, distributed - tandem on the second lane, according to the number of routes for the AK load in 34 documents).

Example:

```
( 35/
     * Pedestrians /
     1 0.20394 1.5 /

     * AK /
     2 1.4276 0 0.2 0.6 2 1.9 2 0 14.276 0 1.5 14.276 0 /
```

```
    * HK /
    3 0 0 0.2 0.8 2 2.7 4 0 25.7 0 1.2 25.7 0 2.4 25.7 0 3.6 25.7 0 /

    * Null line /
    0 1 1 0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.6
          0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.6
          0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.6 /
)
```

Document 36 describes the coefficients for stress combinations in the BRIDGE system. *Document line 36* is specified in the following sequence:

1. Loading index.
2. Coefficients, depending on the type of loading:

2.1. For static load cases, 3 coefficients are specified:

2.1.1. Coefficient for normative values.

2.1.2. Coefficient of reliability under load γ_f > 1.

2.1.3. Coefficient of reliability under load γ_f < 1.

2.2. For pedestrians, 1 factor for strength analysis is set;

2.3. For AK, 8 coefficients are specified:

2.3.1. Factor for strength analysis for distributed load.

2.3.2. The conversion factor to the calculated values for the tandem in the band that gives the largest contribution.

2.3.3. Coefficient of reduction to the calculated values for the tandem for the remaining bands.

2.3.4. Factor for endurance analysis for distributed load.

2.3.5. Coefficient for conversion to values for calculating endurance for tandem in the lane that gives the largest contribution.

2.3.6. Coefficient of conversion to values for calculating endurance for tandem for the rest of the lanes.

2.3.7. Reducing coefficient to two tandems (may not be specified if two tandems are not taken into account).

2.3.8. Distance between two tandems (can be omitted if two tandems are not taken into account).

2.4.For a tram, tram train or subway, 2 coefficients are specified:

2.4.1. Factor to strength analysis.

2.4.2. Factor for endurance analysis.

2.5.Four coefficients are specified for HK:

2.5.1. Factor to strength analysis.

2.5.2. Decreasing factor for consideration of coupled loads.

2.5.3. Distance between the last axis of the first load and the front axis of the second load.

2.5.4. Reducing factor for serviceability limit state design.

*In the line 0, 2 coefficients K1 and S2 are specified, where K1 is the coefficient of addition of the pedestrian load with the load AK (Sum = K1 * P + AK), and S2 is the coefficient to the live* *load, which has a smaller effect while loading the traffic lanes (together with sidewalks) and rail tracks (railways, subways or trams).*

The presence of a zero line indicates that combinations of stresses for static load cases and a moving load will be calculated.

Example:

```
( 36/
     * Static loading /
     1 1 1.1 0.9 /
     2 1 1.1 0.9 /
     3 1 1.1 0.9 /

     * Pedestrians /
     5 1.2 /

     * AK /
     6 1.15 2.1 2.1 1 1.2667 1.2667 /

     * HK /
     7 1.1 0.75 12 0.8 /
     * Null line /
     0 1 0.8 /
)
```

Document 40 describes parameters specification for performing a PushOver calculation. The parameters of one PushOver load are specified in two lines. *The first line* is specified in the following order:

1. Index of loading PushOver.
2. Index of previous history (can not be equal 0).
3. Loading type:
   3.1. 0 — static loading;
   3.2. 1 — calculation dynamic module.
4. If a static loading is specified in the previous paragraph, then the number of the static loading is mentioned, if the dynamics module is specified, then the line number of the dynamic load in the *Document 15*.
5. Index of mode (0 — for static loading).
6. Coefficient for the loading.
7. Limit value of total displacement of the node.
8. Number of controlled node.

The second line is specified in the following order:

1. Index of loading PushOver.
2. Must be zero - continuation of the PushOver upload blog.
3. Loading type (if the number of the static load in the first line is 0, then 1 is the dynamic calculation module).
4. If the module of dynamics is specified in the previous paragraph, then the line number of the dynamic load case in the document is 15, otherwise, it is 0.
5. If the module of dynamics is specified in the previous paragraph, then the modes number.

6. Coefficient for the loading (duplication).
7. Limit value of total displacement of the node (duplication).
8. Number of controlled node (duplication).

Example:

```
( 40/
     1 1 0 0 0 0 0.2 5 /
     1 0 1 1 3 1.2 0.2 5 /
)
```

Document 43 describes the specifying the mass condensation. Each *line of document 43* specifies data for one mass collection group and is specified in the following sequence:

1. List of elements from which you need to collect the masses.
2. Symbol «:».
3. List of nodes into which it is necessary to convert the mass assembled from the elements.

Lists of elements and nodes that go in a row can be specified through the «-» character.

Example:

```
( 43/
     31-99   : 91-97 102 103 108 109 114-120 /
     130-198 : 61-67 72 73 78 79 84-90 /
)
```

Document 47 describes the parameters of generalized load cases. After displacements and stresses are calculated in normal (static and dynamic) load cases, displacements and stresses are calculated in generalized load cases described by the expression (S_1…S_i — already processed load cases)):

$$S = k_0 * \sqrt[p0]{k_1 * {S_1}^{p1} + \cdots + k_i {S_i}^{pi}}$$

Generalized loading is described by the following information:

1. Index of generalized loading.
2. Coefficient to generalization result $- k_0$.
3. Degree to generalization result $- p_0$.
4. Number of generalized load cases (each load case is described by 3 number).
5. Index of generalized loading.
6. Coefficient to generalization result $- k_i$.
7. Degree to generalization result $- p_i$.

Example:

```
( 47/
     47   1 0.5   4   3 1 2   5 1 2   7 1 2   10 1 2 /
)
```

Document 49 describes the initial temperature in the nodes. Each *line of the document 49* contains the initial temperature of the node, the serial number of the line corresponds to the number of the node. Initial temperature must be specified for all nodes.

Example:

```
( 49/
     20 /* 1 /
     20 /* 2 /
     20 /* 3 /
     20 /* 4 /
)
```

A.6 COMBINATIONS

Document 8 describes the definition of design combinations of forces. Each line of the document 8 is responsible for the DCL characteristics for a specific load case and is specified in the following sequence:

1. Load type can take the value:
   1.1. 0 — constant;
   1.2. 1 — long-term;
   1.3. 2 — short-term;
   1.4. 3 — crane certical;
   1.5. 4 — crane braking;
   1.6. 5 — seismic;
   1.7. 6 — special;
   1.8. 7 — instant;
   1.9. 8 — pre-tensioning (only for EN rules);
   1.10. 9 — indefinite (inactive) loading (including mean value of wind action).
2. Combination group number (0 — if combination is absent).
3. Alternating (0 — absent, 1 — present).
4. Number of the mutual exclusion group (0 if mutual exclusion is absent).
5. Numbers of concurrent load cases (6 mandatory numbers, filled with zeros if the concurrent load cases are absent).
6. Adjastment factor for normative loads.
7. Adjastment factor for share of duration.
8. Adjastment factor for design loads (in Eurocode 6 numbers are used, in SNiP, SP and DBN only the first one is used).
9. Coefficients for DCL (15 numbers) to:
   9.1. 1st main;
   9.2. 2nd main;
   9.3. seismic;
   9.4. spesial;
   9.5. 5th combination;
   9.6. 6th combination;
   9.7. 7th combination;
   9.8. 8th combination;
   9.9. 9th combination;
   9.10. 10th combination;
   9.11. 11th combination;
   9.12. 12th combination;
   9.13. 13th combination;
   9.14. 14th combination;
   9.15. 15th combination.

The number of lines of the *8th document* must be equal to the number of load cases in the task, while the sequence of *lines* corresponds to the numbers of load cases in the task.

Example:

```
( 8/
     0  0 0 1  2 0 0 0 0 0  1 1 1.1   1 1   0.9 1   0 0 0 0 0 0 0 0 0 0 0 0 /
     0  0 0 0  0 0 0 0 0 0  1 1 1.1   1 1   0.9 1   0 0 0 0 0 0 0 0 0 0 0 0 /
     0  0 0 0  0 0 0 0 0 0  1 1 1.1   1 1   0.9 1   0 0 0 0 0 0 0 0 0 0 0 0 /
     2  0 0 1  0 0 0 0 0 0 1 0.35 1.2 1 0.9 0.5 0.8 0 0 0 0 0 0 0 0 0 0 0 0 /
     5  0 1 1  0 0 0 0 0 0  1 0 1     0 0   1   0   0 0 0 0 0 0 0 0 0 0 0 0 /
)
```

Document 29 describes the assignment of combination coefficients according to the degree of impact (Table A.24). *In document 29*, only one line is allowed.

Table A.24 Combination factors by impact degree

Loading	**Main**			**Seismic**			**Special**		
Temporary long-term	Ψ_{l1}^{g}	Ψ_{l2}^{g}	Ψ_{l3}^{g}	Ψ_{l1}^{s}	Ψ_{l2}^{s}	Ψ_{l3}^{s}	Ψ_{l1}^{o}	Ψ_{l2}^{o}	Ψ_{l3}^{o}
Short-term	Ψ_{t1}^{g}	Ψ_{t2}^{g}	Ψ_{t3}^{g}	Ψ_{t1}^{s}	Ψ_{t2}^{s}	Ψ_{t3}^{s}	Ψ_{t1}^{o}	Ψ_{t2}^{o}	Ψ_{t3}^{o}
Crane vertical/ Crane braking*	Ψ_{k1}^{g}	Ψ_{k2}^{g}	Ψ_{k3}^{g}	Ψ_{k1}^{s}	Ψ_{k2}^{s}	Ψ_{k3}^{s}	Ψ_{k1}^{o}	Ψ_{k2}^{o}	Ψ_{k3}^{o}
Instant	Ψ_{m1}^{g}	Ψ_{m2}^{g}	Ψ_{m3}^{g}	Ψ_{m1}^{s}	Ψ_{m2}^{s}	Ψ_{m3}^{s}	Ψ_{m1}^{o}	Ψ_{m2}^{o}	Ψ_{m3}^{o}

* — for crane load cases, the logic is somewhat different: if one crane load case enters the combination, then, depending on the combination, the coefficient Ψ_{k1}^{g} or Ψ_{k1}^{s} , or Ψ_{k1}^{o} is taken, for two crane load cases, then the coefficients will be Ψ_{k2}^{g} or Ψ_{k2}^{s} , or Ψ_{k2}^{o}, and for three or more crane load cases the coefficient are Ψ_{k3}^{g} or Ψ_{k3}^{s}, or Ψ_{k3}^{o}.

In the *29th document*, the coefficients are specified in the following order:
1. 12 coefficients that refer to the main combination.
2. 12 coefficients that refer to the seismic combination.
3. 12 coefficients that refer to a special combination

Example:

```
( 29/
     Ψl1g  Ψl2g  Ψl3g   Ψt1g  Ψt2g  Ψt3g   Ψk1g  Ψk2g  Ψk3g   Ψm1g  Ψm2g  Ψm3g
     Ψl1s  Ψl2s  Ψl3s   Ψt1s  Ψt2s  Ψt3s   Ψk1s  Ψk2s  Ψk3s   Ψm1s  Ψm2s  Ψm3s
     Ψl1o  Ψl2o  Ψl3o   Ψt1o  Ψt2o  Ψt3o   Ψk1o  Ψk2o  Ψk3o   Ψm1o  Ψm2o  Ψm3o  /
)
```

Document 37 describes the assignment of factors to load cases, which are taken into account when calculating DCF. Each line of document 37 specifies coefficients for one load case in the following order:

1. Loading index.
2. Adjastment factor for normative loads.
3. Adjastment factor for design loads.
4. Adjastment factor for share of duration.

Example:

```
( 37/
     1  1.00  1.10  1.00 /
     2  1.00  1.10  1.00 /
     3  1.00  1.10  1.00 /
     4  1.00  1.20  0.35 /
     5  1.00  1.00  0.00 /
)
```

Document 38 describes the definition of design load combinations. Each line is responsible for one result combination and is set in the following order:

1. Type of combination (0 — user-defined combination, 1 — automatic combination). It is clear that when creating a text document manually, the only acceptable type of design combination is custom type.
2. Load number.
3. The coefficient with which the load case will be taken into account in this combination.

Items 2–3 in one line are repeated for each load case that participates in this design combination.

Example:

```
( 38/
     0  1 1.0  3 1.0       /* the first combination contains loading 1 and 3 /
     0  2 1.0  4 1.0  5 1.0/* the first combination contains loading 2, 4 and 5 /
)
```