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Spiral steel staircase design calculation pdf

Calculation of the spiral staircase can be done independently. Designs in the form of a spiral staircase can be found quite often, since they can be in a private house, office and even public places. It is worth noting that the popularity of these buildings grows literally every minute, all thanks to their compactness, practicality, affordability and style. Basic dimensions of spiral staircase To make your own hands a spiral staircase to the second floor, it is necessary to prepare a drawing, calculate the dimensions and draw a project. It is worth noting that there are standard parameters by which you can make a screw structure, and at the same time it will perfectly fit into the interior. The main dimensions are: The width of the staircase is 530-1430 mm; The diameter of the holes in the ceiling between the floors is 1400-3400 mm; The diameter of the stairs along the contour of the outer edge is 1300-3300 mm; The diameter of the passage along the contour of the inner edge is 1200-3200 mm; The distance between each turn or the height of the passage is 1900-2300 mm; Turning angle of the stairs is 270-360°. In order to make a spiral staircase with your own hands, first of all you need to prepare a drawing. The width of the tread in the place of motion is taken at 200 mm, at a distance from the location of the rack - 150 mm, and the optimal width is 280 mm. The height of each step is 150-200 mm, and the number of steps is 12-13 pieces, the height of the rail is 900-1200 mm. Drawing the drawings of the spiral staircase with their own hands The design of the future spiral staircase and the calculation of its parameters can be completely handled. It is worth noting that you can calculate the necessary data using the online calculator, or standard formulas. With standard formulas, you can calculate the required data for the ladder. Regardless of the model and its configuration, the spiral staircase should be: Stable; Strong; Safe; To comply with the norms and standards of GOST. In addition, before drawing up a scheme for design, you need to determine a number of points - the location of the opening in the floor, its size, the material from which the staircase will be made, the direction of rotation of the structure. It should be noted the place of the beginning of the construction and its end, the angle of rotation of the turns and the type of railings, and the method of their installation are chosen. How to calculate a spiral staircase by selection method Independently creating a draft of the spiral staircase, and also based on the individual parameters of the house, the object being constructed and, most importantly, personal preferences, it is difficult to meet the standard parameters. What to do in such a situation, and how to mark in the plan parameters like height and width? In order to calculate the dimensions of a screw-type ladder, and how much space it will occupy in space, it is possible to use such devices as: Program; Samples of finished products; Method of selection. Calculate the dimensions of a screw-type ladder using the selection method Very stringent requirements are made precisely to the choice of steps and what should be the cuts between them. Each person has his own path of descent and ascent, as some prefer to descend along the edge of the structure, while others prefer the central part, and therefore it is simply impossible to choose the ideal variant of the structure. Experts recommend creating several variations of one design, and then choose the most appropriate and appropriate standards. Only in this way can you fit within the framework, and in safety standards and personal preferences regarding the size and ease of use. In addition, it is important to take into account that the staircase, regardless of its type and size, is part of the interior, and therefore it is necessary to take into account the style of design, the design of the structure and how competently it will be inscribed in the general view of the room, so that it will be an excellent addition, not an accent, causing irritation and discontent. Nuances in the drawings of the spiral staircase The drawing or drawing of the screw structure should be clear, correctly thought out, without flaws. The minimum% of the error can cause the construction to not correspond to the project in any way, to have an incorrect level of inclination, too sharp a turn or even an uneven installation. On average, spiral staircases can be rotated 360°, and the diameter of both the opening and the structure is 2.2 m with a height of 3 m. Drawings of such constructions as round stairs are made in 3D format in AutoCAD (dwg format) or in a section so that it is possible to clearly see, but on paper note each necessary parameter, such as steps and racks, balusters, main support and not only. Calculation of the project begins with what will be the length of the circle, which according to the rules of geometry is calculated by the formula $L = 2\pi R$. To calculate the length parameter of the line to be traversed, we use the formula $L = 2\pi r$, in which $r = 2R / 3$, since the projection for motion is located at a distance of 2/3 of the radius of the circle. Following these calculations, you can get the length of the ladder. After the length of one ladder march is revealed, you can calculate how many steps you need. If the structure has a height of 3 m, then the best option is to set the steps at a distance of 17 cm + .3. In this case, at a height of 3 m, it is more convenient to take as a basis 20 steps, and then you can easily calculate the number of necessary elements. Due to the fact that the steps of such stairs have a trapezoidal shape, the calculation of their parameters is carried out in several stages. First calculate their depth along the path of motion. For this, the circle circumference parameter is taken as a basis, the description of which is higher. To do this, you need to divide the obtained value by the number of steps, but less by 1, since the latter is set on the site. Since the resulting depth is greater than the standard, you can increase their number to 17, and the 18th will be on the site. If a remainder is formed at the time of dividing the numbers, it can be eliminated by adjusting the size and height of the first stage. The drawing of the screw structure must be clear and correctly thought out. Next, the depth of the tread is calculated in the place where the step will be fixed to the central support of the staircase. The point of support is basically a column of metal, the diameter of which is 50 mm. The steps are threaded onto it, and for their mounting it is necessary to make holes of the same size as the pipe size and 50 mm of the edge. That is why the depth of the trapezoid steps in the part where they are narrowed is 50x3. The calculation is carried out in mm. Calculation of the parameters of the tread in the part where the steps are wide, is carried out according to the formula in which the length of the circumference of the structure is divided by the number of lifts, in this case 17. The calculation is carried out in mm. Next, you need to pay attention to the location of the structure at the top, that is, where the upper stage and platform will be installed. In this case it is necessary to take as a basis the plan of the second floor and look at the place most suitable for mounting the opening, which, as already noted, averages 2.2 m. It should be noted that the opening in the floor must exceed the parameters of the staircase by at least 22 cm and be fenced on all sides and have a kind of gate. This will help to avoid injuring children if they are in the house. Online calculation of spiral staircase (video) In addition to the fact that the correct calculations must be made, it is extremely necessary that the installation process be of the highest quality and without oversights. Experts recommend those who prefer to independently design the stairs and then build them with their own hands, turn to the experienced master, so that he can calculate the correctness of the project and the parameters of the product. The staircase is not only a stylish piece of interior, but also a product that can be extremely unsafe with minimal oversight, and therefore its construction must be approached from the right side. Examples of spiral staircases (photo) Stairs made of metal are a worthy alternative to wooden - based structures, since they have such important qualities as durability, strength, unpretentiousness and noiselessness. Also, structures on a metal frame are quite easy to install and other things being equal, they are cheaper than similar ones made of other materials. Online calculators for calculating metal stairs from KALK.ABМ provides the opportunity to get a ready-made design project, which contains the final estimate with the amount of materials for production, drawings with the exact dimensions of each element of the structure, as well as a 3D model for visual assessment and identification of shortcomings. All calculations are saved in your personal account and are available for download. You can also export the results to email and social networks. The program does not take into account compliance with the SNiP, GOST, TU and does not protect against the risks of building an unstable structure - the calculator only performs mathematical operations based on the values entered by the user. However, the constructor does not allow you to perform calculations when entering obviously incorrect values and provides some recommendations (tilt angle, step height, tread width...) for creating the most comfortable stairs. We strive to ensure that private construction is now available to everyone and provide effective tools to automate the calculations. Every day our service is used by thousands of users around the world and create unique designs with their own hands, you can view them on the page "Reviews". How to calculate a metal ladder? In order to calculate a metal ladder with your own hands correctly and in the future not to worry about your own safety during operation, you must familiarize yourself with the main regulations that are defined for this design. In addition, it is extremely important to make correct measurements of the existing opening, since any, even minor errors, can lead to significant additional costs in the future, due to the completion of many details. Before using our constructors, we recommend that you watch the video below, in which a professional specialist demonstrates the interface, the main features of the tool, and provides useful recommendations. Why are our calculators better? Close cooperation with manufacturers of ladders Highly detailed drawings and 3D models Final report with a list of required materials Ready-made estimate for construction by the contractor Operational technical support service Positive reviews and a large number of completed projects Opportunities KALK service PRO provides the most flexible tools for creating almost any configuration of the future design. Calculators will be equally useful for craftsmen who are professionally engaged in the manufacture and Assembly of metal stairs, as well as for novice craftsmen who make such structures for the first time. When developing the algorithm for calculating stairs made of metal, the data of SNiP 21-01-97 (SP 112.13330.2011) "Fire safety of buildings and structures", SNiP 31-02-2001 (SP 55.13330.2010) "single-family residential houses", SNiP 2.08.01-89 "Residential buildings", SNiP 2.08.02-89 (SP 118.13330.2011) "Public buildings and structures", SNiP 2.01.07-85 (SP 20.13330.2010) "Loads and impacts", GOST 23120-78 "marching stairs, platforms and steel fences", GOST 25772-83 "steel fences for stairs, balconies And roofs", etc. At the moment we offer the calculation of the following types of stair structures made of metal: stairs are straight, spiral stairs. Soon the site will appear: stairs with a platform; stairs with winder steps; two-step stairs; three-step stairs. Try also to calculate the frame from other materials - go to the corresponding page of the calculator for wooden or concrete stairs. Interface To use the online calculator for calculating metal stairs with drawings, you do not need professional skills - you only need to enter the opening parameters as accurately as possible, and everything else is in accordance with building regulations and personal preferences. Also, the calculator for each design has a detailed step-by-step help with illustrations (you can read them on the corresponding pages). We recommend that you carefully double-check all the filled-in fields in the interface, since any accidental error can significantly affect the safety of the structure. Units of measurement. Mm, cm, m, inches, feet (automatic conversion). Drawing color. Color or monochrome drawing of drawings. The option of the stairs. Right-way, left-way. The size of the stairs. Length, width of the March, height of the opening. Steps. Quantity, thickness, protrusion. Risers. Install, do not install + thickness. The open strings. Height and width of the profile pipe. Jumper between the stringers. Height, width, + an additional number. Fencing. Thickness, width, height of handrails, cross-section of balusters. Floor slab. Protrusion above the opening, thickness. The wall. Thickness. Load-bearing structure. Length, number of elements, jumpers. Length (one, total), quantity. Steps. Quantity, length, width, height, volume. Risers. Quantity, length, width, volume. Railing. Length, volume. Balusters. Quantity, volume. The angle of inclination. Recommendations for the optimal angle of the staircase. The step height. Recommendations on the optimum height of the steps. Width of the stairs. Recommendations on the optimum width of the stairs. The width of the tread. Recommendations for the optimal width (depth) of the tread. Width of the carrier element. Recommendations for the optimal thickness of the bowstring. Drawings of stairs made of metal. Drawings are the basis of any construction project and indicate the design features of all elements and connections - without them, it is impossible to correctly build any complex structure. Our service allows you to save a significant amount of time and draws all drawings of metal stairs automatically, based on the values entered in the calculator fields. All images are drawn in a certain dimension with the scale grid specified. 3D-model Interactive 3D modeling allows you to evaluate the appearance of the proposed structure, features, advantages and disadvantages in a real opening. On our website, you can create a 3D model of a metal staircase according to its size and download the resulting project in OBJ format. Design is also performed automatically based on the filled values in the program interface. If you have any questions when using the online calculator for calculating metal stairs, please contact us using the comments form at the bottom of the page. You can also leave feedback, suggestions, and share your experience.

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