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Figure 1-34 Bending of a sheet with a crack groove or a cut process groove and a process hole must be properly treated, and if processors that can be seen from the plate and appearance, then it is not possible to add a rotation of the process holes of the bending (for example, the notch process is not added in the process of processing the plane in order to maintain a uniform style), and other bends should add a hole to the process for the rotation , as shown in Figure 1-36: Figure 1-36 gap between bends Bending the position of sudden change The bending area should avoid the location of a sudden change in work. The distance L of the bending line from the deflection range shall be greater than the bending radius r, i.e. L>r how shown in Figure 1-37 figure 1-37 Zona turn should avoid the location of the hastily missed part of One Time hemming the way for hemming: As in figure 1-38, first fold the sheet to 30 with a 30 degree bending knife and then flatten the offside. Figure 1-38 Edge mode The minimum corner edge dimension L in the figure is 0.5t (t is the thickness of the material) relative to the minimum corner edge size described above. The compressed dead edge is generally used for stainless steel, galvanized sheet metal and aluminum-zinc plate. The stunning parts should not be used as there is a phenomenon of acid catches at the site where hemming is carried out. 180° bending 180 degrees bending mode: As shown in Figure 1-39, first fold the plate to 30 degrees with a 30-degree bending knife, then flatten the bending edge, then pull out the pad. Figure 1-39 180 degree bend method Minimum corner edge dimension L in the figure is the minimum corner edge dimension of one corner plus t (t is the thickness of the material) and height H must be chosen from the flats normally used, such as 0.5, 0.8, 1.0, 1.2, 1.5, 2.0. In general, this height is not suitable for choosing a larger size. Triple folding edge As shown in Figure 1-40, fold the shape first, then fold the edge. Pay attention to the dimensions of each work during the design to ensure that each processing step corresponds to the minimum bending size and avoid unnecessary processing. Figure 1-40 Triple folding ediber Table 1-16 Minimum bearing edge size required for final flattening of bending edge Thickness 0.5 0.6 0.8 1.0 1.2 1.5 2.0 2.5 Bearing edge size 4.5 4.5 5.0 5.0 1.4 Structural forms nuts i vjci on parts of sagged metal Riveted achest shapes riveted orašnik su self-clinching standoff. Self-kilising orah, anchor rivet nut , pull the rivet nut, floating rivet nut. Self-cutting stand Riveting compression means that in the riveting process under external pressure, the rivets the plastic deforms the base material and is compressed into a prefabricated groove, specially designed in the riveting screw and walnut structure, thus ing a reliable connection of the two parts. There are two types of non-standard nuts for the rivet, one is a self-calling stand and the other is a self-calling nut. The connection to the substrate is achieved by such riveted shapes. Such rivets usually require the riveting part of the hardness to be greater than the hardness of the base. Plain low-carbon steels, aluminum alloy plate and copper plate are suitable for tightening self-pressure. For stainless steel and high-carbon steel sheets, due to hard material, especially A riveting nut column is necessary, which is not only expensive, but also hard to load, and crimping is not reliable, and it's easy to fall off after crimping. To ensure reliability, manufacturers often need to add welding on the side of the walnut column, which is not good in the process. That's why the tin parts with the nut column rivet and the riveting walnut aren't as stainless steel as possible. This also applies to riveting screws and rivets which are not suitable for use on stainless steel beams. The process of masking rivet nuts is shown in Figure 1-41: Figure 1-41 Diagram of the riveting procedure Self-cut rivet nut The riveting screw is shown in Figure 1-42: Figure 1-42 Schematic diagram of the riveting riveting process Anchor riveting riveting riveting riveting riveting rivets Part of the material of the riveted yion or asterion is plastic deformed under the action of external force , and the tight fitting is formed with the basic material, thus realizing a reliable connection of two parts. Commonly used ZRS is associated with a substrate with this type of rivet. The riveting process is relatively simple and the strength of the joints is low, but it is usually used to limit the height of the fastening and to hold low torque. As shown in Figure 1-43: Figure 1-43 Schematic diagram of the riveting anchor procedure Drag the riveting nut Pulling the rivets means that the riveted member is plastic deformed under external tension during the riveting process. The position of deformation is usually in a specially designed part, and the substrate is attracted by the deformation part in order to achieve a reliable connection. Commonly used nuts for rivets are associated with a substrate with this type of rivet. The rivet is riveted with a special rivet gun, which is often used in places where the plate to install is small and it is not possible to use universal rivet tools such as closed pipes. As shown in Figure 1-44: Figure 1-44 Diagram of the riveting process of pulling Floating rivet nuts Some of the riveted walnuts on the sheet metal structure, because the entire chassis structure is complex, the error of the accumulation of the structure is too large, so that the relative defect in the position of these riveted walnuts is large, making it difficult to assemble the other parts. This is a good improvement after using a riveted floating walnut in the position of the appropriate riveted walnut. As shown in Figure 1-45: (Note: there must be sufficient space in the rivet position) Figure 1-45 Schematic diagram of the procedure of the floating rivet press Anch Rivet orah for rivets, riveting orah, on the side distance sidro riveting orahinja, riveting rivets, riveting, riveting sheet, sistsnutom leaf. When the anchor riveting or self-clinching rivet is too close to the edge, it's easy to deform this part. In the case of a specific the distance between the centre line of the riveting fasteners and the edge of the sheet must be greater than L, see Figure 1-46. Otherwise, special clamps must be used so that the edges of the sheet are not forcibly deformed. Figure 1-46 Minimum distance between the center line and the edge of the sheet Factors that affect the quality of the rivet there are many factors that affect the quality of the rivet. In summary, there are mainly the following: the effectiveness of the substrate, the size of the lower holes and the rivet method. 1) Properties of the substrate. When the hardness of the substrate is suitable, the quality of the rivets is good and the strength of the riveted member is good. 2) Size of the lower hole. The size of the lower hole directly affects the quality of the rivet, if the opening is large, then the disatture between the substrate and the rivet is large. For rivets there must not be enough deformation to fill the groove on the rivet, so that the force limitation is too little, which directly affects the resistance of the thrust riveting nut (nail). In the case of the rivet screw, the lower hole is too large and the compression force generated by the plastic deflection during the riveting process becomes small, which directly affects the resistance of the thrust and resistance to the torsia of the screw rivet (female). Equally for the rivet, the lower hole is too large, so that the effective friction between the two pieces after the deformation of the plastic is reduced, which affects the quality of the rivet. The size of the lower hole is small, although the strength of the rivet can be increased to a certain extent, the quality of the appearance of the rivets will preferably be poor. The rivet is large, the assembly is unpleasant and the deformation of the lower plate is easily caused, which affects the production efficiency of the metaling and the quality of the rivet. 3) Riveting method. This was introduced in the previous section. Riveting screws and nuts should pay close attention to opportunities in the application process. Different situations and different force requirements require different types. If not used correctly, it will reduce the force of riveted screws and walnuts, causing the connection to failure. Here are some examples to illustrate the correct use of a normal situation. 1) Do not install steel or stainless steel rivets before the aluminum plate is anodised or surface-treated. 2) If there is too much riveting on the same straight line, there is no place for exuding materials that will create great stress and bend the finish line into a curved shape. 3) Try to ensure that the surface of the plate is clad before installing riveting fasteners. 4) M5, M6, M8, M10 nuts are generally safe. Oversized nuts generally require high power. Welding can be used. Under M4 (including M4) the anchor rivets should be used. If electro-clad, a riveting nut must be used as stainless steel as possible. 5) Where walnut on the bent side to ensure the riveting quality of the riveted walnut should be attentive to: 1. The distance from the edge of the rivet hole on the side of the bend must be greater than the deformation area of the bent part. 2. The distance L from the centre of the riveted walnut to the inside of the bent side shall be greater than the sum outside the cylins-hy radius of the riveted walnut and the inner radius of the bend. This is L<gt;D/2+r. Projection varnish Projection safe walnut (safe spot nut care) is often used in the formation of sheet metal parts. However, in many models, the size before the holes does not comply with the standard and cannot be accurately positioned. The structural type and dimensions are shown in Figure 1-47 and Figure 1-48. The recommended values for hole diameter D0 and thickness H before wetting of steel welding plates are given in Table 1-17. Slika 1-47 Tip konstrukcije za varjenje heks orahov Slika 1-48 Varjenje varjenih heks orahov in jeklenih plošč Tabela 1-17 Dimenzije varjenih heks orahov in debelina odprtine ustreznega Čeličnik ploče (mm) Velikost navoja (D ali D×P) M4 M5 M6 M8 M10 M10 M12 M16 — M8×1 M10×1 M12×1.5 M16×1.5 — — — (M10×1.25) (M12×1.25) — e min 9.83 10.95 12.02 15.38 18.74 20.91 26.51 dý max 5.97 6.96 7.96 10.45 12.45 14.75 18.735 min 5.885 6.87 7.87 10.34 12.34 14.64 18.605 h1 max 0.65 0.7 0.75 0.9 1.15 1.4 1.8 min 0.55 0.6 0.6 0.75 0.95 1.2 1.6 h2 max 0.35 0.4 0.4 0.5 0.65 0.8 1 min 0.25 0.3 0.3 0.35 0.5 0.6 0.8 m max 3.5 4.5 6.5 8 10 13 min 3.2 3.7 4.7 6.14 7.64 9.64 12.3 D0 max 6.075 7.09 8.09 10.61 12.61 14.91 18.93 min 6 7 8 10 15 12.5 14.8 18.8 H max 3.5 4.5 5 5 6 min 0.75 0.9 0.9 1 1.25 1.5 2 Note 1: Do not use the specifications in brackets as far as possible. Hole flanging & tapping Common coarse threaded boring size Thread diameter M Thickness t Inner diameter D1 Outer diameter D2 Height h Pre-punch diameter D0 Radius M2.5 0.6 2.1 2.8 1.2 1.4 0.3 0.8 2.8 1.44 1.5 0.4 1 2.9 1.8 1.2 0.5 1.2 2.9 1.92 1.3 0.6 M3 1 2 55 3.5 2 1.4 0.5 1.2 3.5 2 1.6 1.5 0.6 1 1.5 3 5 2 4 1.7 0.75 M4 1 3 35 4 4 6 2 2 3 0.5 1 2 4 5 2 1.6 2 3 0.6 1 5 4 65 2 7 1.8 0.75 2 4 56 3 2 2 4 1 M5 1 2 4 25 5 6 2 4 3 0.6 1 5 5 75 3 2 5 0.75 2 5 75 3 6 2 7 1 2 5 5 75 4 3 1 1 25 The minimum distance from the tapping to the bending edge Table 1-19 Distance between the tapping center and the bending edge H value comparison table Thickness/thread diameter 1 1.2 1.5 2 M3 6.2 6.6 — — M4 7.7 8 — M5 — 7.6 8.4 — Comparison of rivet nuts , self-cutting walnut, rivet and flange for holes & tapping Tapping Table 1-20 Comparison of nut rivets. Self-clinching nut, pull riveting, and the tapping Connection method/feature Anchor rivet nut self-clinching rivet nut pull riveting flanging & tapping Processability it is a good good good average Sheet none metal requirements Inox riveting, easy to fall off Inox riveting is very poor, use special rivetnuts, and need spot safe Copper, aluminum soft material easy to slip Precision good good average Durability good good Copper and aluminum soft materials are poor, other material threads have 3 to 4 buckles or more Cost high average low quality good good average 1.5 Sheet Metal Common stretch forms and design considerations The sheet metal stretch is shown in Figure 1-50. Figure 1-50 Sheet stretching design: The minimum radius of the fillet between the bottom and the wall of the stretched member must be greater than the thickness of the plate, i.e. r1<gt;t; in order to make the stretcher smoother, in general r1=(3-5)t, the maximum radius of the fillet must be less than 8 times the thickness of the plate, i.e. r1 < 8t. The minimum radius fillet of flanges is the wall of the tensile member should be jači from 2 times the thickness of the sheet, i.e. r2<gt;2t; To make the exercise smoother, general se r2=5t, maximum radius fillet must be less than 8 times the thickness of the sheet, i.e. r1 < 8t. The diameter of the inner cavity of the circular tensile parts must be D<gt;12t so that the pressure plate does not press when it is stretched. The minimum angular radius between adjacent walled rectangular tensile parts shall be r3 >= 3t. To reduce the number of stretching, r3 >= 1/5h as much as possible to complete the stretching. The tensile strength of the parts changes after stretching. In general, the centre of the bottom is stored at its original thickness, the material on the lower corners is thinned, the material at the top close to the flange is concentrated and the material becomes thick at rounded corners of the rectangular tensile parts. When designing a stretched product, the drawing clearly states that external dimensions or internal and external dimensions must be used, and the internal and external dimensions cannot be marked at the same time. The thickness of the material in the tensile member generally takes into account the rule that the upper and lower wall thickness is not the same when the process deforms (i.e. the upper thickness is thinner). When the circular tensile parts without the flange are formed simultaneously, the ratio of height H to diameter d shall be less than or equal to 0.4. Size of convex procedure The shape and size of the convex sheet is specified in the sheet metal mould manual several series sizes. The intralink library has the appropriate form model. The design should be selected according to the size specified in the manual, and the mold of the form in the library is directly used. Figure 1-51 Convex on sheets Limit size convex resin and convex edge Table 1-21 Convex resin limits and convex margin Shema 1. B D 0.5 10 6 8.5 13 7.5 10.5 15 9 13 18 11 15 22 13 18 26 16 24 30 31 44 26 36 51 30 43 60 35 48 68 40 55 78 45 Local depression ia line How is shown u 1-52. 0.3-inch sheet metal production may be used as a label for a label or the like to improve the reliability of the label. Such a semi-cut concoction is a deformation much smaller than normal stretching, but there is still a certain deformity behind the plate with a large lid and lower plate, which are not bent or have a low bending height. Alternative method: Two right-angle lines can be pierced in the marking area to improve deformation. However, the reliability of the label attachment is reduced. This method can also be used for processing such as product encoding, date of manufacture, version and even sample. Figure 1-52 Diving and pressing line Reinforcement Compression Ribs on metal parts in the form of panels, see Figure 1-53, helps increase structural stiffness. Figure 1-53 Symmetrical rib structure When marking the corresponding dimensions of the curved part, consider processing Figure 1-54 Example of curved work marking As shown in Figure 1-54, a) After impact and bending, the accuracy of the L dimension is easy to ensure and processing is convenient. b) and c) If the accuracy of the L dimension is high, a hole must be disassembled after bending from the machine. Processing is very difficult and it is better not to use it. 1.6 Other process techniques Drilling rivets Drilling is a riveting method between the sheets used primarily for the connection of coated steel or stainless steel panels. One of the parts is punched, and the other part is struck and in handcuts, there is an inseparable connector. Advantages: The flange is matched by a flat hole, and has a positional function itself. The rivet's power is high, and the efficiency of the rivet through the mold is high. Special mode is shown in Figure 1-55: Figure 1-55 Drilling and riveting Table 1-22 Drilling dimensions for rivets Parameter Thickness T(mm) Flange height H(mm) Flange for inner dia. D(mm) No 3 3.3 4 4.5 6 Corresponding straight hole inner dia. d and pre-hole hole d0 d0 d0 d0 d0 d0 d0 1 0.5 1 2 2 4 1.5 3 2 4 3 4 2 6 4 2 3. 4 2 0.8 2 2 3 0.7 3 1 1.8 3 3 1 2 1 2 9 4 3 3 2 1 2 4 3 2 1 8 4 2 7 4 2 2 9 000 5 2 4 1 2 2 7 3 1 2 3 8 2 3 4 2 5 5 3 6 5 1 5 5 3 2 8 1 3 6 1 7 3 8 2 4 8 3 2 Note : General principle H+T<=(0.3-0.4) D - D' < 0.3, D-d<=0.8T When the T<=0.8mm is, the wall thickness of the flange is 0.4T. At T<=0.8mm, the wall thickness of the flange is usually 0.3mm. H is usually 0.46t0.12 TOX rivets In the metal plate riveting method there is also a riveting method, which is tox rivet. The principle is that the two stand together, as shown in Figure 1-56. Stamping and drawing using mold, which is mainly used to connect coated steel sheets or stainless steel sheets. It has the benefits of energy saving, environmental protection and high efficiency. In the past, the chassis of the communications industry has been used by several rivets, but quality control of mass production Hard. The medicine has been used less and is not recommended. Figure 1-56 Toxic rivet 1.7 Uniform counterattack size Head screw size structural dimensions of the anti-light screw are selected as shown in the following table. If the plate is too thin, it is difficult to provide via d2 and counter-bod at the opposite head of the forgery screw at the same time, and the priority should be provided via d2. Counterhead and via for counter screws: (The selected thickness of sheet t is preferably greater than h) Table 1-23 Screw dimensions against screw d1 M2 M2.5 M3 M3 M5 d2 Ф2.2 Ф2.8 Ф3.5 Ф4.5 Ф5.5 D Ф 4.0 Ф5.0 Ф6.0 Ф9.0 h 1.2 1.5 1.65 2.7 2.7 2.7 Preferred min thickness 1.2 1.5 1.5 2.2 α 90° Uniform Size Counter-rivet size countersunk Table 1-24 Dimensions of counterattack holes for holes Countersunk Rivets d1 Ф2.5 Ф3 Ф4 Ф5 d2 Ф2.2 Ф2.7 Ф3.3 Ф4.3 Ф5.3 D Ф 4.0 Ф5.0 Ф5.5 Ф7.0 Ф9.0 h 1 1.1 1.2 1.6 2 α 120° Special treatment of thin sheets with head tops countersunk seal embroidery is completed M3 countersunk viers. If the thickness of the hole is 1 mm, it is problematic by the usual method. However, they face a large number of such problems in their actual design. The rivet nut is used below and the diameter of the anti-light is 6mm, which can effectively complete the connection as shown in the figure. This size is used in a large number of inserted fields. It is important to know that for this type of connection it is necessary that the lower walnut anchor is riveted nuts. Self-clinching riveting nut and tapping can't complete tightening links. Figure 1-57 Connection of the head screw For standardising such dimensions d/D should be as follows: Table 1-25 Unification of thin sheets contraptable Sheet thickness 1 1.2 1.1.5 M4 4/6 3.6/6.0 3.5/6 M4 — — 5.8/8 5.8/8

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