Discussion on Heat Treatment Process of Welding Weld in Power Plant

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Abstract: In order to improve the quality and efficiency of heat treatment in welds of power stations, this paper summarizes the current situation of 600 MW supercritical power plant welding site heat treatment and puts forward the improved methods and measures accordingly. The heat treatment of welding holes in the construction site Play a certain guiding role.

Key words:power station; welding heat treatment; process; improvement; measures

Introduction

With the rapid development of the power industry, large units, high-parameter thermal power plants continue to emerge, large units have become the main force of China's thermal power generation. Under the guidance of the national 'priority development of hydropower, continue to develop thermal power, the appropriate development of nuclear power' under the guidance of the future installation of thermal power units are mainly 600MW, 1000MW supercritical and ultra-supercritical pressure units. With the increase in the size of generating units, power plant steel varieties continue to increase, the type of steel alloy elements and content is also increasing. In particular, in recent years in the power plant welding often used SA335P91 diameter and wall thickness greatly increased, coupled with the emergence of new steel SA335P92 / SA213T92, heat treatment process is more complex. This series of changes and development for the power station welding heat treatment has brought new challenges, heat treatment process and heat treatment operators have to further improve the level of operation.

1.Heat treatment overview

The welding heat treatment of the power station is carried out before welding, after welding or after welding, the whole or part of the weldment to a certain temperature, heat for a certain time, and then cooled at the appropriate speed down to eliminate the residual stress during welding and So that the weld easily lead to the spread of hydrogen from the weld to escape the workpiece welding process performance and mechanical properties, is to improve the welding of the metallographic organization of a process. Heat treatment includes preheating, post heating and post weld heat treatment.

1.1. Preheat - A heat treatment process that heats all or part of the weldment before welding begins. In the field of welding preheating are part of the heating parts, the purpose of preheating is to slow down the cooling rate after welding to prevent the generation of cold cracks. But also to prevent the welding in the cold under the heating, welding is not uniform local heat, heat expansion and cooling shrink the degree of uneven, so that the weld in the process of shrinkage and expansion of the local stress is too large to produce cracks.

1.2. After the heat - welding work to stop, immediately heated to a certain temperature (300 ℃ ~ 400 ℃), heat for a certain time (2h ~ 4h), and so that the welding slowly cooled down to accelerate the escape of hydrogen Out of a heat treatment process. The effect of hydrogen on the quality of welding has four main points:

1.2.1 Hydrogen embrittlement, hydrogen at room temperature near the plasticity of a serious decline in the phenomenon of steel.

1.2.2 Carbon steel and low alloy steel weld, such as high hydrogen content, it is often in its tensile or bending section appears on the white round brittle fracture point, called the white point. Such as the weld to produce white spots, the plastic greatly reduced.

1.2.3 If the hydrogen is slow to escape, it will form a hole in the weld defects.

1.2.4 Hydrogen in the weld is likely to cause the weld to produce hydrogen cracking, that is, cold cracks, delayed cracks. Has a great impact on the weld.

1.3. After the welding heat treatment - welding work is completed, the welding pieces heated to a certain temperature (material under the phase change temperature Acl below), insulation for a certain period of time, so that the welding slowly cooled down to improve the welding joints of the microstructure and Performance or elimination of residual stress of a heat treatment process.

After the heat treatment, that is, high temperature tempering. The main purpose of tempering is to:

1.3.1 To reduce stress and brittleness to prevent fracture.

1.3.2 Refine the weld organization in the process of welding to form a large microstructure, access to good comprehensive mechanical properties.

1.3.3 To prevent deformation of the workpiece, stable workpiece size. If there is residual stress in the weld, and if there is a mechanism (such as arc abrasion, abrasion of the fixture during the installation process, etc.) that is easy to cause cracking on the weldment, it is easy to use in the residual Stress corrosion cracking caused by stress state.

1.4. Low temperature protection - for the martensitic steel after welding in the temperature will be reduced to 100 ℃ ~ 120 ℃, holding a certain time (1h ~ 2h). The choice of the heat treatment timing after the completion of the welding is very important. The minimum temperature of the post-weld cooling and the time interval of the heat treatment after the welding are required to ensure the austenite transformation in the joint for marten site and then high temperature tempering treatment. If the temperature before the high temperature tempering higher, the process of carbide precipitation along the residual austenite grain boundary precipitation and austenite to pearlite transformation, such a structure is brittle; also does not allow the joint after welding to room temperature and then To temper, so there is the risk of cold cracks.

2. Guide the main work of heat treatment operations at this stage.

2.1 DL / T819-2002 'thermal power plant welding heat treatment technical regulations';

2.2 DL / T869-2004 'thermal power plant welding technical regulations';

2.3 related welding heat treatment process assessment and other technical information;

3. Profile for current construction site used heat treatment equipment.

Three types of heat treatment machines that are frequently used in site construction:

3.1 DWK-A computer temperature controller - 180KW. Suzhou Wujiang Electric Appliance Factory Manufacturing. A heat treatment machine has three heating furnaces. Each furnace power up to 60KW, all the way wire power is 10KW, up to 6 routes. A heat treatment machine can be accessed by 12 temperature points, of which 6 are standby temperature points.

3.2 DWK-C-type computer temperature controller - 240KW, China Wujiang Wuqiang Welding Equipment Co., Ltd. manufacturing. A heat treatment machine has six heating furnaces. Each furnace power up to 40KW, all the way wire power is 10KW, up to 4 lines. A heat treatment machine can take 12 temperature points.

3.3 DWK-C-type computer temperature controller - 360KW, China Wujiang integrity welding equipment factory manufacturing. A heat treatment machine has six heating furnaces. Each furnace power up to 60KW, all the way wire power is 10KW, up to 6 routes. A heat treatment machine can take 12 temperature points.

These three models of heat treatment machines are three-phase four-wire system, the input voltage of 360V, the frequency of 50HZ. The output voltage is 220V. Site construction process, but also by the scene connected to the power supply voltage limit. If the input voltage on the field fails to meet the requirements, the output power of the heat treatment machine is lower than the rated power. In the heat treatment process should be a corresponding increase in power, to ensure that the heat treatment of heat treatment welding quality.

These three models of heat treatment machine operation are relatively simple, after a simple training can be carried out the actual operation. But in the actual operation can be done handy, but also need to have a wealth of theoretical knowledge and practical experience.

4. Customization and options for heat treatment

Flexible ceramic crawler heat treatment heaters used in the production process of ceramic sheets under normal circumstances the specifications are fixed. So the heating plate of the power and the relationship between the areas is in a fixed range, 0.02 ~ 0.024 m^2. / 10KW. (Mm) × wall thickness (mm) / 25.4^2 = the power (KW) required for the heat treatment of the welds when the heat treatment of the welds is performed after welding. In the process of customizing the heat treatment of the heating sheet, the length of the heating sheet and the heating width can be calculated according to the specifications of the welding port, and the required heating sheet size is determined according to the range. For example: the super heater connecting pipe of the welding port specifications Φ508 × 75 (mm), the material is 15CrMoG:

The length of the required heating sheet: diameter multiplied by the pi. 508 (mm) x 3.14 = 1595.12 (mm). And then on the basis of the value minus an adjustment value of 20 (mm) (the size of the adjustment value can be taken in the appropriate situation between 10 ~ 30mm, but for the small diameter pipe generally do not adjust the value). 1595-20 = 1575 (mm).

The width of the required heating sheet: wall thickness multiplied by a factor of 6.5. The requirement is that the width of the weld on each side of the weld is three times the wall thickness, multiplied by a factor of 6, and the width is appropriately increased by the requirement of the procedure, so multiply by 6.5. That is, 75 (mm) x 6.5 = 487.5 (mm). To the heating width is only a minimum, the actual heating width according to the actual site to adjust, than this value to be large.

According to the calculated data in the preheating can choose 1575 (mm) × 150 (mm) of the heating plate. The area of ??the heater is 0.023625 m^2.and the power is 10KW.

The choice of heatsink after heat treatment can be determined according to the formula:

The heat required for the heat treatment of the weld: 580 (mm) x 74 (mm) / 25.4^2=59 (KW).

But the power calculated using this formula is only a reference value, the actual work in the field sometimes do not need such a large power, but sometimes in this value on the basis of additional power. Then the heat treatment of the weld heaters can choose four pieces of 780 (mm) × 300 (mm) of the heating plate. Respectively, two pieces of heating wire with wire length up to 1560 mm, and then wrapped around the weld side by side, the heating width of 600mm. 780 (mm) x 300 (mm) area is 0.0234 m^2., a piece of heating chip power is 10KW, four of the total power is 40KW, enough to weld the weld after the heat treatment.

For the row of post-weld heat treatment, after the completion of the entire row of pipe welding, with a long heating plate on the whole row of welding heat treatment. Such as the end of the super heater tube row (as shown in Figure 1),

the welding port specifications Φ44.5 (mm) × 7.5 (mm), the material is SA213 T91. Picture 1 pipe row welds

A small set of two rows of welding mouth, divided up and down two layers, each row of welding 10 Road. The gap between the two tubes is 62.3 mm, and the gap between the upper and lower rows of tubes is 70 mm.

The heat treatment of the pipe row to choose the heating plate should be calculated the length of the required heating sheet, in the calculation of the length of the heating plate should take into account the gap between the tube and the tube, a row of welding, the application of two pieces of heat treatment, then:

Heating piece length = [44.5 (diameter mm) × 5 + 62.3 (gap mm) × 4] × 2 + (circumference of one pipe diameter) 44.5 (mm) × 3.14 = 1083.13 mm. The value is 1080 mm.

Required heating width = 7.5 (mm) x 6.5 (coefficient) = 48.75 mm. The heating width is the minimum. According to the actual conditions should choose the width of 200 mm.

The area of the heater is 1.08 m x 0.02 m = 0.0216 m^2. Power is 10KW.

5. Heat treatment process and related improvement measures

In order to improve the preheating of the welding head and the quality of the post-weld heat treatment, we have discussed the current situation of the current heat treatment and discussed the following aspects:

5.1 In order to improve the work of the heat treatment operator's responsibility, to keep abreast of the work of heat treatment on-site, to strengthen the intensity of on-site heat treatment supervision, heat

treatment operators should be in strict accordance with DL / T819-2002 'thermal power plant welding heat treatment technical regulations' D2 (see Table 1 welding heat treatment record table) requirements, on-site heat treatment weld every half hour patrol once, and timely detection of problems, and make a record.
Table 1 welding heat treatment operation records

5.2 The use of heat treatment heaters are used in series with ceramic pieces. Heat treatment personnel in the process of handling should pay attention to gently, do not allow to beat the heating film to prevent the ceramic pieces damaged, to avoid the tungsten wire ceramic exposed, in the heat treatment process grounding or wound the pipe, affecting the heat treatment process normal The

5.3 Thermocouples used in the field The KX-type compensation wire (nickel-chromium-nickel-silicon) is used to transfer the temperature measurement signal from the field to the centralized control room or to extend the thermocouple to a constant temperature. The advantage of using the compensating wire is that it can improve the mechanical and physical properties of the thermoelectric circuit, which can increase the softness of the loop, and adjust the resistance value of the circuit and shield the outside interference. It is to ensure that the heat treatment process can proceed smoothly and heat treatment temperature an important measure that can run stably. Compensation of the two wires within the wire is generally red and black colors, red for the positive, black wire for the negative. In the process of wiring the field, the wiring and the thermocouple wiring must be positive and negative corresponding.

In the field heat treatment process should be timely and correct use of compensation wire. It is recommended that each thermocouple be connected with a compensation wire of about one meter in advance. In the dry when the heat treatment line can be directly connected to the compensation wire to ensure that the process can be more convenient and fast, to ensure that the heat treatment process can be carried out smoothly.

5.4 Field use of thermocouple for the K type thermocouple (nickel chromium - nickel silicon). In accordance with the provisions of the thermocouple should be fixed by storage pressure welding, but the site construction we generally use a fixed wire thermocouple. In the process of fixing the thermocouple with wire, special attention should be paid to the fact that the hot end of the thermocouple should be in good contact with the weld center during the post-weld heat treatment (see Figure 2) and secured with wire fast to prevent heat even loosely affect the heat treatment temperature of the output. At the same time to ensure that the temperature of the thermocouple measurement better response to the center of the weld temperature, thermocouple and heating plate can be used between small pieces of cotton insulation to be isolated.

5.5 Thermocouple layout should also be in strict accordance with the requirements of the program (see Figure 3). Thermocouple installation location should be to ensure accurate and reliable temperature, representative of the principle. For pipe diameter greater than or equal to 273 mm, the temperature measurement point should be arranged in the center of the weld circumference symmetrical, and not less than two points; horizontal pipeline, the temperature should be symmetrical layout up and down; partition temperature control, thermocouple arrangement Should be corresponding to the heating device, both thermocouples should not be arranged under the same piece of heat sink; when using a thermocouple to control multiple weldments at the same time, the thermocouple should be placed on a representative welded joint All the welding of the heating film, insulation cotton layout should be the same. In addition, the thermocouple arrangement in the heat treatment of the receiving seat, especially when the difference between the pipe diameter and the wall thickness of the main pipe and the branch pipe is large, the thermocouple should be arranged on the main pipe in order to ensure that the heating and cooling rate and the heating of the pipe are uniform, And the hot end of the thermocouple and the weld center in good contact.

5.6 Heating plate fixed, in the heat treatment process plays an important role. In the following special circumstances of heat treatment, the following measures are recommended:

5.6.1 In the heat treatment tube row (as shown in Figure 1 pipe row welding), because the heating sheet is relatively long, if the heating plate is not suitable for fixing, in the heat treatment process, the middle of the heating plate is easy to sag, making the middle of the welding Heat treatment effect is not ideal. Therefore, when the heater is fixed, it is not only necessary to fix the connection of the heating piece with the wire, but also the insulation cotton and the heating piece are tightly fixed together, and in the gap between the pipe and the pipe (especially the middle section) And in the insulation cotton outside, with a few wire wrapped wire, making the heater and the weld in good contact to prevent the heat treatment process, due to excessive heat loss or heating sheet sag and affect the heat treatment quality. Tubing Welds In the heat treatment process, the thermocouple arrangement should also be arranged on a representative weld. In particular, the welds on both sides of the pipe row have more than half of the pipe diameter in direct contact with the heating plate, the heating rate is faster, and the welding hole in the middle of the pipe is the smallest contact area with the heating plate, so the thermocouple should be arranged in this way Of the two positions, to effectively control the heat treatment temperature rise and fall.

5.6.2 Heat treatment of large diameter welding has been a difficult problem of heat treatment, especially the difficult location, special diameter (size of the first, three links, valves, etc.) heating film banding, fixed, heating process temperature control within the wall, Are in the construction of a difficult point. For the main steam, hot section and other large diameter thick-walled pipe welding hole welding mouth (see picture 4), especially the size of the head of the welding, due to the use of several pieces of heating plate in series, the heating piece itself is relatively large, During the heating of the heating plate is easy to fall along the pipe, it is necessary to take measures to fix the heating sheet to prevent the heating sheet from falling. First of all, in the top of the weld can be wrapped around a few wire, and from this a few wire leads to a few pieces of wire will be heated up. It can also use the surrounding objects to fix it, with wire from the heating plate leads to the fixed around the object, the heating sheet to play the role of suspension. At the same time in the bottom of the heating film, but also the use of models larger wire wrapped around the circle, the heating film and the lower part of the cotton play a role in lifting. Therefore, the heating sheet will not inflate and the expansion of wire will not cause the heating sheet slip down during the heating process, and affect the heat treatment quality.

The heat treatment of large-diameter thick-walled pipe welds also has the problem that the temperature difference between the inner and outer walls is not easy. For this problem should take the following measures: ① appropriate to increase the heat treatment of the width of the heating plate to increase the heat treatment of the power value. ②. According to the rules and process assessment to develop the basis of cooling rate, the appropriate to reduce the rate of cooling, has reached the purpose of reducing the temperature difference between the inner

and outer walls. (3) In the case of permissible conditions, it is possible to put the insulation cotton on the weld inside the pipe (see Figure 5). Insulation measures are taken on the inner and outer walls of the weld, and the open end of the pipe (See Figure 6), thus reducing the heat loss of the weld in the heat treatment process, better and easier to heat the welding port, which can also play the purpose of energy saving.

5.6.3 For the main steam, hot section and other large diameter pipe hanging welding mouth in the heat treatment process, the welding of the bottom of the heating film will be due to heating wire elongation, which led to heating sheet sagging, and the outer wall of the pipeline to form 1 to 2 cm Of the gap, affecting the quality of heat treatment. Therefore, in the process of knotting, should be in the outer part of the insulation cotton with a larger piece of wire, in the middle of the welding mouth plus a few Road, and fixed firmly to prevent the sinking of the heating plate. On the occasion of scene at wound around the heating film leakage phenomenon was mainly because the width of insulation cotton is not enough. In accordance with the provisions of the rules, the width of the insulation on each side of the weld should be more than the width of the heating sheet 100 mm. In the course of the use of wire wrapped around the heating film should be completely wrapped in the insulation cotton, so that insulation cotton can better play the role of insulation. To ensure that the middle of the heating plate does not fall, in the middle of the insulation cotton wrapped around a wire. (Refer Figure 7).

5.7 In the field heat treatment process, due to heat treatment wire and heating plate grounding, will cause the heat treatment process is interrupted, affecting the heat treatment process. In particular, the tungsten wire in the heater is grounded with the pipe and is easily damaged. For pipe wall comparison book pipe may be a direct breakdown of the pipe, damage the equipment. Therefore, in the heat treatment before welding the preparation process, to do all the inspection works. Before the heating treatment need to check wire from the line for the wire and if found a place where the wire leakage, it need to be wrapped with insulating tape in time. Heater should also check the good, there are ceramic pieces broken and broken wire should be replaced. The heat-treated wire and the heater's joint are quick-coupled with a quick connector and do not allow direct connection of the wires and leakage in the air to prevent contact between the wire and the pipe.

5.8 In the boiler auxiliary pipeline and the turbine in the low-pressure pipeline heat treatment process, there are many difficult locations and complex changes in a variety of materials. In the heat treatment of these pipes, should strictly abide by the requirements of heat treatment procedures, according to the heat treatment process card welding process for heat treatment.

5.8.1 As shown in Figure 8, in the field installation process, the valve material for the 20 # steel, pipe material for the 15CrMoG, sometimes a project one day welding work only two welding, 1 # welding material 15CrMoG on the 20 # steel, 2 # welding material for the 15CrMoG. The two welding of the heat treatment process is different from the heat treatment process should be two furnace treatment. However, in practice, due to the relatively concentrated workload of other projects, the heat treatment operator may be two welding with a process with the furnace treatment, this situation is absolutely not allowed. Because the material is different, the steel Acl is different, the temperature of the insulation is different, with the same process will cause one of the weld metal tissue burned or tissue transformation is not complete, affecting the quality of the weld.

5.8.2 as shown in Figure 9 pipe, pipe specifications ϕ89 × 12 (mm), the horizontal section of the pipeline material SA339P91, 45 ° elbow material is SA335P91, inclined section of the pipeline material SA335P22. Ground combination is the SA339P91 pipe and elbow welding, installation of the elbow when the tilt section of the pipe material into SA335P22. The two adjacent welds are of different material and the distance between the two welds is too close (about 120 mm from each other). When one weld is heat-treated, another weld is within the heating range. The two processes are simultaneously heat treated. Such a situation in the construction site is completely avoidable. Technical staff in the familiar drawings under the premise of the actual situation for the site should be in advance with the installation department in consultation with the development of a good construction plan, the SA335P91 pipe and elbow 1 # welding ground combination welding, to be 1 # after welding heat treatment is completed Installation material for the SA335P91 and SA335P22 2 # welding, welding to be completed after the 2 # welding heat treatment.

5.9 Heat treatment personnel in the operation of the heat treatment process, there are some habitual operation, mainly in the following areas:

5.9.1 the heat treatment process in the welding process due to the interruption of the problem, the heat treatment personnel to continue to heat treatment after troubleshooting, it is not allowed to directly shut down the heat treatment recorder using rapid warming measures, waiting for the temperature to interrupt the temperature to open the heat treatment recorder, And then according to the heat treatment process card required heating rate to continue the heat treatment process. Rapid heating, and cannot make the inner and outer wall of the weld temperature reaches the recorder shows the temperature. The thermocouple is arranged under the heating plate, even if the thermocouple output temperature has been reached, but the actual temperature of the inner wall of the weld than the output temperature is much lower, is not conducive to the smooth and comprehensive metal structure changes, and even affect the metal Normal change, reduce the quality of heat treatment. Therefore, this operation is not desirable, should be resolutely put an end to.

5.9.2 In the relatively tight schedule requirements, pre-heating process, sometimes the use of rapid warming measures, to be heated to the required preheating temperature after the start of welding insulation. Such a warming measure, although the output temperature of the thermocouple has reached the required requirements, but the actual temperature of the weld does not necessarily meet the required preheating temperature, especially when the root of the weld root temperature is certainly lower than the required temperature, Easy in the welding process, the root of the weld in the cold cracks, a direct impact on welding quality, this operation should be resolutely put an end.

5.9.3 heat treatment operators should communicate with the technical staff, on-site construction of the welding and heat treatment process has a clear place should be promptly contact with the technician to confirm, to avoid the use of the wrong heat treatment process on the welding port heat treatment operations.

5.9.4 for the need for intermediate inspection of the welding port, welding to 20 ~ 25 mm after the welding port after the heat treatment. After the heat treatment process is to heat the weld to a certain temperature (300 ℃ ~ 400 ℃), heat for a certain time (2h ~ 4h), and then slowly cool down the process. Heat treatment process cards are usually required to reduce the temperature below 300 ° C. Individual operators occasionally turn off the stove after the post-heat insulation (at this time the temperature is 350 ° C), and no longer control the heat treatment cooling process. This operation and heat treatment procedures and the development of the process card 'cooling to 300 ℃ below the control' does not meet the requirements, this cooling process should still be controllable, in control.

5.10 In the technical specification for welding heat treatment of thermal power plants in DL / T819-2002, clause 5.3.2 b): When multiple (sheet) heaters are used with the same furnace, the deviation of the resistance value shall not exceed 5 %. As shown in Figure 10, the pipe and docking flange extension of the end of the case, the flange at one end of a section of the pipe is too short, warm-up when the warmer selected heaters at both ends of the specifications are not the same, The resistance value of the heater used at both ends is definitely more than 5%, so that the heating sheet at both ends cannot work in the same heating furnace at the time of preheating, and the same process should be arranged at both ends, welds for preheating, post-weld heat treatment without sub-furnace temperature control.

5.11 On-site heat treatment operation should be in close cooperation with the welding construction personnel, good communication. Especially for the SA335P91 preheating welding process, the bottom of the preheating temperature is 150 ℃, filling the preheating temperature is 200 ℃, after the end of the welder should promptly notify the heat treatment to 200 ℃ and then continue to fill the welding. Heat treatment operators should also strengthen the on-site inspection, to keep abreast of the weld is finished, after the end of the heating up to 200 ℃ and then notifies the welder for welding.

5.12 The rope-like heater is mainly used with the site of the difficult location and not suitable for the use of sheet heat treatment of heat sink welding. Since the rope-like heater is heated and the number of times of use, the filament is elongated and the spacing between the fingers is constantly increased. Therefore, special attention should be paid to the application of the tiles after the thermocouple And then the mouth of the rope-shaped heater slot gap does not allow in a straight line to prevent the heat treatment process in the thermocouple contact with the furnace wire, or furnace wire and pipe contact occurred grounding accident, affecting the normal heat treatment process get on.

5.13 In the process of welding and heat treatment, if there is residual water or water in the pipeline, it will seriously affect the change of the metal structure at the root of the weld. Especially in the heat treatment process in the pipeline suddenly into the water, the equivalent of the root of the weld quenching, the root metal metallographic structure of a huge change, the hardness value will be seriously exceeded, and the impact of the surface of the weld metal structure in general Smaller. Therefore, before the heat treatment and construction process should be preventive measures to prevent such a situation. In the event of such a situation, it should immediately stop the heat treatment, the weld and the heat affected area of ??the metal with cold processing method to remove, after re-welding.

5.14 DL / T819-2002 'thermal power plant welding heat treatment technical regulations,' 6.3 provides: 6.3.1 require a cold crack tendency of the weldment, when the welding work is stopped, if not immediately after the heat treatment, should be hot The 6.3.2 Requirements for the martensitic steel (such as F12 steel or P91 steel, etc.) welding, if the post-heat, should be carried out after the martensitic transformation. And DL / T869-2004 'thermal power plant welding technical regulations,' the provisions of 5.4.2: easy to produce delayed cracks in the steel, welding should be immediately after the heat treatment, or should do after the heat treatment. The 'T91 / P91 steel welding process guidelines' provides: 'wall thickness ≥ 70 mm pipe weld, welding to 20 ~ 25 mm, should stop welding, immediately after the heat treatment ... ...' In the construction of the wall thickness of more than 70 mm, the material for the SA335P91 the heat treatment of the welding process, due to welding to 20-25 mm to stop welding for intermediate testing. Also, whether the heat treatment in the process accordingly,, it should be carried out before the heat of the problem of low temperature protection controversial. Low temperature protection is the temperature before the heat down to 100 ℃ ~ 120 ℃, heat for a certain time (1h ~ 2h). The martensitic transformation point of martensitic steel has low temperature and low temperature protection measures can make the retained austenite in the joint fully into marten site. We in the middle of the process of testing, the welding port to cool to room temperature and then the middle of the flaw detection, if the joint in the residual austenite into a stable marten site, the weld at room temperature conditions prone to cold cracks , Affecting the quality of welding. Therefore, in this process must be low-temperature protection measures.

6. Heat treatment operation of the safe and civilized construction.

6.1 heat treatment process used in the consumption of materials wire, insulation cotton, etc. should be noted that the use of conservation. Weld heat treatment should be promptly after the end of the heat treatment site, the waste wire and insulation cotton in time to recover the welding port used to fix the thermocouple wire should be promptly removed, should not be left in the welding mouth, The

6.2 in the field of dry and heat treatment process should pay attention to observe the surrounding environment. The braids of the heatsinks are relatively high in temperature during the heat treatment and are liable to ignite the surrounding flammable items such as wood and cotton. Therefore, in the course of the knot should be careful to heat the braids away from flammable items, if necessary, to take effective isolation measures.

CONCLUSIONS

The welding heat treatment of the power station is an effective measure to improve the metal microstructure of the weld metal, eliminate the residual stress in the installation and welding process, and improve the physical properties of the weld metal. The above discussion on the heat treatment work of the welding of the power station is some of the ideas and suggestions in the process of heat treatment of the welding of the power station. Please give criticism.

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