ए.टी. वेल्डिंग के लिए सिंगल शॉट क्रूसिबल के साथ ऑटो टेपिंग थिम्बल एवं थ्री पीस मोल्ड के उपयोग

USE OF SINGLE SHOT CRUCIBLE WITH AUTO TAPPING THIMBLE AND THREE PIECE MOULD FOR A.T. WELDING

1. परिचय / INTRODUCTION

In early days Conventional Technique of Alumino-Thermit welding (A.T. Welding) Two Piece green sand Moulds were commonly used in the process for accommodating molten thermit steel around the joint to make a bond between the rails. In this technique, pre-heating time was around 45-55 minutes.

Later on, after start of SKV technique of AT Welding, use of two piece pre-fabricated moulds started in place of green sand mould. Preheating system was also improved bringing down the pre-heating time to 10-12 minutes.

The main drawback of two piece Pre-Fabricated Mould was the appearance of Fins at the bottom of A.T. joints.



Two Piece Mould

To overcome this defect in A.T. Welding, new technique with Three Piece Pre-Fabricated Mould has been developed.

By providing Third Bottom Piece in Pre-Fabricated Mould, possibility of developing bottom fin is eliminated in A.T. welding.

2.0 पारंपरिक तकनीक और उसके नुकसान / TRADITIONAL TECHNIQUE AND ITS DISADVANTAGE

a) The traditional crucible lined with refractory material (magnesia / crushed alumina slag) and fitted with bottom stone and thimble is preheated before making the first Weld of the day to ensure freedom from moisture.

b) Slag need to be cleaned from the crucible after each reaction.

c) During cleaning, care has to be taken not to damage the refractory crucible lining.

d) The lining has to be examined regularly, either patches are to be repaired or relining to be done as necessary.

e) Improper cleaning or overuse of the crucible may lead to inclusions of lining material in weld steel which may result in weld failure.

f) After the reaction completes about three seconds shall be allowed for the separation of slag from the metal, which may be judged by looking into the crucible through coloured glass.

g) Thereafter, the molten steel shall be tapped into the mould by striking the closing pin with a tapping rod.

h) It is to be ensured that from the commencement of the reaction, thermit steel is tapped within the time limit specified.

i) Care is to be taken to ensure that the crucible does not move from its position during tapping.

j) An improper judgement regarding completion of reaction of portion, may result in tapping the molten metal into the mould either too early or too late.

3.0 उन्नत वेल्डिंग तकनीक / IMPROVED AT WELDING TECHNIQUE

3.1 Single-shot crucible : The single shot crucible is made from a refractory compound agglomerated by means of synthetic resin. It is used for one weld only i.e. it is use & throw type. Its use provides relatively cleaner welds, free from impurities.

3.2 Automatic Tapping Thimble : The automatic tapping thimble enables the automatic tapping of molten steel eliminating the error in manual tapping.

The use of auto thimble ensures that the pouring commences at the correct temperature, after completing the thermit reaction.

3.3 Compressed air-petrol / LPG Pre-heating : This system of pre - heating provides quick and uniform pre-heating and reduces the Pre- heating time considerably.

3.4 Hydraulic weld trimmer : Use of Hydraulic weld trimmer avoids the unnecessary hammering of weld joint, hence eliminating the chances of structure damage.

3.5 Three Piece Mould

3.5.1 These moulds eliminate the presence of fins at the bottom of the joints at the parting face of the two halves of the moulds. In this type of mould, the third piece is used at the bottom.

3.5.2 One set shall comprise three pieces of moulds (2 vertical parts in identical shape & sizes placed side by side and 3rd part is placed at the bottom) as shown in figure 6.

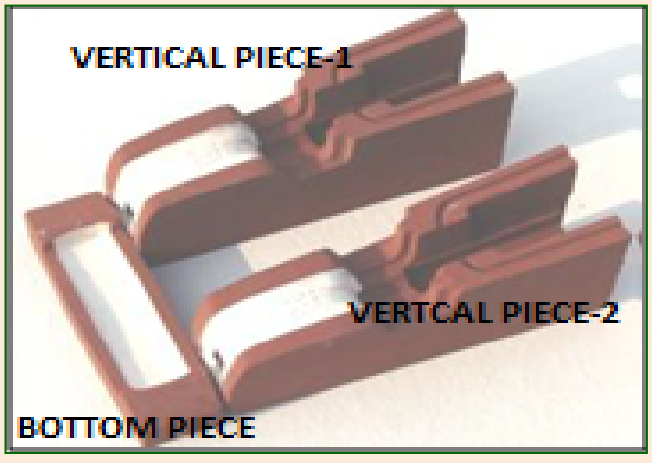


Figure – 6

3.5.3 Care must be taken for proper fitment of two vertical pieces of Pre-Fabricated Mould with the bottom piece so that the Centre of bottom piece matches with that of two vertical pieces as shown in figure 7.



Figure – 7

3.6 Process

Figure 8 to 11 are self explanatory to elaborate the process of A.T. Welding with the use of single shot crucible with auto tapping thimble and three piece mould.



Figure – 8



Figure – 9



Figure – 10



Figure – 11

4.0 उन्नत तकनीक का लाभ / ADVANTAGE OF IMPROVED TECHNIQUE

In case of Single Shot Crucible with Automatic Tapping Thimble, above mentioned disadvantage of traditional technique are taken care of automatically, as:

a) The Single Shot crucible results in cleaner steel and consistent weld quality.
b) The Single Shot Crucible is placed on the locking frame connected with the Mould shoe, possibility of crucible movement from its original position during tapping is eliminated. Thus molten metal will be poured at the specified location with more accuracy.
c) This crucible eliminates the need for carrying heavy welding equipment. It is lighter as compared with the traditional Crucible.
d) It decreases the total welding time considerably using lesser & lighter equipment and pre-heating with mechanised pressurisation.
e) It significantly reduces the manual errors associated with weld preparation using the automatic tapping thimble.
f) It enhances safety by eliminating the need for a welder near the crucible.

5.0 पारंपरिक और बेहतर तकनीक के बीच तुलना / COMPARISON BETWEEN TRADITIONAL AND IMPROVED TECHNIQUE

Parameters	Traditional Technique	Improved Technique
Type of Pre-fabricated Mould.	Two piece manufactured by manual pressing.	Three piece pre-fabricated mould manufactured by manual pressing and Zircon washed.
Crucible system	Multiple use crucible.	Single shot crucible.
Tapping of molten metal	Manual tapping.	Automatic tapping.
Pre-heating system	Air petrol mixture with manual pressurization .	Compressed Air-petrol (mechanised pressurization), Oxy- LPG.
Portion	As Approved by RDSO.	As Approved by RDSO.



Figure – 1

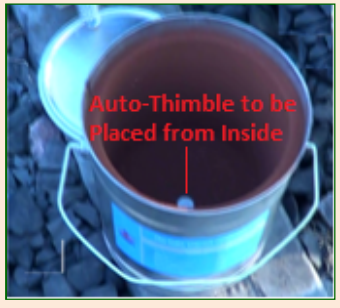


Figure – 2



Figure – 3



Figure – 4
(For traditional crucible)



Figure – 5

Figure 1 and 2 illustrate different view of Single Shot Crucible and figure 3 shows portion in Crucible. Figure 4 elaborate Auto-Tapping thimble and figure 5 shows location of Auto-Thimble in Single Shot Crucible.

हमारा उद्देश्य /OUR OBJECTIVE

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