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Answer 1

(a) Adding Zr to tungsten electrode increase the current capacity while improving arc stability and starting and increasing electrode life. Zirconium - tungsten increasing electrode like Zirconium - tungsten electrodes melt easier
Adding thorium increase the current carrying capacity & reduce the contamination of the weld

(b) Filler metal is supplied from filler wire. There are several factor in the selection of filler of metal
1. shielding gas
2. Base material to be welded
3. Design required
4. Root - weld heat treatment
5. regulatory specification & codes
6. welding equipments
7. welding position.

c GTAW is used by many industry for welding thin workpieces specially non ferrous metals. GTAW is used more frequently to make root pass weld

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it allows excellent control of root pass weld penetration. Root pass weld means pass in any weld process

(d) For constant value of current, thinner the diameter, deeper is the penetration and vice versa

$$\text{electrod diameter} \propto \frac{1}{\text{penetration depth}}$$

Since thinner electrode increase the current density, hence thin electrode penetrate more.

(e) Pilot arc method is based on the priciple of using low current for initiating the arc so to reduce adverse effects of high heat generation in form of electrod contamination and electron melting during the initiation. For this purpose, an additional power source can be used to strike the arc between tungsten & auxillary anode using low current is called pilot arc.

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(f) Electrode covering is done for the sheilding of molten metal, since electrode heating provide sheild gas such as CO_2 under heat, which can sheild molten metal from atmospheric Oxygen, nitrogen and hydrogen. It is necessary to ensure that no gas packets in welding and avoids contamination of weld joint

Answer 2

(a) In DC arc welding, approximately 70% of heat will be concentrated at the positive pole ⊕. In DCEN, the positive pole is on the workpiece, so, there is higher heat generation on the work which result in more welding penetration, which is the distance between the fusion ~~of~~, impacted by the type of current of polarity being used.

(b) In this process, the arc is formed between a continuous automatically fed, metallic consumable electrode and welding job in an atmosphere of INERT GAS. so it is done ~~Any~~ by mixture of argon, oxygen, and CO_2 not only CO_2.

(c) Initially there is low current and arc is thin. Increasing current increase ~~over~~ temperature of arc zone. As a result electrical conductivity increases which in turn decrease the voltage.

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(d) These options are better because it can rupture the oxide layer present on the plate surface. melting point of Al is small so high heat is not required near base plate.

(e) The touch method of initiating the arc is normally used for purpose in which the mobile arc is employed, whereas the touch method using carbon ~~tool~~ black as scrap metal is used for GTA W process. so less preffered

(g) choosing a smaller-diameter electrode allows you to lower ~~up~~ amperage to help control the heat & out of position welding the challanges of overheat. SMW can be minimize by using lower-amperage setting and manipulating the arc with a weave technique that helps make the weld bead wide and flatter