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MODULE B
Welding methods

Distribution of welding methods

Welding methods and their numerical designation

- Fusion welding (0)
- Resistance welding (2)
- Gas welding (3)
- Pressure welding (4)
- Other methods of welding (7)
- Soldering *(9)*

Fusion welding

- Electric arc welding (1)
- Arc welding consumable electrode (11)
- Manual arc welding (111)
- Gravity arc welding (112)
- Arc welding flux cored electrode without shielding gas (114)
- Vibration welding surfacing

Fusion welding

- Welding Submerged arc electric arc (12)
- Electric arc welding under welding flux wire electrode (121)
- Electric arc welding under welding flux strip electrode (122)
- Arc welding in controlled atmosphere (13)
- Arc welding consumable electrode in inert gas-MIG (131)
- Arc welding flux cored electrode in inert gas (132)

Fusion welding

- Arched welding metal powder in inert gas (133)
- Arc welding consumable electrode active gas-MAG (135)
- Cored arc active gas (136)
- Arc welding metal powder active gas (137)
- Arc welding with non-consumable electrode in a protective atmosphere of inert gas TIG (141)

Fusion welding

- Arched welding with non-consumable electrode TIG without filler wire (142)
- Arc welding with non-consumable electrode TIG cored wire or rod (143)
- Plasma welding (15)
- Plasma welding MIG welding (151)
- Magnetically controlled arc welding (185)

resistance welding

- Resistance spot welding (21)
- Seam resistance welding (22)
- Flaring seam welding (222)
- Projections (23)
- Deposition butt welding (24)
- Compressive butt welding (25)
- High frequency resistance welding (291)

Gas welding

- Oxy-acetylene welding (311)
- Oxy-propane welding (312)
- Oxy-hydrogen welding (313)
- Pressure welding (4)
- Ultrasonic welding (41)
- Friction welding (42)

Gas welding

- Forge welding (43)
- Explosion welding (441)
- Diffusion welding (45)
- Pressure welding flame heating (47)
- Cold pressure welding (48)

Other welding methods

- Aluminothermic welding (71)
- Electro slag Welding (72)
- Electro gas Welding (73)
- Induction welding (74)
- Welding of light (75)
- Laser welding (751)
- Electron beam welding (76)
- Stud (78)

Soldering

- Hard soldering (91)
- Soft solder (94)

Labeling methods for welding

- Some welding methods are abbreviated in general use. They are the following abbreviations:
- MAG - Metal active gas (Welding protection active gas consumable electrode -German), e.g. $C0_2$, mixed gases and the like.
- MIG - Metal inert gas (Protection welding inert gas GMAW - Germany), e.g., argon, mixed gases and the like.
- MOG - Metal ohne gas (Welding without shielding gas - German)
- TIG - Tungsten inert gas (Welding in an inert gas protecting non-consumable electrode - Germany)
- TIG - Tungsten inert gas (same as WIG - English)

Characteristics of selected methods of welding

- Welding flame
- Manual arc welding with covered electrode
- TIG welding (TIG)
- Welding method MIG / MAG
- Resistive welding
- Electric arc welding under flux
- Special methods of melt-processing

autogenous welding

- It is a method that is used for thin sheet to a thickness of 4 mm.
- Her Preferably, the low heat input.
- Technology Welding is right or left.
- At welding welder usually added to the melt region of filler material to form a weld bead.
- On workflow autogenous affected by the following factors:
  - Chemical the composition of the welding material,
  - Thickness material to be welded,
  - Heat affecting the base material,
  - Position welding.

Manual arc welding

- It is a method in which is used as the arc heat source.
- Electric arc burns between the electrode and a coated base material.
- Electric arc is an electric discharge that burns under normal temperature and pressure.
- This method can be welded in all positions.
- Welding current ranges from 10 A to 2000 A, the voltage on the arc is in the range of 10 V - 50 V.
- Temperature in the welding arc is about 5000 ° C.

TIG welding (TIG)

- This welding method consists in arcing between electrodes which do not melt and the materials to be welded.
- To arc protection is used an inert gas.
- Like shielding gas used is argon, helium or mixtures thereof.
- Additional material, which is used for the welding, is usually of the same composition as the base material.
- Welds both AC and DC current.

MIG / MAG

- In this process the welding electrode is wound on a spool as a wire.
- At welding electrode melts.
- Method MIG (131) uses an inert protective gas, MAG (135), an active gas.
- Both MIG and MAG can be easily mechanized and robotize. Their use in practice is very broad.

resistance welding

- This method lies in the pressure welding.
- At this method does not heat is supplied from outside, but is formed directly in the formed weld.
- Characteristic welding characteristics of this high welding speed, the possibility of welding positions can weld most metals used in both the short-run as well as in mass production.

Electric arc welding under flux

- This method was developed to increase the amount odtavovaného weld metal.
- Yippee highly productive, high-quality welds are due to the large penetration into the base material, a large current density.
- AT This method is widely heat-affected zone.
- Disadvantage It is consuming preparation of welded surfaces great demands on cleanliness.
- Can weld only in positions PA and PB.

Special methods of melt-processing

- With the development of industries goes hand in hand with the development of welding, use of new materials, welded with different thickness and materials difficult to weld materials.
- In fusion welding is increasingly emerging methods with a high concentration of heat to a small landing area.
- It mainly on welding by laser, plasma or electron beam.

Questions to ponder

1. Where is given a numerical designation welding methods?
2. As They are numerically labeled flame welding methods?
3. As numerically indicates welding methods arc?
4. As They are numerically identified electric resistance welding methods?
5. As numerically the methods of pressure welding?

Recommended literature and information sources

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