DAIKOFCW 321

FCAW

CAST IRON
NiFe-CI

DESCRIPTION

Ni-Fe flux cored wire for cast iron

This nickel alloyed tubular wire has 36 % Ni because at this Ni content an iron alloy has the lowest possible thermal expansion rate. Steel with this composition does not expand up to 200°C. This physical property makes the alloy suitable for the welding of cast iron parts and all applications where tension of shrinkage should be avoided. It is machinable. Used for joining and repairing nearly all types of cast iron. To limit internal stress of the base metal, hammering of the beads is recommended after each pass.

SPECIFICATIONS

DIN 17006	Ni 36	**Werkstoff Number**	1.3912
Shielding	M21	**Positions**	PA, PB, PC
Current	DC+	**Packaging Type**	BS300 spool

HARDNESS

140HB - 230HB

CHEM. COMP. %

C	0.1
Mn	2.5
Ni	35
S	0.02
Si	1
Fe	Bal

MECHANICAL PROPERTIES

	PRODUCT
Tensile strength R_m MPa	420
Yield strength $R_{p0.2}$ MPa	220
Elongation A (L_0=5d_0) %	12

WELDING PARAMETERS

	1.2 mm	1.6 mm
Ampere	80A - 180A	100A - 260A
Voltage	18V - 26V	23V - 27V
Packaging	Ø 1,2÷1,6mm	Ø 1,2÷1,6mm
Packaging Type	BS300 spool	BS300 spool

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DESCRIPTION

APPLICATION

The NiFe alloy is designed to weld various types of cast iron, with a particular focus on spheroidal graphite (SG), nodular or ductile cast irons, as well as some special cast iron alloys. This alloy provides an optimal combination of strength, ductility, and toughness, while ensuring good workability. NiFe consumables are versatile and can also be used on certain high-alloy austenitic cast irons (Ni-Resist). For flake graphite cast iron grades, preheating of 300-350 °C is recommended; however, for SG grades, a buttering procedure using low heat input and low temperature techniques is advised to avoid hot cracking in the heat affected zones (HAZ). It is important to note that Ni-Hard martensitic and white cast irons are generally unweldable due to their high susceptibility to cracking. NiFe consumables are also ideal for creating transition joints between cast iron and cast steels or between cast iron and mild/low-alloy steels. Common components include **machine bases, pump bodies, engine blocks, gears, and gearbox housings**.

ALLOY TYPE

Nominally Fe-40% Ni alloy for the repair and joining of cast iron.

MICROSTRUCTURE

The structure depends on the chemical composition and the speed of solidification and subsequent cooling down.

MATERIALS

The NiFe weld metals produce higher strength than the pure nickel cast iron types and are therefore preferable for dissimilar joints, higher strength cast irons and spheroidal graphite cast irons.

EN W.Nr.: 1563:2018 Spheroidal graphite cast irons, 1562:2019-06 Malleable cast irons

ASTM: A602, A47, A338, A220

WELDING & PWHT

In many cases, welding can be performed without preheating; however, for heavy multi-pass deposits or joints with high constraints, preheating between 150-250 °C may be necessary. Prior to welding, surfaces must be prepared by gouging and/or grinding, minimizing heat input to prevent crack propagation. It is essential that the area to be welded is as free from contaminants like sand, oil, grease, paint, or rust as possible. Preheating can be helpful in eliminating oil impregnated in castings to be repaired. If proceeding without preheat, it is preferable to limit the width of the HAZ using low heat input and low interpass temperature welding techniques. Using a fractional welding technique can be advantageous. For welding of thicker sections or with high constraints, preheating in the range of 150-250 °C might be necessary. Additionally, light peening to reduce contraction stresses can be beneficial, but it's crucial not to compromise the ductility of the weld metal. Buttering of the joining faces or sides of the repair cavity is also recommended before completion, regardless of the preheat applied. After welding, gradual cooling of the piece, with insulation if necessary, is highly recommended.

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