G-TECH 630

SMAW

FERRITIC - MARTENSITIC STAINLESS STEEL
630 (17-4-PH)

DESCRIPTION

Rutile-basic coated electrode for welding precipitation hardening stainless steels.

This electrode is used for hardfacing and for welding precipitation hardening stainless steels base metal of similar composition such as 17- 4 and 17-7. It can be used in the as weld condition as well as heat treated to improve mechanical properties. Typical applications include Hydraulic components, pump shaft and impellers. Excellent weldability with a spatter free arc, self-releasing slag producing a very smooth bead appearance.

SPECIFICATIONS

ISO 3581-B	E 630-16	AWS A5.4	E630-16
DIN	-	Werkstoff Number	1.4034
Certifications	-	Shielding	-
Positions	PA, PB, PC, PD, PE, PF	Current	DC+, AC

ASME QUALIFICATIONS

F-No (QW432)	4
A-No (QW442)	-

FERRITE

-

PREN

17.16

HARDNESS

-

CHEM. COMP. %	DEFAULT
C	0.02
Mn	0.6
Ni	4
Cr	16.5
P	0.01
S	0.01
Mo	0.2
Si	0.3
Cu	2.3

MECHANICAL PROPERTIES	MIN	VARIANT
Tensile strength R_m MPa	930	950
Yield strength $R_{p0.2}$ MPa	0	600
Elongation A (L_0=5d_0) %	6	7
Impact Charpy ISO-V	-	-
Impact Charpy ISO-V	-	-

WELDING PARAMETERS	2.5 mm	3.2 mm	4 mm
Ampere	50A - 80A	80A - 110A	110A - 150A
Voltage	-	-	-
Packaging	53 pcs/kg	27 pcs/kg	19 pcs/kg
Packaging Type	Carton box	Carton box	Carton box

DAIKO

630 (17-4-PH)

DESCRIPTION

APPLICATION

Employed for the welding of exceptionally high-strength martensitic stainless steels, these alloys undergo precipitation hardening facilitated by copper additions. The resultant strength outpaces that of standard 300 series austenitic stainless steels by up to threefold. Notably, the FV520/450 alloys showcase corrosion resistance on par with 304 stainless steel. Conversely, the 630/17-4PH variants, distinguished by their lack of molybdenum and heightened carbon content, fall short in providing equivalent resistance to intergranular and pitting corrosion compared to their FV520/450 counterparts. This welding methodology proves indispensable in the manufacturing of crucial components like pump shafts, impellers, and hydraulic equipment. Its diverse applications span critical sectors, including the oil and gas industry, petrochemical realm, marine environments, and nuclear engineering.

ALLOY TYPE

High strength martensitic precipitation hardening stainless steels.

MICROSTRUCTURE

In the PWHT condition the microstructure consists of precipitation hardened tempered martensite with some retained austenite.

MATERIALS

EN W.Nr.: 1.4542 (X5CrNiCuNb 16-4), 1.4548 (X5CrNiCuNb17-4-4), 1.4549 (GX5CrNiCuNb1).
ASTM: A564, A693, A705, gr. XM-25, A564, gr. 630, A747, CB7Cu-1 (cast).
UNS: S45000, S17400.
PROPRIETARY: FV520B (Firth Vickers), Custom 450, 630 (Carpenter), 17-4PH (AK Steel Steel).

WELDING & PWHT

Preheating is generally unnecessary for materials up to 15mm in thickness. However, in the case of thicker and more restrained sections, it is advisable to employ a preheating and interpass temperature range of 100-200°C. Temperatures surpassing 200°C may hinder martensite transformation, leading to microstructural coarsening. When utilizing matching composition consumables for welding, it becomes imperative to undergo a Post Weld Heat Treatment (PWHT). The standard procedure involves utilizing materials in the over-aged condition. The PWHT for over-ageing follows a specific sequence: 750°C for 2 hours, air-cooled to 15°C, followed by 550°C for 2 hours and air cooling. During the cooling process, the weld metal undergoes transformation from austenite to martensite (Ms) below approximately 250°C. However, a significant fraction of austenite persists at ambient temperature. Since achieving sub-zero cooling is impractical, this retained austenite is destabilized through annealing at 750-850°C. Carbide precipitation in the austenite raises its Ms temperature, ensuring complete transformation upon cooling. This approach promotes more effective tempering and ageing during the second cycle of PWHT. It's crucial to note that omitting the initial PWHT cycle may result in properties with greater batch variability, highlighting the importance of adhering to the complete heat treatment regimen.