



ACTING GLOBAL
WELDING LOCAL

WA Applications

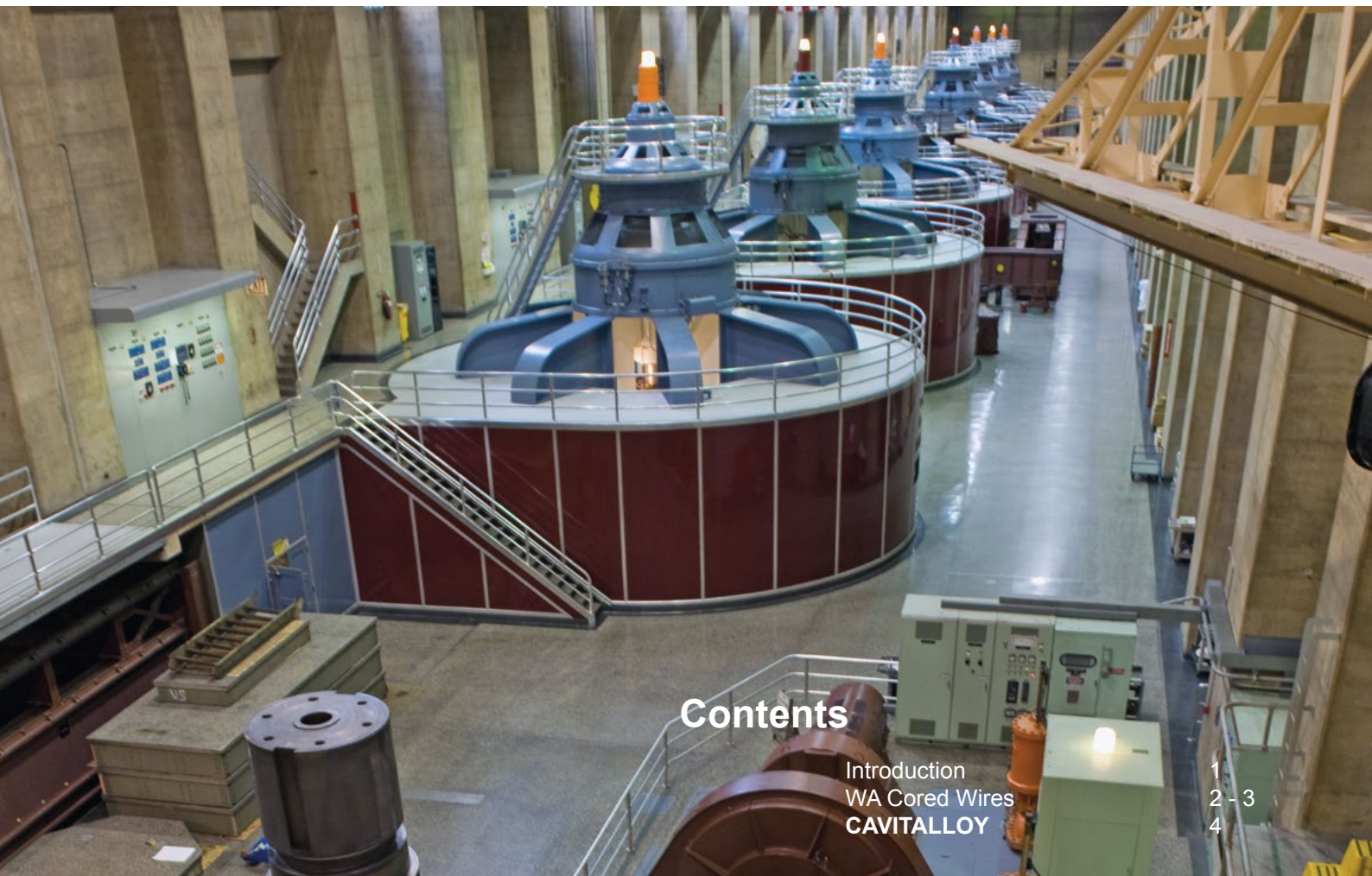
for Hydropower

Success through innovation

This catalogue presents a range of high performance cored wires and electrodes dedicated to hydropower applications. We will gladly examine any special request, please do not hesitate to contact us.

Welding Alloys Group offer the world's largest range of flux and metal cored welding wires for low, medium, high alloy hardfacing and cladding applications, mild steel fabrication, also stainless steel, nickel and cobalt based wires using its own manufacturing technology. The company also offers aluminium welding wires and covered electrodes. Advanced quality control systems ensure consumables meet or exceed industry standards while complying with relevant international approvals.

WA Group's unique expertise comes from years of commitment to research and the development of innovative, highly specialised products and solutions designed to combat wear in a wide range of industrial applications. In addition, the Group offers a wide range of services from its WA Integra™ division. Using WA manufactured products, WA Integra™ engineers are able to provide welding and technical support to industries requiring wear control and performance optimisation, on-site or from one of our strategically located WA Integra™ Service Centres.



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WA Cored Wires

Martensitic stainless steels require special care during welding due to the risk of cold cracking.

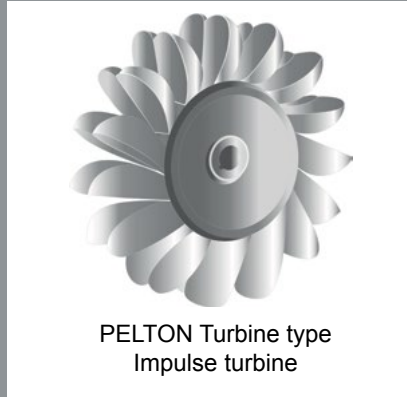
Martensitic : Soft martensitic

Base material composition

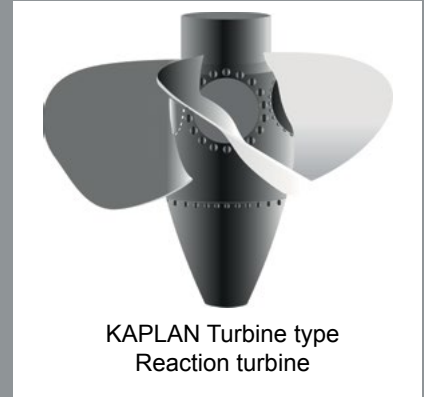
%C	%Si	%Mn	%P	%S	%Cr	%Ni	%Mo
0.05	0.7	1.5	0.04	0.015	12.0 14.0	3.5 4.5	0.3 0.7



FRANCIS Turbine type
Reaction turbine



PELTON Turbine type
Impulse turbine



KAPLAN Turbine type
Reaction turbine

The benefits of Welding Alloys cored wire

Quality

- Very clean fusion and very good bead appearance.
- Virtually no spatter.
- Deposit soundness comparable to that of electrodes.
- Excellent mechanical and metallurgical properties.

Performance

- High deposition rates (kg/h), around three times greater than those of coated electrodes.
- Optimised arc time.
- High welding speed.
- The penetration characteristics lead to increase productivity.



CAVITALLOY Welding position
PE/4G



CAVITALLOY Welding position
PF/3F up



CHROMECORE 12 4 V-G
Welding position PF/3F up



CHROMECORE 13 4-G
Welding position PF/3F up



CHROMECORE M 410 NiMo-G
Welding position PB/2F

		Welding positions	EN ISO	ASME / AWS	H _{DM} [ml/100g]	CVN [J] After PWHT	PWHT	
Joining & Repairing	Metal cored (No slag)	CHROMECORE M 13 4 -G	All positions *	T 13 4 M M12 1	EC410NiMo (nearest)	2	+20°C : 55 -20°C : 45	580°C → 8h
		CHROMECORE M 410NiMo -G	All positions *	T 13 4 M M12 1	EC410NiMo (nearest)	1	+20°C : 70 -20°C : 55	580°C → 8h
	Rutile (fast freezing)	CHROMECORE 12 4V -G	All positions (rutile slag)	T 13 4 P M21 1	E410NiMoT1-4	4	+20°C : 40 -20°C : 39	580°C → 8h
	Basic	CHROMECORE B 13 4 -G		T 13 4 B M12 3	E410NiMoT0-4	3	+20°C : 100 -20°C : 85	580°C → 8h
		CHROMECORE B 16 5 1 -G		T Z 16 5 1 B M12 3	-	2	+20°C : 100 -20°C : 80	610°C → 8h
Hardfacing	Metal cored (No slag)	CAVITALLOY	All positions *	T Z 18 10 10 CrCoMnN M M12 3	-	-	Hardness As Welded: 25 HRC Work hardened: 50 HRC	-
Heterogeneous joining and repairing	Rutile (fast freezing)	TETRA V 309L-G	All positions (rutile slag)	T 23 12 L P M21 1 T 23 12 L P C1 1	E309LT1-4 E309LT1-1	-	-60°C: 35 (Without PWHT)	-

* Positions welding are possible using the short-circuiting or pulsed arc modes of transfer (similar to solid wire)

Welding of soft martensitic stainless steel (13%Cr ; 4%Ni)

The welding of 13-4 stainless steels requires a high-quality wire with low hydrogen content to minimise risk of cold cracking.

To produce a reliable welded turbine, preheat, interpass temperature and PWHT are usually required

→ Preheat temperature : 80 - 200°C (depending of the joint configuration)

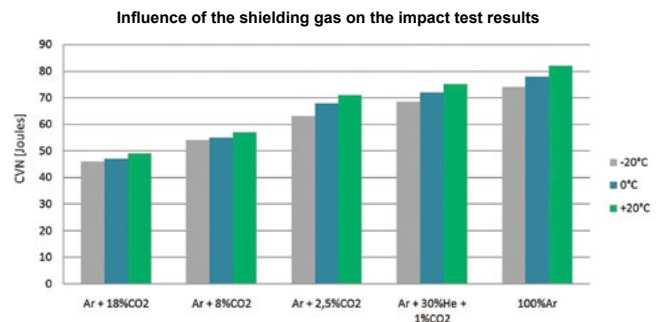
→ PWHT : 580 - 620°C



A unique cored wire: CHROMECORE M 410NiMo-G

Benefits of CHROMECORE M 410NiMo-G

- Soft martensitic stainless steel, nickel stabilizes the martensitic structure and provides toughness 13%Cr-4%Ni (low carbon).
- Excellent resistance to cavitation.
- Less risk of cracks, better bead appearance and shape.
- Reduced sensitivity to cold cracking (HDM < 3ml/100g → typical value = 1ml/100g).
- Slag free deposit , thus less risk of inclusion.
- Excellent arc stability, lower spatter and wide range of application parameters.



The real value of Welding Alloys Cored Wires: ISO 9001 certified quality system

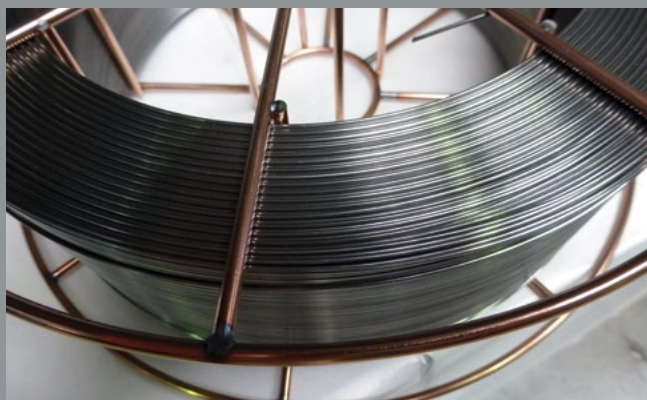


Newly developed cored wire: CAVITALLOY

CAVITALLOY is used for rebuilding hydro turbines when increased corrosion resistance and fatigue properties are required compared to martensitic stainless steels or austenitic stainless steels of the 300 series.

CAVITALLOY deposit is a nitrogen strengthened austenitic stainless steel with superior cavitation resistance, comparable to that of Co-base alloys.

Welding Alloys your partner for cavitation protection

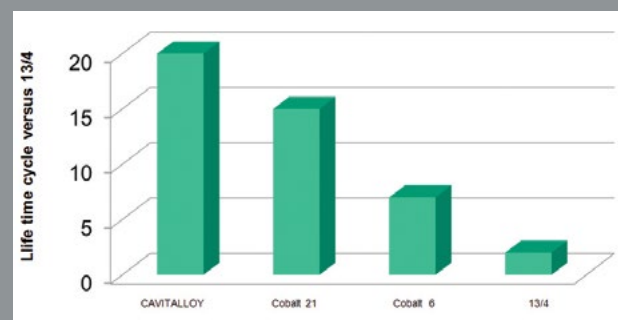


Welding Procedure

- Elimination of the defect (grinding) and preparation of the surface
- Preheat to 150 °C
- Buffer layer TETRA V 309L-G
- Two layers CAVITALLOY
- Post weld heat treatment not necessary



Service life accordingly. ASTM G32-92



With our WA Integra™ welding team we can repair your turbine in situ – just ask us for a quotation.



CAVITALLOY – all position welding developed with our partner EWM HIGHTEC WELDING GmbH

- Excellent welding properties for all positions in combination with a user friendly semi mechanised system.
- Stable and efficient arc characteristics.
- Reproducible quality due to constant speed.
- Adapted synergic curves and programs for in situ applications.



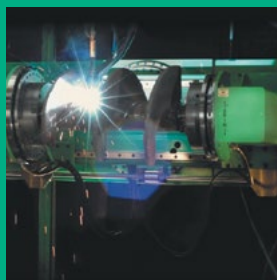
All position welding.

A perfectly controlled technology



WA Cored Wire™

Design and manufacture all types of cored welding wires



WA MultiSurfacer™

Design and manufacture of automated welding equipment for hardfacing and rebuilding applications



WA Integra™ Services

Innovative hardfacing and rebuilding solutions by welding

A worldwide presence

United Kingdom (Head Office)

Welding Alloys Ltd

Argentina

Welding Alloys Argentina S.A.

Australia (Trading Partner)

Specialised Welding Products Pty Ltd

Brazil

Welding Alloys Brazil Ltda

China

Welding Alloys China Ltd

Finland

Welding Alloys Finland Oy

France

Welding Alloys France SAS

Germany

Welding Alloys Deutschland GmbH

Greece

Welding Alloys Hellas EPE

India

Welding Alloys South Asia Pvt Ltd

Italy

Welding Alloys Italiana s.r.l.

Japan

Welding Alloys Japan

Malaysia

Welding Alloys (Far East) Sdn. Bhd.

Mexico

Welding Alloys Panamericana S.A. de C.V.

Morocco

Welding Alloys Maroc Sàrl

Poland

Welding Alloys Polska Sp. z o.o.

Russia

ZAO Welding Alloys

South Africa

WASA (PTY) Ltd

South Korea

Welding Alloys Korea Ltd

Spain

Welding Alloys España

Sweden

Welding Alloys Sweden

Taiwan

Welding Alloys Taiwan Co.

Thailand

Welding Alloys (Thailand) Co. Ltd

Turkey

Welding Alloys Limited Şirketi

USA

Welding Alloys (USA) Inc.

Vietnam

Welding Alloys Vietnam Co. Ltd

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