certilas®

THE NEWLY DEVELOPED CEWELD® AA R500 PIPE FOR MAG ORBITAL WELDING

THE FILLER METAL SPECIALIST

Specially developed for MAG orbital welding with high heat input.

CEWELD® AA R500 PIPE

Standard classification depending on the heat input:

EN -ISO 17632-A: T 50 4 Mn1Ni P M21 1 H5 (for > 1,5 kJ/mm)
EN -ISO 18276-A: T 55 4 Mn1Ni P M21 1 H5 (for < 1,5 kJ/mm)

ASME -AWS A 5.36: E81T1-M21A4-Ni1-H4 (for > 1,5 kJ/mm)
ASME -AWS A 5.36: E91T1-M21A4-Ni1-H4 (for < 1,5 kJ/mm)

Application:

CEWELD® AA R500 PIPE is a seamless rutile cored wire with very good modeling properties, therefore excellent constraint welding with higher amperages is possible. Suitable for use down to -40°C depending on requirements down to -60°C. Especially well suited for orbital welding and basically welding on weld pool backing in all positions, even with high heat input.
CEWELD® AA R500 PIPE is suitable for the following applications:
Pipeline and tank construction, steel construction and shipbuilding as well as in offshore or onshore applications.

Features / Advantages :

- Extremely low diffusible hydrogen contents HD < 3 ml/100g are measured on average.
- HD < 4ml/100g is guaranteed according to AWS.
- No re-drying necessary resp. is not allowed because of the copper plating.
- Reduces costs compared to stick electrodes and many folded flux cored wires.
- Ni < 1 % (suitable for sour gas projects).
- NACE requirements are met.
- Easy slag removal. (Partially self-dissolving).
- Very good notch impact values even in forced positions down to - 40°C, conditionally also down to -60°C possible.
- Orbital welding with bath backing or a root seam with high performance possible.
- High productivity due to alloying optimally adapted to orbital welding.
- Crack-proof even in constrained positions. Reduces reworking and thus costs.

All these points make the CEWELD® AA R500 PIPE a very economical solution for welding in constrained positions with high heat input, especially in MAG orbital welding by machine.

Suitable products for weld pool backing or root welding from our program

Ceramic underlays for weld pool backing:

Contact us or visit our homepage, we have the right ceramic for almost all applications.

Filler metals for root welding:

- **Stick electrodes**

CEWELD® E 6010	Cellulose electrode	2560-A: E 38 3 C 21 / A 5.1: E6010
CEWELD® E 7010	Cellulose electrode	2560-A: E 42 3 C 25 / A 5.1: E7010-P1
CEWELD® E 6013 Root	**Medium** thick coated rutile basic electrode	2560-A: E 38 2 RB 12 / A 5.1: E6013

- **Metal Powder Cored Wires**

CEWELD® AA M400	without Ni	17632-A: T 42 4 M M21 1 H5	/ A 5.18: E70C-6M H4
CEWELD® AA M460	without Ni	17632-A: T 46 6 M M21 1 H5	/ A 5.18: E70C-6M H4
CEWELD® AA M500	< 1,0 % Ni	17632-A: T 50 6 Ni1 M M21 1 H5	/ A 5.28: E80C-Ni1 M H4
CEWELD® AA M550	~ 1,5 % Ni	18276-A: T 55 6 Mn2,5Ni M M21 1 H5	/ A 5.28: E80C-Ni2 M H4

- **Solid wire**

CEWELD® SG Ni1	14341-A: G 50 6 M21 3Ni1	/ A 5.28: ER80S-Ni1
CEWELD® SG Ni2,5	14341-A: G 46 7 M21 2Ni2	/ A 5.28: ER80S-Ni2
CEWELD® SG NiMo1	16834-A: G 505 M21 Z3Ni1	/ A 5.28: ER80S-Ni1

- **TIG solid wire rods**

CEWELD® SG Ni1 Tig	636-A: W 46 6 3Ni1	/ A 5.28: ER80S-N
CEWELD® SG Ni2,5 Tig	636-A: W 42 9 2Ni2	/ A 5.28: ER80S-Ni2
CEWELD® SG NiMo1 Tig	16834-A: W 50 5 I1 Z3Ni1	/ A 5.28: ER80S-Ni1

The new flux cored wire generation for pipeline welding

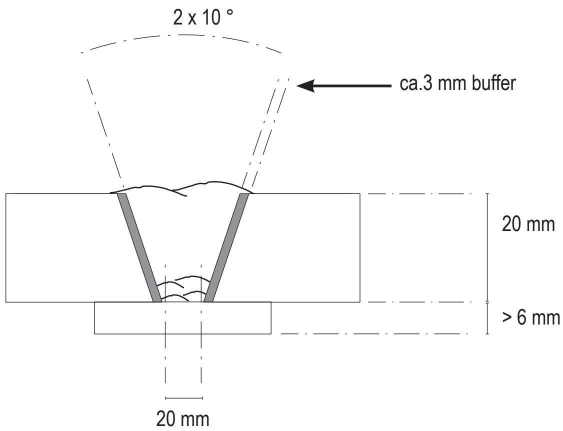
The latest production technology in combination with a special selection of raw materials ensures excellent mechanical properties.

Quality values of the weld metal according to ISO for the **CEWELD® AA R500 PIPE**

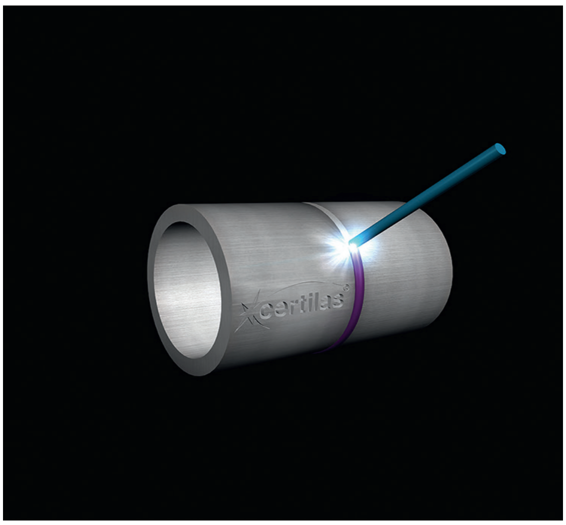
	R_m	$R_{p0,2}$	A5	Charpy V [J]		
Mechanical	[MPa]	[MPa]	[%]	- 20°	- 40°	- 60°
	680	590	23	100	90	70
Chemical [%]	C	Si	Mn	P / S	Ni	Mo
	0,06	0,5	1,6	0,01 / 0,003	0,9	0,01
Hydrogen [H_2]	Guaranteed HD < 4 ml/100g according to AWS A 4. 3 Typical values are between 1.5 - 3 ml/100g					

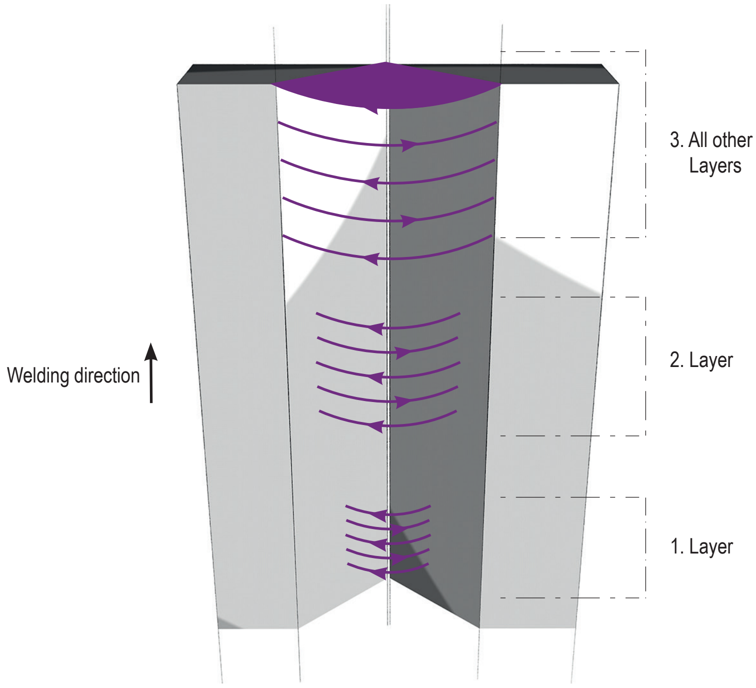
Seam preparation of the standard weld metal according to ISO

Welded with high heat input . With approx. 12 welding beads



Typical layer structure for orbital welding

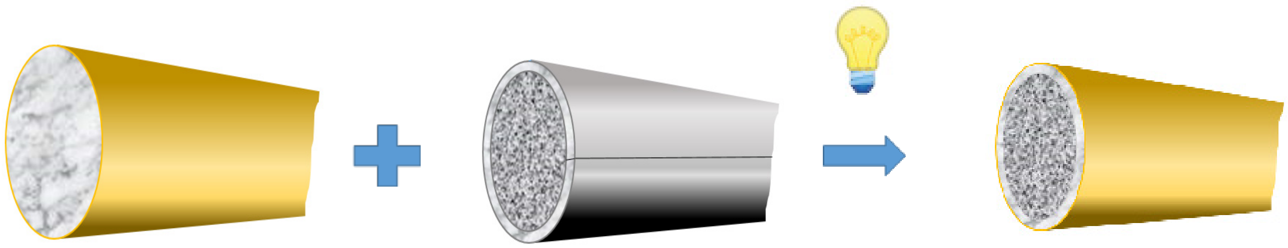




Welding direction from 6 to 12 o'clock position on both sides of the pipe.

It is usually welded in a pendulum mode over the entire width of the seam.

General advantages of our full closed cored wires, the so called seamless cored wire.



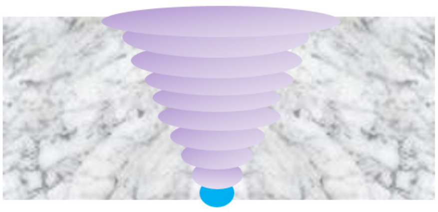
Solid wire　　seamed core wire　　seamless core wire

- **Hydrogen contents HD < 4 ml/100g weld metal according to AWS A4.3 are maintained.
  On average, HD < 3 ml/100g weld metal is measured for the entire processing and storage time.**
- **No special storage conditions required, analogous to those for solid wire. (Dew point must be observed)**
- **No re-drying required or is prohibited for copper plated types. Reduces costs.**
- **Very easy handling for the welder. Reduces the risk of defects. (e.g. bonding defects)**
- **Excellent welding properties in constrained positions due to supporting effect of slag, for rutile types.**
- **Good conveying properties therefore very suitable especially for machine welding.**
- **Reduced nozzle wear compared to cored flux cored wire.**
- **Many types available for high heat input welding.**
- **Very crack-resistant weld metal, even in constrained positions.**
- **Stable arc.**
- **Low smoke generation**
- **Very low spatter formation and thus lower weld metal losses.**
- **Reduced rework costs**

The CEWELD® AA R500 PIPE was evaluated by means of practical tests. It was tested with different heat applications and layer buildups.

For all tests, the seam preparation with 30°C flank angle was selected. The air gap was set 3-4 mm. The root was prepared with a metal powder filler wire in the short arc in the PF position.
All filler layers were also welded in the PF position with a shielding gas of group M21.
The layer structure and thus also the heat input during welding were varied.

Widely oscillated
With high heat input



Quality values		
R_m	610	MPa
$R_{P0,2}$	540	MPa
A5	27	%
AV	80	J(-40°C)

Slightly oscillated
Reduced heat input

Quality values		
R_m	680	MPa
$R_{P0,2}$	590	MPa
A5	25	%
AV	90	J(-40°C)

Not oscillated
Lowest heat input

Quality values		
R_m	720	MPa
$R_{P0,2}$	610	MPa
A5	23	%
AV	100	J(-40°C)

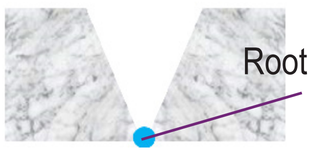
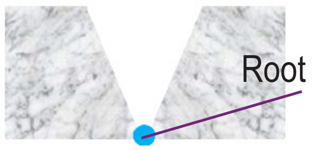
These results show very clearly that the quality values can be strongly influenced by the welding parameters and thus the heat input and the layer structure.
Of course, this can also be used for oneself if the boundary conditions are varied or adapted to

In summary, the following influences should be noted:

- Heat input (Q = [k* U *I *60] / [v*1000] kJ/ mm).
- Carbon equivalent Cev. for some base materials
- Preheating temperature (°C)
- Interpass / working temperature (°C)
- Cooling time (s)
- Layer structure (beads per layer) (ideally always from the flanks to the center)

These points can be summarized under the heading T 8/5 Time Concept.
You can find more information on our homepage or contact us directly.

Typical welding parameters for MAG orbital welding under mixed gas of group M21:

Seam structure	Current [A]	Voltage [V]
15 mm 50° - 60° 	4 Layer 160 - 180 220 - 240	22 - 24
20 mm 50° - 60° 	5 Layer 160 - 180 220 - 240	22 - 24
25 mm 50° - 60° 	6 Layer 160 - 180 220 - 240	22 - 24
30 mm 50° - 60° 	9 Layer 160 - 180 220 - 240	22 - 24

Notes:

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