

# ANCOR

Advanced Environment-friendly Steel  
with Sulfuric Acid Corrosion Resistance

posco



**ANCOR** refers to a type of steel that is manufactured as both hot-rolled and cold-rolled steel with excellent corrosion resistance against both sulfuric acid corrosion and composite acid (sulfuric acid/ HCl). It possesses sulfuric acid corrosion resistance about 15 times higher than ordinary carbon steel, and approximately three times higher than STS against low temperature dew point corrosion caused by low temperature exhaust gas emissions.

## Contents

What is ANCOR?	02
History of ANCOR development & application	04
Corrosion resistance of ANCOR	05
Relative comparison of materials	10
On-site evaluation of ANCOR	12
Welding characteristics of ANCOR(S)	14
ANCOR dedicated welding rod • KISWEL	15
ANCOR dedicated welding rod • SeAH ESAB	16
ANCOR dedicated welding rod • Chosun Welding	17
Application of ANCOR(S)	18
Available size	19

# ANCOR

Advanced environment-friendly steel with  
sulfuric acid corrosion resistance

# What is ANCOR?

## What is ANCOR?

Advanced environment-friendly steel with sulfuric acid corrosion resistance

ANCOR is a type of hot rolled or cold rolled steel with high durability against corrosion of sulfuric acid and composite acid (sulfuric acid/ hydrochloric acid). It boasts of corrosion resistance in sulfuric acid about 15 times higher than ordinary carbon steel and approximately three times higher than STS against low-temperature dew point corrosion caused by low-temperature exhaust gas emissions generated by the power plant equipment.

- Its corrosion resistance in sulfuric acid is enhanced by alloying it with a small amount of elements such as Cu, Co, and Sb that possess corrosion resistance in an acidic environment.
- Depending on the capability to overcome the severity of the applicable corrosion environment, the products manufactured are classified into two types, ANCOR (ordinary grade sulfuric acid corrosion resistant steel) and ANCOR-S (high grade sulfuric acid corrosion resistant steel).
- ANCOR can be produced as both hot rolled and cold rolled steel that are widely applicable to either thin steel sheets for component materials or thick steel plates for structural materials.

## Specifications of ANCOR

### ■ Mechanical properties

Product		Specification	Thickness (mm)	Yield strength (MPa)	Tensile strength (MPa)	Elongation (%)	Specimens number (JIS)
Ordinary Grade	Hot rolled	ANCOR	2.3~16	245 ~	400 ~	21 ~	No.5
	Cold rolled		0.4~2.3	245 ~	340 ~	22 ~	No.5
High grade	Hot rolled	ANCOR-S	2.3~16	245 ~	400 ~	21 ~	No.5
	Cold rolled		0.4~2.3	245 ~	340 ~	22 ~	No.5

### ■ Chemical composition

(Unit : wt%)

Steel type	C	Si	Mn	P	S	Cu	Ni	Co	Sb
ANCOR	0.1 Max	0.5 Max	1.7 Max	0.1 Max	0.1 Max	0.2~0.5	0.5 Max	0.15 Max	-
ANCOR-S	0.1 Max	0.5 Max	1.7 Max	0.1 Max	0.1 Max	0.2~0.5	0.5 Max	0.15 Max	0.2 Max

### ■ Corrosion resistance test results (for reference only)

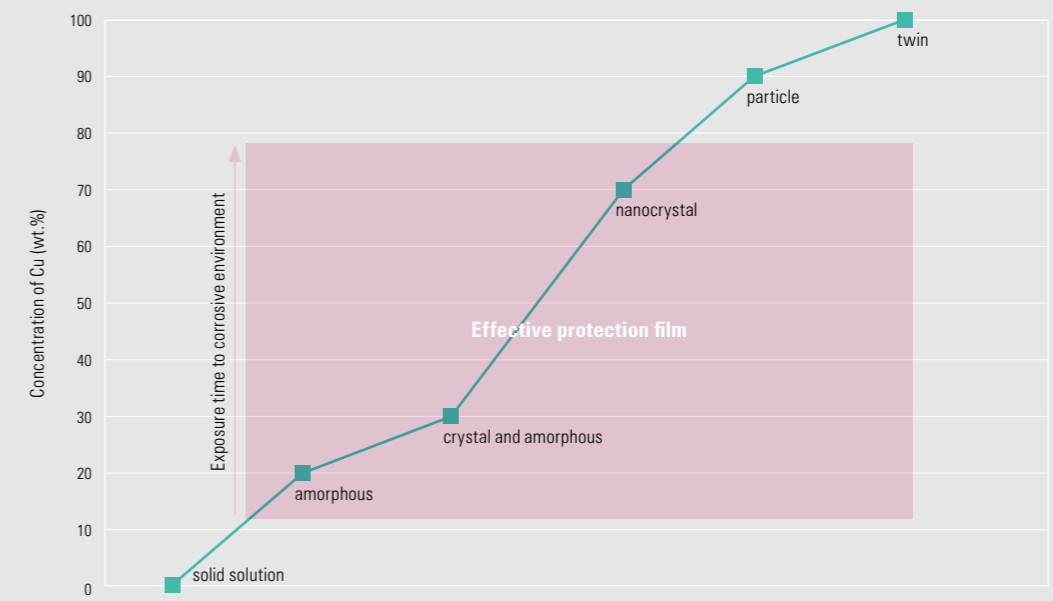
Product		Corrosion resistance in sulfuric acid <sup>1)</sup> (mg/cm <sup>2</sup> /h)	Corrosion resistance in composite acid <sup>2)</sup> (mg/cm <sup>2</sup> /h)
Ordinary Grade	Hot rolled	67.0	6.06
	Cold rolled	61.5	5.91
High grade	Hot rolled	18.9	2.01
	Cold rolled	21.9	2.03

<sup>1)</sup> Immersion conditions for corrosion resistance in sulfuric acid : 50 vol.% H<sub>2</sub>SO<sub>4</sub>, 70°C, 1hr

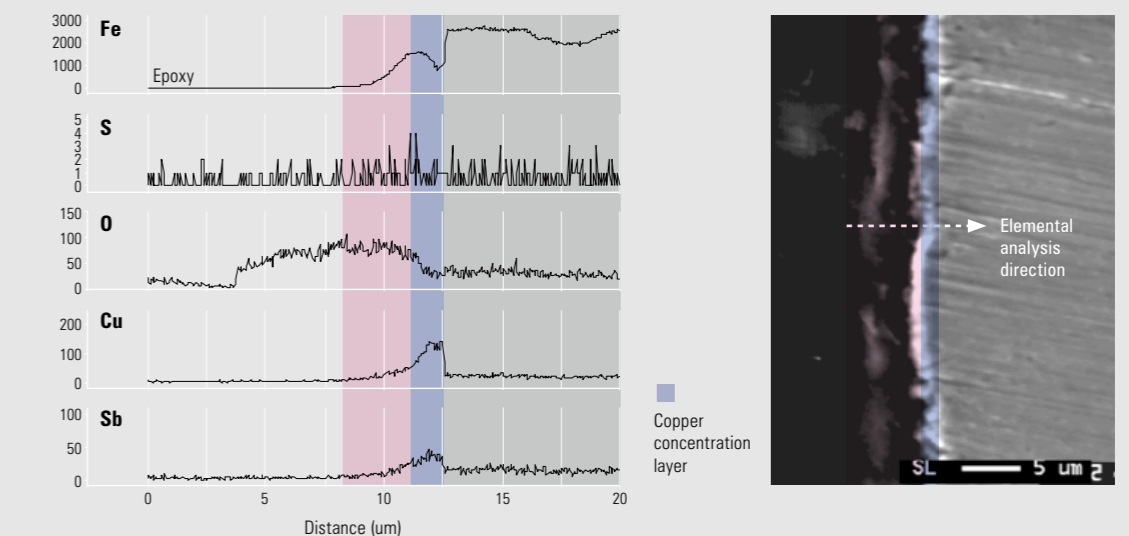
<sup>2)</sup> Immersion conditions for corrosion resistance in composite acid : 16.9 vol.% H<sub>2</sub>SO<sub>4</sub> + 0.35 vol.% HCl, 60°C, 6hr

## Corrosion resistance mechanism of ANCOR in acidic environment

- When ANCOR is exposed to an acidic corrosive environment, a Cu concentrated layer with corrosion resistance to acids is formed on the surface of the steel.
- The Cu concentrated layer is formed densely on the steel material surface in either an amorphous or microcrystalline (nanocrystal) state that it inhibits the corrosion reaction of the substrate steel.
- Other alloying elements of ANCOR such as Sb and Co play the role of contributing to the formation and stabilization of the Cu concentrated layer and further promote additional corrosion resistance by forming a protective oxide layer (Sb<sub>2</sub>O<sub>3</sub>).



Phase changes of Cu concentrated layer on the ANCOR surface



Compositional analysis of ANCOR

Cross section analysis of ANCOR-S(SEM)

# History of ANCOR development & application

## History of ANCOR development

- ~ 1998. 12 Received request for development of sulfuric acid corrosion resistant steel (from Doosan Heavy Industries)
- 1999. 01 ~ 2000. 12 Research and product development completed
- 2001. 12 Obtained materials standard approvals from Korea Electric Power Corporation(KEPCO): Heat element and basket, etc.
- 2002. 07 Started mass production (first shipment 920 tons applied to Air Pre-Heater of Generator Unit No. 1 and No. 2 at Y thermoelectric power plant)
- 2002. 01 ~ 2005. 12 Achieved mass production of ANCOR with average yearly production of 900 tons
- 2005. 02 Obtained quality certification from Korea Power Engineering Co., Ltd. (KOPEC)
- 2005. 09 Selected as the company's key strategic product for high-performance steel
- 2006. 07 Awarded New Excellent Product (NEP) Certification by the Korean Agency for Technology and Standards of the Ministry of Trade, Industry and Energy
- 2006. 07 Completed development of dedicated welding rods for ANCOR
- 2008. 12 Participated national R&D project "Development of manufacturing and application technology for corrosion resistant steel against sulfuric acid / hydrochloric acids, applicable for desulfurization equipment"
- 2011. 12 Started mass production of ANCOR-S
- 2014. 12 Received 18th Award of the Month for Industrial Technology by the Minister of Trade, Industry and Energy (ANCOR-S development, new technology of October)

## Application status of ANCOR for power plant materials

### Application Cases

- Y Thermoelectric Power Plant Unit Nos. 1 and 2 : Heating element parts of preheaters (Korea)
- T Thermoelectric Power Plant Unit Nos. 7 and 8 : Materials for replacement of exhaust duct, GGH element (Korea)
- Y Thermoelectric Power Plant Unit Nos. 3 and 4 : For preheaters, dust collectors, boiler ducts, and GGH cooler ANCOR-S (Korea)
- H Thermoelectric Power Plant Unit No. 7 : GGH (Korea)
- B Thermoelectric Power Plant Unit No. 7 : Preheater (Korea)
- S Thermoelectric Power Plant Unit Nos. 5 and 6 : Air preheater ANCOR-S, 2014 (Korea)
- Overseas Power Plants: EGAT (Thailand), Harbin Boiler (China), NURANI SETIA PERKASA PT (Indonesia)

### Product Certifications

- Quality certification from Korea Power Engineering Co., Ltd. (KOPEC)
- New Excellent Product (NEP) certification in 2006

### Others

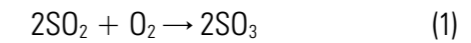
- Completed development of welding materials for ANCOR (FCAW/ SMAW) (2006)
- Completed development of welding materials for ANCOR-S (FCAW/ SMAW) (2013)



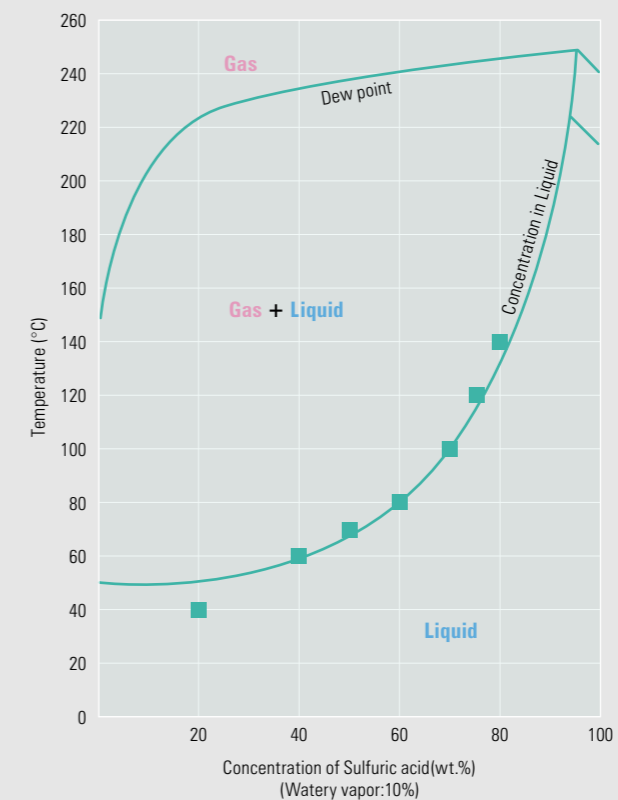
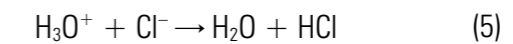
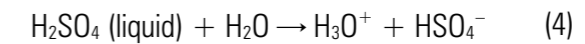
# Corrosion resistance of ANCOR

## Corrosive environment of power plants

After the sulfur dioxide (SO<sub>2</sub>) in the flue gas of the combustion system of a power plant undergoes a partial oxidation process to form sulfur trioxide (SO<sub>3</sub>), it generates sulfuric acid (H<sub>2</sub>SO<sub>4</sub>) steam in conjunction with water (H<sub>2</sub>O). (Reactions 1 and 2) The sulfuric acid condenses on the metal surface when the temperature is lowered below the dew point (Reaction 3), and then a severe corrosion environment with a high concentration of up to 80% sulfuric acid is created.



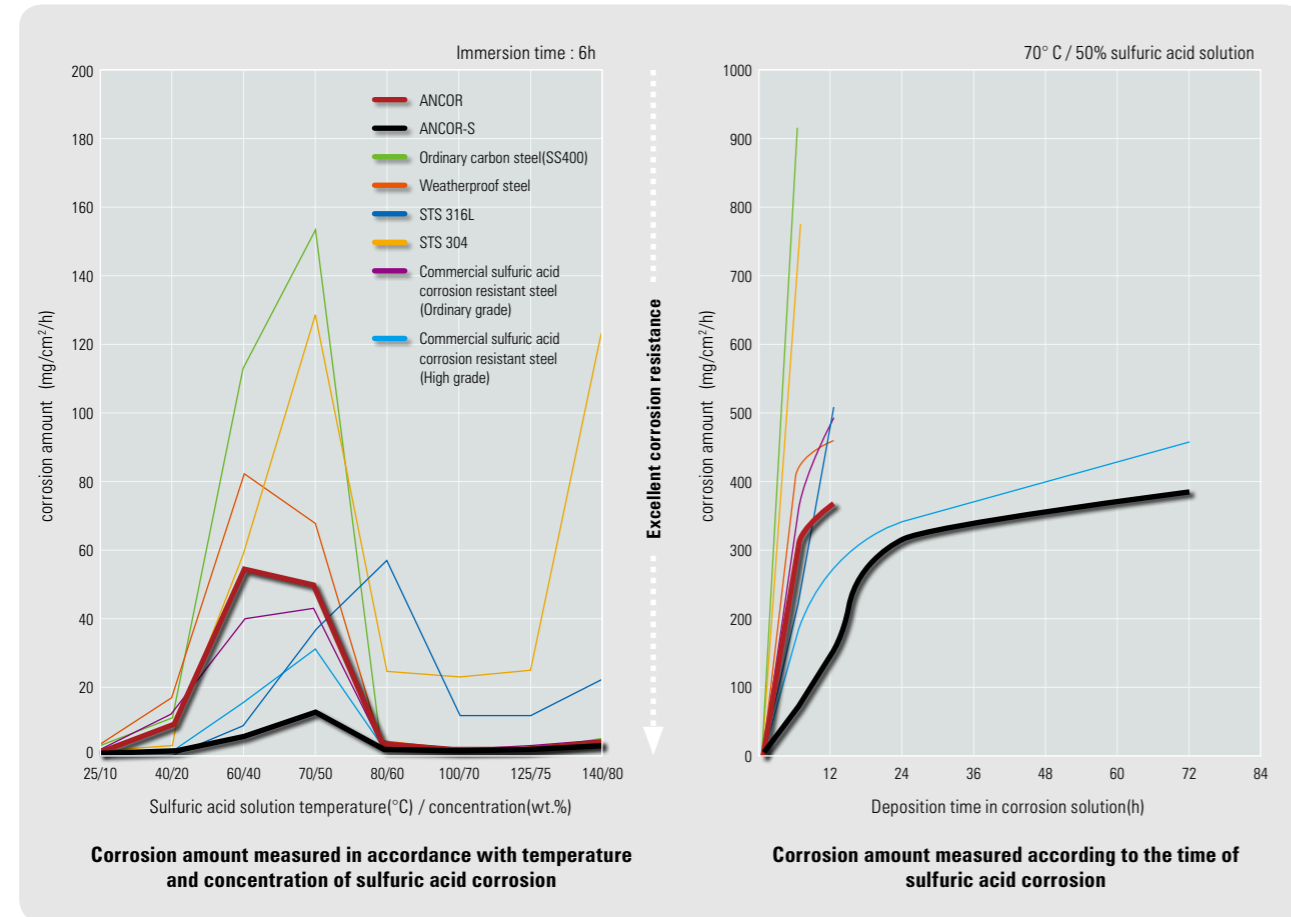
Some hydrogen chloride contained in the flue gas is absorbed in the sulfuric acid condensate already formed in the temperature range of 50 ~ 80 ° C, so that a mixed acid corrosive environment of sulfuric acid and hydrochloric acid (HCl) is created on the metal surface. (Reactions 4, 5)



Relationship between surface temperature and concentration of sulfuric acid condensation

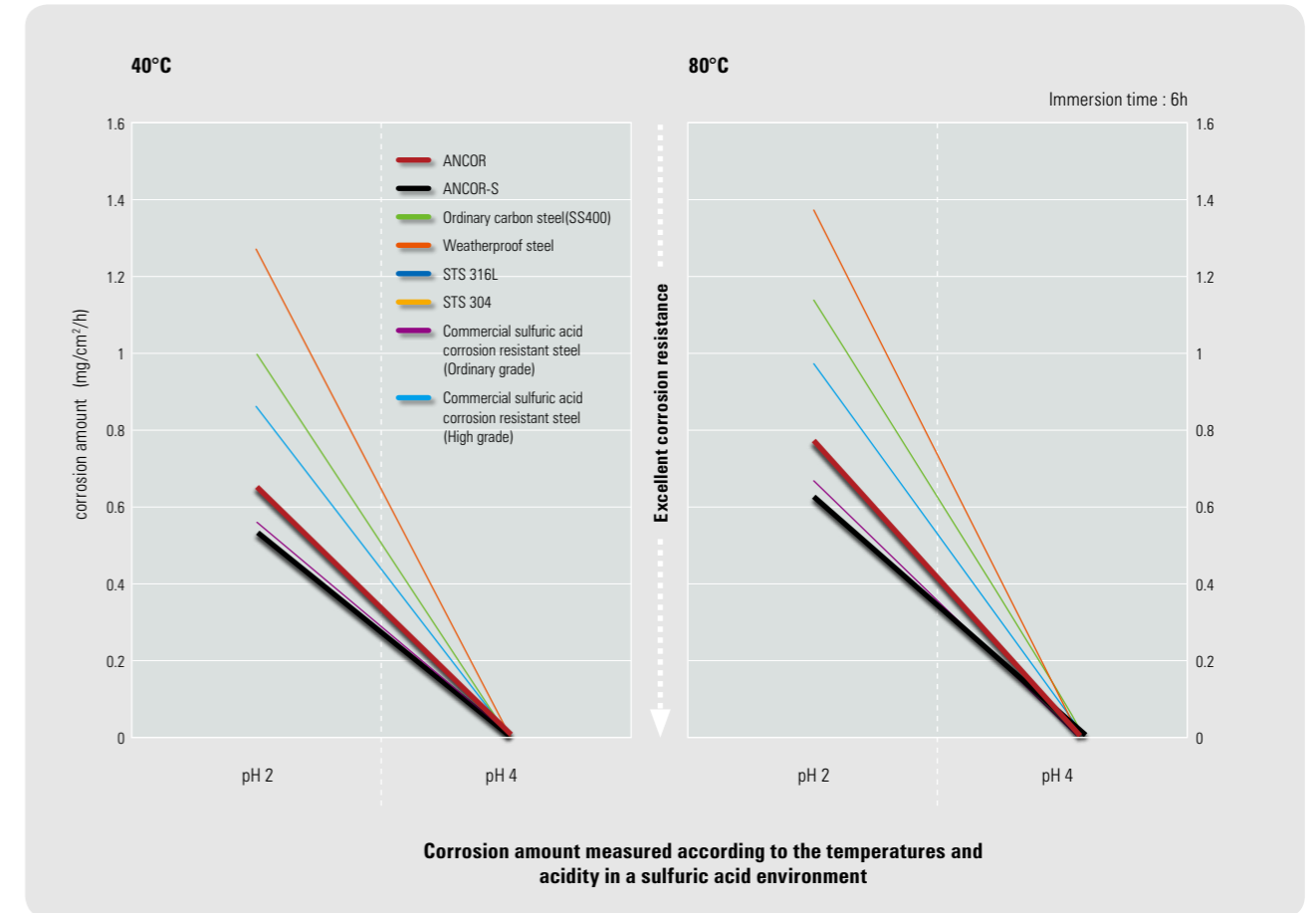
# Corrosion resistance of ANCOR

## Corrosion resistance in sulfuric acid

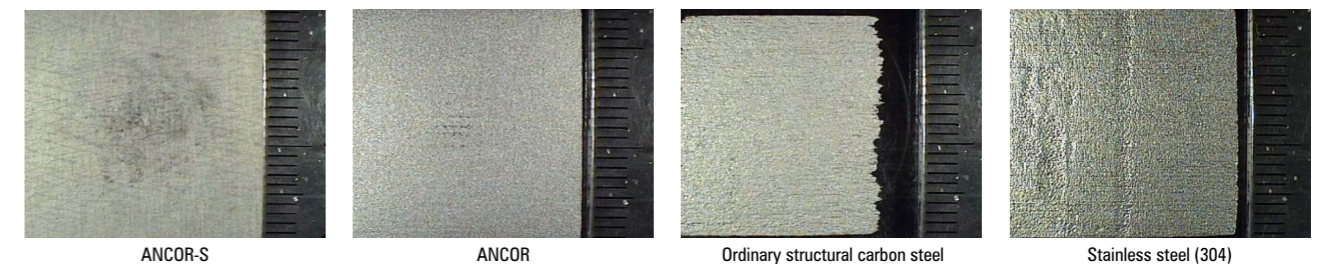


- The corrosion of steel is largely activated in a temperature range of 60~80°C of sulfuric acid solution, and with a concentration of sulfuric acid solution in the 40~60% range.
- The corrosion resistance of ANCOR(-S) in the range of the peak of dew point corrosion is highlighted, and in particular in the condition of 70°C / 50%, ANCOR-S indicates 13 times higher corrosion resistance than ordinary steel (SS400), 3 times higher corrosion resistance than 316L stainless steel and 2.5 times higher corrosion resistance than high grade commercial sulfuric acid corrosion resistant steel.
- In a sulfuric acid environment with high temperature / high concentration conditions(80°C/60% or more), ANCOR(-S) steel shows better corrosion resistance than stainless steel.
- When steel materials undergo prolonged exposure to a severe sulfuric acid corrosive environment(70°C/50%), ANCOR(-S) steel ensures excellent corrosion resistance compared to other materials.
- ANCOR-S maintains 20% higher corrosion resistance in sulfuric acid compared to high grade commercial corrosion resistant steel.
- ANCOR also shows better corrosion resistance compared to ordinary commercial sulfuric acid resistant steel.

## Corrosion resistance in sulfuric acid



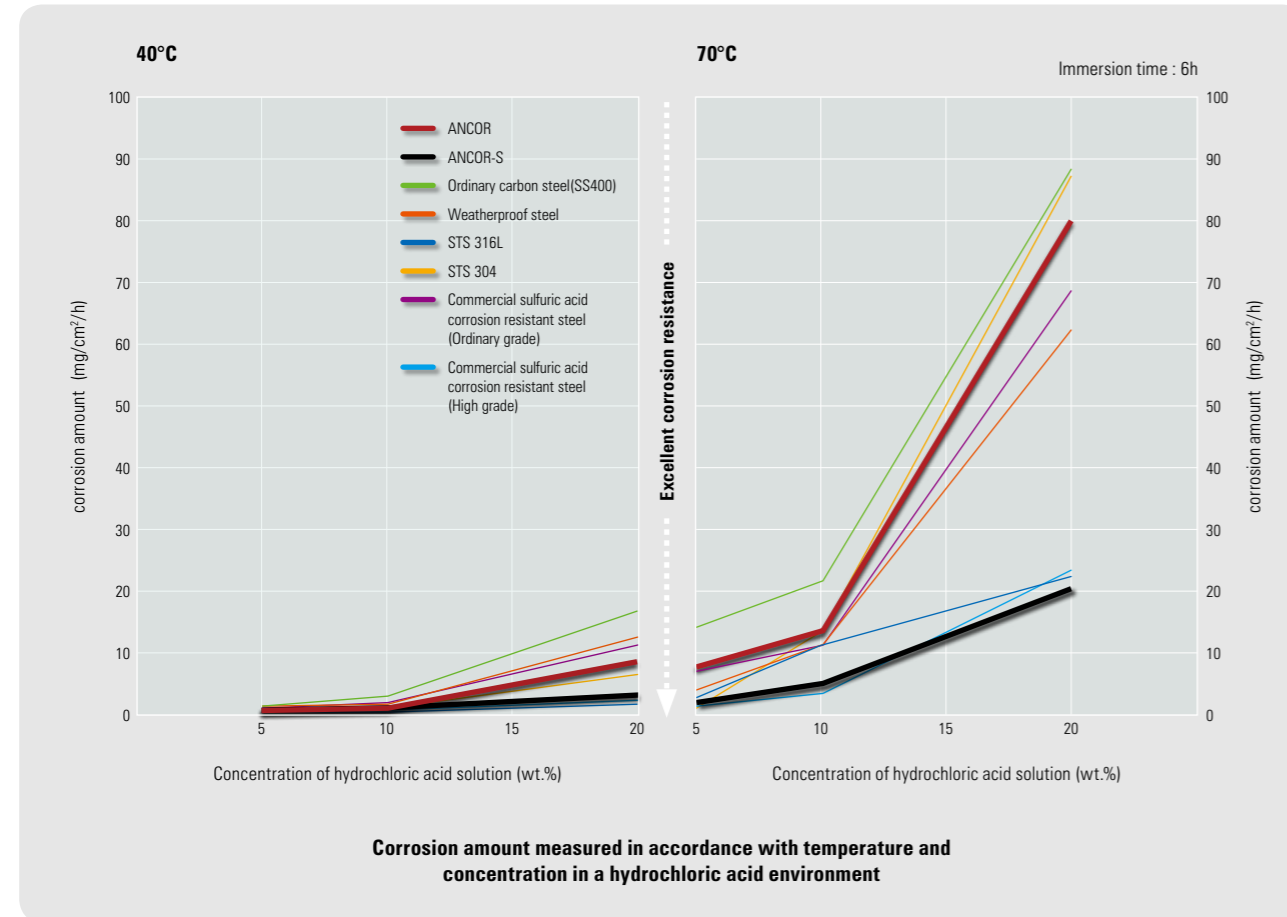
- In a relatively low sulfuric acid corrosion environment(pH 2~4), ANCOR(-S) displays excellent corrosion resistance compared to other materials.



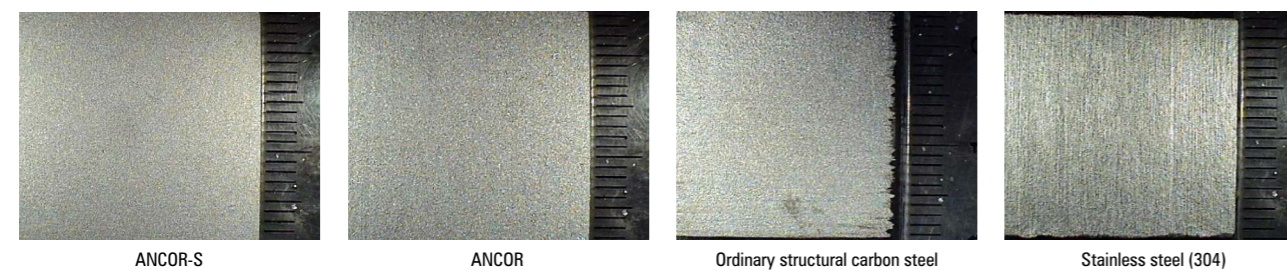
**Sulfuric acid immersion test results** (60°C, 40% sulfuric acid for 6 hours)

# Corrosion resistance of ANCOR

## Corrosion resistance in hydrochloric acid

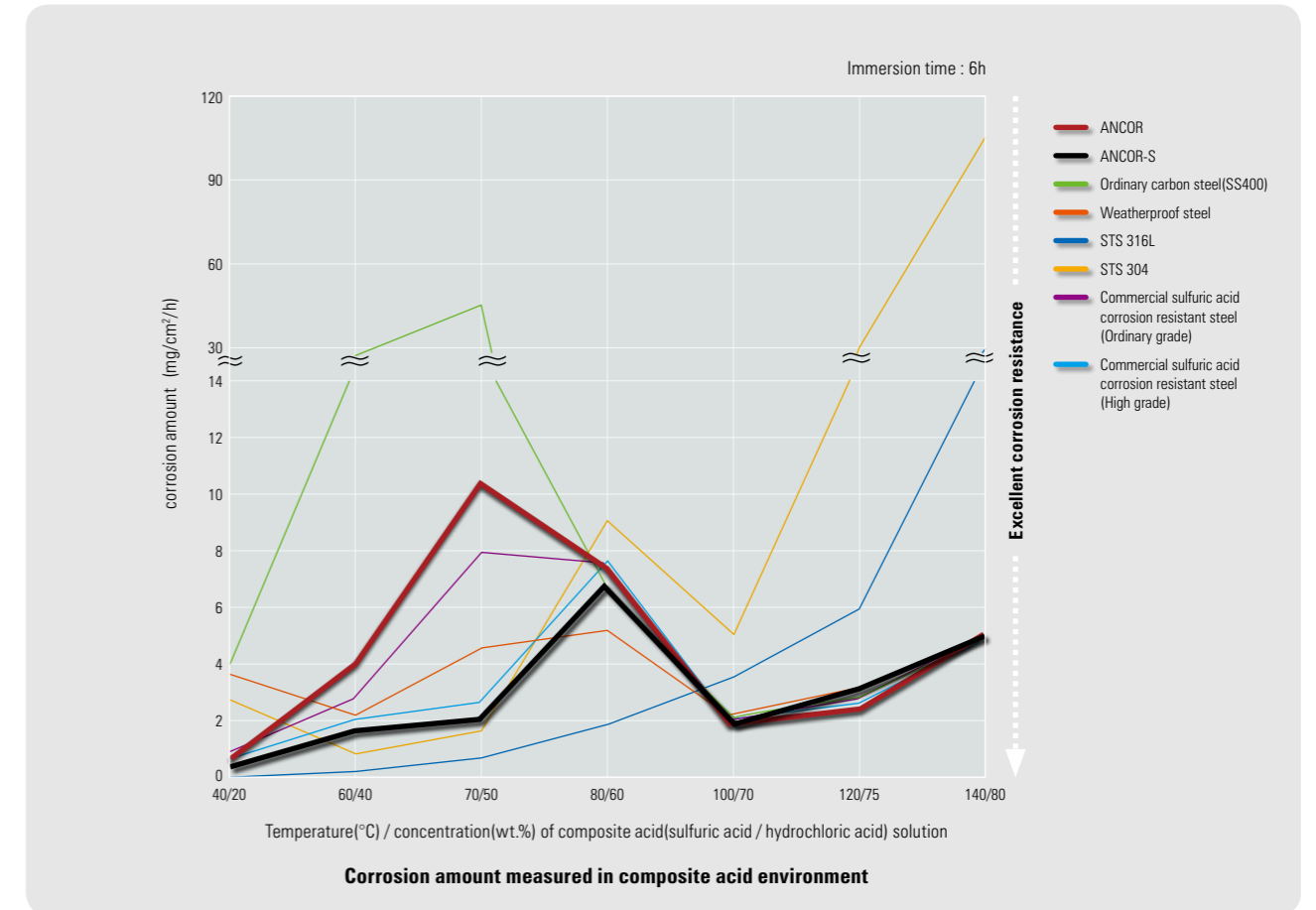


- In a hydrochloric acid environment, ANCOR-S has about six times higher corrosion resistance than ordinary structural carbon steel, while showing an equal level of corrosion resistance compared to 316L stainless steel and high grade commercial sulfuric acid corrosion resistant steel.
- With higher temperatures and concentrations of hydrochloric acid, ANCOR shows no difference in corrosion resistance compared to ordinary carbon structural steel, while showing a relatively higher level of corrosion resistance in conditions of low temperature and low concentration of hydrochloric acid.

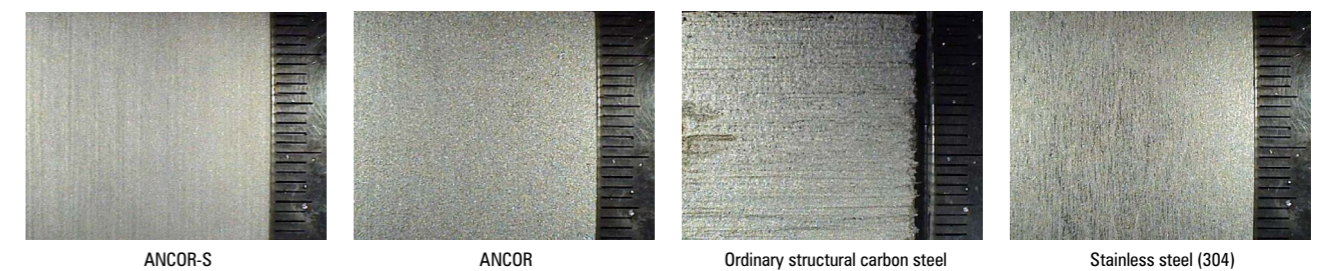


Hydrochloric acid immersion test results (70°C, 20% hydrochloric acid, 6 hours)

## Corrosion resistance in composite acid(sulfuric acid / hydrochloric acid)



- A corrosion evaluation was conducted in a composite acid environment with a mixture of sulfuric acid and hydrochloric acid on condensate collected from a duct in the vicinity of the GGH of a domestic power plant (mixing ratio by weight of sulfuric acid and hydrochloric acid = 98.72 : 1.28).
- In the composite acid environment with a small amount of hydrochloric acid added, the corrosion amount for all types of steel was extremely lowered compared to in an environment with sulfuric acid only.
- As in the sulfuric acid environment, the corrosion of steel was significantly activated at a temperature of 60~80°C with a concentration of 40~60%. ANCOR-S showed excellent corrosion resistance in this severe atmosphere.
- While 316L stainless steel showed a highly corrosion resistance in a low temperature / low concentration composite acid environment, its corrosion resistance rapidly degraded in the more corrosive conditions of a high temperature / high concentration environment.



Composite acid immersion test results (70°C, 50% composite acid, 6 hours)

## Relative comparison of materials

### Relative comparison of corrosion in sulfuric acid environment(ANCOR-S)

#### When ANCOR-S is applied

- ANCOR-S can be expected to show the same level of corrosion resistance or greater compared to high-grade commercial sulfuric acid corrosion resistant steel and SS400 in a sulfuric acid environment with low temperature / low concentration (lower than 60°C / 40%), its corrosion resistance is somewhat inferior compared to stainless steel.
- ANCOR-S can ensure more excellent corrosion resistance in the range of severe sulfuric acid dew point corrosion (60~70°C, 60~50%) compared to carbon steel and stainless steel.
- While it compares with conventional carbon steel in a sulfuric acid environment at high temperature / high concentration (higher than 70°C/50%) on a similar level, it can achieve better corrosion resistance when compared to stainless steel.

Corrosion environment	ANCOR-S vs. Comparable materials			
	Commercial corrosion resistant steel(High grade)	Conventional structural carbon steel(SS400)	Stainless steel (304)	Stainless steel (316L)
Low temperature / low concentration 60°C/40%	Similar levels		Stainless steel shows better corrosion resistance	
Severe corrosion 70°C/50%	Excellent corrosion resistance of ANCOR-S compared to other steel			
High temperature / high concentration	Similar levels			

### Relative comparison of corrosion in sulfuric acid corrosive environment(ANCOR)

#### When ANCOR is applied

- ANCOR can ensure more excellent corrosion resistance in a sulfuric acid environment at low temperature / low concentration (lower than 60°C / 40%) compared to commercial sulfuric resistant steel(ordinary grade) and SS400 while displaying an inferior level against corrosion compared to stainless steel.
- It can ensure more than an equivalent level of corrosion resistance in the range of severe sulfuric acid dew point corrosion(60~70°C, 60~50%) compared to commercial sulfuric acid corrosion resistant steel(ordinary grade), SS400 and STS 304 while presenting slightly inferior corrosion resistance compared to STS 316L.
- While it compares with carbon steel in a sulfuric acid environment at high temperature / high concentration(higher than 70°C/50%) on a similar level, it can achieve better corrosion resistance when compared to stainless steel.

Corrosion environment	ANCOR vs. Compared steel			
	Commercial corrosion resistant steel(Ordinary grade)	Conventional structural carbon steel(SS400)	Stainless steel (304)	Stainless steel (316L)
Low temperature / low concentration 60°C/40%			Stainless steel shows better corrosion resistance	
Severe corrosion 70°C/50%	Excellent corrosion resistance of ANCOR compared to other steel			
High temperature / high concentration	Similar levels			

### Relative comparison of corrosion in composite acid environment (ANCOR-S)

#### When ANCOR-S is applied

- ANCOR-S can ensure more excellent corrosion resistance in a composite acid environment at low temperature / low concentration (lower than 60°C / 40%) compared to high grade commercial sulfuric resistant steel, SS400 and STS 304, It shows slightly inferior corrosion resistance compared to STS 316L.
- While it displays more excellent corrosion resistance in the range of severe sulfuric acid dew point corrosion (60~70°C, 60~50%) compared to carbon steel, it shows slightly inferior corrosion resistance compared to stainless steel.
- While it compares with carbon steel in a sulfuric acid environment at high temperature / high concentration (higher than 70°C/50%) on a similar level, it can achieve better corrosion resistance when compared to stainless steel.

Corrosion environment	ANCOR-S vs. Compared steel			
	Commercial corrosion resistant steel(High grade)	Conventional structural carbon steel(SS400)	Stainless steel (304)	Stainless steel (316L)
Low temperature / low concentration 60°C/40%	Excellent corrosion resistance of ANCOR-S compared to other steel			
Severe corrosion 70°C/50%			Stainless steel shows better corrosion resistance	
High temperature / high concentration	Similar levels			

### Relative comparison of corrosion in composite acid environment (ANCOR)

#### When ANCOR is applied

- ANCOR can ensure more excellent corrosion resistance in a composite acid environment at low temperature / low concentration (lower than 60°C / 40%) compared to SS400 and STS 304, although it shows slightly inferior corrosion resistance compared to commercial sulfuric resistant steel (ordinary grade) and STS 316L.
- While it displays inferior corrosion resistance in the range of severe sulfuric acid dew point corrosion (60~70°C, 60~50%) compared to commercial sulfuric acid corrosion resistant steel (ordinary grade) and stainless steel, it can ensure a better level of corrosion resistance than SS400.
- While it compares with carbon steel in a sulfuric acid environment at high temperature / high concentration (higher than 70°C/50%) on a similar level, it can achieve better corrosion resistance when compared to stainless steel.

Corrosion environment	ANCOR vs. Compared steel			
	Commercial corrosion resistant steel(Ordinary grade)	Conventional structural carbon steel(SS400)	Stainless steel (304)	Stainless steel (316L)
Low temperature / low concentration 60°C/40%	Commercial corrosion resistant steel shows better corrosion resistance	Excellent corrosion resistance of ANCOR compared to other steel		
Severe corrosion 70°C/50%			Stainless steel shows better corrosion resistance	
High temperature / high concentration	Similar levels			

# On-site evaluation of ANCOR

## Air-preheater heat element of thermoelectric power plant 'S'

Serious corrosion occurred in the air-preheater element in the heat exchanger device designed for air input / output in the boilers, which were manufactured with existing ordinary commercial sulfuric acid corrosion resistant steel.

- One year after changing the fuel from bituminous coal to subbituminous coal during operation, the corrosion accelerated.
- To meet with the need for high corrosion resistant materials, ANCOR-S was evaluated.

**Evaluated materials :** Three types of steel (ordinary commercial sulfuric acid corrosion resistant steel, high grade commercial sulfuric acid corrosion resistant steel, and ANCOR-S) were reviewed.

**Test period :** 36 months (2011. 06 ~ 2014. 05)



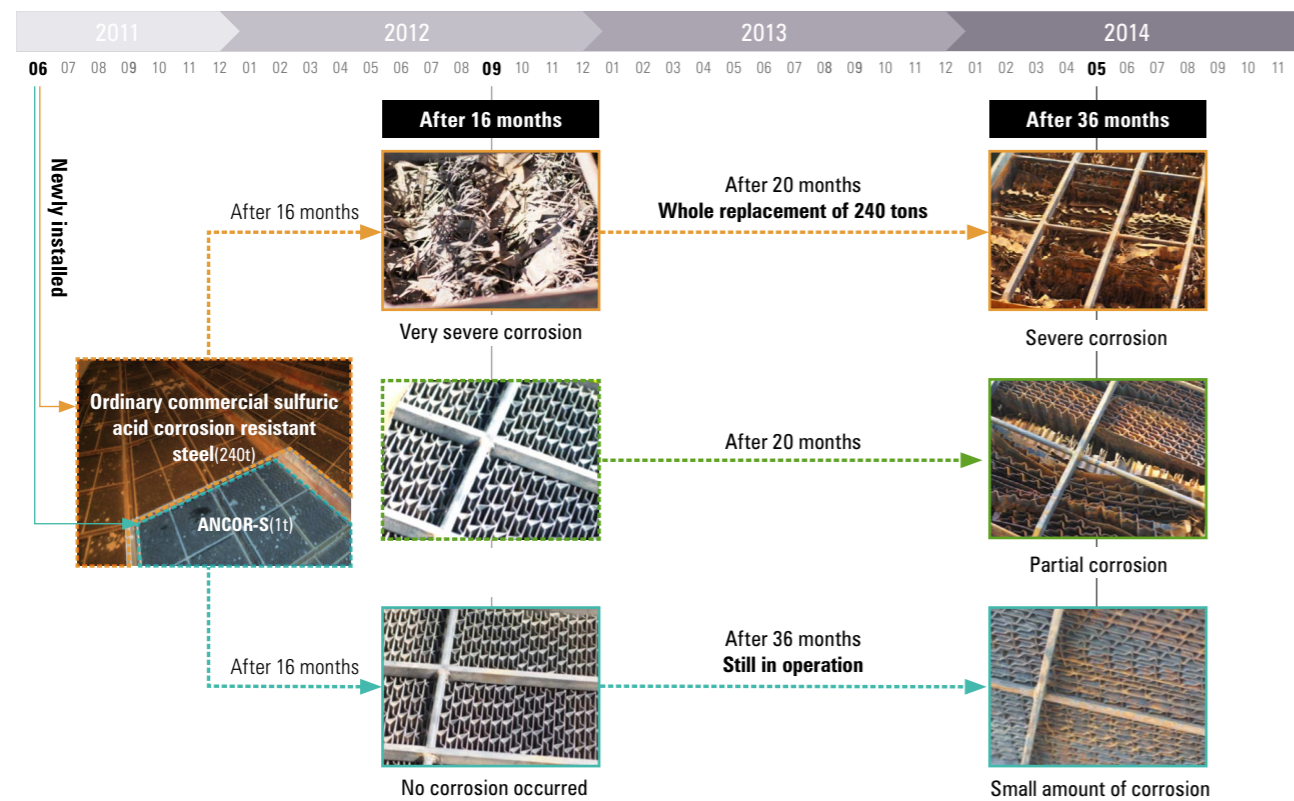
Corrosion of air-preheater



Severe corrosion of the heating elements (ordinary commercial sulfuric acid corrosion resistant steel)

## Results of on-site evaluation

- After long-term use of ANCOR-S for the air-preheater element for 36 months, slight corrosion was observed.
- When high grade commercial sulfuric acid corrosion resistant steel was applied, serious corrosion damage occurred within 20 months.



## Corrosion test specimens installed in GGH of thermoelectric power plant 'Y'

Corrosion resistance test of various materials was conducted by installing a coupon rack to GGH reheater

**Evaluated materials :** 11 types in total (ANCOR-S and conventional / exclusive welding materials, stainless steel and commercial sulfuric acid corrosion resistant steel to be compared)

**Test period :** 11 months (2012. 06 ~ 2013. 04)



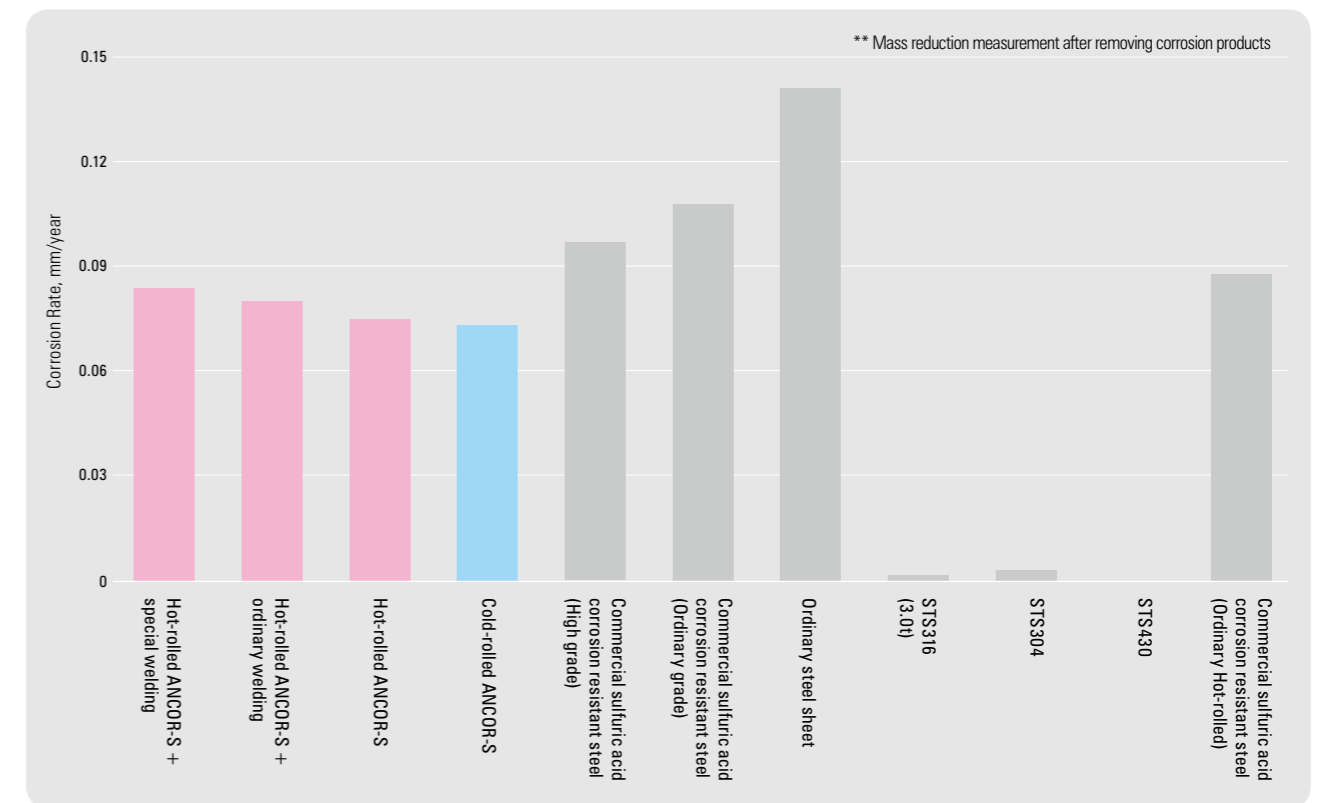
ANCOR(S) specimen test rack



Installation of specimen rack in GGH preheater

## Results of on-site evaluation

- Corrosion resistance : ANCOR-S > ANCOR-S + Welding materials > Commercial sulfuric acid resistant steel > Conventional carbon steel.
- Strong adhesion of Fe-oxide layer to mother material further enhanced corrosion resistance.
- Although stainless steel showed excellent corrosion resistance, the possible localized corrosion such as pitting by corrosion remains a source of concern.



\*\* Mass reduction measurement after removing corrosion products



## Welding characteristics of ANCOR(S)

### Information of dedicated welding rods for ANCOR

Manufacturer	Product name		Specification	
	FCAW	SMAW	FCAW	SMAW
KISWEL	K-71TS	KA-50G	(AWS) A5.36 E71T1-C1A0-CS1 H8	(AWS) A5.5 E7016-G
SeAH ESAB	Dual Shield 71-AC	SL-78AC	(AWS) A5.29 E71T1-GC	(AWS) A5.5 E7018-AC
CHOSUN Welding	CSF-ANCORS	LCA-300	(AWS) A5.29 E71T1-GC	(AWS) A5.1 E7016-G



ANCOR + Dedicated welding rod

ANCOR + Ordinary welding rod

Conventional carbon steel + Conventional welding rod

### Welding characteristics

Amount of sulfuric acid corrosion at joints(mg/cm <sup>2</sup> /h)						Composite corrosion resistance(MPa)						Joint area Bending
SMAW			FCAW			SMAW			FCAW			
12t	6t	3.2t	12t	6t	3.2t	12t	6t	3.2t	12t	6t	3.2t	12t ~ 3.2t
22.98	22.77	20.26	21.98	21.12	20.72	462	500	458	462	522	528	No cracking

Type	Welding workability				Appearance		
	Arc stability	Spatter occurrences	Slag peeling property	Difficulty of working	Bead appearance	Undercut resistance	Pitting prevention
SMAW	○	○	○	○	○	○	○
FCAW	○	○	○	○	○	○	○

○ Excellent ○ Normal ○ Poor

## ANCOR dedicated welding rod KISWEL



50-kilo class for sulfuric acid corrosion resistant steel  
(ANCOR & ANCOR-S) **K-71TS**  
Tel. +82- 2-2270-9400 e-mail. master@kiswel.com



### Characteristics and main applications

- It is a 50-kilo class flux cored wire for all position welding which is dedicated to ANCOR and ANCOR-S with excellent sulfuric acid corrosion resistance and high temperature strength that are used in the desulfurization system of thermoelectric power plants, etc.
- Since the deposited metal contains a small amount of Cu and Co elements, it has excellent resistant against sulfuric acid corrosion with high temperature strength (temperature 500°C).
- It ensures arc stability and excellent slag peeling property with scarce generation of spatters while having an excellent bead appearance.

### Product specifications

• EN ISO 17632-A:2008 : T46 0 P C 1 H10 • EN ISO 17632-B:2008 : T49 0 T1-1CA-U H10 • JIS Z 3313 : T49 0 T1-1CA-U H10

### Work Tips



### Polarity and shielding gas

- CO<sub>2</sub> : 100% CO<sub>2</sub> (15~25 l/min)
- DCEP (DC+)

### An example of chemical composition of deposited metal(%)

Shield gas	C	Si	Mn	P	S	Cu	Co
CO <sub>2</sub>	0.02	0.40	1.00	0.013	0.010	0.38	0.10

### Mechanical properties of deposited metal

Materials	Yield strength (MPa)	Tensile strength (MPa)	High temperature Tensile strength(MPa)	Elongation (%)	Impact toughness (J)	Remarks
EN ISO 17632-B	min. 390	490~670	-	min. 22	>47	-
JIS Z 3313	min. 400	490~670	-	min. 18	>47	-
Example	520	580	420	29	64	CO <sub>2</sub>

### Evaluation of corrosion resistance in sulfuric acid and y-groove cracking

Product	Corrosion resistance	y-groove cracking test
KA-50G	17.4	No cracking occurred
K-71TS	23.2	No cracking occurred

### Key points of welding work and proper welding conditions

- For handling precautions for wire and welding positions, please refer to the specific conditions of use recommended on the www.kiswel.com
- With excessive heat input at welding, optimal mechanical performance cannot be obtained, so please maintain the appropriate welding conditions.

## ANCOR dedicated welding rod SeAH ESAB



AWS A5.29E71T1-GC / 0.5%Cr-0.6%Cu  
**Dual Shield 71-AC** for sulfuric acid corrosion resistant steel  
 Tel. +82-55-289-8111 e-mail. esab\_admin@esab.com

### ■ Characteristics

- It is a titania-based flux cored wire to be applied to sulfuric acid corrosion steel with high corrosion resistance.
- By controlling the amounts of hydrogen that cause low temperature crack as well as the content of S and P that affect high temperature crack, it has excellent crack resistance and corrosion resistance.

### ■ Main applications

- Welding of steel with the properties of low carbon-based sulfuric acid corrosion and weatherproof characteristics with the same chemical composition as the deposited metal.

### ■ Types of shielding gas and electric current

- 100%CO<sub>2</sub>, DCRP (wire ⊕)

### ■ Notes on work conditions and scope of welding

- Please select a slightly lower voltage than the optimal current flow of Dual Shield 7100.

### ■ An example of the chemical composition of deposited metal (%) (shielding gas : 100% CO<sub>2</sub>)

Shielding gas	C	Mn	Si	S	P	Cr	Ni	Cu
CO <sub>2</sub>	0.03	0.80	0.52	0.005	0.013	0.45	0.02	0.56

### ■ An example of the mechanical properties of deposited metal (shielding gas : 100% CO<sub>2</sub>)

Yield strength N/mm <sup>2</sup> (kgf/mm <sup>2</sup> )	Tensile strength N/mm <sup>2</sup> (kgf/mm <sup>2</sup> )	Elongation (%)	Sulfuric acid corrosion resistance (50%/70°C)
530(54)	600(61)	28	19

\* High-temperature tensile strength (500°C) : 446 N/mm<sup>2</sup>

## ANCOR dedicated welding rod CHOSUN WELDING



For sulfuric acid / hydrochloric acid corrosion resistant steel  
**CSF-ANCORS**  
 Tel. +82-52-237-5301 / www.chosunwelding.com



### ■ Characteristics

- It is a flux cored welding wire applicable for all positions CO<sub>2</sub> shielded arc welding.
- With a titania-based flux to ensure excellent feedability, it ensures a very soft and stable arc while generating a much lower amount of spatters than solid wire so that optimal welding workability can be obtained. Also it shows excellent slag peeling as well as excellent welding bead appearance.
- Since the deposited metal contains a small amount of Cu and Ni, its corrosion resistance against composite sulfuric acid / hydrochloric acid as well as sulfuric acid are excellent.

### ■ Main applications

- It is suitable for welding ANCOR-HS, which has excellent corrosion resistance against corrosive sulfuric acid / hydrochloric acid composite and is used in thermoelectric power plant desulfurization equipment. It also matches with ANCOR-H.

### ■ Work tips

- A gas flow rate of 20~25 l/min is recommended.
- If the wind speed is more than 2m/sec, please install a windshield.
- Keep a distance of 15~25mm between the basic materials and the welder tip.

### ■ An example of chemical composition of deposited metal (%) (shielding gas: CO<sub>2</sub>)

C	Si	Mn	P	S	Cu	Ni	Others
0.05	0.46	0.90	0.012	0.010	0.31	0.16	≤ 0.5

### ■ An example of the mechanical properties of deposited metal (shielding gas: 100% CO<sub>2</sub>)

Yield strength N/mm <sup>2</sup> (kgf/mm <sup>2</sup> )	Tensile strength N/mm <sup>2</sup> (kgf/mm <sup>2</sup> )	Elongation (%)	Impact toughness J(0°C)
517	591	30.8	82

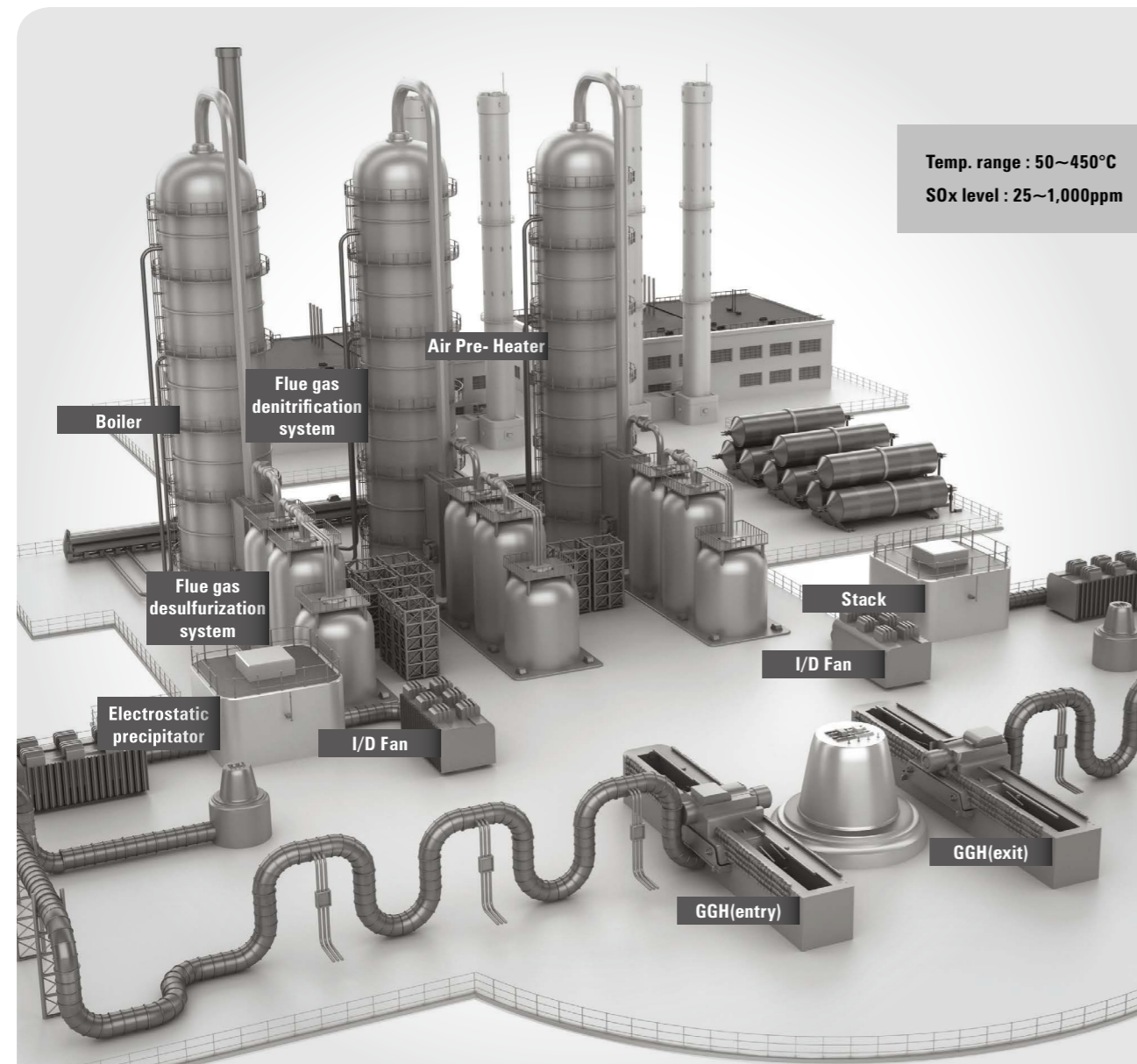
### ■ Product dimensions and proper current (DC +)

Current range	Current. Position / Diameter (mm)	1.2	1.4	1.6
	<b>Flat, H-F</b>		180~340	200~360
<b>V-up</b>		120~220	140~260	160~260
<b>V-down</b>		120~240	140~260	160~280
<b>O.H</b>		120~220	140~260	160~260

## Application of ANCOR(S)

For equipment exposed to the sulfuric acid atmosphere of power plants, etc.  
(air preheater, GGH, desulfurization equipment, duct, etc.)

- Environment : Generating SO<sub>x</sub> and relatively low temperature (condensation environment).
- Steel corrosion rate or period of use : When a part needs to be replaced due to severe corrosion within one year, it is necessary to check potential sulfuric acid corrosion.



Equipment	Boiler duct	Denitrification facilities (SCR)	Air pre-heater	GGH	Electrostatic Precipitator (EP)	Desulfurization duct
Required characteristics	Corrosion resistance in sulfuric acid	Corrosion resistance of ABS	Corrosion resistance in sulfuric acid	Corrosion resistance in sulfuric acid/hydrochloric acid Coating availability	Corrosion resistance in sulfuric acid/hydrochloric acid	Abrasion resistance, Sulfuric acid / hydrochloric acid corrosion resistance

## Available size ANCOR(S), Hot rolled

⚠ Because the product sizes available are subjected to change, please consult with responsible personnel before placing an order.

### Hot rolled ANCOR / ANCOR-S

Available Consultation with responsible personnel is required before placing an order

w/t	Standard width	1st	1.1st	1.2st	1.3st	1.4st	1.5st	1.6st	1.7st	1.8st	2st	2.6st	2.7st	3st	4.5st	6st≤19
750 ≤ w	750															
800 ≤ w	800															
850 ≤ w	850															
900 ≤ w	900															
950 ≤ w	950															
1000 ≤ w	1000															
1050 ≤ w	1050															
1100 ≤ w	1100															
1150 ≤ w	1150															
1200 ≤ w	1200															
1250 ≤ w	1250															
1300 ≤ w	1300															
1350 ≤ w	1350															
1400 ≤ w	1400															
1450 ≤ w	1450															
1500 ≤ w	1500															
1550 ≤ w	1550															
1600 ≤ w	1600															
1650 ≤ w	1650															
1700 ≤ w	1700															
1750 ≤ w	1750															
1800 ≤ w ≤ 1840	1800															

## Available size ANCOR(S), Cold rolled

⚠ Because the product sizes available are subjected to change, please consult with responsible personnel before placing an order.

### Cold rolled ANCOR / ANCOR-S

■ Available    ■ Consultation with responsible personnel is required before placing an order


w/t	Standard width	0.4st	0.5st	0.6st	0.7st	0.8st	0.9st	1.0st	1.1st	1.2st	1.3st	1.4st	1.5st	1.6st	1.7st	1.8st	1.9st	2.0st
750 ≤ w	750																	
800 ≤ w	800	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
850 ≤ w	850	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
900 ≤ w	900	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
950 ≤ w	950	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
1000 ≤ w	1000	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
1050 ≤ w	1050	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
1100 ≤ w	1100	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
1150 ≤ w	1150	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
1200 ≤ w	1200	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
1250 ≤ w	1250	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
1300 ≤ w	1300	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
1350 ≤ w	1350	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
1400 ≤ w	1400	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
1450 ≤ w	1450	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
1500 ≤ w	1500	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
1550 ≤ w	1550	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
1600 ≤ w	1600	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
1650 ≤ w	1650	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
1700 ≤ w	1700	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
1750 ≤ w	1750	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
1800 ≤ w ≤ 1840	1800	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

# ANCOR

Copyright © 2021 by POSCO  
All rights reserved

### Contact Us

POSCO Headquarters  
Global Quality & Service Management Office  
6261, Donghaean-ro, Nam-gu, Pohang-si,  
Gyeongsangbuk-do, 38759 Republic of Korea  
TEL 82-54-220-0114



#### **Headquarters**

6261, Donghaean-ro, Nam-gu, Pohang-si,  
Gyeongsangbuk-do, 38759 Republic of Korea

**TEL** 82-54-220-0114

**FAX** 82-54-220-6000

#### **Seoul Office**

POSCO Center, 440, Teheran-ro,  
Gangnam-gu, Seoul, 06194 Republic of Korea

**TEL** 82-2-3457-0114

**FAX** 82-2-3457-6000

#### **Pohang Works**

6262, Donghaean-ro, Nam-gu, Pohang-si,  
Gyeongsangbuk-do, 37877 Republic of Korea

**TEL** 82-54-220-0114

**FAX** 82-54-220-6000

#### **Gwangyang Works**

20-26, Pokposarang-gil, Gwangyang-si,  
Jeollanam-do, 57807 Republic of Korea

**TEL** 82-61-790-0114

**FAX** 82-61-790-7000



[www.posco.com](http://www.posco.com)

[www.steel-n.com](http://www.steel-n.com)