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2015 No.1

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MG-S430NbS for car exhaust systems: Strong and corrosion resistant

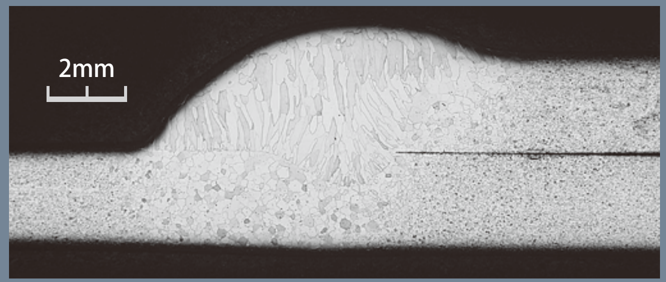
PREMIARC™ MG-S430NbS is a MIG wire that has been developed recently for car exhaust systems. Due to an addition of Nb, it can produce weld metal with superb strength at elevated temperatures as well as excellent intergranular corrosion resistance. The wire's typical chemistry is shown in Table 1.

Table 1: Typical chemistry of wire (mass%)

C	Si	Mn	P	S	Ni	Cr	Nb	Ti	N	Nb+Ti/C+N
0.012	0.88	0.29	0.023	0.001	0.21	18.10	0.56	<0.002	0.011	24

Wire usability (i.e. arc stability, spatter amount and wettability) of the new wire were investigated. Wire usability was tested by carrying out lap-joint fillet welding on a plate less than 2 mm thick (Figure 1) under the welding conditions shown in Table 2.

Figure 1: Macrostructure of the weld metal



Note: Base plate is SUH409L (JIS).

The test results confirmed the new wire is of the same usablity as conventional Nb-free wire.

Table 2: Welding conditions

Polarity	Position	Wire feeding (m/min)	Current (A)	Voltage (V)	Welding speed (cm/min)
DCEP(Pulse)	1G	4.3	125	22	60

Note: 1. Shielding gas : Ar+2%O_2 (Flow rate: 25l/min)
2. Wire extension: 15 mm
3. ϕ : 1.2 mm

Other tests compared the tensile strength at elevated temperatures and intergranular corrosion resistance of MG-S430NbS and conventional Nb-free wire weld metals. As shown in Table 3, the tensile strength of MG-S430NbS weld metal is higher than that of the conventional wire.

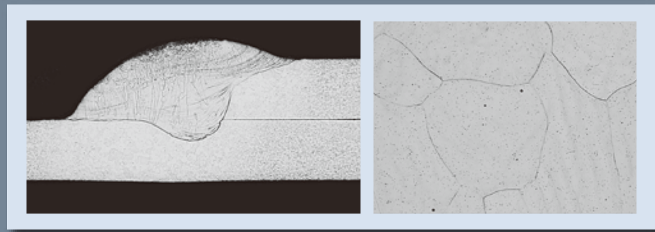
Table 3: Tensile strength at elevated temperatures

	Testing temp. (°C)	TS (MPa)	Ruptured position
MG-S430NbS	800	66	Weld metal
	900	34	Base metal
Conventional	800	55	Weld metal
	900	33	do.

Note: Base plate is SUS444 (JIS)

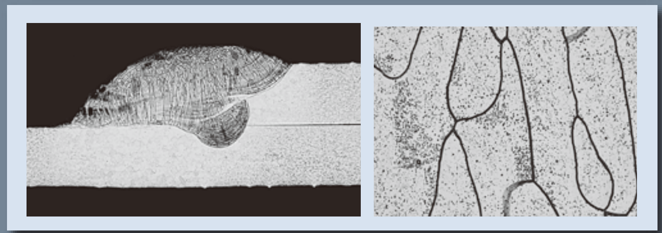
Intergranular corrosion resistance was evaluated using an oxalic acid etching test by JIS G0571 (Japanese Industrial Standard) equal to ASTM A262A. Figures 2 and 3 show the macro- and micro-structures of MG-S430NbS and conventional Nb-free wire weld metals, respectively, following the test. A dual structure *1, which indicates excellent intergranular corrosion resistance, is easily recognized in Figure 2, as opposed to the ditch structure *2 in Figure 3, which does not.

Figure 2: Macro- and micro-structures (MG-S430NbS)



Note: *1: Dual structure: Some ditches at grain boundaries but even one grain, not completely surrounded.

Figure 3: Macro- and micro-structures (conventional Nb-free)



Note: *2: Ditch structure: One or more grains completely surrounded by ditches.

Lastly, a sulfuric acid/copper sulfate corrosion test (JIS G0575) was performed on the all weld metals of the two wires. A bend test was used to evaluate the presence or absence of intergranular corrosion on the specimens, and MG-S430NbS weld metal was found to be free from defects, in comparison to conventional Nb-free wire, which experienced significant corrosion (see Table 4).

Table 4: Intergranular corrosion test result

	Indication of defect
MG-S430NbS	No defect
Conventional	Fully corroded and no bend test was performed.

Note: Bend angle 120°

New Year's greetings from the Senior Managing Director

Dearest KWT readers! I wish all of you a Happy New Year! I'm Tsuyoshi Kasuya, Senior Managing Director and Head of the Welding Business. I hope your days have been fruitful in the weeks that have passed since the start of 2015.

Some time ago, we created a vision for the mid- and long-term future that will allow us to become "the most reliable company for total welding solutions in the world." In order to carry out that vision in 2014, we enforced overseas business functions, strengthened our marketing in such industries as shipbuilding and offshore structures, energy, automobiles and construction machinery, and followed through on the technical requests we received from customers. We also expanded our product menu to fulfill customer needs worldwide. In 2015, we will continue with those same action plans by proposing specific welding solutions for particular regions as well as industries. In the ASEAN countries and China, where we expect significant and continuous progress, we will emphasize production as well as supply systems of welding consumables.

We can achieve success by marketing to specific industries, in particular, the energy-related fields. Clearly, global demand for energy is increasing year by year, and the natural gas has been drawing attention around the world as a clean form of energy. Kobe Steel, therefore, has proposed welding solutions for liquefied natural gas (LNG) tanks and ships as well as welding consumables for the 9% Ni steels that are applied by many fabricators. And now, the Technical Highlight of this issue shows how we are responding to more recent developments in the LNG market with welding consumables for the new 7% Ni TMCP steels that are making LNG tanks less costly and more efficient.

Beyond the energy industry, we will make our utmost effort to propose our total welding solutions for such industries as shipbuilding and offshore structures, the automobile and construction machinery and thus support our KWT readers by improving your ability to manufacture excellent products.

More than ever, we look forward to your kind and continuous patronage of Kobelco's welding consumables as well as equipment in 2015.

Tsuyoshi Kasuya
Senior Managing Director and
Head of the Welding Business
Kobe Steel, Ltd.

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Supply and demand for LNG and implications for 7% Ni TMCP steel and welding consumables

1 Preface

Three and a half years after describing Kobelco's welding consumables for liquefied natural gas (LNG) storage tanks made of 9% Ni steel in the Kobelco Welding Today, Vol.14, No.2, (KWT14-2) (2011) issue, the global market for LNG has changed significantly.

Not only has the supply and demand situation changed, but so have the properties of the steel used for storage tanks. 7% Ni Thermo Mechanical Control Process (TMCP) steel has successfully been introduced in Japan in order to reduce the Ni content, which is expensive and susceptible to fluctuations in the market. The specification of 7% Ni TMCP steel is already covered by Japanese Industrial Standard (JIS) regulations as well as non-Japanese specifications such as ASTM.

This article briefly introduces the welding consumables that are suitable for 7% Ni TMCP steels and provides some up-to-date technical data.

2 Recent LNG supply and demand

Figure 1 shows that LNG exports increased sharply in 2010. Total worldwide LNG exports in 2013 reached 237 million tons per annum (MTPA) as shown in Figure 2, reflecting an increase in global demand, mainly in Asia and particularly in China.

The export of LNG from floating storage units (FSUs) (Figure 1) is also a recent supply trend. In most cases, FSUs or floating storage and gasification units (FSRUs) are converted out of LNG ships, which reduces both cost and time associated with construction and, therefore, keeps up with the current supply and demand of LNG.

Figure 1: Worldwide trends in LNG exports [1]
Note: MTPA: Million tons per annum

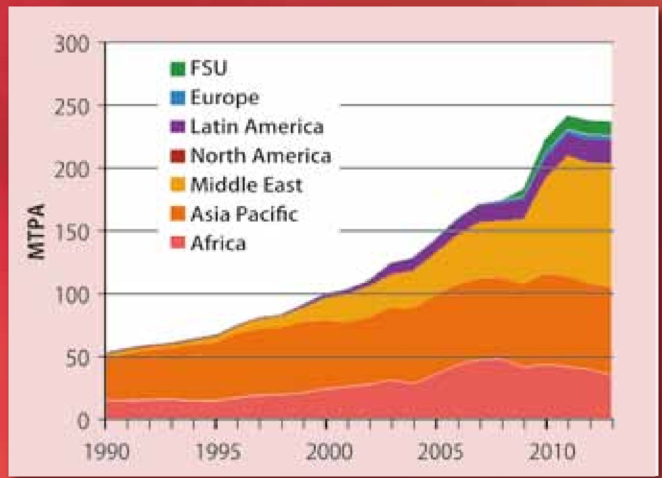
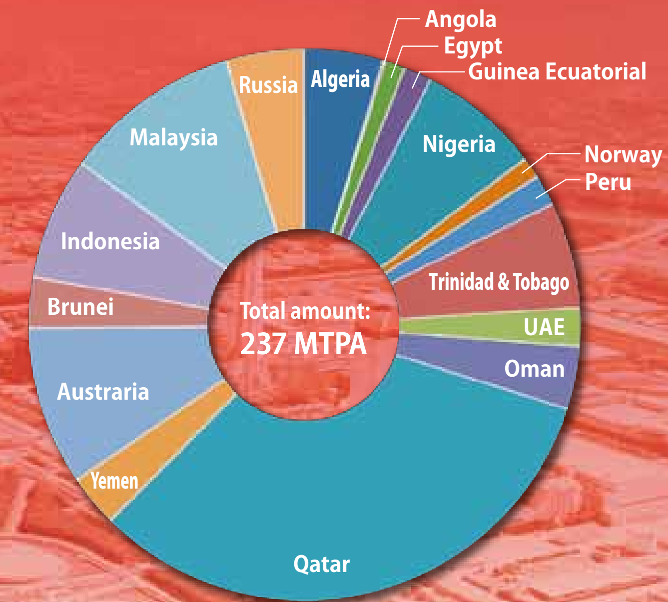


Figure 2: Worldwide LNG exports in 2013 [2]



3 Situation in Asia

Due to the large increase in natural gas consumption, gas liquefaction capacity has also increased and is expected to grow, particularly in Asia and the Pacific as shown in Figure 3.

Accordingly, the need for LNG storage yards and transportation systems such as LNG carriers (oceangoing and domestic) will increase.

Figure 3: Worldwide gas-liquefaction capacity [3]

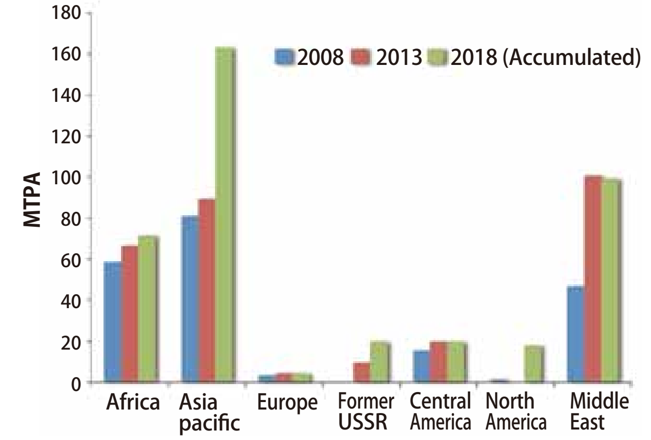
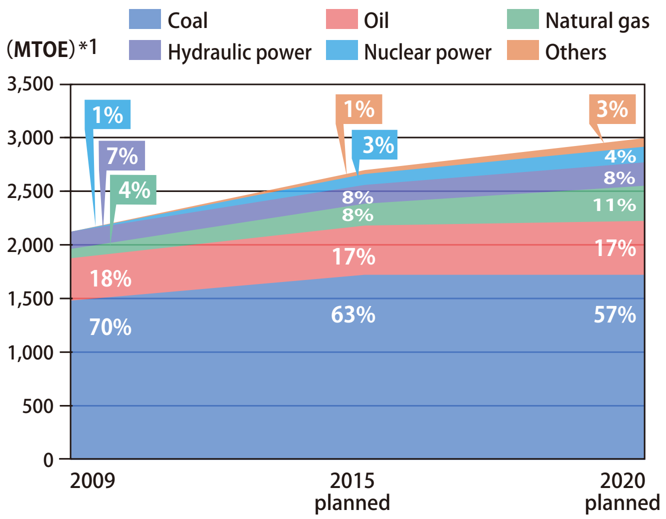


Figure 4 shows China's primary energy consumption plan, based on the twelfth five year plan (2011-2015). China's LNG imports are forecast to increase 50% each year, from 14.7 million tons in 2012 to a maximum 100 million tons per year. Naturally, a large number of LNG terminals and LNG carriers (for oceangoing and domestic use) will be required in due course.

Figure 4: Forecast of primary energy consumption in China [4]
Note: *1: Million tons of oil equivalent.



LNG tanks are classified roughly into three types: Membrane, Moss and IMO (International Maritime Organization)-type A, B or C tanks. While membrane and Moss tanks are applied on oceangoing LNG carriers, the third type is for the smaller-sized, domestic carriers, as shown in Table 1. Figure 5 shows a typical domestic LNG carrier and Figure 6, some IMO–type C tanks.

Table 1: Types of LNG tanks

	Type of LNG tank
Oceangoing LNG carrier	Membrane and Moss
Domestic LNG carrier	IMO – type A, B, C

Figure 7 shows a newly-developed tri-lobe tank, which will be equipped on a liquefied ethylene gas (LEG) ship for the transport of LEG in the near future.

Figure 5: Typical domestic LNG carrier [6]

Figure 6: IMO-type C tanks [6]

Figure 7: Tri-lobe tank [6]

4 Development and specifications of 7% Ni TMCP steel

For safe operations under cryogenic conditions, LNG storage tanks are generally made of 9% Ni steel plates. Recently, however, 7% Ni TMCP steel plate has been developed, which reduces the content of expensive Ni by nearly 20%.

7% Ni TMCP steel was standardized as SL7N590 in JIS G3127, "Nickel steel plates for pressure vessels for low temperature services," in March 2013, when application of this product began in Japan. Around the same time in the USA, ASTM standardized 7% Ni TMCP steel as Gr. G Class 9 and Class 10 in A841, "Standard Specification for Steel Plates for Pressure Vessels, Produced by Thermo-Mechanical Control Process (TMCP)."

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The JIS and ASTM specifications of 7% Ni TMCP and 9% Ni steels are shown in Table 2 for reference.

Table 2: Specifications for 7% Ni TMCP and 9% Ni steels

Specification	ASTM			JIS G 3127	
	A553 Type I	A841 Grade G		SL9N 590	SL7N 590
		Cl.9	Cl.10		
Plate thickness (mm)	50 max.	50 max.		100 max.	50 max.
Process	QT	TMCP		QT	TMCP
C (%)	0.13 max.	0.13 max.		0.12 max.	
Si (%)	0.15-0.40	0.04-0.15		0.30 max.	
Mn (%)	0.90 max.	0.60-1.20		0.90 max.	1.20 max.
P (%)	0.035max.	0.015 max.		0.015 max.	
S (%)	0.035max.	0.015 max.		0.015 max.	
Ni (%)	8.50-9.50	6.00-7.50		8.50-9.50	6.00-7.50
0.2%PS (MPa)	585 min.	585 min.	620 min.	590 min.	
TS (MPa)	690-825	690-825	750-885	690-830	
El (%); Thick (mm)	20 min.	20 min.		21 min. (t ≤16) 25 min. (t > 16)	
IV (J) at -196°C	34 min.	34 min.		41 min.	
LE*1 (mm) at -196°C	0.38 min.	0.38 min. (t ≤32) 0.48 min. (t=50) *2		—	—

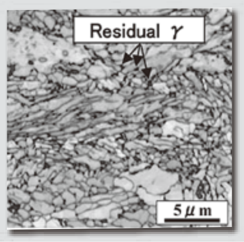
Note: *1: LE: Lateral Expansion
*2: LE value between the plate thickness 32 and 50 shall be determined by linear interpolation.

Results of tests comparing 9% Ni and 7% Ni TMCP steels are described below.

4-1. Basic features of 7% Ni TMCP steel

In order to maintain the same high toughness as 9% Ni steel, TMCP technology allows for much residual austenite (γ) to be distributed in the base structure of 7% Ni TMCP steel.

Figure 8: Microstructure comparison

Steel	7% Ni TMCP	9% Ni
Micro-structure		
Residual γ (%)	8.5	3.2

As seen in Figure 8, the lath structure is refined in 7% Ni TMCP steel, resulting in the increase of residual γ.

4-2. Basic performance evaluation

Tests were carried out on several properties related to the basic performance of 7% Ni TMCP steel, as shown in Table 3. The test results shown in Tables 4 and 5 prove that 7% Ni TMCP steel performs as well as 9% Ni steel.

Table 3: Tests for evaluation of performance

	Basic	Resistance to brittle fracture
Plate	• Tensile test	• CTOD test
	• Notch toughness test	• Duplex ESSO test
Welded joint	• Tensile test	• CTOD test
	• Notch toughness test	• Cross weld notched wide plate test

Table 4: Results of tensile tests

Steel	Thickness (mm)	0.2%PS (MPa)	TS (MPa)	EL (%)
7% Ni TMCP	40	655	738	31
9% Ni	36	726	743	23
SL7N590		590 min.	690-830	21 min.

Note: Position:1/4 t
Direction: Parallel to rolling direction

Table 5: Results of notch toughness tests

Steel	Thickness (mm)	IV (J)at -196°C	BA(%) at -196°C
7% Ni TMCP	40	Avg 256	0
9% Ni	36	Avg 243	0
SL7N590		41 min.	—

Note: BA: Brittle fracture appearance value
Position:1/4 t
Direction: Parallel to rolling direction

4-3. Brittle fracture resistance

7% Ni TMCP and 9% Ni steels were compared for brittle fracture resistance, as shown in Table 3.

Resistance to brittle crack initiation and cracking were evaluated by CTOD test and a Duplex ESSO test, respectively. For reference, a schematic drawing of the Duplex ESSO test is shown in Figure 9. The results of both the CTOD and Duplex ESSO tests show basic equivalence between 7% Ni TMCP and 9% Ni steels as shown in Tables 6 and 7, respectively.

Table 6: Results of CTOD tests

Steel	Thickness (mm)	Critical CTOD value (mm) at -165°C
7% Ni TMCP	40	1.18; 1.05; 1.18
9% Ni	36	0.65; 0.70; 0.68

Note: Direction: Parallel to rolling direction

4-4. Properties of butt joint welding with 7% Ni TMCP steel

Double V butt joint welding was performed on 7% Ni TMCP steel plate using PREMIARC™ NI-C70S, 4 mm dia. covered electrodes in the vertical upward position (3G). The welding conditions are shown in Table 8.

Figure 9: Schematic drawing of Duplex ESSO test

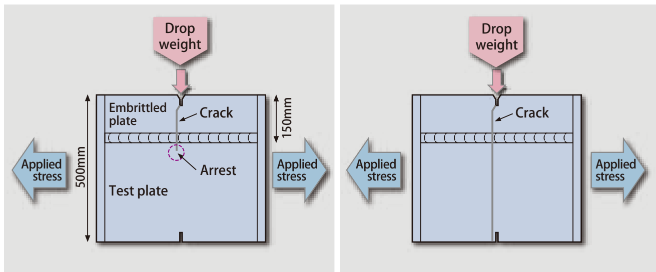


Table 7: Results of Duplex ESSO tests

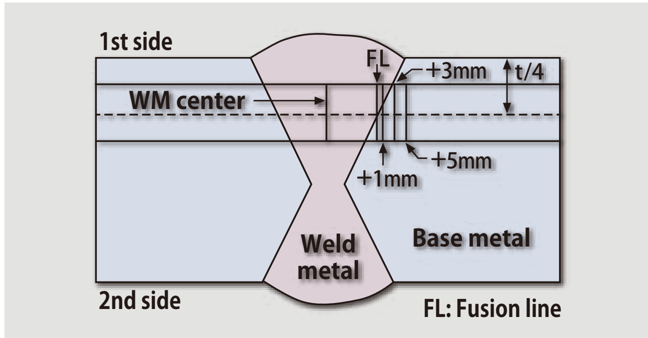
Steel	Thickness (mm)	Temperature (°C)	Applied stress (MPa)	Judgment
7% Ni TMCP	40	−196	392	No-Go
9% Ni steel	36	−196	392	No-Go

Table 8: Welding conditions

Direction of welding	Welding process	Product name	Φ mm	Welding position	Heat input (kJ/mm)
Transverse to rolling direction	SMAW	NI-C70S	4.0	3G uphill	4.4 max.

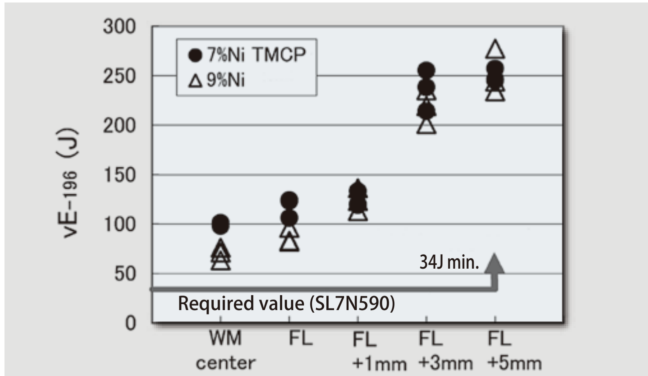
Figure 10 shows the schematic cross-sectional weld metal and location of notch toughness test specimens.

Figure 10: Schematic location of test specimens



The notch toughness test results are shown in Figure 11. All values fulfill the requirement of SL7N590 (34J min. and 41J average at -196°C).

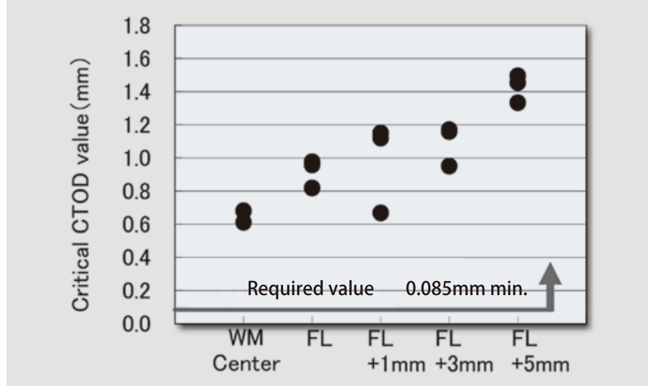
Figure 11: Results of notch toughness tests



4-4-2 Brittle fracture resistance

Resistance to brittle fracture was tested by CTOD, and all values were found to exceed the requirements of a 140,000m³ LNG tank (0.085 mm min. at -196°C) as shown in Figure 12.

Figure 12: Results of CTOD tests



5 Welding consumables for 7% Ni TMCP steel

All welding consumables recommended by Kobe Steel for 9% Ni steels are also suitable for welding 7% Ni TMCP steels without exception. Typical welding consumables recommended for 7% Ni TMCP steels are listed in Table 9.

5-1. PREMIARC™ DW-N709SP

The AWS specification (A5.34) of ENiMo13-T, under which PREMIARC™ DW-N709SP is included, has formally been issued. It is now classified as ENiMo13T1-4/0-1 as shown in Table 9. Recent test results of welding by DW-N709SP and of comparing the efficiency of DW-N709SP with that of a covered electrode are described below.

As seen in Figure 13, Ar-CO_2 shielding gas does not provide sufficient penetration at the corner in horizontal fillet position (2F) welding. When full penetration is required, 100%CO_2 shielding gas is recommended.

Figure 13: Comparison of horizontal fillet welding by shielding gas

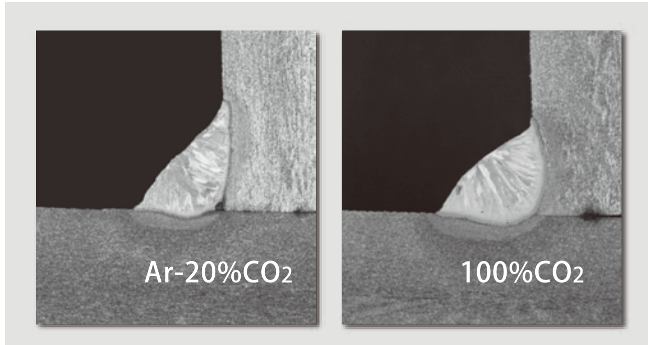


Table 9: Typical welding consumables for 7% Ni TMCP steel

	FCAW	SMAW	GTAW	SAW
Product name	DW-N709SP	NI-C70S	TG-S709S	PF-N4 (flux)/ US-709S (wire)
AWS	A5.34 ENiMo13T1-4 ENiMo13T0-1	A5.11 ENiCrFe-9	A5.14 ERNiMo-8	A5.14 ERNiMo-8 (wire)
Features	• Hastelloy type • Ar-CO_2 gas for all position welding and CO_2 gas, for 1G, 1F and 2F welding	Inconel type	• Hastelloy type • Suitable for automatic-TIG welding	• Hastelloy type • Suitable for 2G position welding
Polarity	DCEP	AC	DCEN	DCEP
Ni (%)	62.5	63.4	70.4	64.0
Cr (%)	6.5	16.6	2.0	1.7
Mo (%)	17.6	5.3	19.0	17.2
W (%)	2.4	0.7	3.0	2.7
Nb+Ta (%)	—	1.1	—	—
Fe (%)	7.9	9.9	5.5	14.9
0.2%PS (MPa)	447	430	460	410
TS (MPa)	723	705	730	680
El (%)	51	41	47	43
IV (J) at -196°C	89	62	160	70

5-2. Butt joint welding on 10 mm thick plate

Butt joint welding in the 3G position was conducted on a 10mm thick plate. The welding conditions are shown in Table 10, the groove shape and macro structure, in Figure 14 and the welded joint properties, in Table 11, respectively.

Table 10: Welding conditions

Product name			DW-N709SP
Shielding gas & flow rate			80%Ar-20%CO2 & 25l/min
Welding position			3G uphill
Interpass temperature			150°C max.
Polarity			DCEP
Welding parameters	Face side	1st layer	140A-24V-17cm/min
		2nd layer	160A-26V-16cm/min
	Back side	Final layer	160A-26V-15cm/min

Figure 14: Groove configuration and macro structure

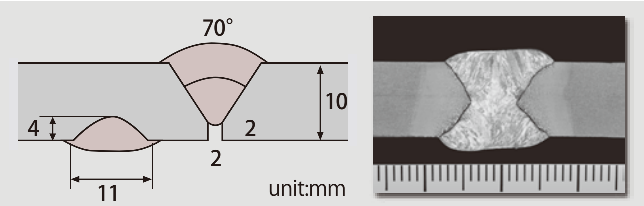


Table 11: Welded joint properties

Properties	Measurements
TS (MPa)	759; 764 (Fractured at base metal) *1
Notch toughness (J) at -196°C	62, 65, 60 (Avg. 62) *2
Longitudinal bending, 180°	No defect

Note: *1: Due to plastic constraint, the weld metal strength is increased.
*2: Specimen size is 7.5mm x 10mm

5-3. Welding efficiency comparison of SMAW and FCAW (DW-N709SP)

SMAW and DW-N709SP were compared in terms of the product quantity and arc time needed to obtain 100 kgs of weld metal. Table 12 shows the results. DW-N709SP was found to be excellent in deposition rate, arc time as well as deposition efficiency.

Table 12: Comparison of efficiency

	DW-N709SP (1.2mmΦ)	SMAW (4mmΦ)
Product quantity (kgs)	125	200
Arc time (hour)	29.4	71.4
Deposition rate (g/min)	75 (at 200 A)	34 (at 150 A)
Deposition efficiency (%)	85	50

6 Notes on usage

When using 7% Ni TMCP steels, users must take the same precautions they would for 9% Ni steels, which were described in KWT14-2.

(1) Easy magnetization
Residual magnetism in 7% Ni TMCP steel will cause magnetic arc blow. For welding, it is advisable to use AC polarity as much as possible for SMAW and SAW.

(2) Crater crack
It is strongly recommended that users grind the crater down each time the arc stops, in order to avoid crater cracks.

(3) Dilution
Dilution of the base metal into the weld metal by the arc causes changes in the weld metal chemistry, resulting in the decrease of weld metal tensile strength. Users must ensure that the tensile strength and 0.2% proof strength fulfill the requirements in the procedure test in advance.

7 Postscript

This article discussed the recent global supply and demand of LNG as well as the application of 7% Ni TMCP steel for cryogenic uses. As a clean source of energy, the natural gas demand is expected to increase further, requiring the development of many new technologies. Kobe Steel will continue cultivating new welding technologies, in accordance with the needs of our users.

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KOBELCO WELDING TODAY Vol.18 No.1 2015

Dubai: Famous for having the world's largest

The Dubai Mall

Burj Khalifa

Palm Islands

In front of the Acrylic Panel at the Dubai Aquarium

Mr Kimata, GM, posing at the entrance of Sheikh Zayed Mosque in Abu Dhabi

Dear KWT readers! My name is Keiichi Kimata. When the Middle East office in Dubai, UAE, opened in August 2014, I was assigned there as General Manager from my former post at Kobelco Welding Asia Pacific Pte. Ltd. (KWAP) in Singapore. Although it is just a "one-man office," I'm planning to develop this branch into the front-line base for our business in the Middle East as well as Africa.

Let me introduce Dubai, the most populous of the seven emirates in the United Arab Emirates (UAE). Dubai covers just 3,885m², almost the same as Saitama Prefecture (adjacent to Tokyo) in Japan. But while it is a small emirate, it can boast having a few "number ones in the world."

The Burj Khalifa, the world's tallest man-made structure, towers over the skyscrapers and high-rise buildings in Dubai, standing 160 stories above the ground and 828meters high. The entrance to the observation deck named "At the Top," which is also the world-highest outdoor observation deck, is located in the first basement floor of the Dubai Mall.

The shopping mall is so large that it was the largest in the world when it opened (though no longer). It took me nearly two hours just to trot through all the floors.

Another "world's largest" is the Acrylic Panel in the Dubai Aquarium at the Dubai Mall. Measuring 32.88m wide x 8.3m high x 750mm thick and weighing 245tons, it was listed in the Guinness Book of Records but recently lost its No.1 position. In Dubai, anyone can enjoy three "world's largest" without difficulty.

When I arrived at Dubai in August, there were days exceeding 50°C, but it has been getting cooler, with maximum highs of around 37°C toward the end of October. (But even so, the temperature equals the hottest of days in Japan!) I am longing for the day when I'll be able to go out in the daytime.

I look forward to seeing KWT readers here in the world's number-one city, Dubai, in the very near future!

Reported by
Keiichi Kimata
KWAP Middle East Representative Office
General Manager

Indonesian people: calm, generous and positive

Attendees posing in front of the Kobe Steel booth at the Iwatani-Indonesia seminar (Mr Sawada, second from the left)

At a Japanese restaurant in Jakarta. Cheers!

Dear KWT readers! My name is Atsushi Sawada. I have been working in the Indonesia Liaison Office, an affiliate of Kobelco Welding Asia Pte. Ltd. (KWAP) in Singapore, as a chief representative since December 2013. The office is located in Jakarta, the capital of Indonesia, where ten million people live (the total population of Indonesia is 247 million).

The political turbulence since the recent change of government has weakened the country's economy, but in a long run, the economy is expected to grow strongly. Accordingly, it still attracts much foreign investment in Indonesia.

The auto-bicycle manufacturing, a key industry supporting the Indonesian economy, is almost entirely monopolized by Japanese-affiliated makers. For this reason Indonesia may be said to be pro-Japanese, which is not always seen in other parts of the world.

As for Kobe Steel's welding business in Indonesia, we have been collaborating technically with P.T. Intan Pertiwi Industri (INTIWI) since 1977. INTIWI has produced and sold high-quality covered electrodes ever since and has contributed to the development of the country's diverse infrastructure. On the other hand, we import CO_2 solid wires made by Kobe MIG Wire (Thailand) Co., Ltd. (KMWT) and sell them to auto-bicycle makers as well as car manufacturers through "CV-ECHO," a local distributor.

I believe that it is my mission to further develop the two businesses and respond to customers' needs for total welding solutions.

Indonesian people are quite calm, generous and always positive whatever happens. I am very fond of such people.

For us to serve our Indonesian customers in the best way possible, however, requires that we supply the best quality products and solutions. I strongly hope that more customers will have the chances to use Kobe Steel's welding consumables.

I look forward to seeing all of you KWT readers soon! Terima Kasih (Thank you)!

Reported by
Atsushi (Andrew) Sawada
KWAP Indonesia Representative Office
Chief Representative

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FABTECH 2014 in Atlanta

The Kobelco booth, crowded with interested people

The entrance to the FABTECH exhibition, held at the Georgia World Congress Center
Attendees posing in front of the Kobe Steel booth (Mr Yanagimoto, first from the Right)

Meeting with clients

The giant FABTECH 2014 was held at the Georgia World Congress Center in Atlanta, Georgia from November 11 to 13. It is one of the biggest metalworking events in North America and is held in a different city in the USA every year. 1,400 exhibitors displayed their wares in the 46,500 square meter exhibition hall, which drew as many as 27,000 participants from all over the world: North America, Central and South America, Europe, Asia as well as Middle East.

During the exhibition, more than 100 sessions were held in which the latest trends and metal-processing technologies were discussed by many specialists. Mr Jody Fleddermann, the President of Precision Metal-forming Association participated as panelist in one of the panel discussions.

Kobelco Welding of America Inc. (KWAI) was a participant - for the twenty-fifth time in a row. This year, we featured a redesigned booth in which the panels of Kobelco welding consumables were displayed by industry such as energy, automobile, shipbuilding so that visitors could easily understand what we intended to show.

Flux cored wires (FCWs) for stainless steels, KWAI's key products, including the XR- and TGX-series FCWs that were originally developed by Kobe Steel, were featured on a large screen display. We learned that Kobelco's unique products could attract large numbers of visitors.

With so many welding-related enterprises, from global giants to medium and small niche manufacturers, all highlighting their own unique products, I realized how important it is that our customers learn about Kobelco's latest welding consumables and technologies under the slogan "the most reliable welding company in the world for the total welding solutions." This is the only way to enhance the presence of Kobelco and our brand.

Next year, FABTECH will be held in Chicago, where it is held every other year. Dear KWT readers, please join us at the Kobelco booth again. We look forward to seeing you there.

Reported by
Ryusaku (Ray) Yanagimoto
National Marketing Manager, KWAI