KOBELCO WELDING TODAY

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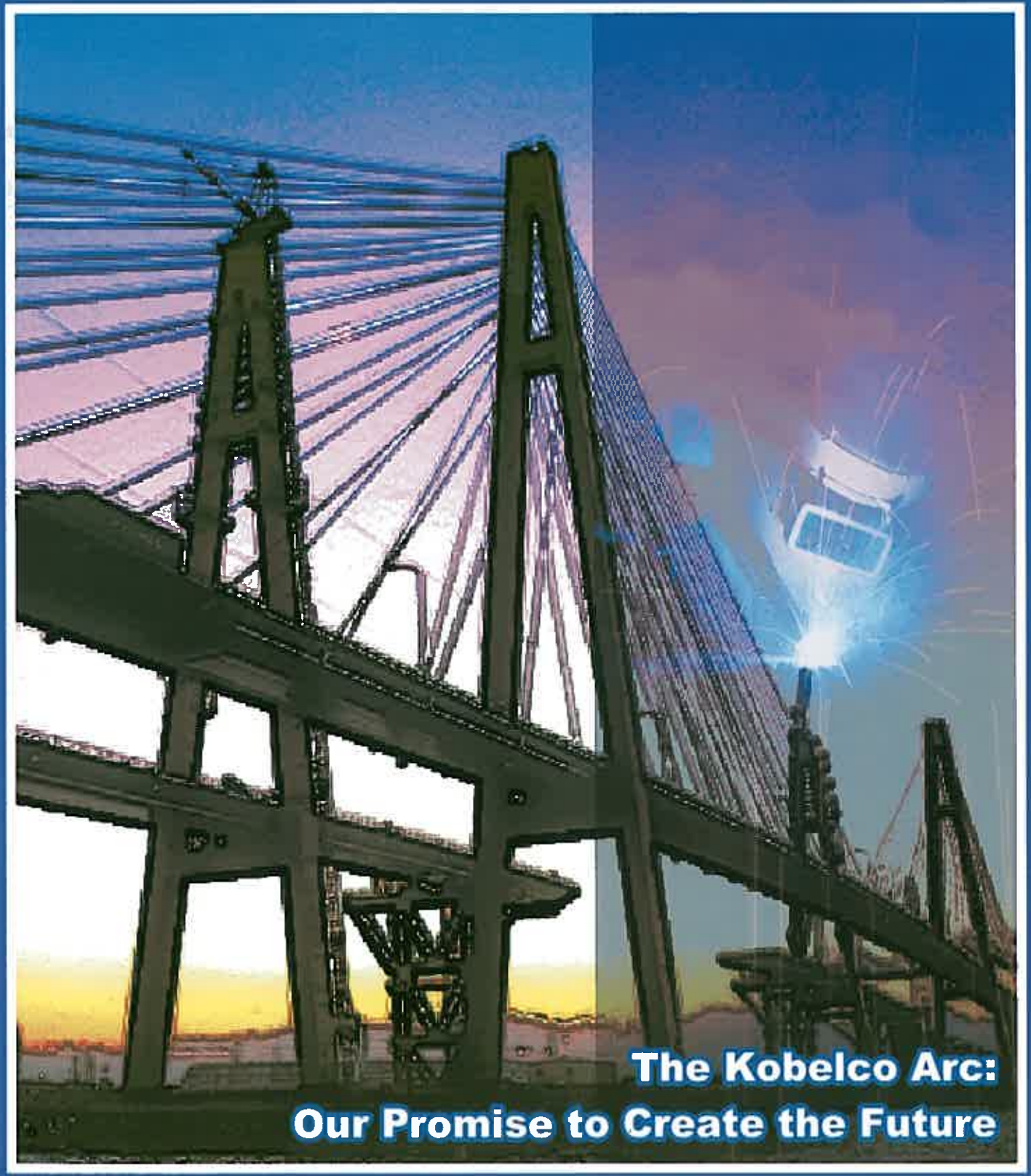


The Kobelco Arc:
Our Promise to Create the Future

HCMI, a Leading Indonesian Fabricator of Hydraulic Excavators, Diversifying through International Engineering Business

PT. Hitachi Construction Machinery Indonesia (HCMI) is one of the largest hydraulic excavator manufacturers in Indonesia, established in 1991 as a joint venture between Hitachi Construction Machinery Co., Ltd. (Japan) and a few other Indonesian and Japanese companies. HCMI manufactures hydraulic excavators, wheel loaders and their components based on designs licensed from Hitachi Construction Machinery of Japan. In addition, HCMI engineers and fabricates various types of large-scaled equipment for plants.

HCMI acquired certification of ISO 9002 for its quality assurance system in 1997. Furthermore, it pays extensive attention to worker safety and sustaining the global environment through its solid environment management system that has been certified to the ISO 14001 requirement in 2001.

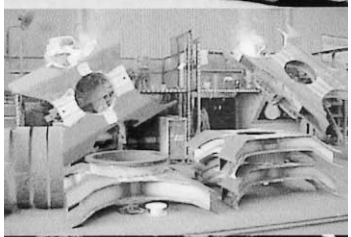
As of 2002, HCMI has 650 employees at its Bekasi and Cibitung factories and an annual capacity of fabricating 800 of power shovels and 15,000 tons of various components and other machinery based on their own engineering. Its sales are comprised of 50% from finished construction machinery, 25% from components of construction machinery and the other 25% from the engineering machinery.

In the field of construction machinery, 30 to 40 hydraulic excavators are manufactured per month, 90% of which is for the domestic market with the rest for export to Malaysia and Thailand. As for construction machinery components, 50 units of side frames as well as parts for 150 wheel loaders are exported each month to Hitachi Construction Machinery (Japan) and 200 units of the fronts of mini-excavators are exported to HCME (Netherlands) each month.

In addition, HCMI will soon start supplying side-frames to PT. Komatsu Indonesia Tbk in accordance with an agreement reached in April 2002 with KOMATSU.

The engineering business covers an extensive array of manufacturing. Pressure vessels, chemical engineering machines, cranes, steel structures, presses and containers and their parts are sold in the domestic market as well as exported to Europe, USA, Japan, Singapore and Malaysia.

The commemorative 3000th delivery of a hydraulic excavator



Track frames in the welding process

Robotic welding contributes to the consistent quality of products

An engineering product of GIS tank / pressure vessel

Future business plans aim at expanding the number of construction machinery components, and becoming the optimum manufacturing site for the Hitachi Construction Machinery group in the world. In the engineering business, emphasis will be placed on fabricating pressure vessels that are certified with the U-Stamp of ASME, acquired in October, 2002.

Kobe Mig Wire (Thailand) Co., Ltd. (KMWT) supplies MG-50 (AWS ER70S-G) and MG-51T (AWS ER70S-6) to HCMI, which are used in the fabrication of diversified products. Spooled wires for semi-automatic welding, in particular, contribute to achieving high efficiency in welding thick plates. We are committed to cooperating with HCMI in its process of acquiring all the functions needed to be the world's optimum manufacturing site for the Hitachi Construction Machinery group, by supporting its efforts in solving welding-related tasks in manufacturing and by supplying good welding products constantly.

Reported by M. Otsu, GM
Technical Department, TKW / KMWT

☐ Message from the Editor ☐

Dear leaders, A Happy New Year!

Last year we, KOBELCO, joined as an exhibitor at the Beijing Essen Welding Fair that was recognized as the world's second largest welding exhibition. As you may know, KOBELCO signed an agreement to establish a joint venture with Panasonic Group of Japan and Khai Whong Group of China to produce solid wires and, in the future, flux-cored wires.

China is the largest country with a great potential of growing the market for welding consumables. We have been exporting a high amount of KOBELCO welding consumables to China many years. However, lately most Chinese fabricators prefer to use domestic products for reasons of policy, logistics, or price. In addition to our decision to manufacture general-use wires in China, KOBELCO will continue to export high-technology products to satisfy the diversified requests of customers.

We are very proud of supplying high quality products to our customers, and promise you to improve persistently the quality of welding consumables. I am counting on you to support KOBELCO as your best partner.

Sincerely yours

Masakazu Tojo
Editorial Chairman

General Manager

International Operations Department

Welding Company
Kobe Steel, Ltd.

Calling from Tokyo

A Very Happy New Year to all readers of Kobelco Welding Today!

My name is Fumitake MORIMOTO. Do you remember Tomokazu MORIMOTO who was introduced in this column last April? I am another MORIMOTO in our department. Please call me Fred for short for your convenience.

I am in charge of the European market and I am really happy to work for this region partly because, if I may confess, Europe is the home of my favorite soccer teams. For my weekend pastime, I enjoy watching live TV broadcasts of European soccer matches featuring Japanese players such as Nakata, Ono and Nakamura.

By the way, did you enjoy the Korea-Japan World Cup? I could not get a ticket for a match played in Japan, even though half of the matches were played here. I finally got a ticket for the match between South Korea and Turkey that was played in Korea. I enjoyed the match very much, and I had a taste of the famous Korean Barbecue in Seoul.

I am very proud of the excellent reputations of our KOBELCO welding consumables and of Kobelco Welding Today throughout the world. I will continue to strive for excellence and do my best so as to ensure that our KOBELCO products remain helpful and useful to all our customers.

Fumitake Morimoto
Asst Manager
International Operations Dept.
Welding Company
Kobe Steel, Ltd.

Contents

Welding of Offshore Structures

Part 1: How to Select Welding Consumables

Offshore structures are used for the drilling and operation of underwater oil and gas wells in seas that may be shallow, deep, mild or cold; and subject to waves, tides, storms, earthquakes, and, in cold seas, ice floes. Therefore, in the fabrication of offshore structures, stricter quality control is required in terms of design, material selection, welding procedures, and inspection. This two-part series of articles on the welding of offshore structures will begin with Part 1: How to Select Welding Consumables. In the next issue the series will continue with Part 2: Essential Factors in Welding Procedure Control.

Jackets, Jack-up-rigs, and Semi-sub-rigs are the Main Types of Offshore Structures

Offshore structures are used for a particular operational purpose: either production or trial drilling of oil or natural gas. The major units are fixed production platforms and mobile rigs. The typical fixed production platform is the jacket type, as shown in **Fig. 1**. The jacket comprises the most heavy duty structure of the platform, the major part of which is positioned under the sea, sustaining the deck, derrick, and housing module.

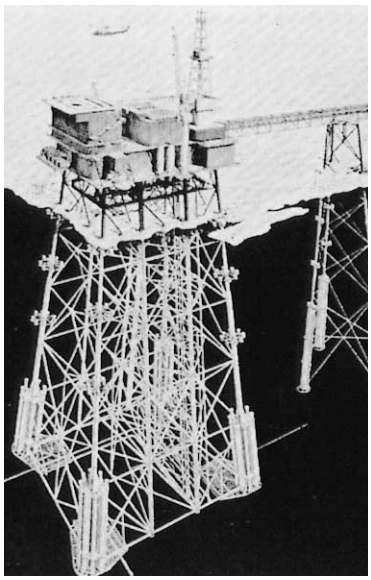


Fig. 1
A fixed production platform with the jacket or braced tubular legs positioned on the sea bottom at an approximate sea depth of 125 m

A typical mobile rig for trial drilling of oil and natural gas is, as shown in **Fig. 2**, the jack-up rig, which is operated at a sea depth up to about 100 m. The legs of a jack-up rig are positioned on the sea bottom to jack up and down the deck and derrick.

Fig. 2
A jack-up rig with truss type legs for jacking up and down the deck, suitable for a 90-m sea depth

Where the sea depth is greater than 100 m and up to approximately 500 m, semi-submergible rigs that are mobile and held in position by anchors are used as shown in **Fig. 3**. The columns and lower hulls of a semi-submergible rig sustain the deck and derrick.

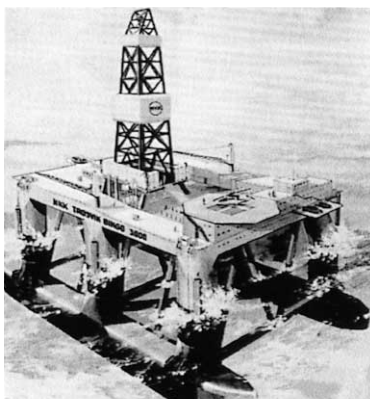


Fig. 3
A semi-submergible rig, consisting of lower hulls, columns, deck, and derrick

A Wide Span of Steel Grades are Used

Ship class grades of steels used for offshore structures vary depending on the type of structure and the service conditions. Fixed platforms use high tensile strength steel tubular products with yield strengths of 350, 400, 420 and 500 MPa for the jacket. Jackets are fabricated with thick-section tubular steels ranging from, for example, 40 to 90 mm and, for a large jacket, over 100 mm. Jack-up rigs use high tensile strength steels with yield strengths of 500, 550 and 690 MPa for legs with thick sections reaching, for rack-to-rack joints, approximately 130 mm. The structural components of semi-submergible rigs use mainly mild steel and high tensile strength steel with yield strength of 350 MPa.

Offshore Structures Require Higher Quality for Welded Joints

In the fabrication of offshore structures, welding is one of the most important processes; therefore, the welding procedure is required to follow several international codes, ship class rules, engineering specifications, and client's specifications depending on the type of offshore structure and the particular sea area for services.

Jackets are fabricated in accordance with clients' specifications related to the exact service environment in addition to international codes such as AWS and BS. Such additional requirements relate to the following qualities.

(1) Fracture toughness

To ensure the fracture toughness of welds, crack tip opening displacement (CTOD) testing is required in addition to conventional 2-mm-V notch Charpy impact testing, in accordance with BS 7448-1997 (Fracture Mechanics Toughness Test). A CTOD value of 0.25 mm at −10℃ is often regarded as acceptable for offshore structure welds. There are Kobelco Brand welding consumables that may satisfy this CTOD requirement (Refer to **Tables 1 through 4**).

(2) Fatigue strength

Jackets are braced tubular structures that consist of complex welded joints particularly at, as shown in **Fig. 4**, the node area, where several tubular components are crossed causing high stress concentrations. The node welds are required to be finished with exceptionally smooth weld surfaces. Kobelco brands for offshore structures offer excellent usability to meet this requirement.

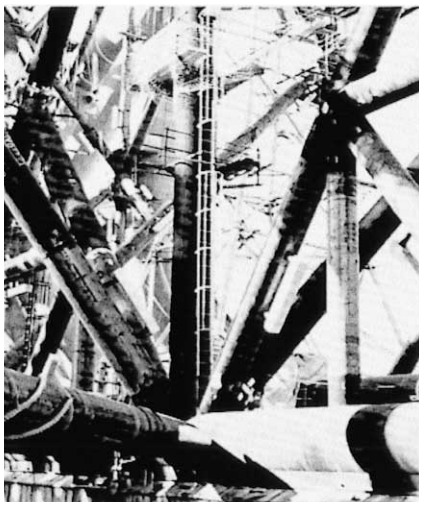


Fig. 4 Part of a jacket showing a few node areas where some tubular components are crossed

(3) Hydrogen induced stress corrosion crack resistance

Seawater contains high or low amounts of hydrogen sulfide depending on the extent of pollution. Hydrogen sulfide can cause sulfide stress corrosion cracking (SSCC) in welds. SSCC is well known to initiate at the toe of the weld and propagate to the heat-affected zone of the base metal. In order to prevent SSCC, the Vickers hardness of welds is required to be controlled (e. g. 290 max). SSCC test data for some Kobelco brands for offshore structures are available.

(4) Cold crack resistance

Jackets use mainly high strength steels with thick sections: therefore, preventing cold cracking is essential. Cold crack susceptibility of welds is affected by the carbon equivalent (Ceq) and chemical element parameter (Pcm) of the base metal, the diffusible hydrogen in the weld metal and the restraint intensity of the weld joint. To improve crack resistance, Kobelco brands for offshore structures offer extra-low or ultra-low diffusible hydrogen.

Jack-up rigs and semi-submergible rigs are often fabricated in accordance with the Mobile Offshore Rules of the ship classification societies. In these cases, ship class grades of steels as per the unified rules of the International Association of Classification Society (IACS) are used; therefore, welding consumables matching these steel grades can be selected. However, for rigs to be operated in cold sea areas of −10℃ or lower, welded joints are required to be assessed by CTOD testing. In addition, fatigue strength and cold crack resistance are important properties required of welds as in the case of jackets.

Quick Guidance to Suitable Welding Consumables for Offshore Structures

1. This guidance is to help users select appropriate welding consumables for fabricating offshore structures. Users are requested to confirm whether the selected brand can satisfy the job specifications including ship-class approvals and other specific requirements in addition to those mentioned in these guidance tables before use. The Charpy impact energies are the average of three testing specimens. Yield strength includes yield point and 0.2% offset strength.
2. Mechanical properties of weld metal may adversely be affected by postweld heat treatment. Therefore, the brands having no "SR" designation should be used in the as-welded condition, whereas the brands that are designated as SR can be used in postweld heat-treated conditions in addition to being used in the as-welded condition.
3. A change of DC current polarity may affect usability of welding consumables, chemical composition, and mechanical properties of weld metals; therefore, use the polarity as indicated in the parentheses.
4. Where several brands are listed in a cell of the table, any brand can satisfy the requirement designated by yield strength, impact energy, and service temperature. The brand labeled MF contains fused type flux for SAW, whereas those indicated as PFH have bonded type fluxes. As for GMAW, the brands designated as DW or DWA are flux-cored wires, whereas those denoted with MGS are solid wires. Shielding gas composition can affect the performance of GMAW wires; therefore, use the shielding gas indicated in the parenthesis for each brand.
5. Brands with an asterisk (*) can satisfy the CTOD requirement of 0.25 mm min at −10℃.

Table 1 For Gas Metal Arc Welding (GMAW)

<table>
<tr><td colspan="2">Tensile strength (MPa)</td><td>490 min</td><td>520 min</td><td>550 min</td><td>610 min</td><td>670 min</td><td>770 min</td></tr>
<tr><td colspan="2">Yield strength (MPa)</td><td>350 min</td><td>400 min</td><td>420 min</td><td>500 min</td><td>550 min</td><td>690 min</td></tr>
<tr><td colspan="2">Impact Energy (J)</td><td>35 min</td><td>40 min</td><td>42 min</td><td>50 min</td><td>55 min</td><td>69 min</td></tr>
<tr><td rowspan="4">Service temperature (℃)</td><td>−20</td><td>DW-100E
(100%CO_2)
MGS-50
(Ar+20%CO_2, SR)</td><td colspan="2" rowspan="3">DW-55L*
(100%CO_2)
DWA-55L*
(Ar+20%CO_2)</td><td rowspan="4">DWA-65L
(Ar+20%CO_2)</td><td rowspan="3">MGS-70
(Ar+20%CO_2)</td><td rowspan="3">MGS-80
(Ar+20%CO_2)</td></tr>
<tr><td>−30</td><td>DW-55E
(100%CO_2)
DWA-55E
(Ar+20%CO_2)
DWA-55ESR
(Ar+20%CO_2, SR)</td></tr>
<tr><td>−40</td><td rowspan="2">None</td><td rowspan="2">MGS-88A
(Ar+20%CO_2)</td></tr>
<tr><td>−60</td><td>DW-55L*
(100%CO_2)
DWA-55L*
(Ar+20%CO_2)
MGS-50LT*
(Ar+20%CO_2, SR)</td><td>DW-55LSR*
(100%CO_2, SR)
DWA-55LSR*
(Ar+20%CO_2, SR)
MGS-50LT*
(Ar+20%CO_2)</td><td>DW-55LSR*
(100%CO_2)
DWA-55LSR*
(Ar+20%CO_2)</td></tr>
</table>

Table 2 For Shielded Metal Arc Welding (SMAW)

Tensile strength (MPa)		490 min	520 min	550 min	610 min	670 min	770 min
Yield strength (MPa)		350 min	400 min	420 min	500 min	550 min	690 min
Impact Energy (J)		35 min	40 min	42 min	50 min	55 min	69 min
Service temperature (°C)	−20	**LB-52** (AC, DCEP, SR) **LB-52A** (AC, DCEP, SR)	**LB-57** (AC, DCEP, SR)	**LB-62UL** (AC, DCEP, SR) **LB-62** (AC, DCEP, SR)	**LB-62UL** (AC, DCEP, SR) **LB-62** (AC, DCEP, SR)	**LB-106** (AC, DCEP)	**LB-80UL** (AC)
	−40	**LB-52LT-18*** (DCEP, SR)	**NB-1SJ*** (AC, DCEP, SR) **LN-52NS*** (AC)	**NB-1SJ*** (AC, SR) **LB-62L*** (AC, DCEP, SR)	**LB-62L*** (AC, SR)	**LBY-75** (AC)	**LB-88LT** (AC)
	−60	**NB-1SJ*** (AC, DCEP, SR) **LB-52NS*** (AC, DCEP, SR)					

Table 3 For Submerged Arc Welding (SAW)

Tensile strength (MPa)		490 min	520 min	550 min	610 min	670 min	770 min
Yield strength (MPa)		350 min	400 min	420 min	500 min	550 min	690 min
Impact Energy (J)		35 min	40 min	42 min	50 min	55 min	69 min
Service temperature (°C)	−20	**MF-300/ US-36** (AC, SR)	**MF-300/ US-49A** (AC, SR)		**MF-300/ US-40** (AC, SR)	**PFH-80AK/ US-255**	**PFH-80AS/ US-80LT** (DCEP) **PFH-80AK/ US-80LT** (AC)
	−40	**MF-300/ US-49A** (AC, SR)	**PFH-55S/ US-49A** (AC, SR)	**PFH-55S/ US-49A** (AC, SR) **PFH-80AK/ US-56B** (DCEP)	**PFH-55S/ US-40** (AC) **PFH-80AK/ US-56B** (AC,DCEP)		
	−60	**PFH-55AS/ US-36J*** (DCEP, SR) **PFH-55LT/ US-36*** (AC, SR)	**PFH-55LT/ US-36J*** (AC, SR) **PFH-55LT/ US-36*** (AC) **PFH-55AS/ US-36J*** (DCEP)	**PFH-55LT/ US-36*** (AC, SR)	**PFH-80AK/ US-56B** (AC)		

Table 4 For Gas Tungsten Arc Welding (GTAW)

Tensile strength (MPa)		490 min	520 min	550 min	610 min	670 min	770 min
Yield strength (MPa)		350 min	400 min	420 min	500 min	550 min	690 min
Impact Energy (J)		35 min	40 min	42 min	50 min	55 min	69 min
Service temp. (°C)	−20	**TGS-50** (SR) **TGS-51T** (SR)	**TGS-62** (SR) **TGS-60A** (SR)			**TGS-80AM** (SR)	
	−40	**TGS-1MT*** TGS-1N	**TGS-60A** (SR)				
	−60						

Revolutionary Ti-B Type Welding Consumables Satisfy CTOD Requirements

Titanium-boron micro-alloyed (Ti-B type) welding consumables were developed in the 1980s to cope with stricter requirements for weld metal fracture toughness that employed the concept of CTOD. The following are typical Ti-B type brands that provide excellent CTOD values.

- SMAW: **LB-52LT-18, LB-52NS, NB-1SJ, LB-62L**
- SAW : **PFH-55LT/US-36, PFH-55LT/US-36J, PFH-55AS/US-36, PFH-55AS/US-36J**
- GMAW: **DW-55L, DWA-55L, DW-55LSR, DWA-55LSR, MGS-50LT**

Titanium-boron micro-alloyed low-oxygen weld metal exhibits a fine grained acicular ferrite structure (**Fig. 5**) with good notch toughness and sufficient CTOD values as shown in **Fig. 6** and **Table 5**, respectively.

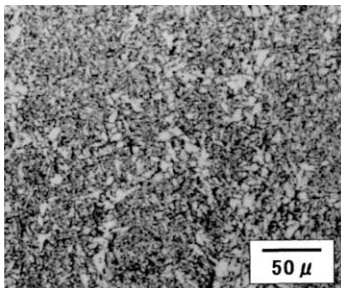


Fig. 5
Fine grained acicular ferrite structure of Ti-B type SAW weld metal

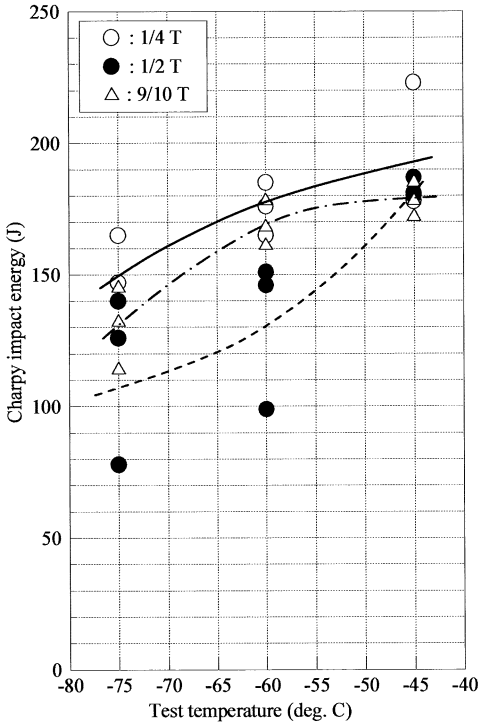


Fig. 6 Charpy impact test results of Ti-B type SAW weld metal (**PFH-55LT/US-36**) in the as-welded condition
(Base metal: BS4360 50D, 70 mm; Double-V groove, AC)

Table 5 CTOD test results of Ti-B type SAW weld metal by **PFH-55LT/US-36** in the as-welded condition (AC)

Base metal	Test method	Test temp.	CTOD
BS4360 50D T: 70 mm	BS standard	−50℃	1.64 mm 1.52 1.68

For the mechanical properties of **LB-52NS**, **NB-1SJ**, **LB-62L**, **DW-55L** and **DW-55LSR**, refer to KOBELCO WELDING TODAY, Special Edition for Low Temperature Applications. For the characteristics of other brands listed above, refer to KOBELCO WELDING HANDBOOK.

Innovative FCWs Expand the Application of GMAW in the PWHT Conditions

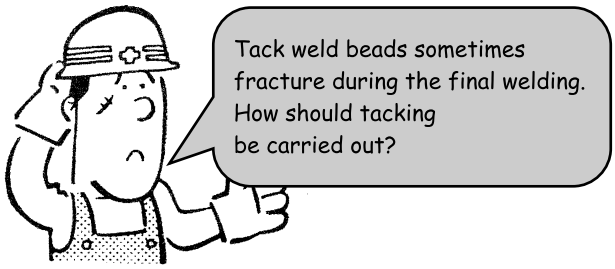
In the construction of offshore structures with postweld heat treatment (PWHT) requirements, GMAW with conventional rutile type flux-core wires (FCWs) was found to be inferior in notch toughness after PWHT due to SR embrittlement of the weld metal. Today, however, innovative FCWs, such as **DWA-55ESR**, **DW-55LSR** and **DWA-55LSR** that contain no impurities such as niobium and vanadium, exhibit excellent notch toughness of the weld metal after PWHT.

Sophisticated Techniques Provide 780-MPa High Tensile Strength Welding Consumables with Superior Resistance to Cold Cracking and Excellent Notch Toughness

780-MPa high tensile strength steel is the main material for the legs of jack-up rigs. These structures require stringent welding procedure control to prevent cold cracking of the welds because of the heavy thickness of the components. **LB-88LT** for SMAW, **PFH-80AK/US-80LT** and **PFH-80AS/US-80LT** for SAW and **MGS-88A** for GMAW offer low susceptibility to cold cracking due to exceptionally low diffusible hydrogen. In addition, these brands provide unsurpassed notch toughness at low temperatures down to −80℃ in the as-welded condition, which ensures reliability in cold seas.

References

1. H. Harasawa, Present Status of the Welding of Large Offshore Structures, Kobelco Technical Guide, No. 148, 1982
2. T. Miyazaki, Welding Procedure Control in Offshore Structures, Kobelco Technical Guide, No. 333, 1998



How to Carry Out Tack Welding

A tack weld is a weld made to hold the parts of a weldment in proper alignment until the final welds are made. A tack weld is generally a short weld made at intermittent points to hold abutting edges together. Tack welding is likely to be done lightly but tack welds should be subject to the same quality requirements as the final welds. Here are tips for making sound tack welds.

(1) Specify the length of each tack weld and the measurement from center to center of the tack welds in advance. In addition, you should specify multiple-pass weld profiles and throat thickness of the tack weld for tacking thick section components. The recommended minimum length of a tack weld bead, according to the Technical Recommendations for Steel Construction for Buildings of the Japanese Architectural Standard Specification (JASS 6), is shown in **Table 1**.

Table 1 Recommended minimum length of a tack weld bead for steel structures (1)

Plate thickness (mm) (2)	Min. bead length (mm) (3)
6 max.	30
Over 6	40

Note: (1) Applied to SMAW and semi-automatic GMAW.
In the case of high heat input welding by SAW, the minimum length of a tack weld bead should be longer with a larger throat thickness than in the case of SMAW and semi-automatic GMAW to prevent fracturing of the tack weld bead, caused by welding distortion.
(2) Apply to the thicker component in the case of a dissimilar thickness joint.
(3) The pitch of tack welds should generally be approximately 400 mm or shorter.

(2) According to the JASS 6 specification, do not do tack welding when the ambient temperature at a welding area is lower than −5℃. When it is in between −5℃ and 5℃, preheat the base metal at an appropriate temperature for a distance up to 100 mm from the welding joint.

(3) In tacking high tensile strength steel and heat-resistant low-alloy steel, a short tack weld bead causes faster cooling rates of the weld and thereby increases the hardness of the heat-affected zone of the base metal, which may cause cracking of the tack weld. In order to prevent this trouble, preheating temperature should be 40-50℃ higher than in the final welding.

(4) Use low hydrogen electrodes for tacking thick components of mild steel, high tensile strength steel and heat-resistant low-alloy steel to prevent cold cracking of tack welds.

(5) Avoid tack welding on sharp corners of the components where residual stress is apt to concentrate. **Figure 1** shows typical recommended locations for tack welds on a steel structure as per the Technical Recommendations for Steel Construction for Buildings.

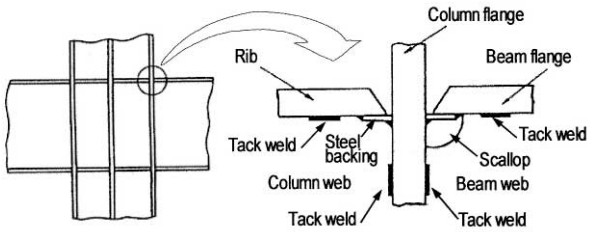


Fig. 1 Recommended tack weld locations for a column-to-beam connection joint

(6) You should progress symmetrically when you carry out tack welding on strongly restrained thick section components as shown in **Fig. 2**.

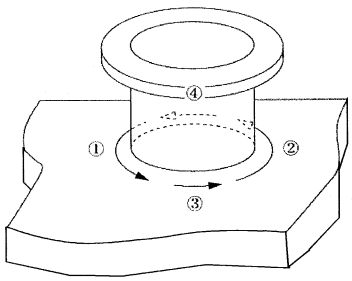


Fig. 2 Symmetrical tack welding on strongly restrained thick section work

(7) Whether they will be removed or left in place, tack welds should be made using a fillet weld or butt weld procedure qualified per the relevant code. Tack welds to be left in place should be made by welders qualified in accordance with the pertinent specification. They should be examined visually for defects and removed if found to be defective.

KWAI relocates to an expanded facility in Stafford, Texas

Kobelco Welding of America Inc. (KWAI) is pleased to announce that it has relocated to Stafford, Texas from Houston. Stafford is located southwest of Houston and is 30 minutes driving distance from downtown.

The new expanded office and warehouse is 36,000 sq. ft wide and allows for greater product availability. The facility includes a welding laboratory, allowing customers the opportunity to view demonstrations of Kobelco flux-cored wires onsite.

The move to Stafford represents Kobelco's ongoing commitment to the QTQ slogan (Quality Products, Technical support and Quick delivery).

The new address is 4755 Alpine Suite 250 Stafford, Texas 77477 USA. For further information, please contact us.
Phone: 281 (240) 5600
Fax: 281(240)5625
Email: kobelco@kobelcowelding.com

KWAI's new functional complex consisting of an office, warehouse and welding laboratory for demonstrations of the Spool of Excellence

Kobelco Exhibits First at Moscow International Welding Show

Big oil and gas pipeline projects are the target of the Kobelco team with **LB-52U** that has been used in various pipeline projects in Russia

There are two major annual welding fairs in Russia. One is the Russian National Welding Exhibition held in September every year and the other is the International Welding Exhibition that was held from October 22 through 25 this year in which KOBELCO participated for the first time. This year, 75 companies including 25 welding-related companies took part in the exhibition. Besides KOBELCO, some of the major welding consumables manufacturers present were ESAB and Lincoln. Also participating were Russian manufacturers including the Paton Welding Research Institute. In the field of power sources and welding machines, KEMPPI and SELCO of Italy exhibited their products. In total there were about 3,000 visitors over 4 days, and KOBELCO's booth drew 900 visitors.

In Russia, major oil companies are planning big oil and gas pipeline projects for supplying petroleum and natural gas to Europe, China, Korea and Japan. Taking advantage of the intensifying competition, KOBELCO will seek to expand its business opportunities, that are leveraged on overwhelmingly high recognition of **LB-52U**, the unsurpassed covered electrode for pipeline construction.

Kobe Steel and Kobe Welding of Tangshan Exhibits at Beijing Essen Welding Fair 2002

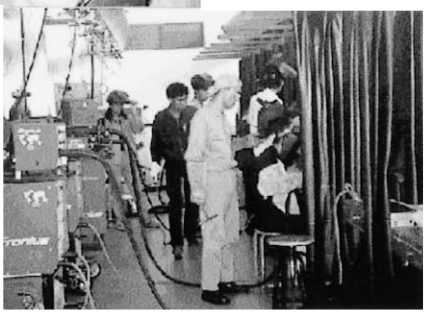
Kobe Steel, Ltd. And Kobe Welding Tangshan Co., Ltd. (KWT) took part in the Beijing Essen Welding Fair 2002 that was held at Beijing Exhibition Center from November 5 through 8. The exhibition drew as many as 40,000 visitors. KOBELCO's booth also captured many guests.

KWT is a joint venture company established in Tangshan, China, that plans to inaugurate operations in the middle of the next year. It is determined to contribute to further development of the welding industry in China, based on joint efforts and cooperation among KSL-Group, Matsushita Industrial Equipment Co., Ltd., and Tangshan Kaiyuan Electric Co. Ltd. KWT's first step will start with the production of CO_2 solid wires (AWS ER70S-6). We should like to invite your attention to the new family member of KOBELCO.

Posing at KOBELCO's booth at Beijing Essen Welding Fair 2002 are the personnel in charge of preparation of Kobe Welding Tangshan

Shinko Welding Service Implements a Welding Seminar in Thailand

All participants were keen to listen to the lecture (Left)



Welding practice was to review what the participants studied in the lecture (Right)

Shinko Welding Service Co., Ltd. (SWS) implemented a welding seminar in Chonburi City in Thailand during 13-20 November 2002. This seminar was organized by the Association for Overseas Technical Scholarship (AOTS) of Japan in cooperation with the Industrial Promotion Center Region 9 of the Department of Industrial Promotion of Thai Government and Thai-Kobe Welding Co. Ltd. (TKW). 31 participants attended the course. They were from leading private companies engaged in various industrial fields such as steel structure fabrication, ship repair, offshore structure fabrication, car fabrication, oil refinery, civil construction, steel production and welding consumable production.

This course focused on quality control in arc welding, employing almost the entire scope of arc welding technology including those for high tensile strength steel, Cr-Mo steel, stainless steel, cast iron, aluminum alloy and hardfacing

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