KOBELCO
KOBE STEEL GROUP

FAMILIARC™

LB-52 Arc Welding Electrode

AWS A5.1 E7016, EN ISO 2560-A-E 42 3 B, JIS Z3211 E4916
(For High Tensile Steel)

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LB-52 is the most popular electrode for 490MPa class high tensile steel in ships, bridges, buildings and pressure vessels. This electrode was adopted in the first nuclear reactor vessel of Japan. Its usability is good in all positions and it deposits weld metal of high quality.

General Characteristics

Workability

- In all positions the workability is good and both fluidity and removability of slag are fine.
- The arc is stable and bead appearance is quite beautiful.

Production Sizes and Recommended Welding Current

Table 1: Production sizes and recommended welding current (AC or DC ±)

Electrode Diameter (mm)		2.6	3.2	4.0	5.0
Electrode Length (mm)		350	350	400	450
Current Range (Amp)	Flat Position	55 ~ 85	90 ~ 130	130 ~ 180	180 ~ 240
	Vertical & Overhead	50 ~ 80	80 ~ 120	110 ~ 170	150 ~ 200

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Weldability

Mechanical Properties of All Weld Metal

Table 2: Typical Mechanical Properties of All Weld Metal

	Yield Point MPa	(ksi)	Tensile Strength MPa	(ksi)	Elongation (%)	IV at -29°C (J)	PWHT
Example	500	(72)	570	(82)	31	120	A.W.
	420	(61)	520	(75)	33	150	620°C X 1 hr
Guaranty	≧400	(≧58)	≧480	(≧70)	≧22	≧27	A.W.
	≧350	(≧50)	≧460	(≧67)	≧25	≧27	620°C X 1 hr

Chemical Composition of All Weld Metal

Table 3: Chemical Composition of All Weld Metal (mass%)

C	Mn	Si	P	S
0.08	0.94	0.60	0.011	0.006

All Weld Metal Impact Test

The result of impact test of all-weld metal is given in Fig. 1.

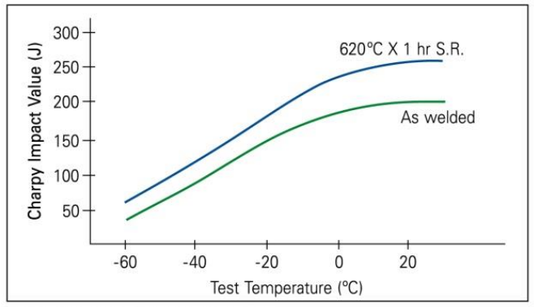

Fig. 1: Result of Charpy Impact Test

Approval List

Table 4: Shipping Approvals

NK	LR	ABS	BV	DNV - GL
KMW53H	3m, 3Ym(H15)	3H10, 3Y	3H, 3YH	3YH10

Notes of Usages

- Dry the electrodes at 300°C~350°C for 30~60 minutes before use.
- Keep the arc length as short as possible.
- Adopt back step method or strike the arc on a small steel plate prepared for this particular purpose to prevent blowholes at the arc starting.
- Use the wind screen against strong wind.
- Do the pre-heating properly when there is fear of cracking at the time of welding high restrained or high carbon equivalent steel.

Technical Report

The No. 1 Low-Hydrogen Type Electrode for both Mild Steel and 490N/mm² High Tensile Steel suited for almost limitless applications.

Inception of LB-52

LB-52 was developed around 1958. "L" stands for Low Hydrogen, while "B" symbolizes a slag-shielding covered electrode. "52" refers to the level of approximate tensile strength of the deposited metal when it was developed.

How low is the Hydrogen content ?

The E7016 electrode is designated as a Low Hydrogen Type, stressing the very important factor of lower hydrogen content in the deposited metal. Hydrogen is a predominant element that accelerates cracking in welds. **Fig. 2** compares the hydrogen content in deposited metals of several types of covered electrode. It clearly shows the low-hydrogen type releases the lowest hydrogen content.

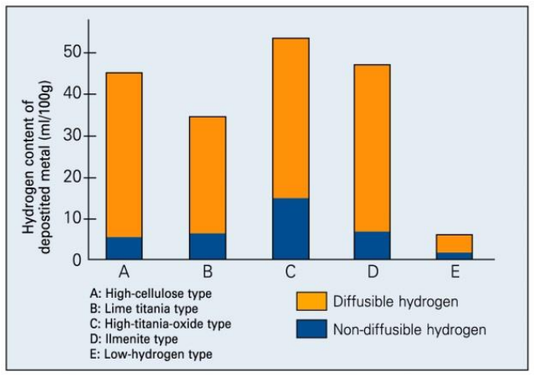

Fig. 2: Hydrogen content in deposited metals of different types of covered electrode.

Outstanding features of LB-52

The outstanding features of LB-52 among other E7016 electrodes are:

- Excellent usability in out-of-position welding: better arc concentration, easier slag removal, smoother bead appearance.
- Excellent mechanical properties: constant tensile strength, higher impact value.
- Excellent X-ray soundness

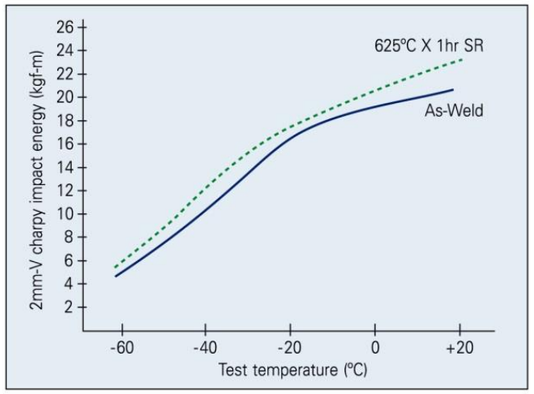

Fig. 3: Impact test results of LB-52 deposited metal both as-welded and postweld heat treated

Fig.3 shows the results of Charpy impact testing with 2mm V-notch specimens at a wide range of testing temperatures. Because of this high impact strength in both as-welded and post-weld-heat-treated condition, LB-52 can be used for low-temperature applications down to -20°C, in addition to room temperature and elevated temperature applications.

Highly reputed for 40 years

Since it was launched, LB-52 has seen its features refined and its markets expanded. Kobe Steel pursues keen quality control in order to maintain the outstanding features of LB-52 produced in Japan and overseas. The maintenance of quality is an important factor in persistently earning a high reputation for LB-52 in almost limitless applications in various fields such as pressure vessels, storage tanks, pipelines, machinery, offshore structures, ships, bridges and steel structures. Kobe Steel is sure LB-52 will be reliable electrode for your workshop.

How to use LB-52

The choice of LB-52 can prevent cracking in welding poor-weldability base metals that contain a high percentage of carbon, or that have thick sections. This is because of the merit of low hydrogen and higher ductility of the weld metal.

The choice of LB-52 can be the solution for passing stricter X-ray test. This is because of excellent arc concentration fusion to the groove face.

The choice of LB-52 can be the solution for fulfilling stricter requirements for tensile strength and impact value in both as-welded and postweld heat-treated condition lot by lot. This is because of Kobe Steel's keen quality control in every lot of production. However, you cannot obtain these benefits unless you follow some of the following precautions:

- Re-dry LB-52 at 300~350°C for 30~60 minutes before use for every four-hour exposure to air without wetting unless otherwise specified. This is the air as shown in **Fig.4**. Moisture can be a source of hydrogen in weld metal. **Fig.4** clearly shows that higher temperatures and humidity accelerate the moisture pick up.

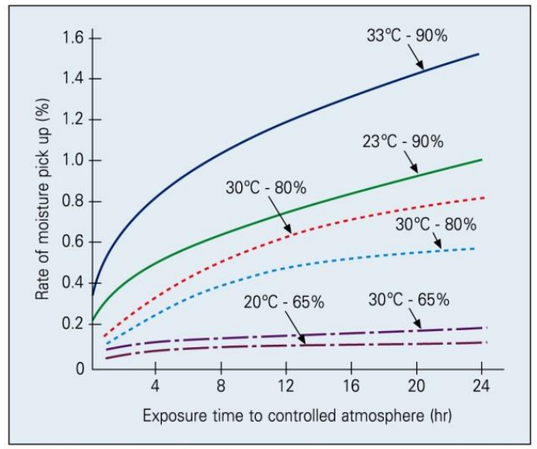

Fig. 4: The moisture pick up vs. several temperatures and levels of humidity of the controlled testing atmosphere.

- Use the backstep technique at arc starting to prevent the occurrence of porosity at the starting area of the bead as illustrated in **Fig.5**. This is common practice for all low hydrogen type electrodes.

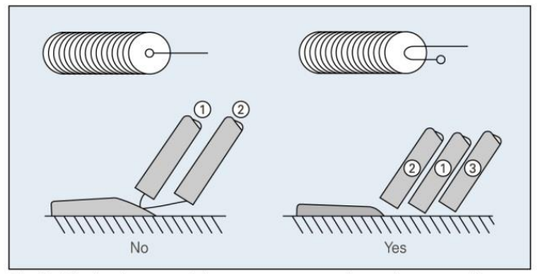

Fig. 5: The backstep technique prevents porosity at the arc starting area of the weld bead.

THE KOBELCO GUARANTEE: QTQ QUALITY PRODUCTS TECHNICAL SUPPORT QUICK DELIVERY

International slogan of Kobelco Welding Group