

**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	400	450	450
Current Range (Amp)	Flat Position	65 ~ 95	90 ~ 130	130 ~ 190	190 ~ 250
	Vertical & Overhead	60 ~ 90	80 ~ 120	110 ~ 170	165 ~ 210

**Weldability**

**Mechanical Properties of All Weld Metal**

Table 2: Typical Mechanical Properties of All Weld Metal

	Yield Point		Tensile Strength		Elongation (%)	IV at -29°C (J)	PWHT
	MPa	(ksi)	MPa	(ksi)			
Example	500	(72)	560	(81)	31	110	A.W.
	410	(60)	510	(74)	33	140	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: Typical Chemical Composition of All Weld Metal (mass%)

C	Mn	Si	P	S
0.07	0.97	0.59	0.013	0.007

**Efficiency**

Fig. 2 & Fig. 3 show the results of welding efficiency and deposition rate respectively.

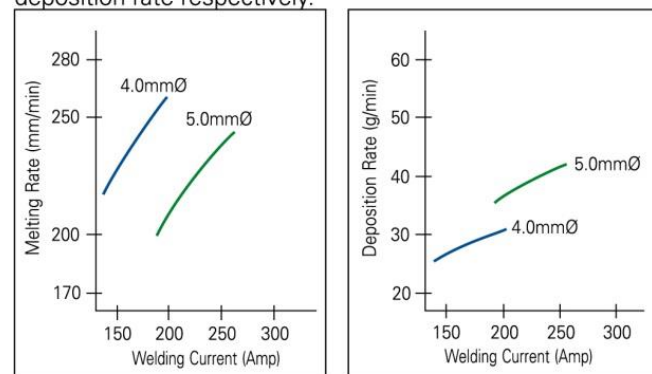


Fig. 2: Melting Rate

Fig. 3: Deposition Rate

**Impact Test of All Weld Metal**

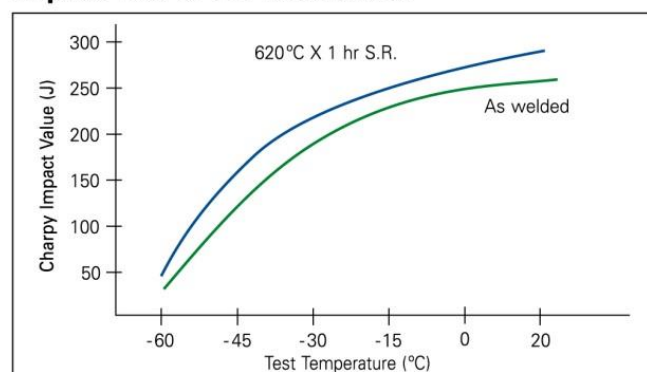


Fig. 1: Result of Charpy Impact Test

**Approval List**

LB-52-18 is approved for welding 490MPa class high tensile steel by the following classification societies.

Table 4: Approvals List

LR	ABS	DNV-GL
2m, 3Ym, H15	3Y, 3H10	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.
- Use the back-step method or a tab plate at the time of arc starting in order to prevent blowholes.
- Use a 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**

**LB-52-18 is a low-hydrogen electrode with a high deposition rate for mild steel and 490N/mm<sup>2</sup> high tensile steel. It is an excellent choice for a variety of applications.**

**Inception of LB-52-18**

LB-52-18 was developed around 1962. "L" stands for low hydrogen, while "B" symbolizes a slag-shielding covered electrode. "52" refers to the typical tensile strength of deposited metal at the time the electrode was developed. "1" shows that it can be used in all positions, while "8" is the designation for "iron powder, low hydrogen" as in the AWS E7018 specification.

**High deposition rate**

The deposition rate is the weight of metal deposited per unit of time. Typical deposition rates of LB-52-18 and an ordinary E7016 electrode, as a function of welding current, are shown in Fig.4.

It is clear that the deposition rates are dependent on welding current, and LB-52-18 provides approximately 20% higher deposition rates when compared with E7016 electrode.

The deposition rate is an important variable in welding economics. A higher deposition rate necessarily results in a faster speed or shorter time for welding a certain mass of groove. Shorter welding times can reduce labour costs. LB-52-18, therefore, can provide savings by up to 20% over ordinary E7016 electrodes when the cost for material and overhead are kept constant.

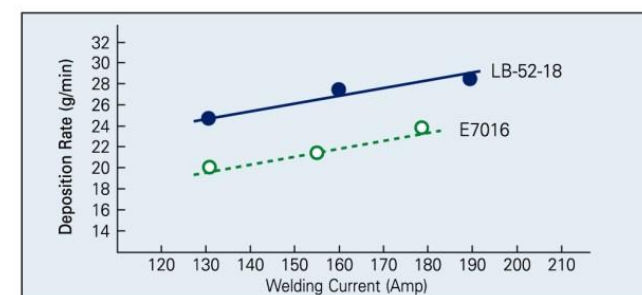


Fig. 4: A Comparison between LB-52-18 and an Ordinary E7016 Electrode on Deposition Rate

**Outstanding features of LB-52-18**

The features that help LB-52-18 stand apart from ordinary E7018 electrodes are:

- Superior welding performance with either DC or AC currents. It is the No. 1 electrode among the various low hydrogen electrodes that use DC.
- Superior mechanical properties: constant tensile strength and high impact value.
- Superior crack resistibility

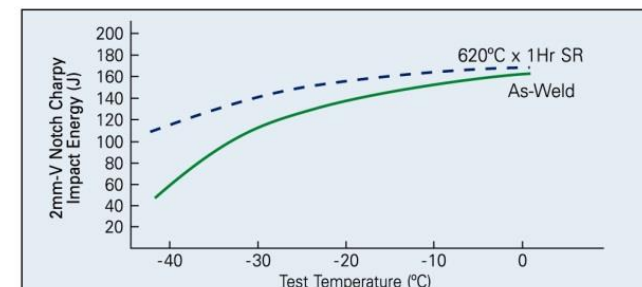


Fig. 5: Typical Impact Energy of LB-52-18 Deposited Metal (4.0mm)

Fig. 5 shows the results of Charpy impact tests on LB-52-18 deposited metal using 2mm V-notch specimens at various testing temperatures. This high impact strength makes LB-52-18 suitable of low-temperature applications down to -20°C, in addition to applications at room and elevated temperatures.

**Highly reputed for 35 years**

Since it was launched, LB-52-18 has seen its features refined and its markets expanded. Kobe Steel pursues keen quality control in order to maintain the excellency of LB-52-18 produced in Japan and overseas. The maintenance of quality is an important factor in the high reputation that LB-52-18 has persistently earned in such diverse fields as machinery, steel structures, bridge construction and shipbuilding.

**How to use LB-52-18**

When higher welding speeds or short welding times are required, ordinary E7016 electrodes can be switched to LB-52-18 in any application. In particular, LB-52-18 really shines in all-position welding of pipes using DC power sources. You will get unsurpassed arc stability and a superior weld bead profile through the girth weld of the pipes, in addition to higher deposition rates. However, you cannot obtain these merits unless you follow some of the following precautions.

- Re-dry LB-52-18 at 300~350°C for 30~60 minutes before use for every four-hour exposure to air without wetting unless otherwise specified. This is because the coating flux tends to pick up moisture in the air as shown in Fig. 6. Moisture can be a cause of spatters, porosity, irregular bead appearance and cold cracking. The moisture content in the coating flux, therefore, should be maintained at 0.5% maximum by re-drying in order to prevent decreased usability and weldability.

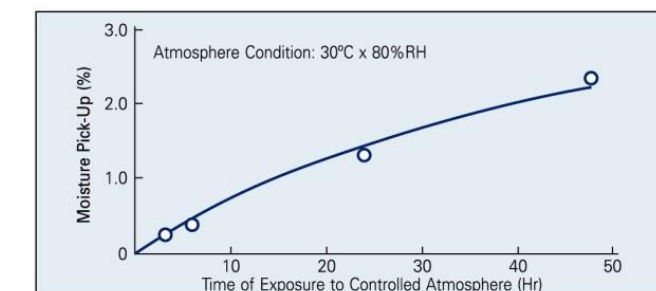


Fig. 6: The Relationship between Moisture Pick-Up and Time of Exposure to Controlled Atmosphere

- Use the backstep technique at arc starting to prevent the occurrence of porosity at the starting area of the weld bead as illustrated in Fig. 7. This figure shows the backstep technique in the vertical-up position when welding a horizontally fixed pipe. This is a common practice for all low hydrogen electrodes.

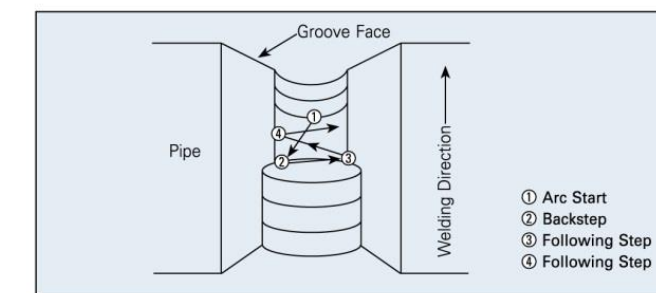


Fig. 7: The Backstep Technique in Vertical-Up Position Welding of Pipes