

# FAMILIARC™ LB-52U

(AWS A5.1 E7016)

FAMILIARC™ LB-52U is the world's No. 1 covered electrode for uranami welding, or the root pass melt-through welding with penetration beads. With FAMILIARC™ LB-52U your welding will be easier and faster, and you will have confidence in the quality of your welds in any kind of pipe welding of mild steel and 490MPa high tensile steel.

## Inception of FAMILIARC™ LB-52U

FAMILIARC™ LB-52U was developed around 1954. The letter "L" stands for low hydrogen, while "B" symbolizes a slag shielding covered electrode. The digits "52" refer to the level of approximate tensile strength of the deposited metal when it was developed. The letter "U" was coined from "uranami" welding.

## What Makes FAMILIARC™ LB-52U the Best for "Uranami" Welding?

### (1) Unsurpassed usability in all-position welding

FAMILIARC™ LB-52U features a very stable arc and low spatter over a wide range of welding currents. In particular, FAMILIARC™ LB-52U really shines in the "uranami" welding of horizontally fixed pipes.

FAMILIARC™ LB-52U features very smooth, glossy "uranami" beads, or the penetration beads protruded on the reverse side of the groove — Fig. 1. FAMILIARC™ LB-52U can accommodate wider tolerance of the root opening, which is an advantage in site welding. Once you have used FAMILIARC™

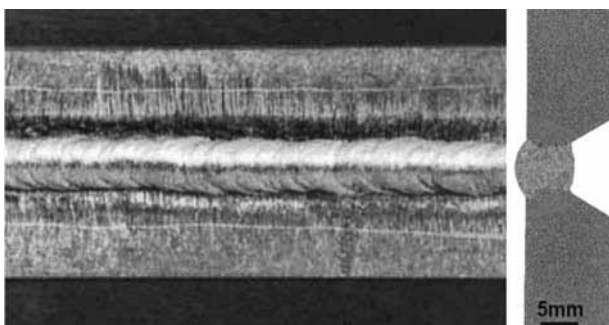


Fig. 1 — The surface and macrosectional profiles of a penetration bead protruding on the reverse side of a single-V-groove weld.



LB-52U, you will choose it again and again for unsurpassed performance.

Table 1: Chemical and mechanical properties of FAMILIARC™ LB-52U

Chemical composition of weld metal (%)				
C	Si	Mn	P	S
0.08	0.64	0.86	0.012	0.008
Mechanical properties of weld metal				[H] <sub>d</sub> <sup>1</sup> (ml/100g)
0.2%YS (MPa)	TS (MPa)	EL (%)	vE-29°C (J)	
480	560	31	80	3.5

1. Diffusible hydrogen in the weld metal made in the welding atmosphere of 21°C × 10%RH (Gas-chromatographic method)

### (2) Superior crack resistance and mechanical properties

FAMILIARC™ LB-52U provides superior crack resistibility due to a lower level of diffusible hydrogen in the weld metal. In addition, its impact strength is high over a range of testing temperatures — Fig. 2. Therefore, it can be used for low-temperature applications as well as moderate high-temperature applications.

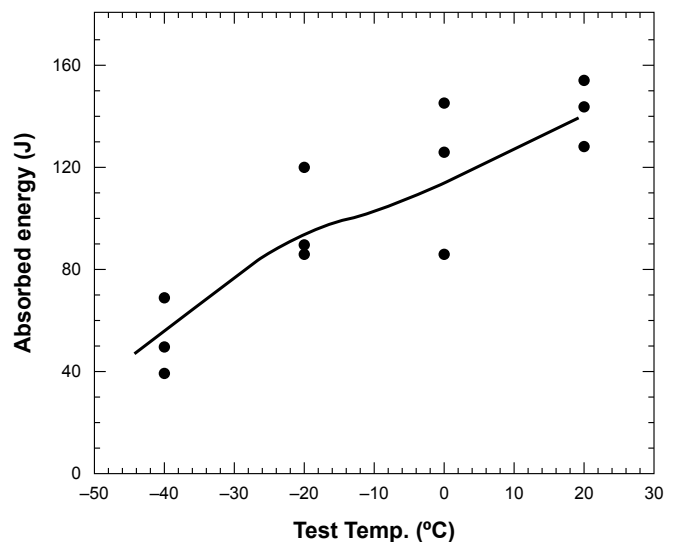


Fig. 2 — Charpy impact test results of the FAMILIARC™ LB-52U weld metal by using DC-EP welding current in the vertical-up position

### (3) A field-proven electrode in the worldwide markets

The unsurpassed usability of FAMILIARC™



Fig. 3 — A pipeline-welding site in Russia where FAMILIARC™ LB-52U is used for joining the girth joints in freezing weather

LB-52U in the "uranami" welding of pipe joints has satisfied users around the world. FAMILIARC™ LB-52U has been popular for a variety of piping jobs across Russia, Asia and the Pacific region. Particularly in Russia, FAMILIARC™ LB-52U has made a great contribution to the construction of very long, oil and gas pipelines under freezing weather with a long history of reliability — Fig. 3. Since 1982, about 80,000 metric tons of FAMILIARC™ LB-52U has been consumed in the construction of the Russian pipelines.

### Key Points in the "Uranami" Welding of Pipes with FAMILIARC™ LB-52U

- (1) Use the keyhole technique. Right after you get the arc by striking the groove face, control the molten pool to form the keyhole crater: then manipulate the electrode along the edge of the keyhole by using the semi-weaving technique — Fig. 4.
- (2) Control the weld penetration in the root of the groove by controlling the arc exposure spot, the electrode holding angle and the electrode oscillation width — Fig. 5 (a, b, c, d). Fig. 5 (a) relates to the other figures of (b), (c), and (d) respectively.

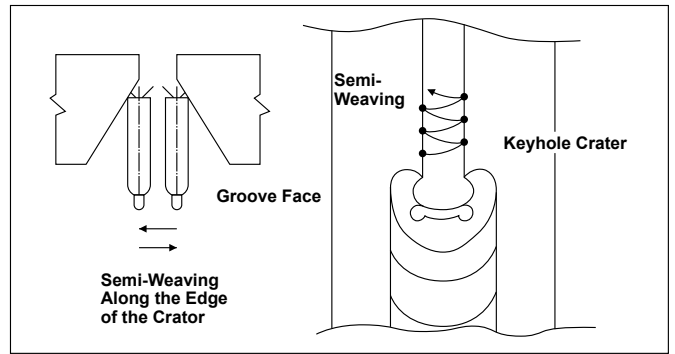


Fig. 4 — The keyhole technique

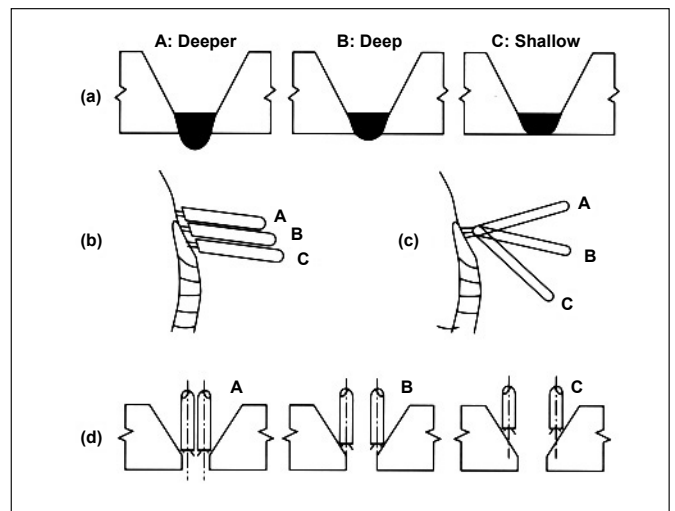


Fig. 5 — The relationship between the weld penetration (a), the arc exposure spot (b), the electrode holding angle (c) and the electrode oscillation width (d) in the "uranami" welding of horizontally fixed pipes

- (3) Terminate the crater on the groove face in order to prevent the crater cracking — Fig. 6.

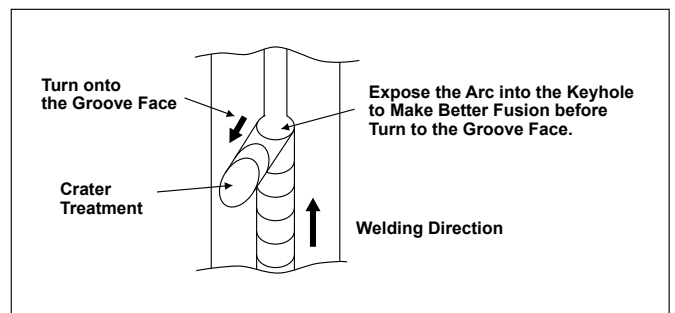


Fig. 6 — How to terminate the weld crater in order to prevent the crater from cracking

- (4) Grind both the starting and ending terminals of the preceding weld beads to assure a smooth joint of weld beads with the succeeding welds.
- (5) When joining the weld beads, start the arc on the preceding bead, and expose the arc into the keyhole to assure better fusion: then follow the same procedure as in Fig. 4.