

KW Weld metal powder

For Grounding & Lightning Protection Systems



Kumwell weld metal powder KW type is exothermic welding connection process for grounding and lightning protection system must maintain a low contact resistance often under adverse conditions for the expected lifetime. Connections in grounding and lightning protection system network are subjected to serve corrosion, high mechanical stress due to electromagnetic force, and rapid thermal heating due to high current magnitude during fault conditions.

Applications

Suitable for typical installation in grounding and lightning protection's connections their fore copper to copper, copper to steel, steel to steel, copper to stainless steel, and stainless steel to stainless steel.

Standards



- UL 467 – Standard for Grounding & Bonding Equipment.



- IEEE 837 – Standard for Qualifying Permanent Connections used in Substation Grounding.



- IEC 62561-1 – Lightning Protection Systems Component (LPSC) for connection components.

Criteria of Test Kumwell Exothermic welding connections have been successfully tested in accordance with;

• IEEE Std. 837 Standard for Qualifying Permanent Connection (For type test product)

1. Mechanical pullout test
2. Electromagnetic force
3. Sequential test group has 3 main procedures to test each if it passes the set standard of each procedure;
 - a. Current Temperature Cycling
 - b. Freeze Thaw Cycling
 - c. Corrosion Sequence Run: Salt Spray Test, Acid Test

• UL 467 Standard for Grounding & Bonding Equipment/UL Inspection Witness

1. Weld metal powder quality: Percentage of material, Particle size, Density of each composition, Starting powder and ignition
2. Reaction: Steady burn, No pop, No drastic color change, No porosity in the resulting copper, Consistency of color
3. Shot Time Current Test
4. Mechanical Sequence from UL 486

• American Railway Engineering and Maintenance-of-way Association (AREMA)

Test methods for tensile testing of metallic material evaluate the consistency chemistry and overall quality of KW, KB and KR Welding material resulting to the average of 43,000 psi tensile strength.

• IEC 62561-1 Lightning Protection Systems Component (LPSC) for connection component

1. Environmental Test: Salt Spray Test, Humid Sulphurous atmosphere test.
2. Electrical Test: Lightning Impulse Current Test, Contact Resistance Measurement
3. Static Mechanical Test: Tensile Test

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High Lightning Impulse Current Generator
10/350 μs & 8/20 μs

High Lightning Impulse Current
Combine Generator 8/20 μs

TEMPERATURE (HUMIDITY) Test Chamber

SULFUR DIOXIDE
Test Chamber

SALT SPRAY
Test Chamber



Quality Assurance

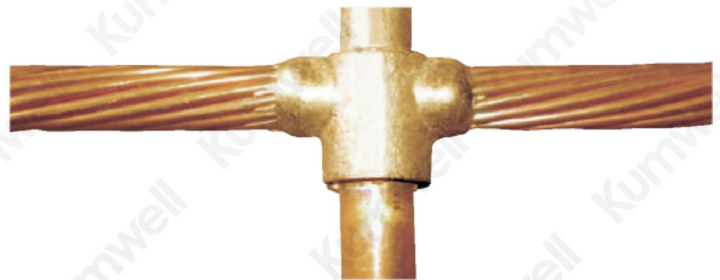
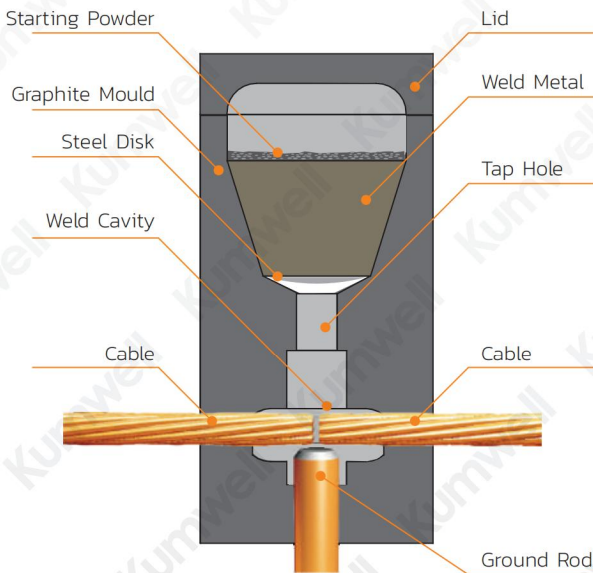


Kumwell also is internationally recognized for high standard of its graphite mould and the exothermic welding powder from successfully passed the control test in accordance with the UL467 Standard for Grounding and Bonding Equipment/UL Inspection Witness.



Process

Kumwell Exothermic Welding process is a molecular chemical reaction between copper oxide and aluminum, generating a tremendous superheat with molten metals reaching approximately temperatures of 2,537 °C (4,598 °F). The process can be completed itself automatically without external source of power or heat.



Completed Connection

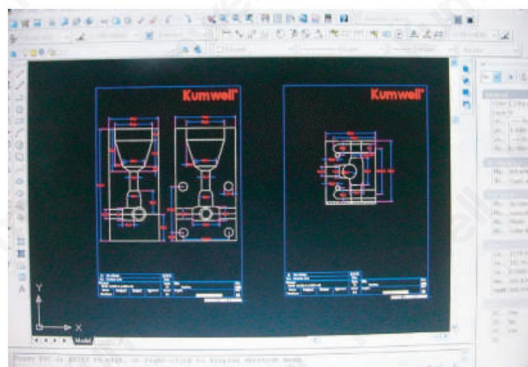
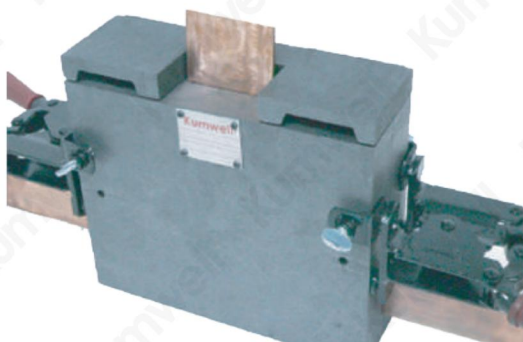
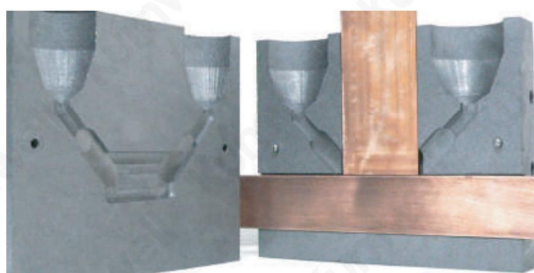
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Graphite Mould

Kumwell's exothermic welding mould made from high quality graphite material. From expert engineering to accurate manufacturing process followed the UL International Standards result in earnest design for cavity and flow path, accurate tolerance, professional design and long service life. Moreover, Kumwell can customize mould made to order.

- Earnest design: cavity, flow path
- High quality raw material
- Accurate tolerance
- Duration: at least 50 times in normal usage



BB11-WC-508508: 50x8 mm² Copper bar to 50x8 mm² Copper bar

Graphite Mould designs by computer programs.

Safety starting and weld metal powder

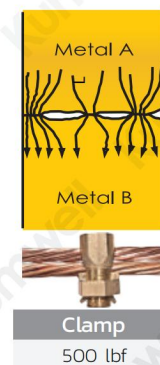
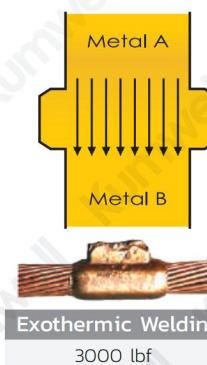
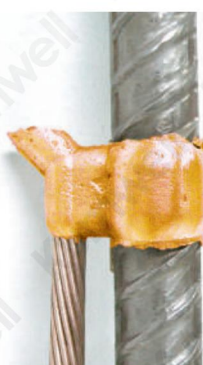
- Nontoxic and heavy metal
- Non self-ignite
- Ignition temperature at least 400°C
- Smooth reaction

- Steady burn without pop and fire out
- No slag and porosity
- Consistency of color
- High conductivity

Technical Comparison

Exothermic welding withstands about 5 times higher than clamp's connection in mechanical force.

Unlike compression and bolt clamp, exothermic welded joint become homogeneous metal.



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Packaging

Kumwell weld metal powder is contained a moisture-resistant plastic cartridge, packed in a paper box. Integral weld metal package is identified as to the weld metal powder's amount, type of metal powder to be connected, Lot No., the number of tubes to manufacturing date (MFD).

Code	KW15	KW25	KW32	KW45	KW65	KW90	KW115	KW150	KW200	KW250
Tubes/box	40	20	20	20	20	20	10	10	10	10

Storage

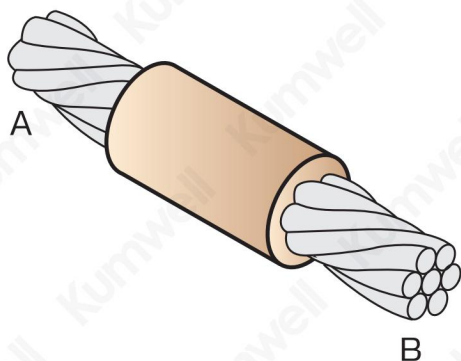
It should be stored at ambient temperature and kept away from moisture.



CC1

Cable to Cable

Horizontal end to end



Equipment

Mould	Metal powder
Handle clamp	Steel disk

Necessary Tools

Mould brush	Cable clean brush	File
Flint igniter	Scraper	Tool box

Recommended Tools

- Butane torch
- Butane gas
- Gloves

Note

- SC means Solid Copper
- "*" means to meet UL Listed

Conductor Size		Metal Powder	Graphite Mold Type	Handle Clamp Type	
A(mm ²)	B(mm ²)				
10	10	KW25	*CC1-C-10	HCC00	
16	16	KW32	*CC1-C-16	HCC00	
25	25	KW32	*CC1-C-25	HCC00	
35	35	KW32	*CC1-C-35	HCC00	
	25	KW32	CC1-C-3525	HCC00	
Ø8 mm	Ø8 mm	KW45	*CC1-C-8SC	HCC00	
	50	50	KW45	*CC1-C-50	HCC00
50	35	KW45	CC1-C-5035	HCC00	
	25	KW32	CC1-C-5025	HCC00	
	Ø10 mm	Ø10 mm	KW65	*CC1-C-10SC	HCC00
70	70	KW65	*CC1-C-70	HCC00	
	50	KW65	CC1-C-7050	HCC00	
	35	KW65	CC1-C-7035	HCC00	
	25	KW65	CC1-C-7025	HCC00	
95	95	KW90	CC1-C-95	HCC00	
	70	KW90	CC1-C-9570	HCC00	
	50	KW65	CC1-C-9550	HCC00	
	35	KW65	CC1-C-9535	HCC00	
	25	KW65	CC1-C-9525	HCC00	
107	107	KW90	*CC1-C-107	HCC00	
120	120	KW115	CC1-C-120	HCC00	
	95	KW115	CC1-C-12095	HCC00	
	70	KW115	CC1-C-12070	HCC00	
	50	KW90	CC1-C-12050	HCC00	
	35	KW90	CC1-C-12035	HCC00	
150	150	KW115	CC1-C-150	HCC00	
	120	KW115	CC1-C-150120	HCC00	
	95	KW115	CC1-C-15095	HCC00	
	70	KW115	CC1-C-15070	HCC00	
	50	KW90	CC1-C-15050	HCC00	
185	185	KW150	CC1-C-185	HCC00	
	150	KW150	CC1-C-185150	HCC00	
	120	KW150	CC1-C-185120	HCC00	
	95	KW115	CC1-C-18595	HCC00	
	70	KW115	CC1-C-18570	HCC00	
240	240	KW200	CC1-C-240	HCC00	
	185	KW200	CC1-C-240185	HCC00	
	150	KW200	CC1-C-240150	HCC00	
	120	KW200	CC1-C-240120	HCC00	
	95	KW150	CC1-C-24095	HCC00	
	70	KW150	CC1-C-24070	HCC00	
	300	300	KW250	CC1-C-300	HCC00
300	240	KW250	CC1-C-300240	HCC00	
	185	KW250	CC1-C-300185	HCC00	
	150	KW200	CC1-C-300150	HCC00	
	120	KW200	CC1-C-300120	HCC00	
	95	KW200	CC1-C-30095	HCC00	
	400	400	KW150x2	CC1-D-400	HCDOO
	400	300	KW150x2	CC1-D-400300	HCDOO
240		KW150x2	CC1-D-400240	HCDOO	
185		KW150x2	CC1-D-400185	HCDOO	
150		KW150x2	CC1-D-400150	HCDOO	
120		KW150x2	CC1-D-400120	HCDOO	
500	500	KW200x2	CC1-D-500	HCDOO	
	400	KW200x2	CC1-D-500400	HCDOO	
	300	KW200x2	CC1-D-500300	HCDOO	
	240	KW200x2	CC1-D-500240	HCDOO	
	185	KW200x2	CC1-D-500185	HCDOO	
	150	KW200x2	CC1-D-500150	HCDOO	

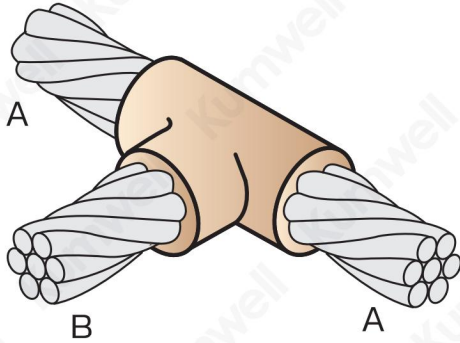
Note: Special requirement can be requested.

EX001/2024

CC2

Cable to Cable

Horizontal cable tap to horizontal cable run



Equipment



Necessary Tools



Recommended Tools

- Butane torch
- Butane gas
- Gloves

Note

- SC means Solid Copper
- "*" means to meet UL Listed

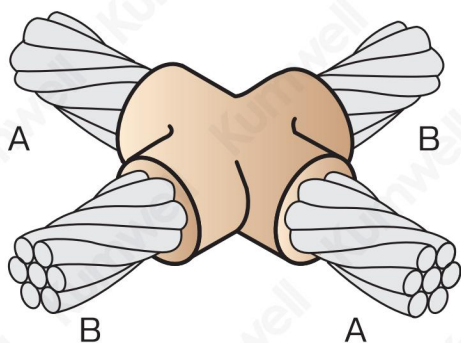
Conductor Size		Metal Powder	Graphite Mold Type	Handle Clamp Type	
A(mm ²)	B(mm ²)				
10	10	KW32	*CC2-C-1010	HCC00	
16	16	KW45	*CC2-C-1616	HCC00	
25	25	KW45	*CC2-C-2525	HCC00	
∅5.6 mm	∅5.6 mm	KW45	*CC2-C-5.6SC5.6SC	HCC00	
35	35	KW45	*CC2-C-3535	HCC00	
	25	KW45	*CC2-C-3525	HCC00	
∅8 mm	∅8 mm	KW65	*CC2-C-8SC8SC	HCC00	
	50	KW90	*CC2-C-5050	HCC00	
	35	KW45	*CC2-C-5035	HCC00	
50	25	KW45	*CC2-C-5025	HCC00	
	∅10 mm	∅10 mm	KW90	*CC2-C-10SC10SC	HCC00
	70	70	KW90	*CC2-C-7070	HCC00
70	50	KW90	*CC2-C-7050	HCC00	
	35	KW45	*CC2-C-7035	HCC00	
	25	KW45	*CC2-C-7025	HCC00	
	95	95	KW115	*CC2-C-9595	HCC00
95	70	KW90	*CC2-C-9570	HCC00	
	50	KW90	*CC2-C-9550	HCC00	
	35	KW90	*CC2-C-9535	HCC00	
	25	KW90	*CC2-C-9525	HCC00	
	120	185	KW150	CC2-C-120185	HCC00
120		KW150	*CC2-C-120120	HCC00	
95		KW150	*CC2-C-12095	HCC00	
70		KW90	*CC2-C-12070	HCC00	
50		KW90	*CC2-C-12050	HCC00	
35		KW90	*CC2-C-12035	HCC00	
25		KW90	*CC2-C-12025	HCC00	
16		KW90	CC2-C-12016	HCC00	
150		150	KW200	CC2-C-150150	HCC00
	120	KW150	CC2-C-150120	HCC00	
	95	KW150	CC2-C-15095	HCC00	
	70	KW90	CC2-C-15070	HCC00	
	50	KW90	CC2-C-15050	HCC00	
	35	KW90	CC2-C-15035	HCC00	
	25	KW90	CC2-C-15025	HCC00	
	185	185	KW200	CC2-C-150185	HCC00
185	150	KW200	CC2-C-185150	HCC00	
	120	KW200	CC2-C-185120	HCC00	
	95	KW150	CC2-C-18595	HCC00	
	70	KW90	CC2-C-18570	HCC00	
	50	KW90	CC2-C-18550	HCC00	
	35	KW90	CC2-C-18535	HCC00	
	25	KW90	CC2-C-18525	HCC00	
	240	240	KW150x2	CC2-C-240240	HCC00
		185	KW200	CC2-C-240185	HCC00
150		KW200	CC2-C-240150	HCC00	
120		KW200	CC2-C-240120	HCC00	
95		KW150	CC2-C-24095	HCC00	
70		KW90	CC2-C-24070	HCC00	
50		KW90	CC2-C-24050	HCC00	
35		KW90	CC2-C-24035	HCC00	
25		KW90	CC2-C-24025	HCC00	
300	300	KW200x2	CC2-D-300300	HCD00	
	240	KW200x2	CC2-D-300240	HCD00	
	185	KW250	CC2-C-300185	HCC00	
	150	KW200	CC2-C-300150	HCC00	
	120	KW150	CC2-C-300120	HCC00	
	95	KW150	CC2-C-30095	HCC00	
	70	KW150	CC2-C-30070	HCC00	
	50	KW150	CC2-C-30050	HCC00	
	35	KW150	CC2-C-30035	HCC00	
25	KW150	CC2-C-30025	HCC00		

Note: Special requirement can be requested.

CC4

Cable to Cable

Horizontal to horizontal cable cross



Equipment



Necessary Tools



Recommended Tools

- Butane torch
- Butane gas
- Gloves

Note

- SC means Solid Copper
- "*" means to meet UL Listed
- S means Galvanized steel wire stands.

Conductor Size		Metal Powder	Graphite Mold Type	Handle Clamp Type
A(mm ²)	B(mm ²)			
10	10	KW32	*CC4-C-1010	HCC00
16	16	KW45	*CC4-C-1616	HCC00
25	25	KW45	*CC4-C-2525	HCC00
35	35	KW65	*CC4-C-3535	HCC00
	25	KW65	*CC4-C-3525	HCC00
Ø8 mm	Ø8 mm	KW90	*CC4-C-8SC8SC	HCC00
	50	50	KW90	*CC4-C-5050
50	35	KW90	*CC4-C-5035	HCC00
	25	KW90	*CC4-C-5025	HCC00
	Ø10 mm	Ø10 mm	KW115	*CC4-C-10SC10SC
70	70	KW115	*CC4-C-7070	HCC00
	50	KW115	*CC4-C-7050	HCC00
	35	KW115	*CC4-C-7035	HCC00
	25	KW115	*CC4-C-7025	HCC00
95	95	KW150	*CC4-C-9595	HCC00
	70	KW150	*CC4-C-9570	HCC00
	50	KW115	*CC4-C-9550	HCC00
	35	KW115	*CC4-C-9535	HCC00
	25	KW115	*CC4-C-9525	HCC00
120	95	KW115	CC4-C-95S95S	HCC00
	120	KW200	*CC4-C-120120	HCC00
	95	KW200	*CC4-C-12095	HCC00
	70	KW150	*CC4-C-12070	HCC00
	50	KW150	*CC4-C-12050	HCC00
150	35	KW115	*CC4-C-12035	HCC00
	25	KW115	*CC4-C-12025	HCC00
	150	KW250	CC4-C-150150	HCC00
	120	KW250	CC4-C-150120	HCC00
	95	KW200	CC4-C-15095	HCC00
	70	KW150	CC4-C-15070	HCC00
	50	KW150	CC4-C-15050	HCC00
185	35	KW115	CC4-C-15035	HCC00
	25	KW115	CC4-C-15025	HCC00
	185	KW150x2	CC4-C-185185	HCC00
	150	KW250	CC4-C-185150	HCC00
	120	KW250	CC4-C-185120	HCC00
	95	KW200	CC4-C-18595	HCC00
	70	KW200	CC4-C-18570	HCC00
240	50	KW200	CC4-C-18550	HCC00
	35	KW150	CC4-C-18535	HCC00
	25	KW150	CC4-C-18525	HCC00
	240	KW250x2	CC4-D-240240	HCDOO
	185	KW200x2	CC4-D-240185	HCDOO
	150	KW200x2	CC4-D-240150	HCDOO
300	120	KW150x2	CC4-C-240120	HCC00
	95	KW150x2	CC4-C-24095	HCC00
	70	KW250	CC4-C-24070	HCC00
	50	KW250	CC4-C-24050	HCC00
	300	KW200x3	CC4-D-300300	HCDOO
	240	KW200x3	CC4-D-300240	HCDOO
300	185	KW250x2	CC4-D-300185	HCDOO
	150	KW250x2	CC4-D-300150	HCDOO
	120	KW200x2	CC4-D-300120	HCDOO
	95	KW200x2	CC4-D-30095	HCDOO

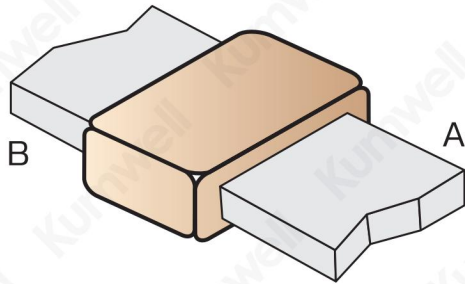
Note: Special requirement can be requested.

EX001/2024

BB7

Bus Bar to Bus Bar

Horizontal flat bus bar end to end



Conductor Size		Metal Powder	Graphite Mold Type	Handle Clamp Type
A(mm.xmm.)	B(mm.xmm.)			
20x2	20x2	KW45	BB7-C-202	HCC00
20x3	20x3	KW45	BB7-C-203	HCC00
20x4	20x4	KW65	BB7-C-204	HCC00
20x5	20x5	KW90	BB7-C-205	HCC00
25x2	25x2	KW45	BB7-C-252	HCC00
25x3	25x3	KW65	BB7-C-253	HCC00
25x4	25x4	KW90	BB7-C-254	HCC00
25x5	25x5	KW90	BB7-C-255	HCC00
25x6	25x6	KW115	BB7-C-256	HCC00
25x8	25x8	KW150	BB7-C-258	HCC00
25x12	25x12	KW200	BB7-C-2512	HCC00
30x2	30x2	KW65	BB7-C-302	HCC00
30x3	30x3	KW65	BB7-C-303	HCC00
30x4	30x4	KW90	BB7-C-304	HCC00
30x5	30x5	KW115	BB7-C-305	HCC00
30x6	30x6	KW150	BB7-C-306	HCC00
31x3	31x3	KW65	BB7-C-313	HCC00
31x6	31x6	KW150	BB7-C-316	HCC00
38x3	38x3	KW90	BB7-C-383	HCC00
38x5	38x5	KW150	BB7-C-385	HCC00
38x6	38x6	KW200	BB7-C-386	HCC00
38x8	38x8	KW250	BB7-C-388	HCC00
40x3	40x3	KW90	BB7-C-403	HCC00
40x4	40x4	KW115	BB7-C-404	HCC00
40x5	40x5	KW150	BB7-C-405	HCC00
40x6	40x6	KW200	BB7-C-406	HCC00
50x3	50x3	KW150	BB7-D-503	HCDOO
50x4	50x4	KW200	BB7-D-504	HCDOO
50x5	50x5	KW200	BB7-D-505	HCDOO
50x6	50x6	KW250	BB7-D-506	HCDOO
50x8	50x8	KW150x2	BB7-D-508	HCDOO
50x10	50x10	KW200x2	BB7-D-5010	HCDOO
60x6	60x6	KW150x2	BB7-D-606	HCDOO
60x8	60x8	KW200x2	BB7-D-608	HCDOO
60x10	60x10	KW250x2	BB7-D-6010	HCDOO
80x6	80x6	KW200x2	BB7-D-806	HCDOO
80x8	80x8	KW250x2	BB7-D-808	HCDOO
80x10	80x10	KW200x3	BB7-D-8010	HCDOO

Equipment



Necessary Tools



Recommended Tools

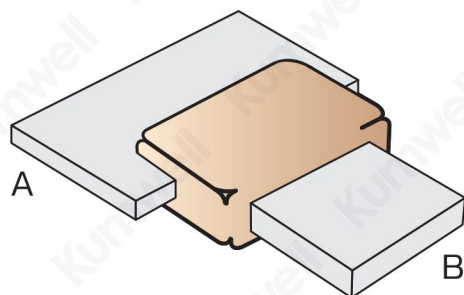
- Butane torch
- Butane gas
- Gloves

Note: Special requirement can be requested.

BB14

Bus Bar to Bus Bar

Horizontal flat bus bar run and tap



Equipment



Necessary Tools



Recommended Tools

- Butane torch
- Butane gas
- Gloves

Note

- "*" means to meet UL Listed

Conductor Size		Metal Powder	Graphite Mold Type	Handle Clamp Type
A(mm.xmm.)	B(mm.xmm.)			
20x2	20x2	KW45	*BB14-C-202202	HCC00
20x3	20x3	KW45	*BB14-C-203203	HCC00
20x4	20x4	KW65	*BB14-C-204204	HCC00
20x5	20x5	KW90	*BB14-C-205205	HCC00
25x2	25x2	KW45	*BB14-C-252252	HCC00
25x3	25x3	KW65	*BB14-C-253253	HCC00
25x4	25x4	KW90	*BB14-C-254254	HCC00
25x5	25x5	KW90	*BB14-C-255255	HCC00
25x6	25x2	KW115	*BB14-C-256256	HCC00
25x6	25x6	KW90	*BB14-C-256252	HCC00
25x6	50x6	KW250	BB14-D-256506	HCDOO
25x8	25x8	KW150	BB14-C-258258	HCC00
25x12	25x12	KW250	BB14-C-25122512	HCC00
30x2	30x2	KW65	*BB14-C-302302	HCC00
30x3	30x3	KW65	*BB14-C-303303	HCC00
30x4	30x4	KW90	*BB14-C-304304	HCC00
30x5	30x5	KW115	*BB14-C-305305	HCC00
30x6	30x6	KW150	BB14-C-306306	HCC00
31x3	31x3	KW90	*BB14-C-313313	HCC00
31x6	31x6	KW150	*BB14-C-316316	HCC00
38x3	38x3	KW90	*BB14-C-383383	HCC00
38x5	38x5	KW150	*BB14-C-385385	HCC00
38x6	38x6	KW200	*BB14-C-386386	HCC00
38x8	38x8	KW250	BB14-C-388388	HCC00
40x3	40x3	KW90	*BB14-C-403403	HCC00
40x4	40x4	KW115	*BB14-C-404404	HCC00
40x5	40x5	KW150	*BB14-C-405405	HCC00
40x6	40x6	KW200	*BB14-C-406406	HCC00
50x3	50x3	KW150	*BB14-D-503503	HCDOO
50x4	50x4	KW200	*BB14-D-504504	HCDOO
50x5	50x5	KW200	*BB14-D-505505	HCDOO
50x6	25x6	KW115	BB14-C-506256	HCC00
50x6	50x6	KW250	*BB14-D-506506	HCDOO
50x8	50x8	KW150x2	BB14-D-508508	HCDOO
50x10	50x10	KW200x2	BB14-D-50105010	HCDOO
60x6	60x6	KW150x2	BB14-D-606606	HCDOO
60x8	60x8	KW200x2	BB14-D-608608	HCDOO
60x10	60x10	KW250x2	BB14-D-60106010	HCDOO
80x6	80x6	KW200x2	BB14-D-806806	HCDOO
80x8	80x8	KW250x2	BB14-D-808808	HCDOO
80x10	80x10	KW200x3	BB14-D-80108010	HCDOO

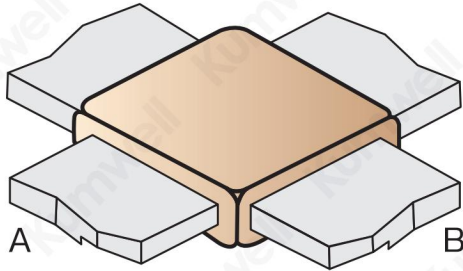
Note: Special requirement can be requested.

EX001/2024

BB40

Bus Bar to Bus Bar

Horizontal flat bus bar cross (Uncut)



Conductor Size		Metal Powder	Graphite Mold Type	Handle Clamp Type
A(mm.xmm.)	B(mm.xmm.)			
20x2	20x2	KW65	BB40-C-202202	HCC00
20x3	20x3	KW90	BB40-C-203203	HCC00
20x5	20x5	KW115	BB40-C-205205	HCC00
25x2	25x2	KW90	BB40-C-252252	HCC00
25x3	25x3	KW90	BB40-C-253253	HCC00
25x4	25x4	KW115	BB40-C-254254	HCC00
25x5	25x5	KW150	BB40-C-255255	HCC00
25x6	25x6	KW150	BB40-C-256256	HCC00
25x8	25x8	KW200	BB40-C-258258	HCC00
25x12	25x12	KW200	BB40-C-25122512	HCC00
30x2	30x2	KW150	BB40-C-302302	HCC00
30x3	30x3	KW200	BB40-C-303303	HCC00
30x4	30x4	KW250	BB40-C-304304	HCC00
30x5	30x5	KW250	BB40-C-305305	HCC00
30x6	30x6	KW250	BB40-C-306306	HCC00
31x3	31x3	KW200	BB40-C-313313	HCC00
31x6	31x6	KW250	BB40-C-316316	HCC00
38x3	38x3	KW250	BB40-D-383383	HCDOO
38x5	38x5	KW150x2	BB40-D-385385	HCDOO
38x6	38x6	KW150x2	BB40-D-386386	HCDOO
38x8	38x8	KW200x2	BB40-D-388388	HCDOO
40x3	40x3	KW200x2	BB40-D-403403	HCDOO
40x4	40x4	KW200x2	BB40-D-404404	HCDOO
40x5	40x5	KW200x2	BB40-D-405405	HCDOO
40x6	40x6	KW200x2	BB40-D-406406	HCDOO
50x3	50x3	KW250x2	BB40-D-503503	HCDOO
50x4	50x4	KW250x2	BB40-D-504504	HCDOO
50x5	50x5	KW250x2	BB40-D-505505	HCDOO
50x6	50x6	KW250x2	BB40-D-506506	HCDOO
50x8	50x8	KW250x3	BB40-D-508508	HCDOO
50x10	50x10	KW250x4	BB40-DR-50105010	HCDOO
60x6	60x6	KW200x4	BB40-DR-606606	HCDOO
60x8	60x8	KW250x4	BB40-DR-608608	HCDOO
60x10	60x10	KW250x5	BB40-DR-60106010	HCDOO

Equipment



Necessary Tools



Recommended Tools

- Butane torch
- Butane gas
- Gloves

Note: Special requirement can be requested.