



CALCIUM SEALED MAINTENANCE FREE BATTERY



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HANMIX INTERNATIONAL CO.,LTD

ADD: Room 604,Building 1, TEL: +86 532 8086 7001 E-MAIL: Info@hanmix.net
Celebrity International,No.39 +86 532 6888 7003 Web: WWW.HANMIX.NET
Shiling Road Laoshan District, FAX: +86 532 8086 7001
Qingdao,China.



HANMIX INTERNATIONAL CO.,LTD



HANMIX CERTIFICATE



HANMIX is an international brand covered with 40 years' experience in tire and tire accessories business. Hanmix provide high level of value and top quality products based on unique mix of more of different factories from different origins. HANMIX automotive battery, made from Korea, adopt the most advanced technology and superior production process.

THE MOST ADVANCED TECHNOLOGY OF NEW SMF BATTERY

HANMIX is an international brand covered with 40 years' experience in tire and tire accessories business.

PROCESSING LINE



01 LEAD OXIDE PLANT

- Barton type PENOX lead powder machine
- Produces reliable quality of lead oxides



02 (+) STRIP CAST

- Soverna(ITALY)
- Over 90% raw strip rolling lead
- Equalized quality production



03 (+) STRIP PUNCHING

- Wirtz(USA)
- High technical machine
- Produces complete designed grids
- Full framed grid design protects active materials & improves service life



04 PASTING

- Advanced version of Wirtz mixing machine
- Steel Belt Paster & Drum Paster
- Increases the stability of plate quality
- Produces optimal quality of plates



05 CURING

- Advanced conveyor moving technology (Glascock)
- Complete plate quality by conveyor moving
- Optimal particle sizes for starting power & service life



06 ASSEMBLY LINE

- Dual inspection system after COS & cell welding
- Reliable welding properties



07 CHARGING

- High performance by charging efficiency & step charging



08 FINISH

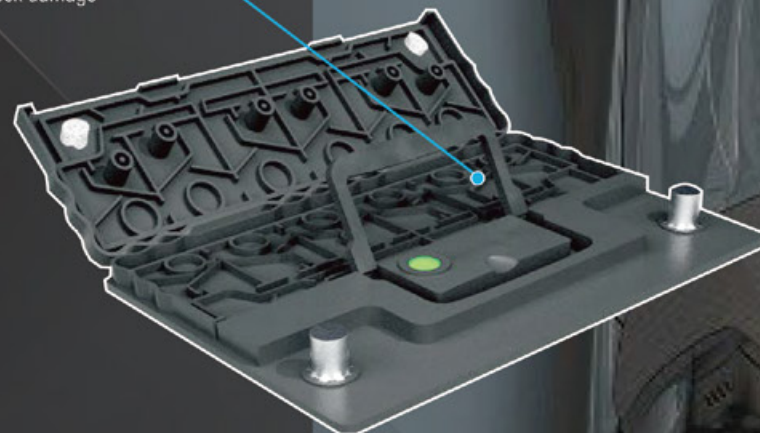
- Terminal polishing
- Automatic washing & dry process
- Reliable inspection by high rate discharge for all sizes

FRAME ARRESTER

- Prevents possibility of explosion
- Minimizes acid leakage

SPECIAL SEALED COVER

- Prevents acid-leakage & blocks fire from outside
- Minimizes electrolyte deflection between cells
- Minimizes electrolyte loss by gassing recovery system
- Reinforced design for resistance of vibration & shock damage
- Eco friendly materials(PP/PE copolymer)



PUNCHED GRID

POWERFUL NEW PUNCHED GRID PLATE

- Improves corrosion resistance & longer life in high temperature
- Minimizes self-discharge and enhances cold cranking power
- Uniforms grid dimension and smooth electrical flow
- Full framed round edge grid design offers strong physical strength
- Internal short circuit protection by applying wide-bridge & strong adhesion of active materials

MICRO FIBER & SPECIAL TISSUE

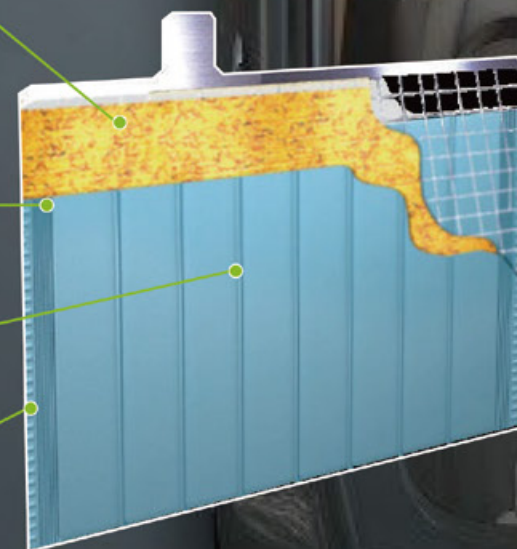
- Enhances adhesion of active materials
- Improves starting power and greater service life

PASTED CURED PLATE

- Enhancing anti-vibration
- Suitable capacity design for powerful diesel engine

ENVELOP SEPARATOR FOR LOW ELECTRIC RESISTANCE

- Enhances starting power
- Prevents short circuit
- Improves vibration durability



HANDLE

- Enhances safety by Integrated computer design
- Strong power and easy transportation

MAGIC EYE INDICATOR

- Green: Good
- Black: Charging necessary
- White: Replace

COMPUTER INTEGRATED DESIGN

- Reinforced inner vibration by compact design & uniform injection

PATENT BUSHING

- Exclusive patented for acid leakage
- High resistance to corrosion

ADVANCED CENTER LUG AND CAST-ON-STRAP

- Improves inner vibration
- Perfect starting power by powerful welding



JIS MF SERIES (For Japanese Vehicles)

Group	JIS No.		Capacity (AH) 20HR	CCA (SAE)	R.C (MIN)	Dimension(mm)				Layout	Terminal	B/Down
	New	Old				L	W	H	TH			
B19	32B19L	NS40L	32	270	48	187	127	200	220	0	B	B0
	32B19R	NS40	32	270	48	187	127	200	220	1	B	B0
	32B19FL		32	270	48	187	135	200	220	0	B	B1
	32B19FR		32	270	48	187	135	200	220	1	B	B1
	40B19L	NS40ZL	35	300	52	187	127	200	220	0	B	B0
	40B19R	NS40Z	35	300	52	187	127	200	220	1	B	B0
	40B19LS	NS40ZLS	35	300	52	187	127	200	220	0	A	B0
	40B19RS	NS40ZS	35	300	52	187	127	200	220	1	A	B0
	40B19FL		35	300	52	187	135	200	220	0	B	B1
	40B19FR		35	300	52	187	135	200	220	1	B	B1
	40B19FLA		35	300	52	187	135	200	220	0	B+ADT	B1
	40B19FRA		35	300	52	187	135	200	220	1	B+ADT	B1
	40B19FLS		35	300	52	187	135	200	220	0	A	B1
	40B19FRS		35	300	52	187	135	200	220	1	A	B1
	42B19L		38	340	55	187	127	200	220	0	B	B0
	42B19R		38	340	55	187	127	200	220	1	B	B0
	42B19FL		38	340	55	187	135	200	220	0	B	B1
	42B19FR		38	340	55	187	135	200	220	1	B	B1
	44B19L		40	370	60	187	127	200	220	0	B	B0
	44B19R		40	370	60	187	127	200	220	1	B	B0
	44B19LS		40	370	60	187	127	200	220	0	A	B0
	44B19RS		40	370	60	187	127	200	220	1	A	B0
	44B19FL		40	370	60	187	135	200	220	0	B	B1
	44B19FR		40	370	60	187	135	200	220	1	B	B1
B24	50B24L	N40LB	40	370	60	235	127	200	220	0	B	B0
	50B24R	N40B	40	370	60	235	127	200	220	1	B	B0
	50B24LS	N40L	40	370	60	235	127	200	220	0	A	B0
	50B24RS	N40	40	370	60	235	127	200	220	1	A	B0
	50B24FL		40	370	60	235	135	200	220	0	B	B1
	50B24FR		40	370	60	235	135	200	220	1	B	B1
	50B24FLS		40	370	60	235	135	200	220	0	A	B1
	50B24FRS		40	370	60	235	135	200	220	1	A	B1
	50B24FLA		40	370	60	235	135	200	220	0	B+ADT	B1
	50B24FRA		40	370	60	235	135	200	220	1	B+ADT	B1
	55B24L	NS60L	45	430	71	235	127	200	220	0	B	B0
	55B24R	NS60	45	430	71	235	127	200	220	1	B	B0
	55B24LS	NS60LS	45	430	71	235	127	200	220	0	A	B0
	55B24RS	NS60S	45	430	71	235	127	200	220	1	A	B0
	55B24FL		45	430	71	235	135	200	220	0	B	B1
	55B24FR		45	430	71	235	135	200	220	1	B	B1
	55B24FLS		45	430	71	235	135	200	220	0	A	B1
	55B24FRS		45	430	71	235	135	200	220	1	A	B1
	55B24FLA		45	430	71	235	135	200	220	0	B+ADT	B1
	55B24FRA		45	430	71	235	135	200	220	1	B+ADT	B1
	60B24L		48	470	75	235	127	200	220	0	B	B0
	60B24R		48	470	75	235	127	200	220	1	B	B0
D20	50D20L		50	450	80	200	172	200	220	0	A	B1
	50D20R		50	450	80	200	172	200	220	1	A	B1
	50D20EL		50	450	80	200	172	200	220	0	A	B0
	50D20ER		50	450	80	200	172	200	220	1	A	B0

JIS MF SERIES (For Japanese Vehicles)

Group	JIS No.		Capacity (AH) 20HR	CCA (SAE)	R.C (MIN)	Dimension(mm)				Layout	Terminal	B/Down
	New	Old				L	W	H	TH			
D23	55D23L		60	550	100	231	172	200	220	0	A	B1
	55D23R		60	550	100	231	172	200	220	1	A	B1
	55D23EL		60	550	100	231	172	200	220	0	A	B0
	55D23ER		60	550	100	231	172	200	220	1	A	B0
	75D23L		65	580	110	231	172	200	220	0	A	B1
	75D23R		65	580	110	231	172	200	220	1	A	B1
	75D23EL		65	580	110	231	172	200	220	0	A	B0
	75D23ER		65	580	110	231	172	200	220	1	A	B0
D26	48D26L	N50L	50	430	80	258	172	200	220	0	A	B1
	48D26R	N50	50	430	80	258	172	200	220	1	A	B1
	48D26EL	N50L	50	430	80	258	172	200	220	0	A	B0
	48D26ER	N50	50	430	80	258	172	200	220	1	A	B0
	55D26L	N50ZL	60	550	100	258	172	200	220	0	A	B1
	55D26R	N50Z	60	550	100	258	172	200	220	1	A	B1
	55D26EL	N50ZL	60	550	100	258	172	200	220	0	A	B0
	55D26ER	N50Z	60	550	100	258	172	200	220	1	A	B0
	75D26L	NS70L	65	580	110	258	172	200	220	0	A	B1
	75D26R	NS70	65	580	110	258	172	200	220	1	A	B1
	75D26EL	NS70L	65	580	110	258	172	200	220	0	A	B0
	75D26ER	NS70	65	580	110	258	172	200	220	1	A	B0
	80D26L	NX110-5L	70	600	120	258	172	200	220	0	A	B1
	80D26R	NX110-5	70	600	120	258	172	200	220	1	A	B1
	80D26EL	NX110-5L	70	600	120	258	172	200	220	0	A	B0
	80D26ER	NX110-5	70	600	120	258	172	200	220	1	A	B0
	90D26L		75	630	130	258	172	200	220	0	A	B1
	90D26R		75	630	130	258	172	200	220	1	A	B1
	90D26EL		75	630	130	258	172	200	220	0	A	B0
	90D26ER		75	630	130	258	172	200	220	1	A	B0
D31	60D31L		65	560	120	303	172	200	220	0	A	B1
	60D31R		65	560	120	303	172	200	220	1	A	B1
	60D31EL		65	560	120	303	172	200	220	0	A	B0
	60D31ER		65	560	120	303	172	200	220	1	A	B0
	65D31L	N70L	70	600	120	303	172	200	220	0	A	B1
	65D31R	N70	70	600	120	303	172	200	220	1	A	B1
	65D31EL	N70L	70	600	120	303	172	200	220	0	A	B0
	65D31ER	N70	70	600	120	303	172	200	220	1	A	B0
	75D31L	N70ZL	75	630	130	303	172	200	220	0	A	B1
	75D31R	N70Z	75	630	130	303	172	200	220	1	A	B1
	75D31EL	N70ZL	75	630	130	303	172	200	220	0	A	B0
	75D31ER	N70Z	75	630	130	303	172	200	220	1	A	B0
	95D31L	NX120-7L	80	670	140	303	172	200	220	0	A	B1
	95D31R	NX120-7	80	670	140	303	172	200	220	1	A	B1
	95D31EL	NX120-7L	80	670	140	303	172	200	220	0	A	B0
	95D31ER	NX120-7	80	670	140	303	172	200	220	1	A	B0
	105D31L		90	750	160	303	172	200	220	0	A	B1
	105D31R		90	750	160	303	172	200	220	1	A	B1
	105D31EL		90	750	160	303	172	200	220	0	A	B0
	105D31ER		90	750	160	303	172	200	220	1	A	B0
	115D31L		95	830	170	303	172	200	220	0	A	B1
	115D31R		95	830	170	303	172	200	220	1	A	B1
	115D31EL		95	830	170	303	172	200	220	0	A	B0
	115D31ER		95	830	170	303	172	200	220	1	A	B0

JIS MF SERIES (For Japanese Vehicles)

Group	JIS No.		Capacity (AH) 20HR	CCA (SAE)	R.C (MIN)	Dimension(mm)				Layout	Terminal	B/Down
	New	Old				L	W	H	TH			
D33	MF100L		100	830	180	326	172	203	223	0	A	B0
	MF100R		100	830	180	326	172	203	223	1	A	B0
E41	95E41L	N100L	100	830	180	408	172	210	230	0	A	B0
	95E41R	N100	100	830	180	408	172	210	230	1	A	B0
	115E41L	NS120L	110	900	200	408	172	210	230	0	A	B0
	115E41R	NS120	110	900	200	408	172	210	230	1	A	B0
F51	135F51L	N120L	120	870	230	506	182	213	233	3	A	B0
	135F51R	N120	120	870	230	506	182	213	233	4	A	B0
G51	160G51L	N150L	150	1000	300	506	215	213	233	3	A	B0
	160G51R	N150	150	1000	300	506	215	213	233	4	A	B0
	165G51L	NS200L	170	1050	325	506	215	213	233	3	A	B0
	165G51R	NS200	170	1050	325	506	215	213	233	4	A	B0
H52	210H52L	N200L	200	1200	430	509	274	220	240	3	A	B0
	210H52R	N200	200	1200	430	509	274	220	240	4	A	B0
	245H52L		220	1400	460	509	274	220	240	3	A	B0
	245H52R		220	1400	460	509	274	220	240	4	A	B0

TERMINAL

	A(Standard)	B(Small)	STUD	TOP	DUAL	MARINE TWIN	SIDE
Positive Terminal							
Negative Terminal							

JIS, DIN Cell Layout

0	1	3	4

DIN MF SERIES (For European Vehicles)

Group	DIN No.	Capacity (AH) 20HR	CCA (EN)	R.C (MIN)	Dimension(mm)				Layout	Terminal	B/Down
					L	W	H	TH			
LB1	53518	35	330	60	207	173	175	175	0	A	B13
	53519	35	330	60	207	173	175	175	1	A	B13
	53624	36	330	60	207	173	175	175	0	A	B1
	53638	36	330	60	207	173	175	175	1	A	B1
	53646	36	330	60	207	173	175	175	0	A	B14
	54316	43	400	70	207	173	175	175	0	A	B13
	54321	43	450	71	207	173	175	175	0	A	B13
	54322	43	450	71	207	173	175	175	1	A	B13
L1	54459	44	390	71	207	173	190	190	0	A	B13
	54464	44	390	71	207	173	190	190	1	A	B13
	55054	50	420	80	207	173	190	190	0	A	B13
	55055	50	420	80	207	173	190	190	1	A	B13
LB2	54518	45	390	71	242	173	175	175	1	A	B14
	54519	45	390	71	242	173	175	175	0	A	B14
	55040	50	450	80	242	173	175	175	0	A	B13
	55457	54	480	90	242	173	175	175	0	A	B13
	55458	54	480	90	242	173	175	175	1	A	B13
	56009	60	510	100	242	173	175	175	0	A	B13
	56009R	60	510	100	242	173	175	175	1	A	B13
	56077	60	540	100	242	173	175	175	0	A	B13
L2	56077R	60	540	100	242	173	175	175	1	A	B13
	55559	55	480	90	242	173	190	190	0	A	B13
	55565	55	480	90	242	173	190	190	1	A	B13
	56219	62	540	100	242	173	190	190	0	A	B13
LB3	56220	62	540	100	242	173	190	190	1	A	B13
	55415	54	480	90	276	173	175	175	0	A	B13
	56318	63	540	105	276	173	175	175	0	A	B14
	56330	63	540	105	276	173	175	175	0	A	B13
	56821	68	570	113	276	173	175	175	1	A	B13
	56828	68	570	113	276	173	175	175	0	A	B13
	57113	71	640	120	276	173	175	175	0	A	B13
L3	57112	71	640	120	276	173	175	175	1	A	B13
	56638	66	540	110	276	173	190	190	0	A	B13
	56640	66	540	110	276	173	190	190	1	A	B13
	57219	72	610	120	276	173	190	190	1	A	B13
	57220	72	610	120	276	173	190	190	0	A	B13
	57412	74	680	130	276	173	190	190	0	A	B13
LB4	57413	74	680	130	276	173	190	190	1	A	B13
	57539	75	640	130	315	173	175	175	0	A	B13
L4	58014	80	680	140	315	173	175	175	0	A	B13
	58043	80	640	140	315	173	190	190	0	A	B13
	58043R	80	640	140	315	173	190	190	1	A	B13
	59042	90	720	160	315	173	190	190	0	A	B13
LB5	59043	90	720	160	315	173	190	190	1	A	B13
	58515	85	720	145	351	173	175	175	0	A	B13
	59015	90	740	160	351	173	175	175	0	A	B13

DIN MF SERIES (For European Vehicles)

Group	DIN No.	Capacity (AH) 20HR	CCA (EN)	R.C (MIN)	Dimension(mm)				Layout	Terminal	B/Down
					L	W	H	TH			
L5	58821	88	680	150	351	173	190	190	1	A	B13
	58827	88	680	150	351	173	190	190	0	A	B13
	59218	92	720	165	351	173	190	190	0	A	B13
	59219	92	720	165	351	173	190	190	1	A	B13
	60044	100	850	180	351	173	190	190	0	A	B13
	60044R	100	850	180	351	173	190	190	1	A	B13
B19	53520F	35	300	52	187	135	200	220	0	B	B1
	53520	35	300	52	187	127	200	220	0	B	B0
	53521	35	300	52	187	127	200	220	0	A	B0
	53522	35	300	52	187	127	200	220	1	B	B0
B24	54523	45	360	71	235	127	200	220	0	A	B0
	54524	45	360	71	235	127	200	220	1	A	B0
	54551	45	360	71	235	127	200	220	1	B	B0
	54584	45	360	71	235	127	200	220	0	B	B0
D20	55041	50	390	80	200	172	200	220	0	A	B1
	55042	50	390	80	200	172	200	220	1	A	B1
D23	56068E	60	480	100	231	172	200	220	0	A	B0
	56069E	60	480	100	231	172	200	220	1	A	B0
	56068	60	480	100	231	172	200	220	0	A	B1
	56069	60	480	100	231	172	200	220	1	A	B1
D26	56048E	60	480	100	258	172	200	220	0	A	B0
	56049E	60	480	100	258	172	200	220	1	A	B0
	56048	60	480	100	266	172	200	220	0	A	B9
	56049	60	480	100	266	172	200	220	1	A	B9
	57024	70	540	120	266	172	200	220	1	A	B9
	57029	70	540	120	266	172	200	220	0	A	B9
D31	57512	75	600	130	303	172	200	220	0	A	B1
	57513	75	600	130	303	172	200	220	1	A	B1
	58513E	85	680	145	303	172	200	220	0	A	B0
	58513	85	680	145	303	172	200	220	0	A	B1
	58514E	85	680	145	303	172	200	220	1	A	B0
	58514	85	680	145	303	172	200	220	1	A	B1
	59518E	95	720	170	303	172	200	220	0	A	B0
	59518	95	720	170	303	172	200	220	0	A	B1
	59519E	95	720	170	303	172	200	220	1	A	B0
	59519	95	720	170	303	172	200	220	1	A	B1
	60045E	100	760	180	303	172	200	220	0	A	B0
	60045	100	760	180	303	172	200	220	0	A	B1
	60046E	100	760	180	303	172	200	220	1	A	B0
	60046	100	760	180	303	172	200	220	1	A	B1
D33	59615	96	760	170	326	172	203	223	0	A	B1
	59616	96	760	170	326	172	203	223	1	A	B1
E41	60016	100	760	180	408	172	210	230	0	A	B0

DIN MF SERIES (For European Vehicles)

Group	DIN No.	Capacity (AH) 20HR	CCA (EN)	R.C (MIN)	Dimension(mm)				Layout	Terminal	B/Down
					L	W	H	TH			
A	62034	120	680	230	514	189	196	215	3	A	B0
	62035	120	680	230	514	189	196	215	3	A	B13
	62038	120	680	230	514	189	196	215	4	A	B0
	63532	135	720	250	514	189	196	215	4	A	B0
	64589	145	800	260	514	189	196	215	3	A	B0
B	67018	170	950	320	514	223	196	215	3	A	B0
	67019	170	950	320	514	223	196	215	4	A	B0
	68032	180	1000	370	514	223	196	215	3	A	B0
	68033	180	1000	370	514	223	196	215	4	A	B0
	68035	180	1000	370	514	223	196	215	3	A	B13
	68036	180	1000	370	514	223	196	215	4	A	B13
C	70027	200	1050	430	518	273	216	235	3	A	B0
	70029	200	1050	430	518	273	216	235	4	A	B0
	71014	210	1150	430	518	273	216	235	3	A	B0
	71015	210	1150	430	518	273	216	235	4	A	B0
	72512	225	1150	460	518	273	216	235	3	A	B0
	72512R	225	1150	460	518	273	216	235	4	A	B0

BCI MF SERIES (For American Vehicles)

Group	BCI No.	CCA (SAE)	R.C (MIN)	Dimension(mm)				Layout	Terminal	B/Down
				L	W	H	TH			
85	85-450	450	75	231	172	180	200	11	A	B1
	85-500	500	85	231	172	180	200	11	A	B1
	85-550	550	95	231	172	180	200	11	A	B1
86	86-450	450	75	231	172	180	200	10	A	B1
	86-500	500	85	231	172	180	200	10	A	B1
	86-500E	500	85	231	172	180	200	1	A	B0
	86-530	530	85	231	172	180	200	10	A	B1
	86-550E	550	95	231	172	180	200	1	A	B0
	86-550	550	95	231	172	180	200	10	A	B1
24	24-500E	500	90	258	172	200	220	1	A	B0
	24-670E	670	140	258	172	200	220	1	A	B0
	24-700E	700	140	258	172	200	220	1	A	B0
	24-430	430	80	258	172	200	220	10	A	B1
	24-500	500	90	258	172	200	220	10	A	B1
	24-550	550	100	258	172	200	220	10	A	B1
	24-600	600	120	258	172	200	220	10	A	B1
	24-630	630	130	258	172	200	220	10	A	B1
	24-670	670	140	258	172	200	220	10	A	B1
	24-700	700	140	258	172	200	220	10	A	B1

BCI MF SERIES (For American Vehicles)

Group	BCI No.	CCA (SAE)	R.C (MIN)	Dimension(mm)				Layout	Terminal	B/Down
				L	W	H	TH			
24R	24R-500E	500	90	258	172	200	220	0	A	B0
	24R-670E	670	140	258	172	200	220	0	A	B0
	24R-700E	700	140	258	172	200	220	0	A	B0
	24R-430	430	80	258	172	200	220	11	A	B1
	24R-500	500	90	258	172	200	220	11	A	B1
	24R-550	550	100	258	172	200	220	11	A	B1
	24R-600	600	120	258	172	200	220	11	A	B1
	24R-630	630	130	258	172	200	220	11	A	B1
	24R-670	670	140	258	172	200	220	11	A	B1
	24R-700	700	140	258	172	200	220	11	A	B1
25	25-500E	500	90	231	172	200	220	1	A	B0
	25-500	500	90	231	172	200	220	10	A	B1
	25-550	550	100	231	172	200	220	10	A	B1
	25-580	580	110	231	172	200	220	10	A	B1
35	35-500E	500	90	231	172	200	220	0	A	B0
	35-500	500	90	231	172	200	220	11	A	B1
	35-550	550	100	231	172	200	220	11	A	B1
	35-580	580	110	231	172	200	220	11	A	B1
21	21-430	430	80	200	172	200	220	10	A	B1
	21-430E	430	80	200	172	200	220	1	A	B0
	21-450	450	80	200	172	200	220	10	A	B1
21R	21R-430	430	80	200	172	200	220	11	A	B1
	21R-430E	430	80	200	172	200	220	0	A	B0
	21R-450	450	80	200	172	200	220	11	A	B1
34	34-550	550	100	260	172	181	201	10	A	B1
	34-600	600	113	260	172	181	201	10	A	B1
	34-670	670	120	260	172	181	201	10	A	B1
	34-750	750	130	260	172	181	201	10	A	B1
34R	34R-550	550	100	260	172	181	201	11	A	B1
	34R-600	600	113	260	172	181	201	11	A	B1
	34R-670	670	120	260	172	181	201	11	A	B1
	34R-750	750	130	260	172	181	201	11	A	B1
27	27-630	630	130	303	172	200	220	10	A	B1
	27-650	650	120	303	172	200	220	10	A	B1
	27-670	670	140	303	172	200	220	10	A	B1
	27-750	750	160	303	172	200	220	10	A	B1
	27-800E	800	170	303	172	200	220	1	A	B0
	27-800	800	170	303	172	200	220	10	A	B1
	27-830	830	170	303	172	200	220	10	A	B1

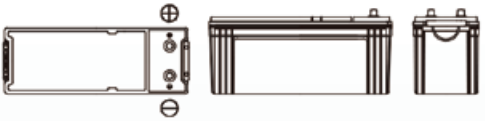
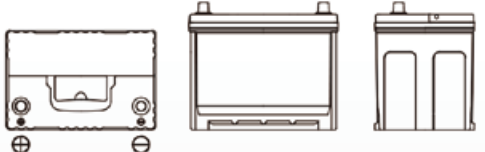
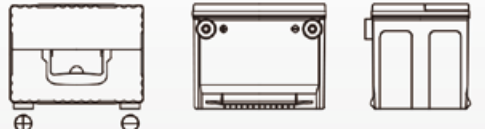
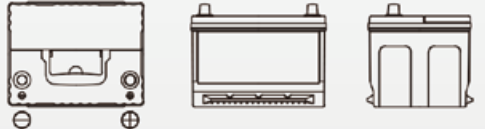
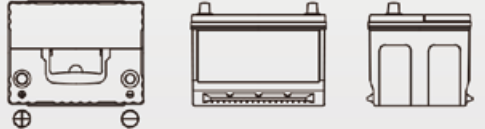
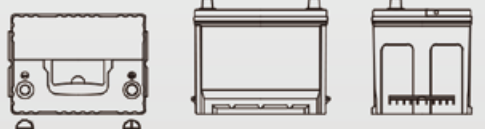
BCI MF SERIES (For American Vehicles)

Group	BCI No.	CCA (SAE)	R.C (MIN)	Dimension(mm)				Layout	Terminal	B/Down
				L	W	H	TH			
27R	27R-630	630	130	303	172	200	220	11	A	B1
	27R-650	650	120	303	172	200	220	11	A	B1
	27R-670	670	140	303	172	200	220	11	A	B1
	27R-750	750	160	303	172	200	220	11	A	B1
	27R-800E	800	170	303	172	200	220	0	A	B0
	27R-800	800	170	303	172	200	220	11	A	B1
	27R-830	830	170	303	172	200	220	11	A	B1
51	51-370	370	60	235	135	200	220	10	A	B1
	51-430	430	71	235	135	200	220	10	A	B1
	51-470	470	75	235	135	200	220	10	A	B1
51R	51R-370	370	60	235	135	200	220	11	A	B1
	51R-430	430	71	235	135	200	220	11	A	B1
	51R-470	470	75	235	135	200	220	11	A	B1
47	47-500	500	90	242	173	190	190	24	A	B13
	47-550	550	90	242	173	190	190	24	A	B13
	47-580	580	100	242	173	190	190	24	A	B13
	47-650	650	120	242	173	190	190	24	A	B13
	47-650R	650	120	242	173	190	190	1	A	B13
48	48-550	550	90	276	173	190	190	24	A	B13
	48-580	580	100	276	173	190	190	24	A	B13
	48-630	630	130	276	173	190	190	24	A	B13
	48-700	700	130	276	173	190	190	24	A	B13
49	49-750	750	160	351	173	190	190	24	A	B13
	49-800	800	170	351	173	190	190	24	A	B13
	49-850	850	170	351	173	190	190	24	A	B13
58	58-500	500	90	234	182	157	177	26	A	B8
	58-550	550	100	234	182	157	177	26	A	B8
58R	58R-500	500	90	234	182	157	177	19	A	B8
	58R-550	550	100	234	182	157	177	19	A	B8
65	65-650	650	120	287	187	172	192	10	A	B8
	65-750	750	140	287	187	172	192	10	A	B8
65R	65R-650	650	120	287	187	172	192	11	A	B8
	65R-750	750	140	287	187	172	192	11	A	B8
75	75-500	500	90	230	179	181	181	17	SIDE	B1
	75-550	550	100	230	179	181	181	17	SIDE	B1
	75-600	600	113	230	179	181	181	17	SIDE	B1
	75-650	650	120	230	179	181	181	17	SIDE	B1
75DT	75DT-500	500	90	230	179	181	201		DT	B1
	75DT-550	550	100	230	179	181	201		DT	B1
	75DT-600	600	113	230	179	181	201		DT	B1
	75DT-650	650	120	230	179	181	201		DT	B1

BCI MF SERIES (For American Vehicles)

Group	BCI No.	CCA (SAE)	R.C (MIN)	Dimension(mm)				Layout	Terminal	B/Down
				L	W	H	TH			
78	78-550	550	100	260	179	181	181	17	SIDE	B1
	78-600	600	113	260	179	181	181	17	SIDE	B1
	78-670	670	120	260	179	181	181	17	SIDE	B1
	78-750	750	130	260	179	181	181	17	SIDE	B1
78DT	78DT-550	550	100	260	179	181	201		DT	B1
	78DT-600	600	113	260	179	181	201		DT	B1
	78DT-670	670	120	260	179	181	201		DT	B1
	78DT-750	750	130	260	179	181	201		DT	B1
90	90-430	430	71	242	173	175	175	24	A	B13
	90-450	450	71	242	173	175	175	24	A	B13
	90-500	500	80	242	173	175	175	24	A	B13
	90-550	550	90	242	173	175	175	24	A	B13
	90-570	570	100	242	173	175	175	24	A	B13
91	91-580	580	105	276	173	175	175	24	A	B13
	91-630	630	110	276	173	175	175	24	A	B13
	91-670	670	120	276	173	175	175	24	A	B13
92	92-670	670	120	315	173	175	175	24	A	B13
	92-750	750	140	315	173	175	175	24	A	B13
	92-830	830	145	315	173	175	175	24	A	B13
93	93-750	750	140	351	173	175	175	24	A	B13
	93-830	830	130	351	173	175	175	24	A	B13
30H	30H-830L	830	180	326	172	203	223	11	A	B1
	30H-830	830	180	326	172	203	223	10	A	B1
4D	4D-1000	1000	300	506	215	213	233	8	A	B0
	4D-1050	1050	325	506	215	213	233	8	A	B0
8D	8D-1200	1200	430	509	274	220	240	8	A	B0
	8D-1400	1400	460	509	274	220	240	8	A	B0
22F	22F-450	450	75	240	172	180	203	11F	DUAL FIT	B9
	22F-450R	450	75	240	172	180	203	10F	DUAL FIT	B9
	22F-500	500	85	240	172	180	203	11F	DUAL FIT	B9
	22F-500R	500	85	240	172	180	203	10F	DUAL FIT	B9
	22F-550	550	95	240	172	180	203	11F	DUAL FIT	B9
	22F-550R	550	95	240	172	180	203	10F	DUAL FIT	B9
C31	C31-670	670	150	330	172	217	240	18	TOP	B0
	C31-750	750	160	330	172	217	240	18	TOP	B0
	C31-800	800	170	330	172	217	240	18	TOP	B0
	C31-850	850	180	330	172	217	240	18	TOP	B0
	C31-900	900	185	330	172	217	240	18	TOP	B0
	C31-950	950	185	330	172	217	240	18	TOP	B0
	C31-1000	1000	190	330	172	217	240	18	TOP	B0
C31S	C31S-670	670	150	330	172	217	240	18	STUD	B0
	C31S-750	750	160	330	172	217	240	18	STUD	B0
	C31S-800	800	170	330	172	217	240	18	STUD	B0
	C31S-850	850	180	330	172	217	240	18	STUD	B0
	C31S-900	900	185	330	172	217	240	18	STUD	B0
	C31S-950	950	185	330	172	217	240	18	STUD	B0
	C31S-1000	1000	190	330	172	217	240	18	STUD	B0

BCI Cell Layout

FIG.8		FIG.10	
FIG.11		FIG.17	
FIG.18		FIG.19	
FIG.24		FIG.26	
FIG.10F		FIG.11F	

HOLD-DOWN

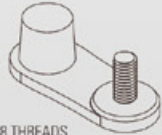
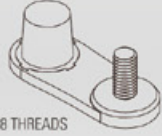
B0		B1	 10.5mm on long sides only
B4	5 notches  19mm on long sides only	B8	 13.5mm on long sides only
B9	 10.5mm on long sides, 29mm on short sides	B13	5 notches  10.5mm on all four sides
B14	 19mm on long sides, 10.5mm on short sides		

MARINE

FOR STARTING & SEMI-DEEP CYCLE

Group	MARINE No.	C20(AH)	CCA (0°F/-18°C)	CA (32°F/0°C)	R.C (MIN)	Dimension(mm)				Layout	Terminal	B/Down
						L	W	H	TH			
M24	M24-500	55	500	620	90	258	172	200	221	1	TWIN	B1
	M24-560	60	560	700	105	258	172	200	221	1	TWIN	B1
	M24-600	70	600	750	120	258	172	200	221	1	TWIN	B1
	M24-700	75	700	860	140	258	172	200	221	1	TWIN	B1
	M24-750	75	750	930	130	258	172	200	221	1	TWIN	B1
M27	M27-710	85	710	880	145	303	172	200	221	1	TWIN	B1
	M27-750	90	750	920	160	303	172	200	221	1	TWIN	B1
M31	M31-800	100	800	1000	180	330	172	217	238	1	TWIN	B0
	M31-850	100	850	1060	180	330	172	217	238	1	TWIN	B0
	M31-900	105	900	1120	185	330	172	217	238	1	TWIN	B0
	M31-950	105	950	1180	185	330	172	217	238	1	TWIN	B0

TERMINAL

MARINE TWIN	
Positive Terminal	 5/16"-18 THREADS
Negative Terminal	 5/16"-18 THREADS

HOLD-DOWN

B0	
B1	 10.5mm on long sides only

LAYOUT

0	
1	

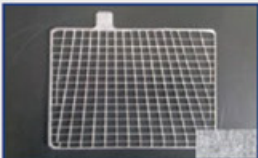


MF BATTERIES FOR MARINE

Construction Features & Benefits

Features	Benefits
Dual Purpose Plate(Starting & Deep Cycling) - Full Frame Grid (Stamped Grid)Technology - Special (Thicker) Plate with High Density Active Material - Calcuim + High Tin Alloy - Micro Fiber & New Special Tissue - Twin Terminal Anti-Vibration - Low Resistance Envelope Separator with Glass Mat - Hot Melt Glue & Reinforced container	Longer Life & High Cycle Stability - Longer life, stabler starting power, and stronger durability - Flexible design for semi-traction (deep cycling) and starting - Compatibility with TOP and STUD Terminal - Corrosion Resistance due to repeated cycling improvements Strongly built to withstand the pounding and vibration of marine, 4WD and heavy vehicle application

Special Material

GRID	
	Calcium Tin Alloy - Preventing transformation of grid surface from corrosion - Reduce self-discharge by chemical bonding with Calcium-Tin alloy
	Optimized Mesh Pattern - Quick transmission of electrical power - Improvement of charging acceptability Specialized Processing Methods - The strong adhesion of active materials to unique designed punched grid - High durability from poly fleece
	A.M - Stable performance during deep cycle by applying special additives (4BS-Seed) and high-density A.M

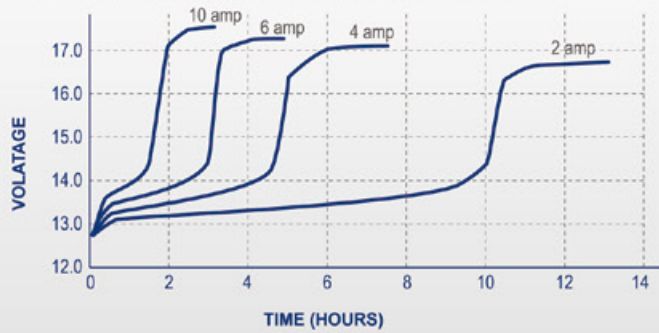
Common Structure & Advantage (Marine)

	Special Sealed Cover - Preventing ACID leakage & block fire from outside - Minimizing electrolyte deflection between cells - Minimizing electrolyte loss by gassing recovery system - Reinforced design for Resistance of vibration & shock damage - ECO friendly materials(PP/PE Copolymer)
	Micro Fiber & Special Tissue - Enhances adhesion of Active materials - Improves starting power and greater service life

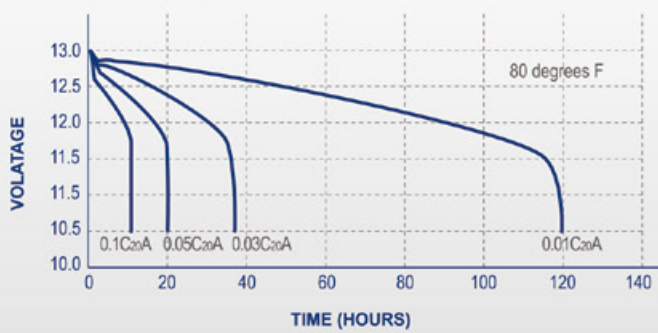
MF BATTERIES FOR MARINE

Charge and Discharge Charateristics

Charge characteristics from 20% DOD, M31-800 MF



Discharge characteristics



Charging Method

- ※ Batteries should be recharged within 24hours after each period of use.
- ※ Charging time by various charging rate can be determined by the the SOC(state of charge)

Method 1 ; Constant Voltage Charge (Recommended Method)

Type	Voltage Setting
Daily Cycle Service	14.4~14.8
Floating Service	13.2~13.7
Equalizing	15.5

* Unit Average at 77°F (25°C)

- ※ Every 30 to 90 days, conduct the equalizing charge.
- Daily cycle service and deep discharging service need more frequent equalizing.

End of charge

- Current : below 1.0A during charge.
- Stabilized open circuit voltage : 12.75V or higher.

Method 2 ; Constant Current charge

Battery		M24-720	M27-750	M31-800
SOS	OCV	4.25A	4.5A	5.0A
100%	12.75V		-	
75%	12.40V		6Hr	
50%	12.20V		12Hr	
25%	12.00V		18Hr	
0%	11.90V		24Hr	

End of charge

- Maximum voltage output across the battery terminals is maintained at constant level for 2 hours during the charge.
- Stabilized open circuit voltage : 12.75V or higher.

Hours of Usable Power(H.U.P)			
Amp.Draw	5A	15A	25A
M24-700	16.0hrs.	4.4hrs.	2.5hrs.
M27-750	17.8hrs.	4.9hrs.	2.7hrs.
M31-800	20.0hrs.	5.6hrs.	3.1hrs.

TECHNICAL INFORMATION

JIS	DIN	BCI	DRAWING	Dimension(mm)				HOLD DOWN
				L	W	H	TH	
B19	53520	-		187	127	200	220	B0, B1
B24	54523	51		235	127	200	220	B0, B1
D20	55041	21		200	172	200	220	B0, B1
D23	56068	25		231	172	200	220	B1
D26	56048	24		258	172	200	220	B1, B9
D31	59518	27		303	172	200	220	B1
D33	59615	30H		326	172	203	223	B0, B1
-	-	85 22F		240	172	180	203	B1, B9
-	-	34		260	172	181	201	B1

TECHNICAL INFORMATION

JIS	DIN	BCI	DRAWING	Dimension(mm)				HOLD DOWN
				L	W	H	TH	
-	-	58		234	182	157	177	B8
-	-	65		287	187	172	192	B8
-	-	75		230	179	181	181	B1
-	-	75DT		230	179	181	201	B1
-	-	78		260	179	181	181	B1
-	-	78DT		260	179	181	201	B1
-	-	C31		330	172	217	240	B0
-	L1	-		207	173	190	190	B13
-	L2	47		242	173	190	190	B13

TECHNICAL INFORMATION

JIS	DIN	BCI	DRAWING	Dimension(mm)				HOLD DOWN
				L	W	H	TH	
-	L3	48		276	173	190	190	B13
-	L4	-		315	173	190	190	B13
-	L5	49		351	173	190	190	B13
-	LB1	-		207	173	175	175	B1, B13
-	LB2	90		242	173	175	175	B4, B13
-	LB3	91		276	173	175	175	B13
-	LB4	92		315	173	175	175	B13
-	LB5	93		351	173	175	175	B13
E41	60016	-		408	172	213	230	B0

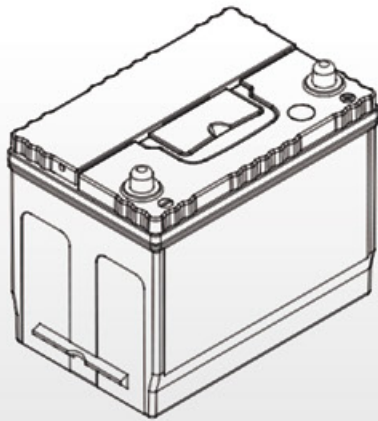
TECHNICAL INFORMATION

JIS	DIN	BCI	DRAWING	Dimension(mm)				HOLD DOWN
				L	W	H	TH	
F51	-	-		506	182	213	233	B0
G51	-	4D		506	215	213	233	B0
H52	-	8D		509	274	220	240	B0
-	A	-		514	189	196	215	B0, B13
-	B	-		514	223	196	215	B0, B13
-	C	-		518	273	216	235	B0
-	-	M24		258	172	200	221	B1
-	-	M27		303	172	200	221	B1
-	-	M31		330	172	217	238	B0

BATTERY SERVICE MANUAL

Handling the battery in stock

- A wet-charged battery will be discharged by itself even under not-in use condition. keep the battery in a dark, cool place and measure the open circuit voltage once a month.
- When the open circuit voltage is below 12.4V/25°C, carry out an auxiliary charge, following the procedure described in para.3.
- If the battery has been left for a long period at a low open circuit voltage, battery will have a sulfation and the battery cannot be fully recharged, or at the worst, cannot be recharged at all.



Before selling to consumer

- Usually a storage battery will not have full capacity because of self-discharge
- Therefore before selling, we recommend to follow the procedure in para.3 to recover the amount of capacity which has discharged during transportation and storage.

Charge

Constant current charge

- Charge the battery at a constant current 1/10 of its 20 hours rate capacity-until all cells generate much bubbles, and/or until three or more consecutive reading figures of the terminal voltage are same.
- This method is very effective when the discharged ampere-hour of the battery is known because the charging rate can be determined before charging. Typically 120 to 130% volume of discharged ampere-hour will be charged. Do not forget to disconnect the charging power source when the battery is completely charged. If not it will continue feeding the same amount of current to the battery resulting the overcharge of the battery

Judgement of finish of charge

- The plates are generating many bubbles (hydrogen and oxygen gases)
- Charged voltage is stable at a maximum level.

Battery charging considerations

- Perform charging at a place which is free from direct sunshine, rain, dew, moisture, and well ventilated, acid proof, washable and well drained.
- Connect the charger terminals to the battery terminals tightly and correctly. Incorrect connection will deteriorate the functions, and may cause damage to not only the battery but also the charger.
- Have a good judgement on the end of charging. Do not overcharge. Excessive charge may cause overcharging, resulting in damaged plates and separators and distortion of softening container due to high temperature.
- Never bring the battery close to fire: Explosive hydrogen and oxygen gas from the battery will catch fire.
- Keep electrolyte below 45°C. When it reaches near such temperature, decrease the charging current by half or stop charging until the fluid goes down to 35°C.

Charging indicator

- The indicator on the lid of the battery can help to check the charging status of the battery.



STATE OF CHARGE

Approximate Sate of Charge	OCV
100%	12.75
75%	12.40
50%	12.20
25%	12.00
Discharged	11.90

Safety precautions

- Batteries are dangerous to handle or work on. They are filled with dilute sulfuric acid. If the electrolyte gets on your skin or cloth, flush with plenty completely with clean water and take medical care immediately.
- Never bring cigarettes, flames or sparks near the battery.
- It may produce explosive hydrogen and oxygen gas when charging.
- Keep battery cover clean so that the hole in the vent plugs are free from clogging materials. Clogged up battery will have high internal pressure which may crack the container or leak electrolyte out of sealed portion.
- Battery should not be put at sealed location in any conditions. Especially, when charging, please do it in well-ventilated place.
- Jump start by booster cable should be done in accordance with following method to prevent explosion of battery.
- There is still energy left of used battery. Please be careful with spark, short circuit, flow of battery electrolyte.
- Please refrain from dismantlement of battery since it is too dangerous.
- This battery is designed and manufactured in accordance with conditions of vehicle operations. Please note that prescribed performance of battery can not be obtained when battery is used for other equipment

Safety labeling

- Each battery is marked with six kinds of symbols as follows. The meanings of the symbols are:

