



PRODUCT CATALOGUE

EUROPEAN EDITION 2021

**ACCELERATE YOUR POWER
WITH HANKOOK AUTOMOTIVE BATTERIES**



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Overview

Hankook & Company is a global energy solution provider that has grown with customers for over 70 years.

Smart Energy Solution provider, Hankook & Company

Pioneer in the Domestic Battery Industry

Development of the first MF battery in Korea in 1982 and the first AGM battery in Korea in 2005. Hankook & Company is a pioneer in the battery industry for the past 70 years, challenging the quality and quantitative growth of the battery industry in Korea.

Continuing Challenges: From Domestic to Global Entrepreneurship

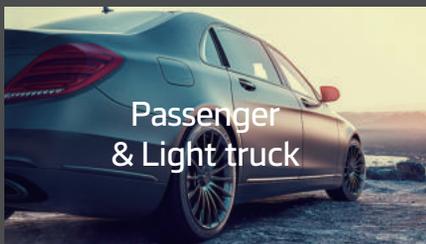
Based on the Daejeon and Jeonju plants, Hankook & Company with a global network has been strengthening its distribution competitiveness through the operation of its North American plants in 2020, and continues its history of innovation with unique technologies.

Batteries that Satisfy Customers

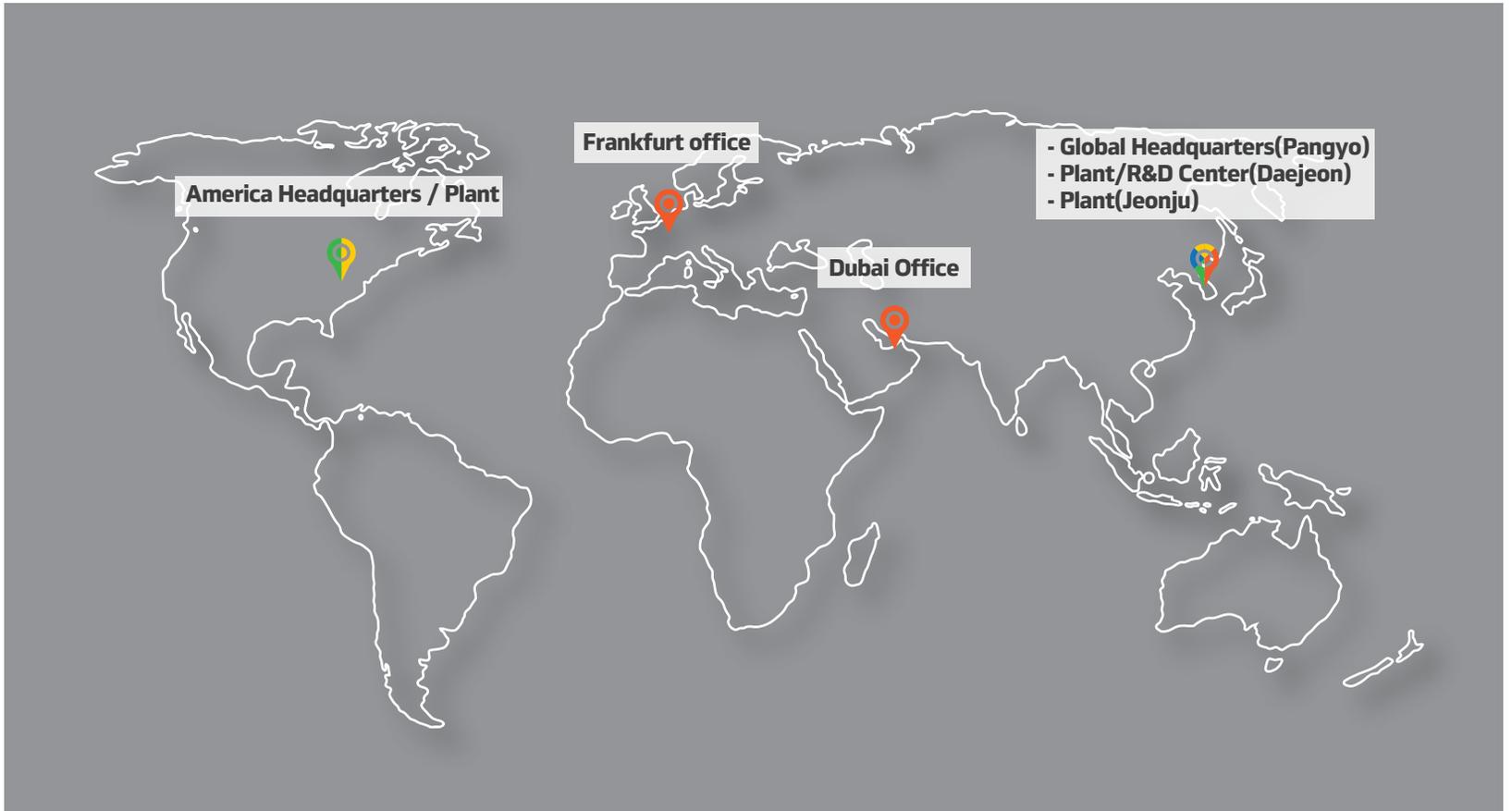
Hankook & Company produces high-performance, high-quality batteries through continuous R&D and rigorous quality inspections to provide the best batteries to customers. Customer satisfaction is the fundamental value at Hankook & Company.

293 Customers in 125 Countries

Hankook & Company provides advanced technologies as well as the best product and service around the world.



Global Network



HQ



Office



R&D



Plant

	Address	Tel	Fax
Global Headquarters	2F, 286, Pangyo-ro, Bundang-gu, Seongnam-si, Gyeonggi-do, Republic of Korea	+82-31-5178-8121	+82-31-5178-8198
Frankfurt office	2F Siemensstr. 14, 63263, Neu-Isenburg Germany	+49-173-5196742	

| Automotive

HANKOOK passenger car battery is designed to provide satisfactory power and battery life for a wide range of vehicles. Enjoy a line of various products with MF, EFB, and AGM battery technologies.

Battery series AGM / EFB / PRIME / SMF



| Commercial Vehicle

HANKOOK truck and bus battery provides satisfactory performance under the specific conditions required by large trucks and buses as well as in other various equipment.

Battery series EFB / SHD / HD



| Leisure

HANKOOK leisure battery provides home-like coziness while enjoying exciting outdoor activities.

Battery series AGM / XDC / DC / XV



Automotive Batteries

Trust HANKOOK's Innovative Technology

Take a powerful ride with HANKOOK Car batteries.

Whether it's for an entry level vehicle or a high-end performance car, HANKOOK batteries provide reliable starting power that goes all the way through till the end of your journey.

As always, HANKOOK's outstanding product quality is the result of our innovative technology.



Automotive AGM

For vehicles with Start Stop system



Automotive EFB

For vehicles with Start Stop system



Automotive PRIME

Premium Starter Batteries



Automotive SMF

Reliable Starter Batteries

	Automotive AGM	Automotive EFB	Automovite Prime	Automotive SMF
Usage	Start-Stop	Entry-level Start-Stop	SLI	SLI
EN Endurance Grade	★★★★★	★★★★☆	★★★★☆	★★★☆☆
Starting performance	★★★★★	★★★★★	★★★★☆	★★★☆☆
Charge acceptance	★★★★★	★★★★☆	★★★☆☆	★★★☆☆
Capacity	★★★★☆	★★★★★	★★★★☆	★★★☆☆
Safety	★★★★★	★★★★☆	★★★★☆	★★★★☆
Maintanance	★★★★★	★★★★☆	★★★★☆	★★★☆☆
Core tech	AGM Tech	EFB Tech	PRIME Tech	SMF Tech

★★★★★ : Excellent / ★★★★☆ : Best / ★★★☆☆ : Very Good / ★★★★★ : Good / ★☆☆☆☆ : Normal

Automotive **AGM**



Hankook AGM battery features the new concept AGM(Absorbent Glass Mat) technology, providing the best values for the start-stop vehicles as well as premium vehicles.

- 4x the battery life compared to regular MF batteries (for start stop vehicles)
- Strengthened cranking power with Advanced X-Frame Technology
- Fast charging time via Dynamic Charging Control Technology
- Enhanced deep discharge with cycle proof design for start-stop vehicles
- Premium safety and high performance with AGM VRLA design

AGM
Technology

DURABILITY
High
Plate Tech.

X-FRAME
Stamped Grid

Start Stop

Type List
Automotive AGM

Gr.No	Type No.	Capacity	CCA (EN)	Dimension (mm)				Layout	Terminal	Hold-Down
				L	W	H	TH			
L1	AGM 55020	50	540	208	174	190	190	0	A	B13
L2	AGM 56020	60	680	242	174	190	190	0	A	B13
L3	AGM 57020	70	760	277	174	190	190	0	A	B13
L4	AGM 58020	80	800	314	174	190	190	0	A	B13
L5	AGM 59520	95	850	352	174	190	190	0	A	B13
L6	AGM 60520	105	950	393	174	190	190	0	A	B13

Gr.No	Type No.	Capacity	CCA (SAE)	Dimension (mm)				Layout	Terminal	Hold-Down
				L	W	H	TH			
B20	AGM S34B20R	35	340	196	127	201	220	1	A(B)	B0
B24	AGM S46B24L	45	370	236	125	200	220	0	A(B)	B0
D23	AGM S55D23L	50	550	220	170	200	220	0	A	B0(B1)
D26	AGM S65D26L	75	750	260	172	200	220	0	A	B0(B1)
D31	AGM S115D31L	90	800	305	172	200	220	0	A	B0(B1)

Technology

Hankook AGM Tech.

- AGM Cycle Proofing Design
Advanced Tetrabasic Lead Sulfate
- AGM Dynamic Charging Control
Carbon Black Technology

High Durabilty Plate Tech

- Thicker Grid X-FRAME yields thicker plate
- The Advanced Grid Structure for Long Life
- The Advanced Grid Design for Extra Power

Other Tech.

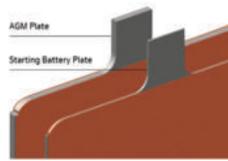
- AGM Separator
- 6 Valve Design
- Micro Fiber
- Ca/Ca-Sn
- Eco-Friendly



<Tetrabasic Lead Sulfate>



<Carbon Black Tech>



<AGM Plate>



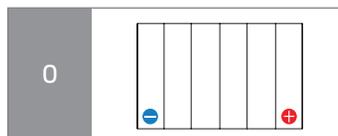
<AGM Separator>



<6 Valve Design>

Technical Data

LAYOUT



TERMINALS

Terminal	A (Standard)	B (Small)
Positive		
Negative		

HOLD - DOWN

B1		10.5mm on long sides only
B13		5 notches 10.5mm on all four sides

* For B0 there is no Hold-Down

Automotive **EFB**



Hankook EFB battery features the enhanced flooded battery technology, providing the best performance for popular start-stop vehicles as well as general vehicles.

- 3x the battery life compared to regular MF batteries (for start-stop vehicles)
- Strengthened cranking power with Advanced X-Frame Technology
- Fast charging time via Dynamic Charging Control Technology
- Enhanced deep discharge with cycle proof design for start-stop vehicles

EFB
Technology

DURABILITY
High
Plate Tech.

X FRAME
Stamped Grid

Start Stop

Type List

Automotive **EFB**

Gr.No	Type No.	Capacity	CCA (EN)	Dimension (mm)				Layout	Terminal	Hold-Down
				L	W	H	TH			
L1	EFB 55010	55	480	207	174	190	190	0	A	B13
L2	EFB 56030	60	640	242	174	190	190	0	A	B13
LB3	EFB 56530	65	650	277	174	175	175	0	A	B13
L3	EFB 57030	70	760	277	174	190	190	0	A	B13
LB4	EFB 57530	75	730	315	174	175	175	0	A	B13
L4	EFB 58030	80	800	315	174	190	190	0	A	B13
L5	EFB 59530	95	850	354	174	190	190	0	A	B13
L6	EFB 61010	110	950	393	174	190	190	0	A	B13
Gr.No	Type No.	Capacity	CCA (SAE)	Dimension (mm)				Layout	Terminal	Hold-Down
				L	W	H	TH			
B20	EFB 60B20L(M24)	40	420	196	127	200	220	0	A(B)	B0
B24	EFB 80B24L(N55)	51	500	234	127	200	220	0	A(B)	B0(B1)
D23	EFB 115D23L(Q85)	70	670	230	172	200	220	0	A	B0
D26	EFB 130D26L(S95)	75	760	257	172	200	220	0	A	B0
D31	EFB 145D31L(T110)	90	820	302	172	200	220	0	A	B0

Technology

Hankook EFB Tech.

- Cycle Proofing Design
Advanced Tetrabasic Lead Sulfate
- Dynamic Charging Control Tech
Carbon Black Additive

High Durablilty Plate Tech.

- Thicker Grid X-FRAME yields thicker plate
- The Advanced Grid Structure for Long Life
- The Advanced Grid Design for Extra Power

Other Tech.

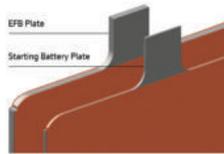
- PET Tissue
- Micro Fiber
- Ca/Ca-Sn
- Eco-Friendly



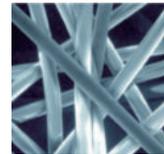
<Tetrabasic Lead Sulfate>



<Carbon Black Tech>



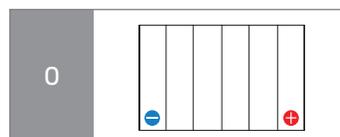
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Technical Data

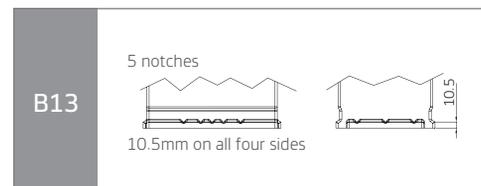
LAYOUT



TERMINALS

Terminal	A (Standard)	B (Small)
Positive		
Negative		

HOLD - DOWN



* For B0 there is no Hold-Down

Automotive **PRIME**



Hankook PRIME battery is designed to provide ultimate performance for a wide range of premium vehicles that require higher power support.

- The premium battery for vehicles with non-start-stop technology
- Meets to the EN 50342 Standard
- Fast and powerful start with X-Frame Technology
- Enduring and consistent power performance with High Durability Tech

PRIME
Technology

High
DURABILITY
Plate Tech.

X-FRAME
Stamped Grid

Type List

Automotive **Prime**

Gr.No	Type No.	Capacity	CCA (EN)	Dimension (mm)				Layout	Terminal	Hold-Down
				L	W	H	TH			
LB1	PMF55205	52	520	208	174	175	175	O	A	B13
L1	PMF55405	54	530	208	174	190	190	O	A	B13
LB2	PMF56105	61	600	242	174	175	175	O	A	B13
L2	PMF56305	63	610	242	174	190	190	O	A	B13
LB3	PMF57405	74	750	277	174	175	175	O	A	B13
L3	PMF57705	77	780	277	174	190	190	O	A	B13
LB4	PMF58005	80	800	315	174	175	175	O	A	B13
L4	PMF58505	85	800	315	174	190	190	O	A	B13
L5	PMF60005	100	830	354	174	190	190	O	A	B13

Technology

Hankook Prime Tech.

- Cycle Proofing Design
Advanced Tetrabasic Lead Sulfate
- Dynamic Charging Control Tech
Carbon Black Additive

High Durablilty Plate Tech.

- The Advanced Grid Structure for Long Life
- The Advanced Grid Design for Extra Power

Other Tech.

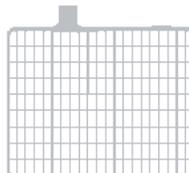
- PET Tissue
- Micro Fiber
- Ca/Ca-Sn
- Eco-Friendly



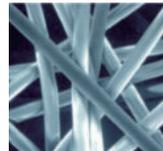
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<Carbon Black Tech>



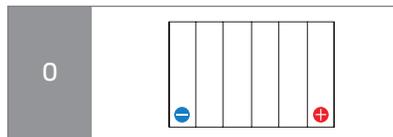
<X-FRAME plate>



<PET Tissue>

Technical Data

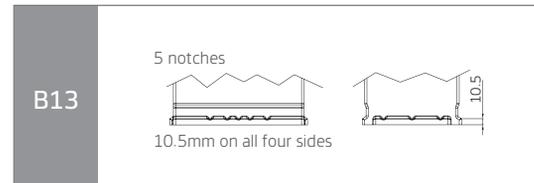
LAYOUT



TERMINALS

Terminal	A (Standard)
Positive	
Negative	

HOLD - DOWN



* For B0 there is no Hold-Down

Automotive **SMF**



Hankook SMF battery is the ideal choice for standard vehicles with satisfactory power and battery life. With the advantage of maintenance-free, it provides reliable power support for all applications.

- Reliable starting power with X-Frame Technology
- High Durability Technology delivers longer service life
- A complete range offered for 99% of vehicles on the market

SMF
Technology

High
DURABILITY
Plate Tech.

X-FRAME
Stamped Grid

Type List
Automotive **SMF**

Gr.No	Type No.	Capacity	CCA (EN)	Dimension (mm)				Layout	Terminal	Hold-Down
				L	W	H	TH			
L0	MF54080	40	340	174	174	190	190	0	A	B13
LB1	MF54321	45	450	208	174	175	175	0	A	B13
L1	MF54459	44	390	208	174	190	190	0	A	B13
L1	MF54464	44	390	208	174	190	190	1	A	B13
L1	MF55054	50	420	208	174	190	190	0	A	B13
LB2	MF56077	60	510	242	174	175	175	0	A	B13
L2	MF56219	62	540	242	174	190	190	0	A	B13
L2	MF56220	62	540	242	174	190	190	1	A	B13
LB3	MF57113	72	640	277	174	175	175	0	A	B13
L3	MF57412	74	680	277	174	190	190	0	A	B13
L3	MF57413	74	680	277	174	190	190	1	A	B13
LB4	MF57539	75	640	315	174	175	175	0	A	B13
L4	MF58043	80	640	315	174	190	190	0	A	B13
LB5	MF58515	85	720	354	174	175	175	0	A	B13
L5	MF59218	92	720	354	174	190	190	0	A	B13
Gr.No	Type No.	Capacity	CCA (EN)	Dimension (mm)				Layout	Terminal	Hold-Down
				L	W	H	TH			
A19	52805	28	240	184	127	160	174	1	FLANGE	B0
A19	52815	28	240	184	127	160	174	0	FLANGE	B0
MINI	MF53890	38	340	243	127	180	200	1	A	B6
B19	MF53504	35	330	187	136	200	220	0	B	B1
B19	MF53520	35	330	187	127	200	220	0	B	B0
B19	MF53522	35	330	187	127	200	220	1	B	B0
B19	MF54026	40	360	187	127	200	220	0	B	B0
B19	MF54027	40	360	187	127	200	220	1	B	B0
B24	MF54523	45	360	234	127	200	220	0	A	B0
B24	MF54524	45	360	234	127	200	220	1	A	B0
B24	MF54551	45	360	234	127	200	220	1	B	B0
B24	MF54584	45	360	234	127	200	220	0	B	B0
D20	MF55041	50	390	200	172	200	220	0	A	B1
D20	MF55042	50	390	200	172	200	220	1	A	B1
D23(35)	MF56068	60	480	230	172	200	220	0	A	B1
D23(35)	MF56069	60	480	230	172	200	220	1	A	B1
D26(24)	MF57024	70	540	257	172	200	220	1	A	B1
D26(24)	MF57029	70	540	257	172	200	220	0	A	B1
D31(27)	MF59518	95	720	302	172	200	220	0	A	B1
D31(27)	MF59519	95	720	302	172	200	220	1	A	B1

Type List
Automotive **SMF**

Gr.No	Type No.	RC (min)	CCA (SAE)	Dimension (mm)				Layout	Terminal	Hold-Down
				L	W	H	TH			
34	MF34-710	140	710	260	172	180	200	1	A	B1
34	MF34R-710	140	710	260	172	180	200	0	A	B1
C31	MF31-750	160	750	330	172	218	242	1	A	B0
C31	MF31-1000	190	1000	330	172	218	242	1	A	B0
75	MF75-600	113	600	230	179	180	180	1	SIDE	B1
75	MF75DT-600	113	600	230	179	180	200	1	DT	B1
78	MF78-750	155	750	260	179	180	180	1	SIDE	B1
78	MF78DT-750	155	750	260	179	180	200	1	DT	B1

Technical Data

LAYOUT

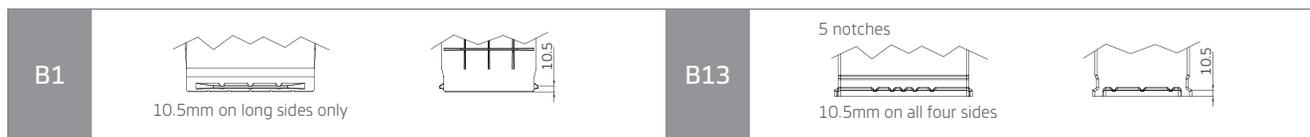


TERMINALS

Terminal	A (Standard)	B (Small)	Side	Flange
Positive				
Negative				

* DT : Dual Terminal (Standard + Side)

HOLD - DOWN



* For B0 there is no Hold-Down

Commercial Batteries

PERFECT POWER SOLUTION

PERFECT POWER SOLUTION

Demanding commercial vehicles require nothing less than the most powerful, reliable, durable batteries. The HANKOOK commercial batteries have excellent starting power to provide the best starting, higher reserve capacity and deep discharge cycling to provide the most reliable power. HANKOOK is the perfect power solution and has the right battery for every commercial vehicle. As always, HANKOOK's outstanding product quality is the result of our innovative technology.



Heavy Duty EFB

Enhanced Flooded Batteries



Heavy Duty SHD

Premium Starter Batteries



Heavy Duty HD

Reliable Starter Batteries

	Heavy Duty EFB	Heavy Duty SHD	Heavy Duty HD
Usage	Long-haul modern trucks (Rear-chassis / Rough terrain)	Long-haul modern trucks, City bus	Standard truck Tractors Construction machines
Starting performance	★★★★☆	★★★★☆	★★★★☆
Reserve capacity	★★★★★	★★★★☆	★★★★☆
Vibration Resistance	★★★★★	★★★★☆	★★★★☆
Safety	★★★★☆	★★★★☆	★★★★☆
Maintanance	★★★★☆	★★★★☆	★★★★☆
Core tech	EFB Tech	SHD Tech	HD Tech

★★★★★ : Excellent / ★★★★☆ : Best / ★★★☆☆ : Very Good

Heavy Duty **EFB / SHD / HD**



Hankook EFB is perfectly suited for modern heavy vehicles with high power and superior vibration resistance demand.

Hankook Super Heavy Duty is the perfect choice for highly equipped commercial vehicles (HGVs) like trucks, coaches and emergency vehicles.

Hankook Heavy Duty is the ideal choice for CVs and HGVs with usual power demands. With the advantage of maintenance-free, it provides the perfect power support that you can rely on.

High
DURABILITY
Plate Tech.

X FRAME
Stamped Grid

Type List

Commercial **EFB / SHD / HD**

12V Commercial Vehicle / HANKOOK EFB

Gr.No	Type No.	Capacity 20HR(AH)	CCA (DIN:EN /JIS:SAE)	Dimension (mm)				Layout	Terminal	Hold-Down	
				L	W	H	TH				
EN	C	EFB 72512	225	1150	516	274	216	238	3	A	B0/B13

12V Commercial Vehicle / HANKOOK Super Heavy Duty

EN (DIN)	A	SHD 63530	135	700	511	188	195	217	3	A	B0/B13
		SHD 64589	145	800	511	188	195	217	3	A	B0/B13
	B	SHD 66514	165	900	511	222	195	217	3	A	B0/B13
		SHD 68032	180	1000	511	222	195	217	3	A	B0/B13
	C	SHD 71014	210	1050	516	274	216	238	3	A	B0/B13
		SHD 72512	225	1150	516	274	216	238	3	A	B0/B13

12V Commercial Vehicle / HANKOOK Heavy Duty Sealed Maintenance Free

EN (DIN)	A	MF 62034	120	760	511	188	195	217	3	A	B0/B13
	B	MF 65513	155	900	511	222	195	217	3	A	B0/B13
	C	MF 70027	200	1050	516	274	216	238	3	A	B0/B13
JIS	F51	MF 135F51	120	870	506	182	210	233	4	A	B0
	G51	MF 160G51	150	1000	506	212	210	230	4	A	B0
	H52	MF 210H52	200	1200	509	274	218	238	4	A	B0
		MF 245H52	220	1400	509	274	218	238	4	A	B0

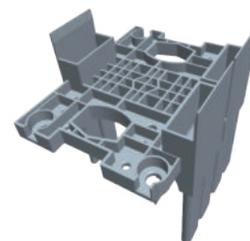
12V Commercial Vehicle / HANKOOK Heavy Duty

EN (DIN)	COM100	60527	105	680	342	172	214	236	1	A	B0
		60528	105	680	342	172	214	236	0	A	B0
	COM125	62512	125	720	342	172	262	286	0	A	B0
		62514	125	720	342	172	262	286	1	A	B0

Technical Data(Commercial EFB)

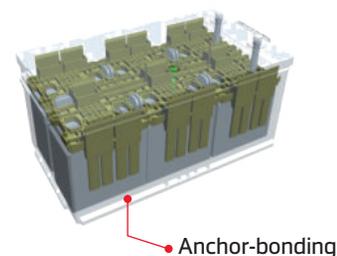
FIXING ELEMENT

- The “Fixing Element” is developed to increase service life by reducing acid stratification and by preventing ripped off plates and broken connectors.



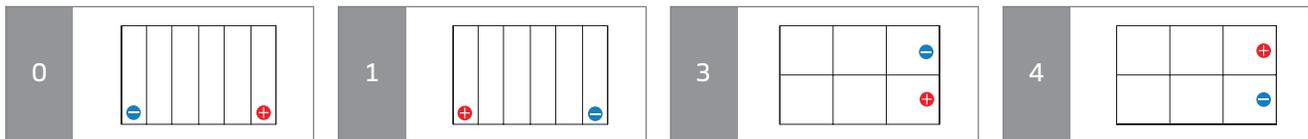
EXTREME VIBRATION RESISTANCE

- Injection molded “Fixing Element” and Anchor-bonding keep the plates and connectors steady. Especially “Fixing Element” prevents the connectors from breaking even severe vibration. This innovative technology has led to exceeding EN Vibration resistance Level 3.



Technical Data

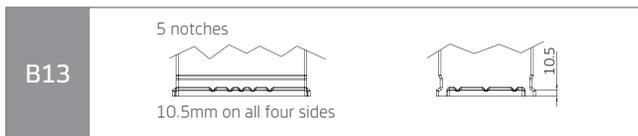
LAYOUT



TERMINALS

Terminal	A (Standard)
Positive	
Negative	

HOLD - DOWN



* For B0 there is no Hold-Down

Leisure Batteries

Innovating the powerful battery

HANKOOK Marine & RV Product have a superior and extraordinary battery for high-performance applications. HANKOOK thoroughly analyses consumer research and extracts useful data to develop Marine & RV battery which satisfy the diverse needs of drivers.

The driver is always our top priority and this enables us to always be a step ahead with our innovative technology, making true Battery technology possible.



Leisure AGM

AGM Tech.
Deep Cycling & Starting

Leisure XDC

High Cranking Power
& Deep Cycling

Leisure DC

Extra Reserve Power

Leisure XV

High Cranking Power

	Leisure AGM	Leisure XDC	Leisure DC	Leisure XV
Usage	Dual purpose	Dual purpose	Dual purpose	Starting
Cycling endurance	★★★★★	★★★★☆	★★★★☆	Non
Cold cranking performance	★★★★★	★★★★☆	★★★★☆	★★★★☆
Reserve Capacity	★★★★★	★★★★☆	★★★★☆	★★★★☆
Vibration Resistance	★★★★★	★★★★☆	★★★★☆	★★★★☆
Safety	★★★★★	★★★★☆	★★★★☆	★★★★☆
Maintanance	★★★★★	★★★★☆	★★★★☆	★★★★☆

★★★★★ : Excellent / ★★★★☆ : Best / ★★★☆☆ : Very Good

Leisure **AGM / XDC / DC / XV**



Leisure AGM: Hankook Dual Purpose AGM can be used to start the engine and deliver service power for accessories and electronics. Its premium spill-proof design brings essential convenience and safety to the water sports and RV enthusiast.

Leisure XDC: Extreme Dual Purpose Battery is the ideal compromise between high cranking power and moderate deep cycle service. With long lasting battery life that is maintenance-free, it's ideal for seasonal use.

Leisure DC: Dual Purpose Battery is the ideal compromise between high cranking power and extra reserve power for accessory loads.

Leisure XV: Hankook XV Battery is developed to meet the needs of water sports & RV enthusiasts by offering stronger power while using electronic system compared to any other general batteries.

 High
DURABILITY
Plate Tech.

 **X FRAME**
Stamped Grid

Type List

Leisure **AGM / XDC / DC / XV**

12V Leisure / HANKOOK AGM

Gr.No	Type No.	C20 (AH)	CA (32°F / 0°C)	CCA (0°F / -18°C)	RC (min)	Dimension (mm)				Layout	Terminal	Hold -Down	
						L	W	H	TH				
DIN	L2	AGM L2	60	850	680	110	242	174	190	190	0	A	B13
	L3	AGM L3	70	950	760	140	277	174	190	190	0	A	B13
	L4	AGM L4	80	1000	800	160	314	174	190	190	0	A	B13
	L5	AGM L5	95	1000	850	180	352	174	190	190	0	A	B13
BCI	31	AGM M31-925	100	1000	925	200	332	172	210	231	1	MARINETWIN*	B0

12V Leisure / HANKOOK XDC

BCI	24	XDC24MF	80	625	500	140	257	172	200	220	1	MARINETWIN*	B1
	27	XDC27MF	90	750	600	170	302	172	200	220	1	MARINETWIN*	B1
	31	XDC31MF	100	810	650	180	330	172	218	242	1	MARINETWIN*	B0

12V Leisure / HANKOOK DC

BCI	24	DC24MF	80	850	680	140	257	172	200	220	1	MARINETWIN*	B1
	27	DC27MF	90	920	750	170	302	172	200	220	1	MARINETWIN*	B1
	31	DC31MF	100	1000	800	180	330	172	218	242	1	MARINETWIN*	B0

12V Leisure / HANKOOK XV

Gr.No	Type No.	Voltage (V)	CA (32°F / 0°C)	CCA (0°F / -18°C)	RC (min)	Dimension (mm)				Layout	Terminal	Hold -Down	
						L	W	H	TH				
BCI	U1	U1MF-X	12	375	300	40	205	132	160	185	1	U1 LUG	B0
	U1R	U1RMF-X	12	375	300	40	205	132	160	185	0	U1 LUG	B0
	24	XV24MF	12	900	720	140	257	172	200	220	1	MARINETWIN*	B1
	27	XV27MF	12	900	720	160	302	172	200	220	1	MARINETWIN*	B1
	30H	XV30HMF	12	1000	800	180	325	172	200	220	1	A	B1
	31	XV31MF	12	1000	800	180	330	172	218	242	1	MARINETWIN*	B0

MARINE TWIN* : STUD is available

Technical Data

LAYOUT



TERMINALS

Terminal	A (Standard)	Marine Twin	U1 Lug
Positive		 5/16"-18 THREADS	
Negative		 5/16"-18 THREADS	

HOLD - DOWN

B1	 10.5mm on long sides only	
B13	 5 notches 10.5mm on all four sides	

* For B0 there is no Hold-Down

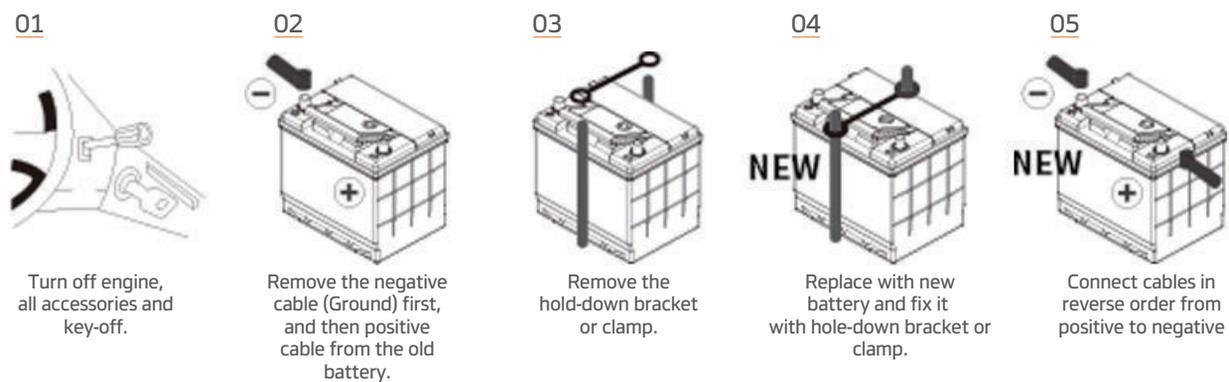
Maintenance & Care

Precaution

If treated with care and taking the proper precautions, lead acid batteries can be handled safely with minimum risk. However, lead acid batteries contain sulfuric acid which is both poisonous and corrosive. This makes them potentially hazardous and can cause serious injury when standard handling procedures and safety measures are not respected.



Installation



※ if clamp or cables are corroded, remove corroded material and grease it

Safety

- Always wear acid resistant clothing, protective goggles, PVC gloves and rubber boots.
- Avoid smoking, sparks and flames near operating or charging lead acid batteries.
- Keep metal objects away from terminals.
- Batteries are heavy. Lift carefully and do not place on unstable surfaces.
- Keep away from children.

Emergency Action

- Splashes in eyes : Wash out eyes with plenty of water for at least 15 minutes.
- Splashes on skin : Remove contaminated clothing carefully and wash the affected skin areas with plenty of water.
- Swallowed : Drink copious amounts of milk of magnesia, water or milk. Do not induce vomiting.

Storage

- Keep batteries upright.
- Batteries should not be directly exposed to the sun.
- Keep batteries clean and always store in a cool, dry place.
- Never stack over 4 layers.
- Never drop, never overthrow.
- In all cases, (First In, First Out) storage procedure should be applied.

Disposal

- Batteries must NEVER be disposed of in household waste.
- Batteries are recyclable material.
- Do not throw away.

BATTERY TESTING PROCEDURES

A. Visual Check

- Check the Container, Cover and Terminals. Where physical damage is present, replace the battery.
- Check the Indicator (If the battery has the Indicator). Always look right down when viewing the Indicator and lightly tap the Indicator on the battery to dislodge any air bubbles.



B. Voltage Check

- If OCV is below 12.4V(Flooded) or 12.5V(AGM), recharge the battery immediately.

C. Discharge Test (Load Test)

- Connect the battery tester to battery terminals.
- Measure the temperature of the battery around.
- Set the battery tester ampere values for 1/2 of the CCA rating.
- Apply the load for 15 seconds and then read the voltage.
- Compare measured values with values in TABLE 2.
- If the values are outside of the table values, recharge the battery and test again.
- If the battery fails the load test twice, replace it.
- Sometimes, electronic testers such as MIDTRONICS, SNAP-ON and etc are used instead of load tester.
- Electronic testers are only suitable for batteries that have been in use for a certain time.
- They cannot rate the performance of new or unused batteries
- For this reason, Hankook & Company recommends the test defined in global standards to confirm rated specifications.

TABLE 1. State of Charge

Approx. State of Charge	OCV	
	Flooded	AGM
100%	> 12.75V	> 12.90V
> 75%	> 12.40V	> 12.50V
> 50%	> 12.20V	> 12.25V
> 25%	> 12.00V	> 12.00V
Discharged	< 11.99V	< 11.99V

* For Reference Only

TABLE 2. Load Test

Minimum Voltage	Temperature
9.6V	21°C & Above
9.4V	10°C
9.1V	-1°C
8.9V	-7°C
8.5V	-18°C

BATTERY CHARGE

If the battery is below 12.4V or fails to pass the load test, battery must be recharged as soon as possible to prevent lead sulfation. During charge, if the battery sprays electrolyte through the vent holes or gets hot (over 52°C), the charge must be stopped for a time to allow the battery to be cool down.

Constant Voltage Charge

Another method is to charge a battery at a specified voltage(Flooded : 16.0V or AGM : 14.8V) in below table. When charging starts, a high rate current flows into the battery. As the battery is being charged, the current is reduced. Generally this method needs more time than the constant-current-charge, but overcharge risk is lower

Constant Current charge

General guidelines for constant-current-charge are given in TABLE 3 and TABLE 4. TABLES summarize approximate amperes and hours in need of charge according to 20Hr-rate capacity and OCV.

End of Charge

If a battery has been properly charged, voltage output across battery terminals on charge will be maintained for 2 hours.

TABLE 3. Constant Current Charge Condition - Flooded

OCV	Charging Time (Hours)	Charging Current (Amperes)																				
		31-40Ah	41-50Ah	51-60Ah	61-70Ah	71-80Ah	81-90Ah	91-100Ah	101-110Ah	111-120Ah	121-130Ah	131-140Ah	141-150Ah	151-160Ah	161-170Ah	171-180Ah	181-190Ah	191-200Ah	201-210Ah	211-220Ah	221-230Ah	
12.4 - 12.49V	6 Hr.																					
12.3 - 12.39V	10 Hr.																					
12.2 - 12.29V	14 Hr.	2.0 A	2.5 A	3.0 A	3.5 A	4.0 A	4.5 A	5.0 A	5.5 A	6.0 A	6.5 A	7.0 A	7.5 A	8.0 A	8.5 A	9.0 A	9.5 A	10.0 A	10.5 A	11.0 A	11.5 A	
12.1 - 12.19V	16 Hr.																					
12.0 - 12.09V	20 Hr.																					
Below 11.99V	24 Hr.																					

TABLE 4. Constant Current Charge Condition - AGM

OCV	Charging Time (Hours)	Charging Current (Amperes)							
		31-40Ah	41-50Ah	51-60Ah	61-70Ah	71-80Ah	81-90Ah	91-100Ah	101-110Ah
12.5 - 12.59V	6 hr.								
12.4 - 12.49V	9 hr.								
12.3 - 12.39V	12 hr.								
12.2 - 12.29V	15 hr.	2.0 A	2.5 A	3.0 A	3.5 A	4.0 A	4.5 A	5.0 A	5.5 A
12.1 - 12.19V	18 hr.								
12.0 - 12.09V	21 hr.								
Below 11.99V	24 hr.								







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