Therefore, to choose the battery with capacity reserve, you can calculate the necessary capacity with this formula:

$$C_{batt2.} = C_{batt1.} \cdot n$$

where: $C_{batt2.}$ – required battery capacity, A/h; $C_{batt1.}$ – battery capacity without reserve, A; n – the amount of the battery discharge cycles per one 100% charge.

Also, when choosing the battery capacity, you should consider the possibility of using it at low temperatures. The "ADS"'s nickel-cadmium batteries are operable at low temperatures (down to -40°C). But when the temperature decreases, so does battery's capacity; this phenomenon affects all types of batteries but this effect is not permanent or irreversible for nickel-cadmium batteries. When the temperature increases, the capacity grows, and as soon as the temperature settles between +15 ° C and +25°C capacity recovers to it's normal level. The discharge capacity of nickel-cadmium batteries at extremely low temperatures (-40 °C) is 25 - 30% of nominal. At the same time, certain types of lead-acid batteries when used under sub-zero conditions can lose it's capacity irreversibly.

Considering these facts capacity of the required battery should be taken with a reserve for the low temperatures operating.

CHOOSING BATTERIES BY TYPE AND PURPOSE OF USE

Depending on the construction, there are three types of "ADS" nickel-cadmium batteries:

KL-series - these batteries produce long-lasting discharges with relatively low currents (0,2 Cnom). As a rule they are installed within the uninterrupted power supply systems. Also the KL-batteries are used to power the electric motors of loading machinery, electro-trucks, mining electric locomotives, etc.

KM-series - are suitable with devices, where the discharges of mediocre currents (1 Cnom) and high battery power are necessary. The batteries of this series have all the advantages of KL-series. They provide long-lasting discharges with low currents (0,2 Cnom), but when necessary, they also can produce long-lasting discharges with medium current (1 Cnom). That's why they are recommended for use in electric transport as a motor supplying source. For example, when a mine locomotive starts moving with trolleys fully loaded, or when the fork-truck lifts a heavy load off the ground – they both need the higher current. That's where the KM-series battery proves to be more effective than the KL-series.

KH-series - are used for starting combustion engines; they produce high discharge current (10 Cnom). The "ADS" starter batteries of KH-series are mainly used in railway transport for diesel locomotives main engine starting.

ACCUMULATOR BATTERY CHARGE

The charging and discharging device, conducting of forming and cycling.

Adjusting the charging parameters.

Recommended charge current for batteries of KL series is calculated by formula:

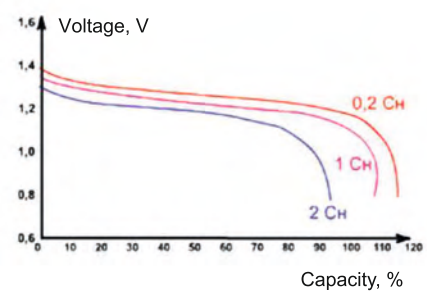
$$I_{cha.} = C_{nom.} \cdot 0{,}2$$

where: $I_{cha.}$ – recommended charge current, A; $C_{nom.}$ – rated battery capacity, A/h (in serial connection, the battery capacity is equal to the one element capacity).

Charging of batteries is more efficient, when you can set the proper charging current of charging device. If the charger has no current adjustment – you should use the voltage regulator, to set the voltage at which the current will match the recommended value for the battery. Avoid exceeding the recommended charging voltage (i.e. 1.7 V). In case of exceeding recommended settings (including the current) the amount of emitted gases will increase and shorten the maintenance period due to higher usage of distilled water.

Make sure that the room, where charging takes place has a free air flow!

DISCHARGE OF THE ACCUMULATOR BATTERY



The graph of nickel-cadmium batteries discharge

The maximal discharge current is calculated by formula:

$I_{dis.} = C_{nom.} \cdot 0{,}5$ – KL series

$I_{dis.} = C_{nom.} \cdot 1$ – KM series

$I_{dis.} = C_{nom.} \cdot 10$ – KH series

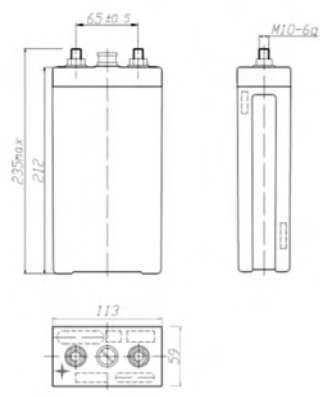
where: $I_{dis.}$ – the maximum discharge current, A; $C_{ном.}$ – rated battery capacity, A/h (in serial connection the battery capacity is equal to the one element capacity).

TECHNICAL SPECIFICATIONS

The "ADS" company offers batteries with different capacitive ratings in the following dimensions:

Option 1

Battery	Rated capacity A/h	Dimensions				Available diameters of terminals (2 units) mm.	Weight	
		Length	Width	Height	Height1		without electrolyte	with electrolyte
KL 24 P	24	59	113	212	235	5, 10	1,12	1,51
KL 30 P	30	59	113	212	235	5, 10	1,27	1,64
KL 40 P	40	59	113	212	235	5, 10	1,8	2,68
KL 45 P	45	59	113	212	235	5, 10	1,92	2,8
KL 55 P	55	59	113	212	235	5, 10	2,05	2,82



"ADS" accumulator KL 24...55P

"ADS" accumulator KL 55P

MATERIAL CHARACTERISTICS:

Frame: polypropylene (PP) of K 499 type

Cover: polypropylene (PP) of K 499 type

Valve: polypropylene (PP) of K 499 type, heat, frost, acid-alkali resistant rubber

Terminals: 20-th grade nickel plated steel

Nuts: M10 h=5 mm DIN 934, galvanized with nickel

Washers: steel of 08 KP type, galvanized with nickel

Electrolyte: solution of potassium hydroxide (p=1,26 g/cm^3) with the addition of lithium hydroxide 20 g/l

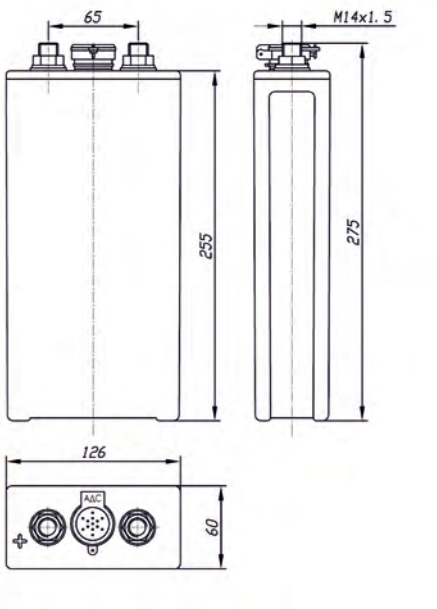
Batteries can be shipped in frames with a certain amount of cells.

Batteries can be shipped in frames with a certain amount of cells:

- busbars to connect the elements into the battery *(length on demand);*
- wires with tips for batteries sections connection;
- nuts and washers to fixate the plates and wires;
- spare valves and nipple gums;
- spanners for the battery mounting.

Option 2

Battery	Rated capacity A/h	Dimensions				Available diameters of terminals (2 units) mm.	Weight	
		Length	Width	Height	Height1		without electrolyte	with electrolyte
KL 70 P	70	60	126	255	275	14	2.9	3.7



"ADS" Battery KL 70P sketch

MATERIAL CHARACTERISTICS:

Frame: polypropylene (PP) of K 499 type

Cover: polypropylene (PP) of K 499 type

Valve: ABS plastic

Terminals: 20-th grade nickel plated steel

Nuts: M14 h=7 mm DIN 80705, galvanized with nickel

Washers: steel of 08 KP type, galvanized with nickel

Electrolyte: solution of potassium hydroxide (p=1,26 g/cm^3) with the addition of lithium hydroxide 20 g/l

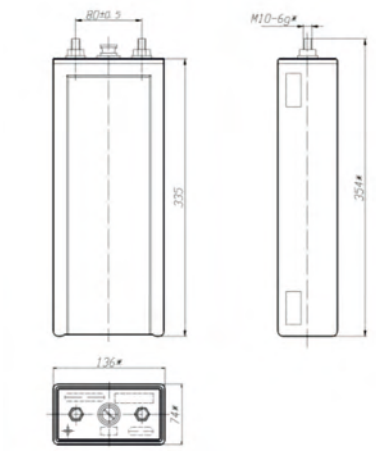
Batteries can be shipped in frames with a certain amount of cells.

Batteries can be shipped in frames with a certain amount of cells:

- busbars to connect the elements into the battery *(length on demand);*
- wires with tips for batteries sections connection;
- nuts and washers to fixate the plates and wires;
- spare valves and nipple gums;
- spanners for the battery mounting.

Option 3

Battery	Rated capacity A/h	Dimensions				Available diameters of terminals (2 units) mm.	Weight	
		Length	Width	Height	Height1		without electrolyte	with electrolyte
KL 70 P	70	74	136	335	354	10	3,12	5,08
KL 80 P	80	74	136	335	354	10	3,37	5,32
KL 100 P	100	74	136	335	354	10	3,78	5,61
KL 125 P	125	74	136	335	354	10	3,96	5,74
KL 140 P	140	74	136	335	354	10	4,47	6,07



"ADS" Battery KL 65...140P sketch

MATERIAL CHARACTERISTICS:

Frame: polypropylene (PP) of K 499 type

Cover: polypropylene (PP) of K 499 type

Valve: polypropylene (PP) of K 499 type, heat, frost, acid-alkali resistant rubber

Terminals: 20-th grade nickel plated steel

Nuts: M10 h=5 mm DIN 934, galvanized with nickel

Washers: steel of 08 KP type, galvanized with nickel

Electrolyte: solution of potassium hydroxide (p=1,26 g/cm^3) with the addition of lithium hydroxide 20 g/l

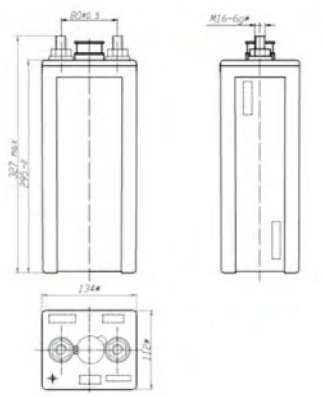
Batteries can be shipped in frames with a certain amount of cells.

Batteries can be shipped in frames with a certain amount of cells:

- busbars to connect the elements into the battery *(length on demand);*
- wires with tips for batteries sections connection;
- nuts and washers to fixate the plates and wires;
- spare valves and nipple gums;
- spanners for the battery mounting.

Option 4

Battery	Rated capacity A/h	Dimensions				Available diameters of terminals (2 units) mm.	Weight	
		Length	Width	Height	Height1		without electrolyte	with electrolyte
KL 150 P	150	112	134	295	327	16	4,9	7,1
KL 160 P	160	112	134	295	327	16	5,7	9,8
KL 185 P	185	112	134	295	327	16	6,33	9,99
KL 200 P	200	112	134	295	327	16	6,69	10,35



"ADS" Battery KL 65…140P sketch

"ADS" Battery KL 160P

MATERIAL CHARACTERISTICS:

Frame: polypropylene (PP) of K 499 type

Cover: polypropylene (PP) of K 499 type

Valve: polypropylene (PP) of K 499 type, heat, frost, acid-alkali resistant rubber

Terminals: 20-th grade nickel plated steel

Nuts: M16 h=7 mm DIN 934, galvanized with nickel

Washers: steel of 08 KP type, galvanized with nickel

Electrolyte: solution of potassium hydroxide (p=1,26 g/cm^3) with the addition of lithium hydroxide 20 g/l

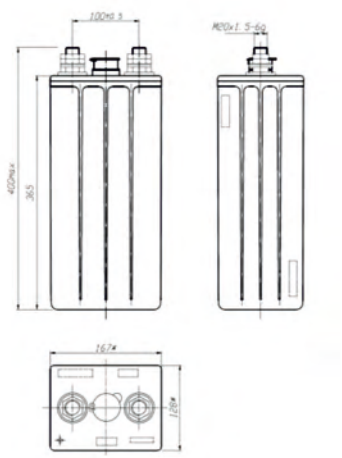
Batteries can be shipped in frames with a certain amount of cells.

Batteries can be shipped in frames with a certain amount of cells:

- busbars to connect the elements into the battery *(length on demand);*
- wires with tips for batteries sections connection;
- nuts and washers to fixate the plates and wires;
- spare valves and nipple gums;
- spanners for the battery mounting.

Option 5

Battery	Rated capacity A/h	Dimensions				Available diameters of terminals (2 units) mm.	Weight	
		Length	Width	Height	Height1		without electrolyte	with electrolyte
KL 240 P	240	128	167	365	400	16, 20	7,5	10,8
KL 270 P	270	128	167	365	400	16, 20	8,32	11,26
KL 300 P	300	128	167	365	400	16, 20	9,14	11,72
KL 350 P	350	128	167	365	400	16, 20	11,4	16,6



"ADS" Battery KL 240...350P sketch

"ADS" batteries group KL 270 P

MATERIAL CHARACTERISTICS:

Frame: polypropylene (PP) of K 499 type

Cover: polypropylene (PP) of K 499 type

Valve: polypropylene (PP) of K 499 type, heat, frost, acid-alkali resistant rubber

Terminals: 20-th grade nickel plated steel

Nuts: M20 h=7 mm DIN 934, galvanized with nickel

Washers: steel of 08 KP type, galvanized with nickel

Electrolyte: solution of potassium hydroxide (p=1,26 g/cm^3) with the addition of lithium hydroxide 20 g/l

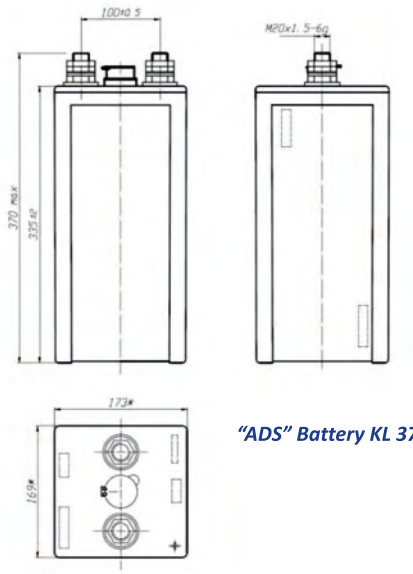
Batteries can be shipped in frames with a certain amount of cells.

Batteries can be shipped in frames with a certain amount of cells:

- busbars to connect the elements into the battery *(length on demand);*
- wires with tips for batteries sections connection;
- nuts and washers to fixate the plates and wires;
- spare valves and nipple gums;
- spanners for the battery mounting.

Option 6

Battery	Rated capacity A/h	Dimensions				Available diameters of terminals (2 units) mm.	Weight	
		Length	Width	Height	Height1		without electrolyte	with electrolyte
KL 375 P	375	173	169	335	370	16, 20	12,2	17,1
KL 400 P	400	173	169	335	370	16, 20	13,0	17,7
KL 435 P	435	173	169	335	370	16, 20	13,8	18,2
KL 470 P	470	173	169	335	370	16, 20	14,6	18,8



"ADS" Battery KL 375...470P sketch

MATERIAL CHARACTERISTICS:

Frame: polypropylene (PP) of K 499 type

Cover: polypropylene (PP) of K 499 type

Valve: ABS plastic

Terminals: 20-th grade nickel plated steel

Nuts: M20 h=7 mm DIN 934, galvanized with nickel

Washers: steel of 08 KP type, galvanized with nickel

Electrolyte: solution of potassium hydroxide (p=1,26 g/cm^3) with the addition of lithium hydroxide 20 g/l

Batteries can be shipped in frames with a certain amount of cells.

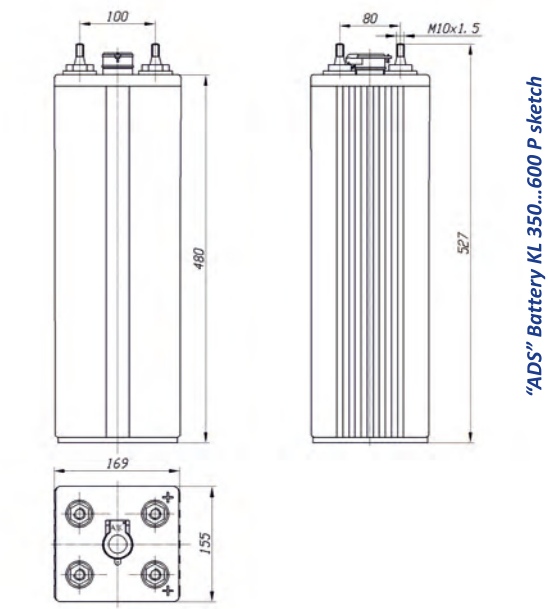
Batteries can be shipped in frames with a certain amount of cells:

- busbars to connect the elements into the battery *(length on demand);*
- wires with tips for batteries sections connection;
- nuts and washers to fixate the plates and wires;
- spare valves and nipple gums;
- spanners for the battery mounting.

Option 7

Battery	Rated capacity A/h	Dimensions				Available diameters of terminals (2 units) mm.	Weight	
		Length	Width	Height	Height1		without electrolyte	with electrolyte
KL 350 P	350	153	165	454	495	10, 16, 20	12,0	16,9
KL 400 P	400	153	165	454	495	10, 16, 20	13,1	17,9
KL 450 P	450	153	165	454	495	10, 16, 20	14,1	18,6
KL 500 P	500	153	165	454	495	10, 16, 20	14,9	19,5
KL 550 P	550	153	165	454	495	10, 16, 20	14,6	18,8
KL 600 P	600	153	165	454	495	10, 16, 20	14,6	18,8

"ADS" Battery KL 450 P YS



"ADS" Battery KL 350...600 P sketch

MATERIAL CHARACTERISTICS:

Frame: polypropylene (PP) of K 499 type

Cover: polypropylene (PP) of K 499 type

Valve: ABS plastic

Terminals: 20-th grade nickel plated steel

Nuts: M20 h=7 mm DIN 934, galvanized with nickel

Washers: steel of 08 KP type, galvanized with nickel

Electrolyte: solution of potassium hydroxide (p=1,26 g/cm^3) with the addition of lithium hydroxide 20 g/l

Batteries can be shipped in frames with a certain amount of cells.

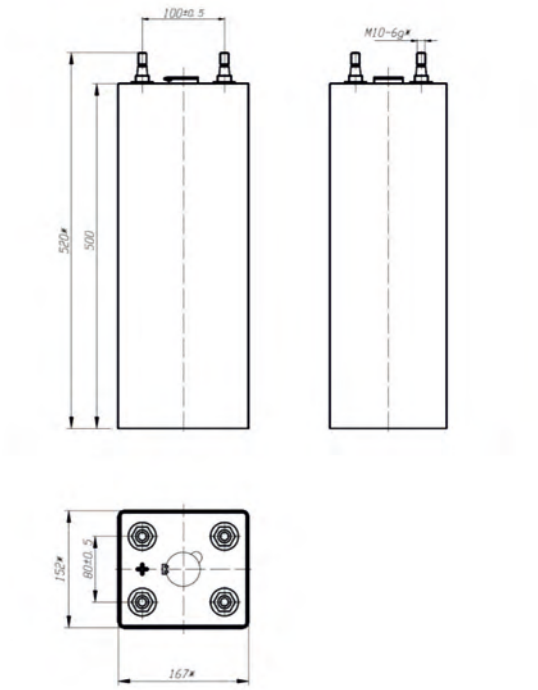
Batteries can be shipped in frames with a certain amount of cells:

- busbars to connect the elements into the battery *(length on demand);*
- wires with tips for batteries sections connection;
- nuts and washers to fixate the plates and wires;
- spare valves and nipple gums;
- spanners for the battery mounting.

Option 8

Battery	Rated capacity A/h	Dimensions				Available diameters of terminals (2 units) mm.	Weight	
		Length	Width	Height	Height1		without electrolyte	with electrolyte
KL 350 P	375	152	167	500	520	10, 16, 20	12,2	17,1
KL 400 P	400	152	167	500	520	10, 16, 20	13,0	17,7
KL 450 P	435	152	167	500	520	10, 16, 20	13,8	18,2
KL 500 P	470	152	167	500	520	10, 16, 20	14,6	18,8
KL 550 P	550	152	167	500	520	10, 16, 20		
KL 600 P	600	152	167	500	520	10, 16, 20		

"ADS" Battery KL 350...600P sketch



MATERIAL CHARACTERISTICS:

Frame: polypropylene (PP) of K 499 type

Cover: polypropylene (PP) of K 499 type

Valve: ABS plastic

Terminals: 20-th grade nickel plated steel

Nuts: M20 h=7 mm DIN 934, galvanized with nickel

Washers: steel of 08 KP type, galvanized with nickel

Electrolyte: solution of potassium hydroxide (p=1,26 g/cm^3) with the addition of lithium hydroxide 20 g/l

Batteries can be shipped in frames with a certain amount of cells.

Batteries can be shipped in frames with a certain amount of cells:

- busbars to connect the elements into the battery *(length on demand);*
- wires with tips for batteries sections connection;
- nuts and washers to fixate the plates and wires;
- spare valves and nipple gums;
- spanners for the battery mounting.