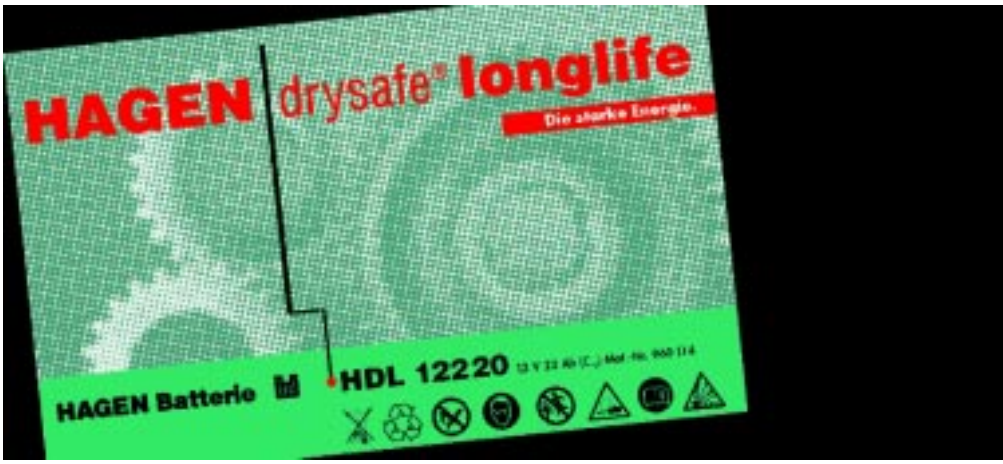
HAGEN Batterie AG

Valve regulated batteries for stationary applications

HAGEN *HDL*



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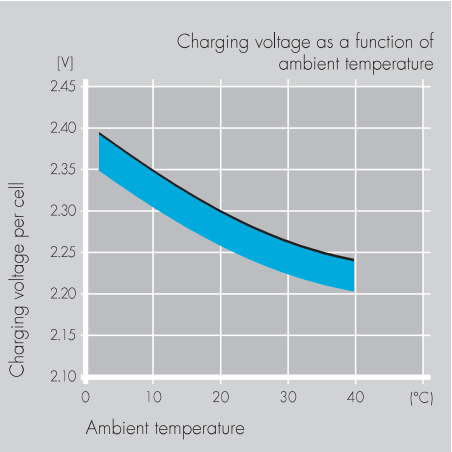


Figure 1

HDL is a new range of heavy duty VRLA lead acid batteries using AGM technology.

The range is designed to fulfil Eurobat Specification and meet the requirement of the High Performance group (10 years life time). It can also be supplied upon request in flame retardant container to UL-VO and will therefore comply with Eurobat High Integrity Classification as well as meet BS 6920-P2 specification.

The build in security valve fitted in the cover protects the battery against over-pressure that could be generated by a failing charging system. It also prevents air from entering the battery.

High pressure tested pole sealing provides for an absolutely tight and corrosion-free pole bushing.

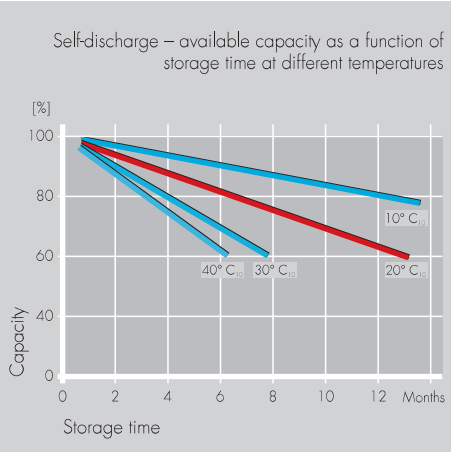


Figure 2

Applications

- Telecommunication equipment
- Industrial UPS
- Central Emergency Lighting
- Signalling equipments
- Switchgear
- Alarm systems
- Offshore industry
- Data processing centers
- Railways

Advantages

- High energy density
- High current proof
- Maintenance free, sealed
- Corrision protected terminals
- Thick plates with optimised grid mesh
- Low self discharge allowing long storage
- Transport without danger of acid leakeages
- Service life in float operation of 10 years
- Reduced ventilation
- Optional fully flame retardant design

Charging Method And Charging Voltage

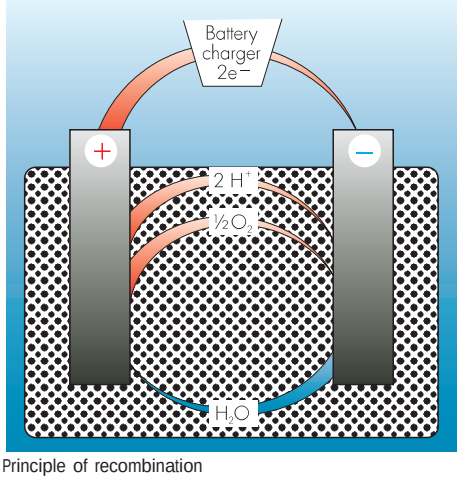
Only regulated charges should be used to charge the batteries. The floating voltage should be set at 2.27 to 2.30 V/cell for an ambient temperature of 20 °C. Temperature compensated charging systems will improve the service life of the battery (see figure 1).

Storage Conditions

The batteries should be stored fully charged in dry environment. Direct sunlight and high temperature should be avoided.

Figure 2 shows the relation between self discharge and duration of the storage at various ambient temperature.

Recombination and how it works!



Principle of recombination

In lead batteries with a liquid electrolyte, water is decomposed into the hydrogen and oxygen gas during charging, especially at its end. These gases escape through the battery cell plugs and have to be replaced by adding water.

In our valve regulated lead acid storage battery, the electrolyte is absorbed in microscopic glass-fibre mats, the pore volume of which is filled up to 90%.

With a suitable design of the positive and negative plate capacities, oxygen evolves first at the positive plate during charging. This oxygen can flow through the free pores directly to the negative plate, where it combines with the stream of H^+ ions of the electrolyte and electrons out of the electrode to form water again.

By this procedure the development of hydrogen is almost completely suppressed.

The water reaches the positive electrode by means of diffusion. The cycle of decomposition and recombination is closed. Due to the very low loss of water a refilling of the battery during the life time is not necessary.

Projecting Data

Discharge current in A

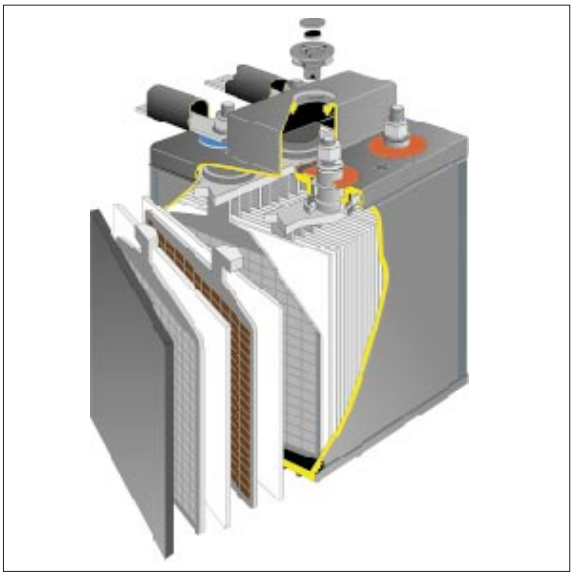
Us = 1.90 V/Z						
Typ	30'	1h	3h	5h	8h	10h
HDL 12220	20.4	12.8	5.9	3.8	2.4	2.1
HDL 12320	27.0	17.0	7.2	5.0	3.2	2.8
HDL 12420	37.0	23.0	10.2	6.7	4.4	3.8
HDL 12550	43.5	27.5	12.7	8.0	5.6	4.9
HDL 12800	61.5	39.2	18.4	12.0	8.3	7.3
HDL 61150	94.0	59.0	28.0	17.8	11.8	10.3
HDL 61650	139.0	84.5	35.6	24.2	16.7	14.7
HDL 22000	136.0	94.0	46.5	31.8	21.8	17.9
HDL 22500	172.0	118.0	57.0	38.8	26.2	21.5
HDL 23000	204.0	141.0	70.0	47.7	32.5	26.8
HDL 23600	238.0	165.0	81.4	55.7	38.0	31.3
HDL 24000	272.0	186.0	90.0	60.8	41.5	34.4

Us = 1.85 V/Z						
Typ	30'	1h	3h	5h	8h	10h
HDL 12220	23.0	14.2	6.4	4.1	2.6	2.2
HDL 12320	30.0	18.8	8.5	5.5	3.5	3.0
HDL 12420	41.5	26.0	11.5	7.4	4.8	4.0
HDL 12550	49.0	31.0	13.8	9.1	6.2	5.2
HDL 12800	69.5	44.0	19.8	13.2	9.0	7.6
HDL 61150	106.0	66.5	30.5	19.8	13.0	10.8
HDL 61650	156.0	96.0	38.9	27.0	17.9	15.5
HDL 22000	174.0	112.0	52.0	34.8	23.5	19.3
HDL 22500	210.0	137.0	64.0	42.5	28.4	23.5
HDL 23000	261.0	168.0	78.0	52.2	35.2	28.9
HDL 23600	305.0	196.0	91.0	60.9	41.1	33.8
HDL 24000	336.0	220.0	101.0	67.0	45.2	37.6

Us = 1.80 V/Z						
Typ	30'	1h	3h	5h	8h	10h
HDL 12220	25.1	15.1	6.9	4.3	2.7	2.2
HDL 12320	33.0	20.2	9.1	5.9	3.7	3.2
HDL 12420	46.0	27.5	12.4	7.7	4.9	4.2
HDL 12550	53.0	33.0	14.3	9.6	6.5	5.5
HDL 12800	75.5	47.0	20.5	13.8	9.3	8.0
HDL 61150	115.0	71.0	32.8	20.8	13.5	11.5
HDL 61650	170.0	102.0	42.1	28.4	18.8	16.5
HDL 22000	196.0	123.0	55.5	36.9	24.9	20.0
HDL 22500	247.0	155.0	68.0	45.0	30.2	25.0
HDL 23000	294.0	185.0	83.2	55.3	37.3	30.0
HDL 23600	343.0	215.0	97.0	64.6	43.6	36.0
HDL 24000	396.0	248.0	110.0	72.0	48.5	40.0

Us = 1.75 V/Z						
Typ	30'	1h	3h	5h	8h	10h
HDL 12220	26.1	15.3	7.0	4.4	2.8	2.4
HDL 12320	34.5	20.5	9.2	6.0	3.8	3.3
HDL 12420	48.0	28.5	12.6	7.9	5.1	4.3
HDL 12550	55.0	34.5	14.6	9.8	6.6	5.6
HDL 12800	78.5	48.8	21.0	14.2	9.5	8.2
HDL 61150	120.0	73.5	33.6	21.4	13.8	11.6
HDL 61650	175.0	105.0	43.5	29.2	19.5	16.6
HDL 22000	214.0	130.0	57.0	37.8	25.1	20.7
HDL 22500	267.0	162.0	69.0	46.2	30.7	25.2
HDL 23000	321.0	195.0	85.0	56.7	37.6	31.0
HDL 23600	374.0	228.0	100.0	66.0	43.9	36.2
HDL 24000	424.0	258.0	112.0	73.2	49.0	40.3

Us = 1.70 V/Z						
Typ	30'	1h	3h	5h	8h	10h
HDL 12220	26.9	15.5	7.1	4.5	2.9	2.4
HDL 12320	35.5	20.8	9.3	6.1	3.9	3.3
HDL 12420	50.0	29.0	12.7	8.0	5.2	4.4
HDL 12550	56.5	35.0	14.9	10.0	6.7	5.7
HDL 12800	80.0	49.6	21.7	14.5	9.7	8.3
HDL 61150	124.0	74.5	34.1	21.8	14.1	11.7
HDL 61650	179.0	108.0	44.5	29.8	19.8	16.9
HDL 22000	228.0	136.0	58.0	38.6	25.3	20.9
HDL 22500	282.0	168.0	70.0	46.9	31.3	25.4
HDL 23000	342.0	204.0	87.0	58.0	38.0	31.3
HDL 23600	399.0	238.0	101.0	67.5	44.3	36.6
HDL 24000	448.0	268.0	114.0	74.4	49.5	40.6



Projecting Data

Constant performance in Watt/cell

Us = 1.85 V/Z

Typ	5'	10'	15'	20'	30'	45'	1h
HDL 12220	123.8	89.5	70.8	58.8	45.1	34.7	28.3
HDL 12320	159.2	116.0	92.5	78.0	59.2	45.2	37.0
HDL 12420	222.5	162.5	130.0	108.3	83.3	62.7	51.7
HDL 12550	230.5	180.5	145.3	124.2	96.0	74.2	61.5
HDL 12800	291.3	236.0	198.0	171.0	136.2	106.0	87.2
HDL 61150	510.0	394.7	323.7	270.3	208.3	159.7	131.0
HDL 61650	617.7	514.7	444.0	386.0	305.7	235.0	189.7
HDL 22000	650.0	550.0	465.0	407.0	327.0	258.0	214.0
HDL 22500	795.0	673.0	575.0	500.0	403.0	393.0	265.0
HDL 23000	975.0	825.0	695.0	610.0	491.0	384.0	321.0
HDL 23600	1140.0	965.0	810.0	710.0	575.0	447.0	375.0
HDL 24000	1210.0	1030.0	900.0	775.0	645.0	502.0	421.0

Us = 1.80 V/Z

Typ	5'	10'	15'	20'	30'	45'	1h
HDL 12220	143.0	101.0	77.6	64.0	48.3	36.5	29.9
HDL 12320	185.7	132.7	103.0	85.2	64.2	48.2	39.5
HDL 12420	260.0	185.8	144.2	118.3	90.0	67.2	54.5
HDL 12550	266.5	201.3	158.8	132.3	101.8	78.7	64.8
HDL 12800	340.0	267.7	220.2	186.8	145.7	112.3	91.8
HDL 61150	600.7	452.3	359.0	297.0	224.0	168.3	138.7
HDL 61650	723.7	585.3	492.3	421.3	328.0	249.0	200.0
HDL 22000	745.0	620.0	525.0	453.0	361.0	281.0	231.0
HDL 22500	920.0	765.0	650.0	562.0	448.0	348.0	285.0
HDL 23000	1120.0	930.0	785.0	680.0	541.0	421.0	346.0
HDL 23600	1305.0	1085.0	915.0	795.0	630.0	491.0	404.0
HDL 24000	1420.0	1185.0	1010.0	890.0	720.0	553.0	452.0

Us = 1.75 V/Z

Typ	5'	10'	15'	20'	30'	45'	1h
HDL 12220	154.9	107.5	82.2	67.7	50.2	37.3	30.2
HDL 12320	201.0	141.2	109.2	89.5	66.7	49.3	40.2
HDL 12420	281.7	197.5	152.5	125.0	93.3	68.7	55.8
HDL 12550	295.2	215.7	166.7	139.2	106.2	82.0	67.0
HDL 12800	383.3	288.2	231.2	194.8	151.3	115.5	95.0
HDL 61150	665.0	485.3	381.3	312.7	232.7	175.0	143.7
HDL 61650	810.7	637.0	521.0	444.0	340.7	257.7	208.0
HDL 22000	850.0	685.0	570.0	493.0	391.0	300.0	242.0
HDL 22500	1040.0	852.0	713.0	612.0	485.0	372.0	300.0
HDL 23000	1275.0	1030.0	860.0	740.0	587.0	450.0	363.0
HDL 23600	1490.0	1200.0	1005.0	865.0	685.0	525.0	424.0
HDL 24000	1595.0	1330.0	1120.0	970.0	770.0	558.0	476.0

Us = 1.70 V/Z

Typ	5'	10'	15'	20'	30'	45'	1h
HDL 12220	164.5	112.3	85.5	69.5	51.7	37.9	30.5
HDL 12320	214.0	147.3	112.8	92.5	68.3	50.5	40.8
HDL 12420	299.2	206.7	158.3	129.2	95.8	70.0	56.7
HDL 12550	316.2	222.0	170.3	142.3	107.8	83.0	67.8
HDL 12800	426.7	304.0	240.7	201.2	153.7	117.2	96.7
HDL 61150	707.0	505.3	394.7	321.3	238.7	177.0	145.0
HDL 61650	891.0	672.3	540.3	453.7	344.0	260.7	211.0
HDL 22000	930.0	745.0	625.0	530.0	411.0	312.0	250.0
HDL 22500	1140.0	920.0	765.0	657.0	510.0	387.0	312.0
HDL 23000	1395.0	1120.0	935.0	795.0	616.0	468.0	375.0
HDL 23600	1630.0	1305.0	1090.0	930.0	720.0	546.0	438.0
HDL 24000	1775.0	1445.0	1200.0	1045.0	810.0	611.0	495.0

Us = 1.65 V/Z

Typ	5'	10'	15'	20'	30'	45'	1h
HDL 12220	170.3	115.0	86.9	70.9	52.7	38.2	30.7
HDL 12320	221.3	151.2	115.3	93.7	69.3	50.8	41.2
HDL 12420	310.0	211.7	160.8	131.7	97.5	70.5	57.2
HDL 12550	327.2	228.2	174.7	144.8	109.0	83.5	68.3
HDL 12800	462.3	319.8	247.0	204.3	155.5	118.2	97.5
HDL 61150	733.7	518.7	401.3	328.0	241.7	178.3	145.7
HDL 61650	958.7	704.3	556.7	460.0	347.3	262.3	212.7
HDL 22000	1005.0	790.0	645.0	553.0	423.0	317.0	257.0
HDL 22500	1220.0	975.0	800.0	680.0	525.0	393.0	317.0
HDL 23000	1505.0	1185.0	970.0	830.0	635.0	475.0	386.0
HDL 23600	1755.0	1385.0	1130.0	970.0	740.0	554.0	450.0
HDL 24000	1900.0	1520.0	1250.0	1065.0	830.0	620.0	503.0

Us = 1.60 V/Z

Typ	5'	10'	15'	20'	30'	45'	1h
HDL 12220	173.5	116.8	88.0	71.7	53.0	38.3	30.7
HDL 12320	225.7	153.5	116.7	95.0	70.3	51.2	41.3
HDL 12420	315.8	215.0	163.3	133.3	98.3	70.8	57.5
HDL 12550	346.0	234.7	178.3	147.3	110.2	84.0	68.8
HDL 12800	478.2	327.8	251.7	205.8	156.8	118.8	98.2
HDL 61150	756.0	527.7	406.7	330.3	243.7	179.7	146.3
HDL 61650	994.0	723.7	566.7	463.3	350.7	263.7	214.0
HDL 22000	1035.0	810.0	670.0	563.0	432.0	320.0	259.0
HDL 22500	1255.0	995.0	825.0	695.0	535.0	397.0	319.0
HDL 23000	1550.0	1220.0	1005.0	845.0	648.0	480.0	388.0
HDL 23600	1810.0	1425.0	1175.0	985.0	756.0	560.0	453.0
HDL 24000	1930.0	1535.0	1270.0	1085.0	835.0	625.0	506.0

Technical data

Nominal capacities, dimensions and weights

Type	U_N Volt	Capacity (Ah) C_{10} at 20 °C	Dimensions (mm) L	W	H	Weight (kg)	Terminals
HDL 12220	12	22	168	127	174	9	M 6
HDL 12320	12	32	198	168	175	13.5	M 6
HDL 12420	12	42	234	169	190	18.5	M 8
HDL 12550	12	55	271.5	166	189.5	22	M 8
HDL 12800	12	80	359	171.5	226	30	M 8
HDL 61150	6	115	271.5	166	189.5	23	M 8
HDL 61650	6	165	359	171	226	31.5	M 8
HDL 22000	2	200	208	135	282	16	M 12
HDL 22500	2	250	208	135	282	18	M 12
HDL 23000	2	300	208	201	282	24	M 12
HDL 23600	2	360	208	201	282	26	M 12
HDL 24000	2	400	208	201	282	28	M 12