



Robex 220LC-9SH

CRAWLER EXCAVATOR



SERVICE MANUAL

FOREWORD	10
1. Structure	10
2. How To Read The Service Manual	11
3. Conversion Table	12
SECTION 1 GENERAL	18
Group 1 Safety	19
Group 2 Specifications	28
2. Specifications	29
3. Working Range	32
4. Weight	35
5. Lifting Capacities	38
6. Bucket Selection Guide	41
7. Undercarriage	43
8. Specifications For Major Components	45
9. Recommended Oils	49
SECTION 2 STRUCTURE AND FUNCTION	50
Group 1 Pump Device	51
1. Structure	51
2. Function	57
Group 2 Main Control Valve	70
1. Structure	70
2. Hydraulic Circuit	76
3. Function	77
Group 3 Swing Device	104
1. Structure	104
Group 3 Swing Device (type 2)	105
1. Structure	105
2. Principle Of Driving	108
Group 4 Travel Device	116
1. Structure	116
2. Principle Of Driving	118
Group 5 Rcv Lever	124
1. Structure	124
2. Functions	127
Group 6 Rcv Pedal	131
1. Structure	131
2. Function	133
SECTION 3 HYDRAULIC SYSTEM	137
Group 1 Hydraulic Circuit (cluster Type 1)	138

Hydraulic Circuit (cluster Type 2)	139
Group 2 Main Circuit	140
1. Suction And Delivery Circuit	140
2. Return Circuit	141
3. Drain Circuit	142
Group 3 Pilot Circuit	143
1. Suction, Delivery And Return Circuit	144
2. Safety Solenoid Valve (safety Lever)	145
3. Boom Priority System.	146
4. Travel Speed Control System	147
5. Main Relief Pressure Change Circuit	148
6. Arm Regeneration Cut System (cluster Type 1)	149
7. Swing Parking Brake Release	150
8. Swing Priority System.	151
Group 4 Single Operation	152
1. Boom Up Operation.	152
2. Boom Down Operation	153
3. Arm In Operation.	154
4. Arm Out Operation	155
5. Bucket In Operation	156
6. Bucket Out Operation.	157
7. Swing Operation	158
8. Travel Forward And Reverse Operation	160
Group 5 Combined Operation	162
1. Outline	162
2. Combined Swing And Boom Up Operation.	163
3. Combined Swing And Arm Operation	164
4. Combined Swing And Bucket Operation.	165
5. Combined Swing And Travel Operation	166
6. Combined Boom And Travel Operation	167
7. Combined Arm And Travel Operation	168
8. Combined Bucket And Travel Operation.	169
SECTION 4 ELECTRICAL SYSTEM	170
Group 1 Component Location	171
1. Location 1.	171
2. Location 2.	172
Memorandum.	177
1. Power Circuit (cluster Type 1)	178
2. Power Circuit (cluster Type 2)	180
3. Starting Circuit (cluster Type 1)	182
4. Starting Circuit (cluster Type 2)	184
5. Charging Circuit (cluster Type 1)	186
6. Charging Circuit (cluster Type 2)	188

7. Head And Work Light Circuit.	190
8. Beacon Lamp And Cab Light Circuit	192
9. Wiper And Washer Circuit.	194
Group 3 Electrical Component Specification.	202
Group 4 Connectors	210
1. Connector Destination	210
2. Connection Table For Connectors	214
SECTION 5 MECHATRONICS SYSTEM	233
Group 1 Outline.	234
Group 2 Mode Selection System (cluster Type 1)	237
1. Power Mode Selection System.	237
2. Work Mode Selection System	238
3. User Mode Selection System	239
Mode Selection System (cluster Type 2)	240
1. Power Mode Selection System.	240
2. Work Mode Selection System	241
3. User Mode Selection System	242
Group 3 Automatic Deceleration System (cluster Type 1)	243
1. When Auto Idle Pilot Lamp On 2. When Auto Idle Pilot Lamp Off	243
Automatic Deceleration System (cluster Type 2)	244
1. When Auto Idle Pilot Lamp On 2. When Auto Idle Pilot Lamp Off	244
Group 4 Power Boost System (cluster Type 1).	245
Power Boost System (cluster Type 2)	246
Group 5 Travel Speed Control System (cluster Type 1)	247
Travel Speed Control System (cluster Type 2)	248
Group 6 Automatic Warming Up System (cluster Type 1)	249
Automatic Warming Up System (cluster Type 2)	250
Group 7 Engine Overheat Prevention System (cluster Type 1)	251
Engine Overheat Prevention System (cluster Type 2)	252
Group 8 Variable Power Control System (cluster Type 1)	253
Group 9 Attachment Flow Control System (cluster Type 1)	254
Group 10 Anti-restart System	255
1. Anti-restart Function	255
Group 11 Self-diagnostic System (cluster Type 1).	256
1. 2..	256
3. Machine Error Codes Table	257
Self-diagnostic System (cluster Type 2)	260
3. Machine Error Codes Table (cluster Type 2)	261
Group 12 Engine Control System	263
1. Mcu (machine Control Unit)	263
2. Mcu Assembly.	263
3. Exchange Method Of The Rom In The Cluster (type 2)	264

Group 13 Eppr Valve (cluster Type 1)	265
1. Pump Eppr Valve.	265
1).	265
3)	266
4)	267
2. Boom Priority Eppr Valve (cluster Type 1, 2).	268
4)	269
Eppr Valve (cluster Type 2).	270
1. Pump Eppr Valve.	270
1).	270
Group 14 Monitoring System (cluster Type 1)	271
1. Outline	271
2. Cluster	271
3. Cluster Connector	273
Monitoring System (cluster Type 2).	294
1. 2..	294
3. Cluster Connector	296
Group 15 Fuel Warmer System	307
1. Specification.	307
2. Operation	307
3. Electric Circuit	307
SECTION 6 TROUBLESHOOTING	308
Group 1 Before Troubleshooting	309
1. Introduction	309
2. Diagnosing Procedure	310
Group 2 Hydraulic And Mechanical System	312
1. Introduction	312
2. Drive System	313
3. Hydraulic System	315
4. Swing System	317
5. Travel System	321
6. Attachment System.	326
Group 3 Electrical System (cluster Type 1)	332
1. When Starting Switch Is Turned On, Monitor Panel Display Does Not Appear.	332
3. Battery Charging Warning Lamp Lights Up (starting Switch : On)	334
4. When Coolant Overheat Warning Lamp Lights Up (engine Is Started).	335
5. When Air Cleaner Warning Lamp Lights Up (engine Is Started).	336
6. When Engine Oil Pressure Warning Lamp Lights Up (engine Is Started).	337
7. When Hydraulic Oil Temperature Warning Lamp Lights Up (engine Is Started)	338
8. When Coolant Temperature Gauge Does Not Operate (hcespn 304, Fmi 3 Or 4)	339

9. When Fuel Gauge Does Not Operate (hcespn 301, Fmi 3 Or 4)	340
10. When Safety Solenoid Does Not Operate.	341
11. When Travel Speed 1, 2 Does Not Operate (hcespn 167, Fmi 5 Or 6)	342
12. When Engine Does Not Start (Lights Up Condition)	343
13. When Starting Switch On Does Not Operate	344
14. When Starting Switch Is Turned On, Wiper Motor Does Not Operate	345
15. When Starting Switch Is Turned On, Head Lamp Does Not Lights Up.	346
16. When Starting Switch Is Turned On, Work Lamp Does Not Lights Up.	347
Electrical System (cluster Type 2)	348
1. When Starting Switch Is Turned On, Monitor Panel Display Does Not Appear.	348
3. Battery Charging Warning Lamp Lights Up (starting Switch : On)	350
4. When Coolant Overheat Warning Lamp Lights Up (engine Is Started).	351
5. When Air Cleaner Warning Lamp Lights Up (engine Is Started).	352
6. When Engine Oil Pressure Warning Lamp Lights Up (engine Is Started).	353
7. When Hydraulic Oil Temperature Warning Lamp Lights Up (engine Is Started)	354
8. When Coolant Temperature Gauge Does Not Operate	355
9. When Fuel Gauge Does Not Operate (check Warning Lamp On/off)	356
10. When Safety Solenoid Does Not Operate.	357
11. When Travel Speed 1, 2 Does Not Operate.	358
12. When Engine Does Not Start (Lights Up Condition)	359
13. When Starting Switch On Does Not Operate	360
14. When Starting Switch Is Turned On, Wiper Motor Does Not Operate	361
15. When Starting Switch Is Turned On, Head Lamp Does Not Lights Up.	362
16. When Starting Switch Is Turned On, Work Lamp Does Not Lights Up.	363
Group 4 Mechatronics System (cluster Type 1)	364
1. All Actuators Speed Are Slow	364
2. Engine Stall	366
3. Malfunction Of Cluster Or Mode Selection System	368
4. Malfunction Of Accel Dial	369
5. Auto Decel System Does Not Work.	371
6. Malfunction Of Pump 1 Pressure Sensor	373
7. Malfunction Of Pump 2 Pressure Sensor	375
8. Malfunction Of Pump 3 Pressure Sensor	377
9. Malfunction Of Swing Pressure Sensor	379
10. Malfunction Of Boom Up Pressure Sensor	381
11. Malfunction Of Power Max	383
12. Malfunction Of Boom Priority Eppr Valve	385
13. Malfunction Of Arm Regeneration Solenoid	386
Mechatronics System (cluster Type 2)	388
1. All Actuators Speed Are Slow	388
2. Engine Stall	390
3. Malfunction Of Cluster Or Mode Selection System	392

4. Malfunction Of Accel Dial	393
5. Auto Decel System Does Not Work.	395
6. Malfunction Of Pump 1 Pressure Sensor	397
7. Malfunction Of Pump 2 Pressure Sensor	399
8. Malfunction Of Pump 3 Pressure Sensor	401
9. Malfunction Of Power Max.	403
10. Malfunction Of Boom Priority Eppr Valve	405
SECTION 7 MAINTENANCE STANDARD	406
Group 1 Operational Performance Test	407
1. Purpose.	407
2. Terminology.	408
3. Operation For Performance Tests	409
Group 2 Major Component.	428
1. Main Pump	428
2. Main Control Valve	429
3. Swing Device	430
4. Travel Motor.	431
5. Rcv Lever.	432
6. Rcv Pedal.	433
7. Turning Joint	434
8. Cylinder.	435
Group 3 Track And Work Equipment.	436
1. Track	436
2. Work Equipment	441
SECTION 8 DISASSEMBLY AND ASSEMBLY	442
Group 1 Precautions	443
1. Removal Work	443
2. Install Work	444
3. Completing Work.	445
Group 2 Tightening Torque.	446
1. Major Components	446
2. Torque Chart	447
Group 3 Pump Device	449
1. Removal And Install	449
2. Main Pump (1/2)	451
3. Regulator (1/2).	461
Group 4 Main Control Valve	472
1. Removal And Install Of Motor	472
2. Structure	473
3. Disassembly And Assembly	478
Group 5 Swing Device (type 1).	493
1. Removal And Install Of Motor	493
2. Disassembly And Assembly Of Swing Motor.	494

3. Removal And Install Of Reduction Gear	508
4. Disassembly And Assembly Of Reduction Gear	509
Group 5 Swing Device (type 2, 3)	518
1. Removal And Install Of Motor	518
2. Disassembly And Assembly Of Swing Motor	519
3. Disassembly And Assembly Of Reduction Gear	531
4. Assembly Reduction Unit	536
Group 6 Travel Device	548
1. Removal And Install	548
2. Travel Motor.	549
3. Outline Of Disassembling	551
4. Outline For Assembling	557
Group 7 Rcv Lever	580
1. Removal And Install	580
2. Disassembly And Assembly	581
Group 8 Turning Joint	594
1. Removal And Install	594
2. Disassembly And Assembly	595
Group 9 Boom, Arm And Bucket Cylinder	599
1. Removal And Install	599
2. Disassembly And Assembly	605
Group 10 Undercarriage	616
1. Track Link.	616
2. Carrier Roller	617
3. Track Roller	618
4. Idler And Recoil Spring	619
Group 11 Work Equipment.	628
1. Structure	628
2. Removal And Install	629
SECTION 9 COMPONENT MOUNTING TORQUE	632
Group 1 Introduction Guide.	633
Group 2 Engine System	634
1. Engine And Accessories Mounting	634
2. Cooling System And Fuel Tank Mounting	635
Group 3 Electric System	636
1. Electric Components Mounting 1	636
2. Electric Components Mounting 2	637
Group 4 Hydraulic System	638
1. Hydraulic Components Mounting 1	638
2. Hydraulic Components Mounting 2	639
3. Hydraulic Components Mounting 3	640
Group 5 Undercarriage.	641
1. Undercarriage Mounting.	641

2. Undercarriage Mounting (high Walker)	642
Group 6 Structure	643
1. Cab And Accessories Mounting	643
2. Cab Interior Mounting.	644
3. Cowling Mounting	645
4. Counterweight And Covers Mounting	646
Group 7 Work Equipment	647

FOREWORD

1. STRUCTURE

This service manual has been prepared as an aid to improve the quality of repairs by giving the serviceman an accurate understanding of the product and by showing him the correct way to perform repairs and make judgements. Make sure you understand the contents of this manual and use it to full effect at every opportunity.

This service manual mainly contains the necessary technical information for operations performed in a service workshop.

For ease of understanding, the manual is divided into the following sections.

SECTION 1 GENERAL

This section explains the safety hints and gives the specification of the machine and major components.

SECTION 2 STRUCTURE AND FUNCTION

This section explains the structure and function of each component. It serves not only to give an understanding of the structure, but also serves as reference material for troubleshooting.

SECTION 3 HYDRAULIC SYSTEM

This section explains the hydraulic circuit, single and combined operation.

SECTION 4 ELECTRICAL SYSTEM

This section explains the electrical circuit, monitoring system and each component. It serves not only to give an understanding electrical system, but also serves as reference material for trouble shooting.

SECTION 5 MECHATRONICS SYSTEM

This section explains the computer aided power optimization system and each component.

SECTION 6 TROUBLESHOOTING

This section explains the troubleshooting charts correlating **problems** to **causes**.

SECTION 7 MAINTENANCE STANDARD

This section gives the judgement standards when inspecting disassembled parts.

SECTION 8 DISASSEMBLY AND ASSEMBLY

This section explains the order to be followed when removing, installing, disassembling or assembling each component, as well as precautions to be taken for these operations.

SECTION 9 COMPONENT MOUNTING TORQUE

This section shows bolt specifications and standard torque values needed when mounting components to the machine.

The specifications contained in this shop manual are subject to change at any time and without any advance notice. Contact your HYUNDAI distributor for the latest information.

2. HOW TO READ THE SERVICE MANUAL

Distribution and updating

Any additions, amendments or other changes will be sent to HYUNDAI distributors.

Get the most up-to-date information before you start any work.

Filing method

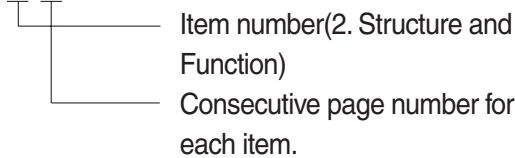
1. See the page number on the bottom of the page.

File the pages in correct order.

2. Following examples shows how to read the page number.

Example 1

2 - 3



3. Additional pages : Additional pages are indicated by a hyphen(-) and number after the page number. File as in the example.

10 - 4

10 - 4 - 1

10 - 4 - 2

10 - 5

Added pages

Revised edition mark(①②③...)

When a manual is revised, an edition mark is recorded on the bottom outside corner of the pages.

Revisions

Revised pages are shown at the list of revised pages on the between the contents page and section 1 page.

Symbols

So that the shop manual can be of ample practical use, important places for safety and quality are marked with the following symbols.

Symbol	Item	Remarks
	Safety	Special safety precautions are necessary when performing the work.
		Extra special safety precautions are necessary when performing the work because it is under internal pressure.
	Caution	Special technical precautions or other precautions for preserving standards are necessary when performing the work.

3. CONVERSION TABLE

Method of using the Conversion Table

The Conversion Table in this section is provided to enable simple conversion of figures. For details of the method of using the Conversion Table, see the example given below.

Example

1. Method of using the Conversion Table to convert from millimeters to inches

Convert 55mm into inches.

- (1) Locate the number 50 in the vertical column at the left side, take this as (a), then draw a horizontal line from (a).
- (2) Locate the number 5 in the row across the top, take this as (b), then draw a perpendicular line down from (b).
- (3) Take the point where the two lines cross as (c). This point (c) gives the value when converting from millimeters to inches. Therefore, 55mm = 2.165 inches.

2. Convert 550mm into inches.

- (1) The number 550 does not appear in the table, so divide by 10 (Move the decimal point one place to the left) to convert it to 55mm.
- (2) Carry out the same procedure as above to convert 55mm to 2.165 inches.
- (3) The original value (550mm) was divided by 10, so multiply 2.165 inches by 10 (Move the decimal point one place to the right) to return to the original value.
This gives 550mm = 21.65 inches.

Millimeters to inches

(b)

1mm = 0.03937 in

	0	1	2	3	4	5	6	7	8	9
0		0.039	0.079	0.118	0.157	0.197	0.236	0.276	0.315	0.354
10	0.394	0.433	0.472	0.512	0.551	0.591	0.630	0.669	0.709	0.748
20	0.787	0.827	0.866	0.906	0.945	0.984	1.024	1.063	1.102	1.142
30	1.181	1.220	1.260	1.299	1.339	1.378	1.417	1.457	1.496	1.536
40	1.575	1.614	1.654	1.693	1.732	1.772	1.811	1.850	1.890	1.929
(a) 50	1.969	2.008	2.047	2.087	2.126	(c) 2.165	2.205	2.244	2.283	2.323
60	2.362	2.402	2.441	2.480	2.520	2.559	2.598	2.638	2.677	2.717
70	2.756	2.795	2.835	2.874	2.913	2.953	2.992	3.032	3.071	3.110
80	3.150	3.189	3.228	3.268	3.307	3.346	3.386	3.425	3.465	3.504
90	3.543	3.583	3.622	3.661	3.701	3.740	3.780	3.819	3.858	3.898

Millimeters to inches

1mm = 0.03937in

	0	1	2	3	4	5	6	7	8	9
0		0.039	0.079	0.118	0.157	0.197	0.236	0.276	0.315	0.354
10	0.394	0.433	0.472	0.512	0.551	0.591	0.630	0.669	0.709	0.748
20	0.787	0.827	0.866	0.906	0.945	0.984	1.024	1.063	1.102	1.142
30	1.181	1.220	1.260	1.299	1.339	1.378	1.417	1.457	1.496	1.536
40	1.575	1.614	1.654	1.693	1.732	1.772	1.811	1.850	1.890	1.929
50	1.969	2.008	2.047	2.087	2.126	2.165	2.205	2.244	2.283	2.323
60	2.362	2.402	2.441	2.480	2.520	2.559	2.598	2.638	2.677	2.717
70	2.756	2.795	2.835	2.874	2.913	2.953	2.992	3.032	3.071	3.110
80	3.150	3.189	3.228	3.268	3.307	3.346	3.386	3.425	3.465	3.504
90	3.543	3.583	3.622	3.661	3.701	3.740	3.780	3.819	3.858	3.898

Kilogram to Pound

1kg = 2.2046lb

	0	1	2	3	4	5	6	7	8	9
0		2.20	4.41	6.61	8.82	11.02	13.23	15.43	17.64	19.84
10	22.05	24.25	26.46	28.66	30.86	33.07	35.27	37.48	39.68	41.89
20	44.09	46.30	48.50	50.71	51.91	55.12	57.32	59.5	61.73	63.93
30	66.14	68.34	70.55	72.75	74.96	77.16	79.37	81.57	83.78	85.98
40	88.18	90.39	92.59	94.80	97.00	99.21	101.41	103.62	105.82	108.03
50	110.23	112.44	114.64	116.85	119.05	121.25	123.46	125.66	127.87	130.07
60	132.28	134.48	136.69	138.89	141.10	143.30	145.51	147.71	149.91	152.12
70	154.32	156.53	158.73	160.94	163.14	165.35	167.55	169.76	171.96	174.17
80	176.37	178.57	180.78	182.98	185.19	187.39	189.60	191.80	194.01	196.21
90	198.42	200.62	202.83	205.03	207.24	209.44	211.64	213.85	216.05	218.26

Liter to U.S. Gallon

1 ℓ = 0.2642 U.S.Gal

	0	1	2	3	4	5	6	7	8	9
0		0.264	0.528	0.793	1.057	1.321	1.585	1.849	2.113	2.378
10	2.642	2.906	3.170	3.434	3.698	3.963	4.227	4.491	4.755	5.019
20	5.283	5.548	5.812	6.076	6.340	6.604	6.869	7.133	7.397	7.661
30	7.925	8.189	8.454	8.718	8.982	9.246	9.510	9.774	10.039	10.303
40	10.567	10.831	11.095	11.359	11.624	11.888	12.152	12.416	12.680	12.944
50	13.209	13.473	13.737	14.001	14.265	14.529	14.795	15.058	15.322	15.586
60	15.850	16.115	16.379	16.643	16.907	17.171	17.435	17.700	17.964	18.228
70	18.492	18.756	19.020	19.285	19.549	19.813	20.077	20.341	20.605	20.870
80	21.134	21.398	21.662	21.926	22.190	22.455	22.719	22.983	23.247	23.511
90	23.775	24.040	24.304	24.568	24.832	25.096	25.631	25.625	25.889	26.153

Liter to U.K. Gallon

1 ℓ = 0.21997 U.K.Gal

	0	1	2	3	4	5	6	7	8	9
0		0.220	0.440	0.660	0.880	1.100	1.320	1.540	1.760	1.980
10	2.200	2.420	2.640	2.860	3.080	3.300	3.520	3.740	3.950	4.179
20	4.399	4.619	4.839	5.059	5.279	5.499	5.719	5.939	6.159	6.379
30	6.599	6.819	7.039	7.259	7.479	7.699	7.919	8.139	8.359	8.579
40	8.799	9.019	9.239	9.459	9.679	9.899	10.119	10.339	10.559	10.778
50	10.998	11.281	11.438	11.658	11.878	12.098	12.318	12.528	12.758	12.978
60	13.198	13.418	13.638	13.858	14.078	14.298	14.518	14.738	14.958	15.178
70	15.398	15.618	15.838	16.058	16.278	16.498	16.718	16.938	17.158	17.378
80	17.598	17.818	18.037	18.257	18.477	18.697	18.917	19.137	19.357	19.577
90	19.797	20.017	20.237	20.457	20.677	20.897	21.117	21.337	21.557	21.777

kgf · m to lbf · ft

1 kgf · m = 7.233 lbf · ft

	0	1	2	3	4	5	6	7	8	9
		7.2	14.5	21.7	28.9	36.2	43.4	50.6	57.9	65.1
10	72.3	79.6	86.8	94.0	101.3	108.5	115.7	123.0	130.2	137.4
20	144.7	151.9	159.1	166.4	173.6	180.8	188.1	195.3	202.5	209.8
30	217.0	224.2	231.5	238.7	245.9	253.2	260.4	267.6	274.9	282.1
40	289.3	296.6	303.8	311.0	318.3	325.5	332.7	340.0	347.2	354.4
50	361.7	368.9	376.1	383.4	390.6	397.8	405.1	412.3	419.5	426.8
60	434.0	441.2	448.5	455.7	462.9	470.2	477.4	484.6	491.8	499.1
70	506.3	513.5	520.8	528.0	535.2	542.5	549.7	556.9	564.2	571.4
80	578.6	585.9	593.1	600.3	607.6	614.8	622.0	629.3	636.5	643.7
90	651.0	658.2	665.4	672.7	679.9	687.1	694.4	701.6	708.8	716.1
100	723.3	730.5	737.8	745.0	752.2	759.5	766.7	773.9	781.2	788.4
110	795.6	802.9	810.1	817.3	824.6	831.8	839.0	846.3	853.5	860.7
120	868.0	875.2	882.4	889.7	896.9	904.1	911.4	918.6	925.8	933.1
130	940.3	947.5	954.8	962.0	969.2	976.5	983.7	990.9	998.2	10005.4
140	1012.6	1019.9	1027.1	1034.3	1041.5	1048.8	1056.0	1063.2	1070.5	1077.7
150	1084.9	1092.2	1099.4	1106.6	1113.9	1121.1	1128.3	1135.6	1142.8	1150.0
160	1157.3	1164.5	1171.7	1179.0	1186.2	1193.4	1200.7	1207.9	1215.1	1222.4
170	1129.6	1236.8	1244.1	1251.3	1258.5	1265.8	1273.0	1280.1	1287.5	1294.7
180	1301.9	1309.2	1316.4	1323.6	1330.9	1338.1	1345.3	1352.6	1359.8	1367.0
190	1374.3	1381.5	1388.7	1396.0	1403.2	1410.4	1417.7	1424.9	1432.1	1439.4

kgf/cm² to lbf/in²

1 kgf / cm² = 14.2233 lbf / in²

	0	1	2	3	4	5	6	7	8	9
		14.2	28.4	42.7	56.9	71.1	85.3	99.6	113.8	128.0
10	142.2	156.5	170.7	184.9	199.1	213.4	227.6	241.8	256.0	270.2
20	284.5	298.7	312.9	327.1	341.4	355.6	369.8	384.0	398.3	412.5
30	426.7	440.9	455.1	469.4	483.6	497.8	512.0	526.3	540.5	554.7
40	568.9	583.2	597.4	611.6	625.8	640.1	654.3	668.5	682.7	696.9
50	711.2	725.4	739.6	753.8	768.1	782.3	796.5	810.7	825.0	839.2
60	853.4	867.6	881.8	896.1	910.3	924.5	938.7	953.0	967.2	981.4
70	995.6	1010	1024	1038	1053	1067	1081	1095	1109	1124
80	1138	1152	1166	1181	1195	1209	1223	1237	1252	1266
90	1280	1294	1309	1323	1337	1351	1365	1380	1394	1408
100	1422	1437	1451	1465	1479	1493	1508	1522	1536	1550
110	1565	1579	1593	1607	1621	1636	1650	1664	1678	1693
120	1707	1721	1735	1749	1764	1778	1792	1806	1821	1835
130	1849	2863	1877	1892	1906	1920	1934	1949	1963	1977
140	1991	2005	2020	2034	2048	2062	2077	2091	2105	2119
150	2134	2148	2162	2176	2190	2205	2219	2233	2247	2262
160	2276	2290	2304	2318	2333	2347	2361	2375	2389	2404
170	2418	2432	2446	2460	2475	2489	2503	2518	2532	2546
180	2560	2574	2589	5603	2617	2631	2646	2660	2674	2688
200	2845	2859	2873	2887	2901	2916	2930	2944	2958	2973
210	2987	3001	3015	3030	3044	3058	3072	3086	3101	3115
220	3129	3143	3158	3172	3186	3200	3214	3229	3243	3257
230	3271	3286	3300	3314	3328	3343	3357	3371	3385	3399
240	3414	3428	3442	3456	3470	3485	3499	3513	3527	3542

TEMPERATURE

Fahrenheit-Centigrade Conversion.

A simple way to convert a fahrenheit temperature reading into a centigrade temperature reading or vice verse is to enter the accompanying table in the center or boldface column of figures.

These figures refer to the temperature in either Fahrenheit or Centigrade degrees.

If it is desired to convert from Fahrenheit to Centigrade degrees, consider the center column as a table of Fahrenheit temperatures and read the corresponding Centigrade temperature in the column at the left.

If it is desired to convert from Centigrade to Fahrenheit degrees, consider the center column as a table of Centigrade values, and read the corresponding Fahrenheit temperature on the right.

°C		°F	°C		°F	°C		°F	°C		°F
-40.4	-40	-40.0	-11.7	11	51.8	7.8	46	114.8	27.2	81	117.8
-37.2	-35	-31.0	-11.1	12	53.6	8.3	47	116.6	27.8	82	179.6
-34.4	-30	-22.0	-10.6	13	55.4	8.9	48	118.4	28.3	83	181.4
-31.7	-25	-13.0	-10.0	14	57.2	9.4	49	120.2	28.9	84	183.2
-28.9	-20	-4.0	-9.4	15	59.0	10.0	50	122.0	29.4	85	185.0
-28.3	-19	-2.2	-8.9	16	60.8	10.6	51	123.8	30.0	86	186.8
-27.8	-18	-0.4	-8.3	17	62.6	11.1	52	125.6	30.6	87	188.6
-27.2	-17	1.4	-7.8	18	64.4	11.7	53	127.4	31.1	88	190.4
-26.7	-16	3.2	-6.7	20	68.0	12.8	55	131.0	32.2	90	194.0
-26.1	-15	5.0	-6.7	20	68.0	12.8	55	131.0	32.2	90	194.0
-25.6	-14	6.8	-6.1	21	69.8	13.3	56	132.8	32.8	91	195.8
-25.0	-13	8.6	-5.6	22	71.6	13.9	57	134.6	33.3	92	197.6
-24.4	-12	10.4	-5.0	23	73.4	14.4	58	136.4	33.9	93	199.4
-23.9	-11	12.2	-4.4	24	75.2	15.0	59	138.2	34.4	94	201.2
-23.3	-10	14.0	-3.9	25	77.0	15.6	60	140.0	35.0	95	203.0
-22.8	-9	15.8	-3.3	26	78.8	16.1	61	141.8	35.6	96	204.8
-22.2	-8	17.6	-2.8	27	80.6	16.7	62	143.6	36.1	97	206.6
-21.7	-7	19.4	-2.2	28	82.4	17.2	63	145.4	36.7	98	208.4
-21.1	-6	21.2	-1.7	29	84.2	17.8	64	147.2	37.2	99	210.2
-20.6	-5	23.0	-1.1	35	95.0	21.1	70	158.0	51.7	125	257.0
-20.0	-4	24.8	-0.6	31	87.8	18.9	66	150.8	40.6	105	221.0
-19.4	-3	26.6	0	32	89.6	19.4	67	152.6	43.3	110	230.0
-18.9	-2	28.4	0.6	33	91.4	20.0	68	154.4	46.1	115	239.0
-18.3	-1	30.2	1.1	34	93.2	20.6	69	156.2	48.9	120	248.0
-17.8	0	32.0	1.7	35	95.0	21.1	70	158.0	51.7	125	257.0
-17.2	1	33.8	2.2	36	96.8	21.7	71	159.8	54.4	130	266.0
-16.7	2	35.6	2.8	37	98.6	22.2	72	161.6	57.2	135	275.0
-16.1	3	37.4	3.3	38	100.4	22.8	73	163.4	60.0	140	284.0
-15.6	4	39.2	3.9	39	102.2	23.3	74	165.2	62.7	145	293.0
-15.0	5	41.0	4.4	40	104.0	23.9	75	167.0	65.6	150	302.0
-14.4	6	42.8	5.0	41	105.8	24.4	76	168.8	68.3	155	311.0
-13.9	7	44.6	5.6	42	107.6	25.0	77	170.6	71.1	160	320.0
-13.3	8	46.4	6.1	43	109.4	25.6	78	172.4	73.9	165	329.0
-12.8	9	48.2	6.7	44	111.2	26.1	79	174.2	76.7	170	338.0
-12.2	10	50.0	7.2	45	113.0	26.7	80	176.0	79.4	172	347.0

SECTION 1 GENERAL

Group 1 Safety Hints	1-1
Group 2 Specifications	1-10

SECTION 1 GENERAL

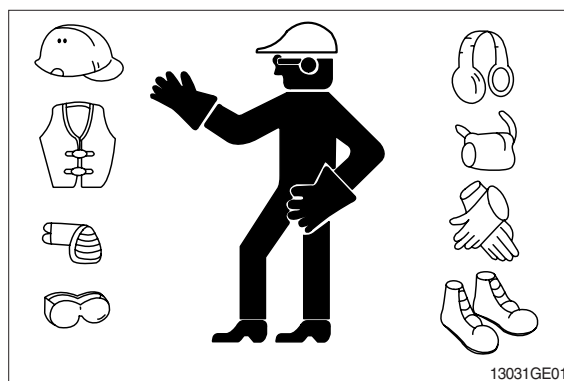
GROUP 1 SAFETY

FOLLOW SAFE PROCEDURE

Unsafe work practices are dangerous. Understand service procedure before doing work; Do not attempt shortcuts.

WEAR PROTECTIVE CLOTHING

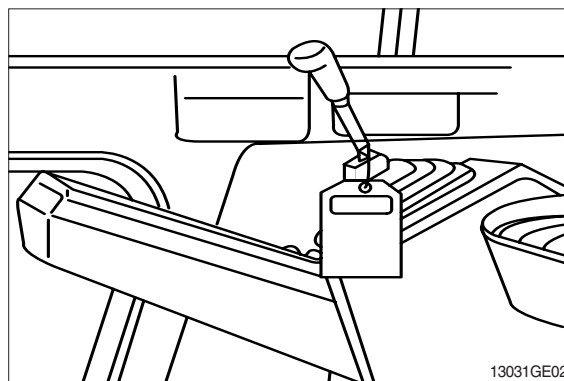
Wear close fitting clothing and safety equipment appropriate to the job.



WARN OTHERS OF SERVICE WORK

Unexpected machine movement can cause serious injury.

Before performing any work on the excavator, attach a 「Do Not Operate」 tag on the right side control lever.



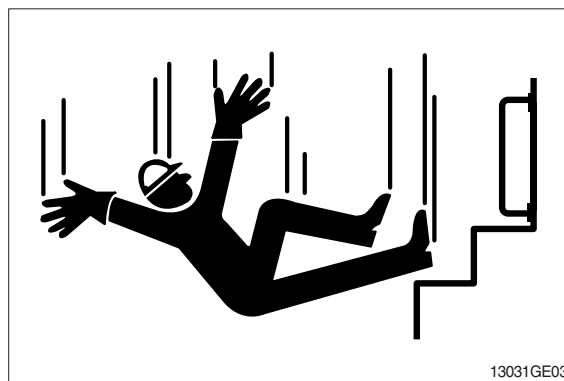
USE HANDHOLDS AND STEPS

Falling is one of the major causes of personal injury.

When you get on and off the machine, always maintain a three point contact with the steps and handrails and face the machine. Do not use any controls as handholds.

Never jump on or off the machine. Never mount or dismount a moving machine.

Be careful of slippery conditions on platforms, steps, and handrails when leaving the machine.

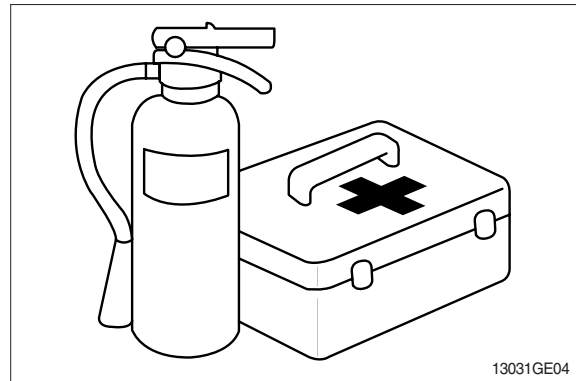


PREPARE FOR EMERGENCIES

Be prepared if a fire starts.

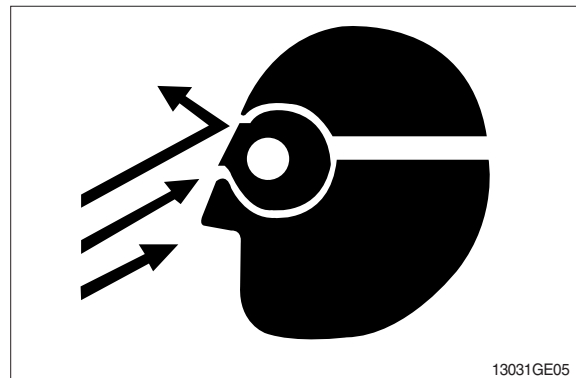
Keep a first aid kit and fire extinguisher handy.

Keep emergency numbers for doctors, ambulance service, hospital, and fire department near your telephone.



PROTECT AGAINST FLYING DEBRIS

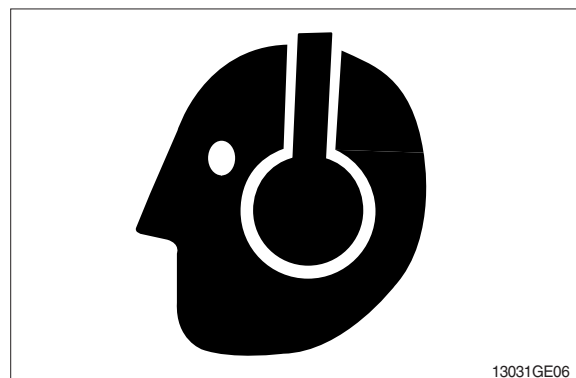
Guard against injury from flying pieces of metal or debris; Wear goggles or safety glasses.



PROTECT AGAINST NOISE

Prolonged exposure to loud noise can cause impairment or loss of hearing.

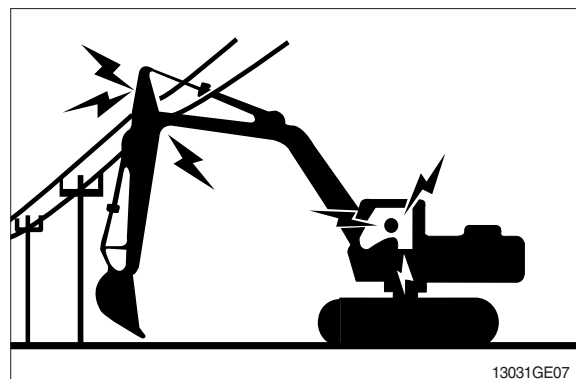
Wear a suitable hearing protective device such as earmuffs or earplugs to protect against objectionable or uncomfortable loud noises.



AVOID POWER LINES

Serious injury or death can result from contact with electric lines.

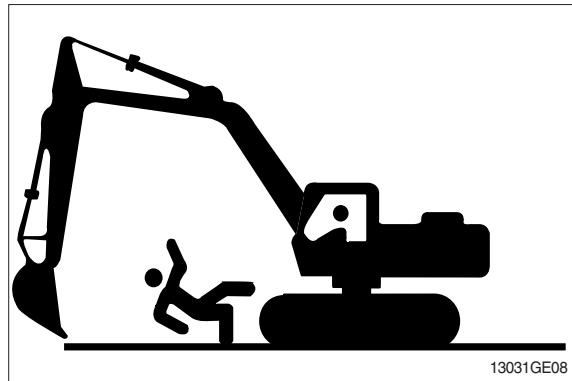
Never move any part of the machine or load closer to electric line than 3m(10ft) plus twice the line insulator length.



KEEP RIDERS OFF EXCAVATOR

Only allow the operator on the excavator. Keep riders off.

Riders on excavator are subject to injury such as being struck by foreign objects and being thrown off the excavator. Riders also obstruct the operator's view resulting in the excavator being operated in an unsafe manner.

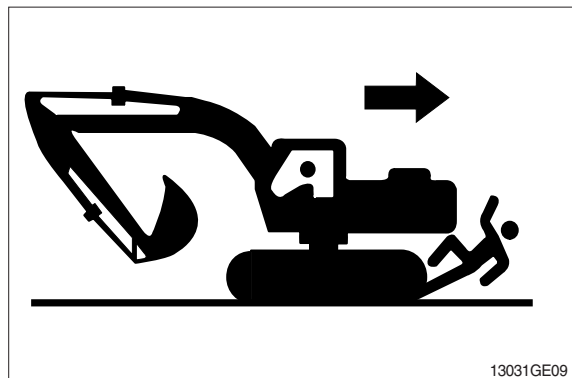


MOVE AND OPERATE MACHINE SAFELY

Bystanders can be run over. Know the location of bystanders before moving, swinging, or operating the machine.

Always keep the travel alarm in working condition. It warns people when the excavator starts to move.

Use a signal person when moving, swinging, or operating the machine in congested areas. Coordinate hand signals before starting the excavator.



OPERATE ONLY FROM OPERATOR'S SEAT

Avoid possible injury machine damage. Do not start engine by shorting across starter terminals.

NEVER start engine while standing on ground. Start engine only from operator's seat.



PARK MACHINE SAFELY

Before working on the machine:

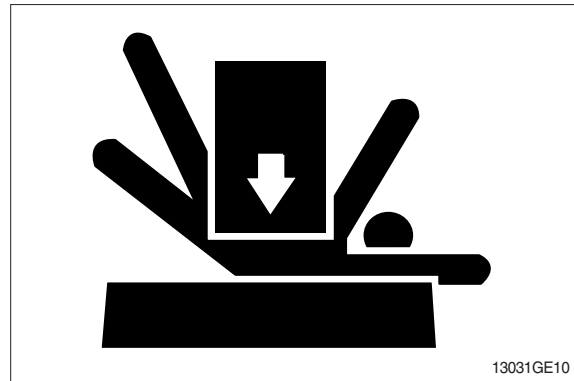
- Park machine on a level surface.
- Lower bucket to the ground.
- Turn auto idle switch off.
- Run engine at 1/2 speed without load for 2 minutes.
- Turn key switch to OFF to stop engine. Remove key from switch.
- Move pilot control shutoff lever to locked position.
- Allow engine to cool.

SUPPORT MACHINE PROPERLY

Always lower the attachment or implement to the ground before you work on the machine. If you must work on a lifted machine or attachment, securely support the machine or attachment.

Do not support the machine on cinder blocks, hollow tiles, or props that may crumble under continuous load.

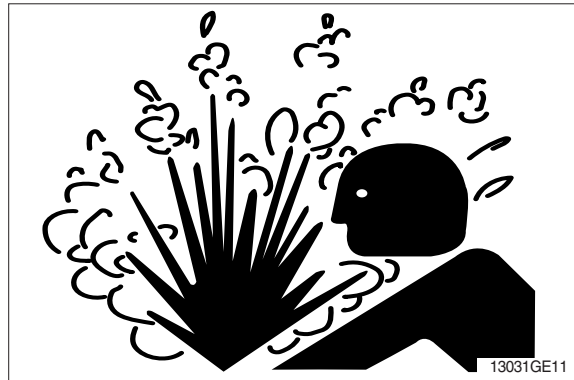
Do not work under a machine that is supported solely by a jack. Follow recommended procedures in this manual.



SERVICE COOLING SYSTEM SAFELY

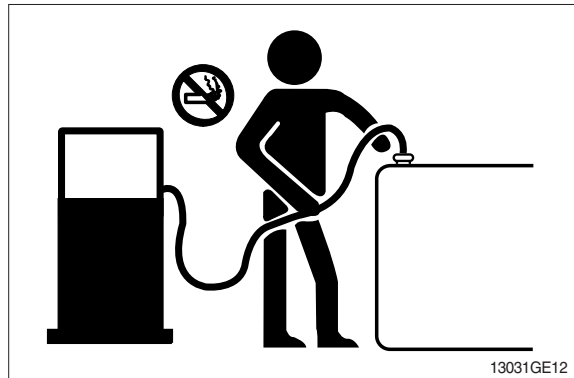
Explosive release of fluids from pressurized cooling system can cause serious burns.

Shut off engine. Only remove filler cap when cool enough to touch with bare hands.



HANDLE FLUIDS SAFELY-AVOID FIRES

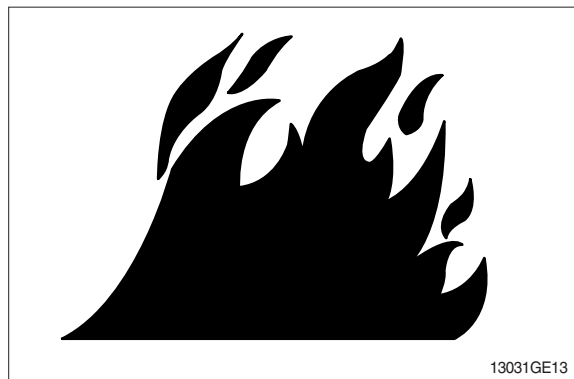
Handle fuel with care; It is highly flammable. Do not refuel the machine while smoking or when near open flame or sparks. Always stop engine before refueling machine. Fill fuel tank outdoors.



Store flammable fluids away from fire hazards. Do not incinerate or puncture pressurized containers.

Make sure machine is clean of trash, grease, and debris.

Do not store oily rags; They can ignite and burn spontaneously.



BEWARE OF EXHAUST FUMES

Prevent asphyxiation. Engine exhaust fumes can cause sickness or death.

If you must operate in a building, be positive there is adequate ventilation. Either use an exhaust pipe extension to remove the exhaust fumes or open doors and windows to bring enough outside air into the area.

REMOVE PAINT BEFORE WELDING OR HEATING

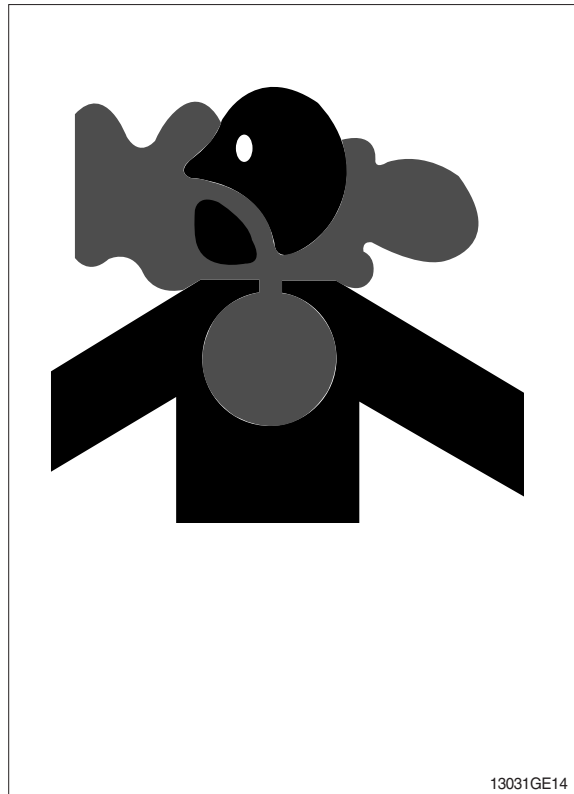
Avoid potentially toxic fumes and dust.

Hazardous fumes can be generated when paint is heated by welding, soldering, or using a torch.

Do all work outside or in a well ventilated area. Dispose of paint and solvent properly.

Remove paint before welding or heating:

- If you sand or grind paint, avoid breathing the dust.
Wear an approved respirator.
- If you use solvent or paint stripper, remove stripper with soap and water before welding. Remove solvent or paint stripper containers and other flammable material from area. Allow fumes to disperse at least 15 minutes before welding or heating.



ILLUMINATE WORK AREA SAFELY

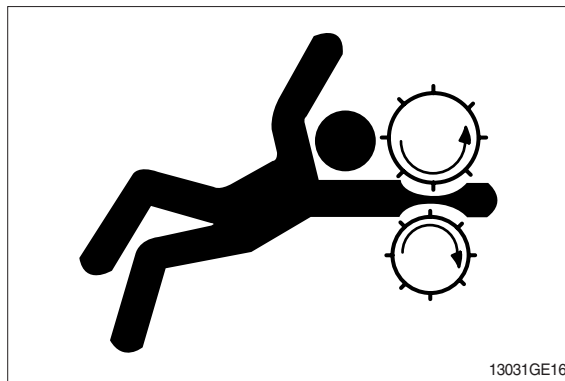
Illuminate your work area adequately but safely. Use a portable safety light for working inside or under the machine. Make sure the bulb is enclosed by a wire cage. The hot filament of an accidentally broken bulb can ignite spilled fuel or oil.



SERVICE MACHINE SAFELY

Tie long hair behind your head. Do not wear a necktie, scarf, loose clothing or necklace when you work near machine tools or moving parts. If these items were to get caught, severe injury could result.

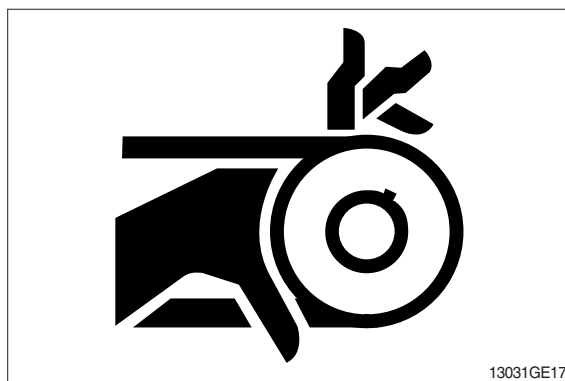
Remove rings and other jewelry to prevent electrical shorts and entanglement in moving parts.



STAY CLEAR OF MOVING PARTS

Entanglements in moving parts can cause serious injury.

To prevent accidents, use care when working around rotating parts.



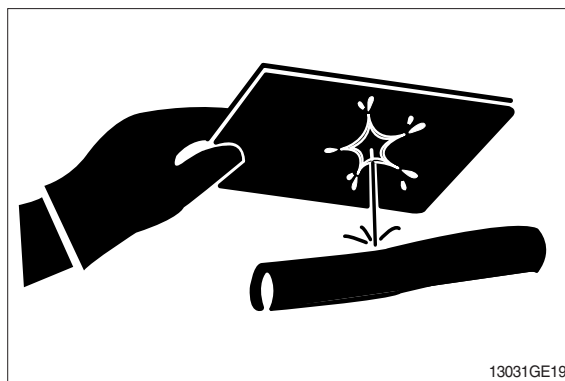
AVOID HIGH PRESSURE FLUIDS

Escaping fluid under pressure can penetrate the skin causing serious injury.

Avoid the hazard by relieving pressure before disconnecting hydraulic or other lines. Tighten all connections before applying pressure.

Search for leaks with a piece of cardboard. Protect hands and body from high pressure fluids.

If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.



AVOID HEATING NEAR PRESSURIZED FLUID LINES

Flammable spray can be generated by heating near pressurized fluid lines, resulting in severe burns to yourself and bystanders. Do not heat by welding, soldering, or using a torch near pressurized fluid lines or other flammable materials.

Pressurized lines can be accidentally cut when heat goes beyond the immediate flame area. Install fire resisting guards to protect hoses or other materials.



PREVENT BATTERY EXPLOSIONS

Keep sparks, lighted matches, and flame away from the top of battery. Battery gas can explode.

Never check battery charge by placing a metal object across the posts. Use a volt-meter or hydrometer.

Do not charge a frozen battery; It may explode. Warm battery to 16°C (60°F).



PREVENT ACID BURNS

Sulfuric acid in battery electrolyte is poisonous. It is strong enough to burn skin, eat holes in clothing, and cause blindness if splashed into eyes.

Avoid the hazard by:

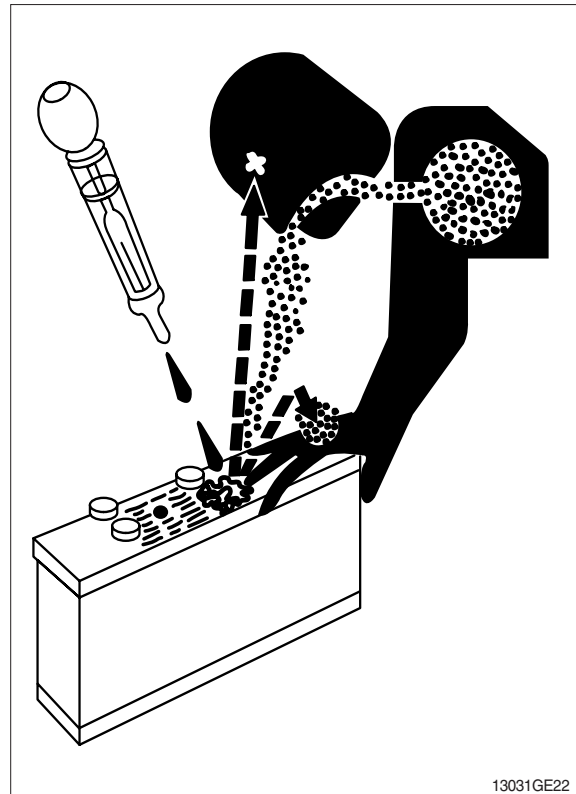
1. Filling batteries in a well-ventilated area.
2. Wearing eye protection and rubber gloves.
3. Avoiding breathing fumes when electrolyte is added.
4. Avoiding spilling or dripping electrolyte.
5. Use proper jump start procedure.

If you spill acid on yourself:

1. Flush your skin with water.
2. Apply baking soda or lime to help neutralize the acid.
3. Flush your eyes with water for 10-15 minutes. Get medical attention immediately.

If acid is swallowed:

1. Drink large amounts of water or milk.
2. Then drink milk of magnesia, beaten eggs, or vegetable oil.
3. Get medical attention immediately.



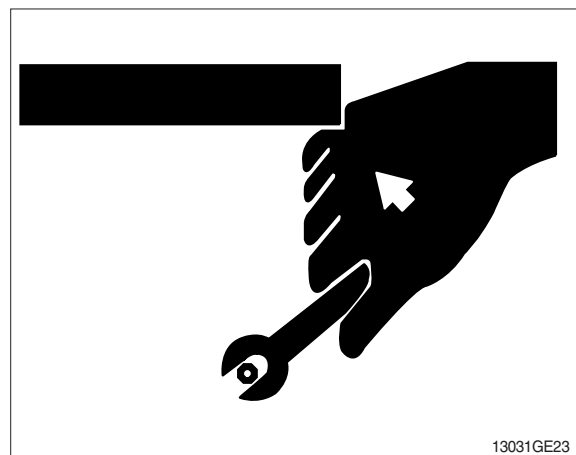
USE TOOLS PROPERLY

Use tools appropriate to the work. Makeshift tools, parts, and procedures can create safety hazards.

Use power tools only to loosen threaded tools and fasteners.

For loosening and tightening hardware, use the correct size tools. DO NOT use U.S. measurement tools on metric fasteners. Avoid bodily injury caused by slipping wrenches.

Use only recommended replacement parts. (See Parts catalogue.)

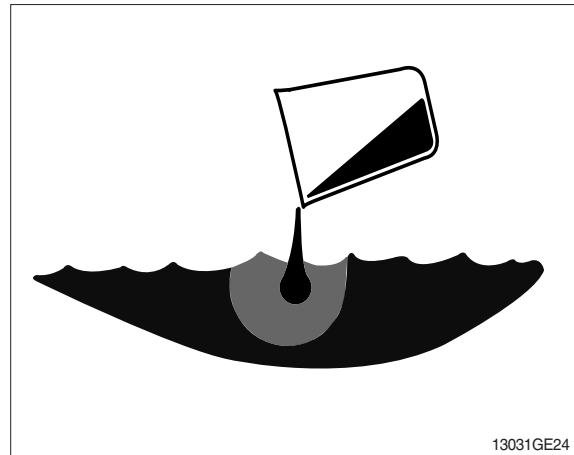


DISPOSE OF FLUIDS PROPERLY

Improperly disposing of fluids can harm the environment and ecology. Before draining any fluids, find out the proper way to dispose of waste from your local environmental agency.

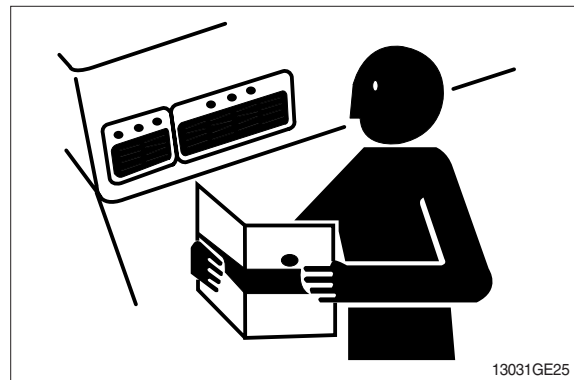
Use proper containers when draining fluids. Do not use food or beverage containers that may mislead someone into drinking from them.

DO NOT pour oil into the ground, down a drain, or into a stream, pond, or lake. Observe relevant environmental protection regulations when disposing of oil, fuel, coolant, brake fluid, filters, batteries, and other harmful waste.



REPLACE SAFETY SIGNS

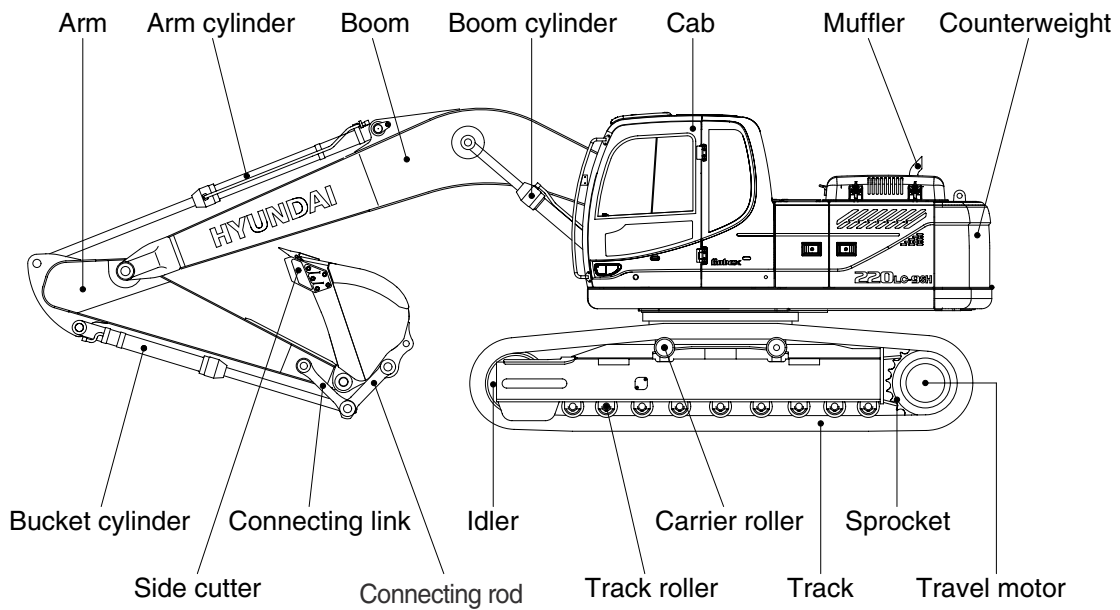
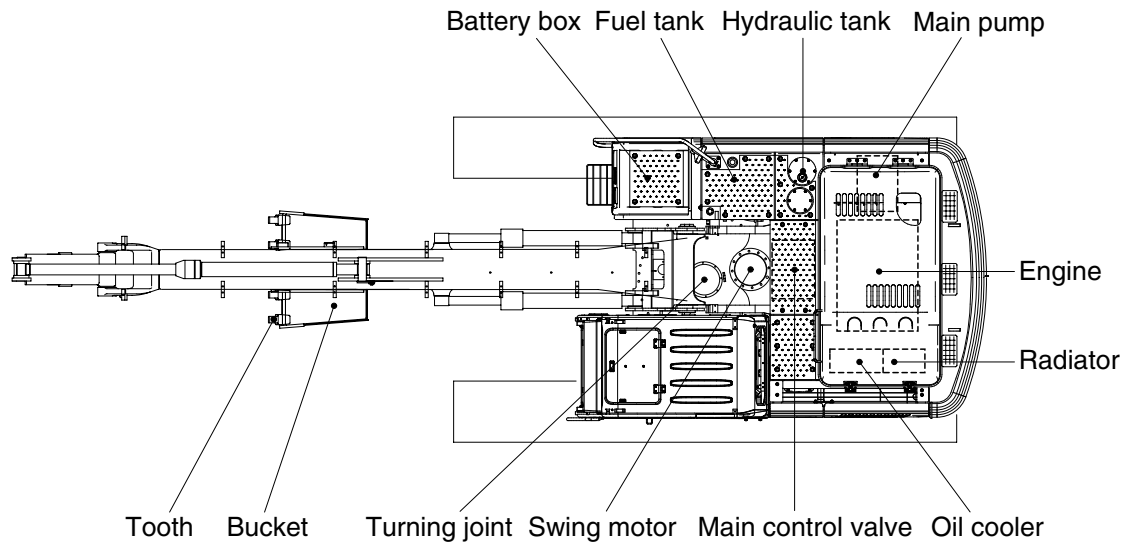
Replace missing or damaged safety signs. See the machine operator's manual for correct safety sign placement.



LIVE WITH SAFETY

Before returning machine to customer, make sure machine is functioning properly, especially the safety systems. Install all guards and shields.

GROUP 2 SPECIFICATIONS

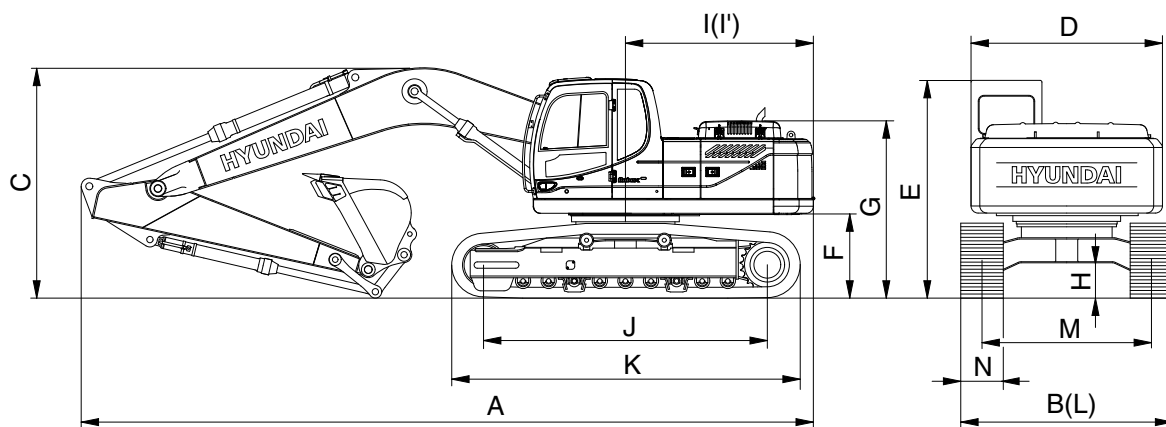


2209SH2SP01

2. SPECIFICATIONS

1) R220LC-9SH

· 5.68 m (18' 8") BOOM and 2.92 m (9' 7") ARM

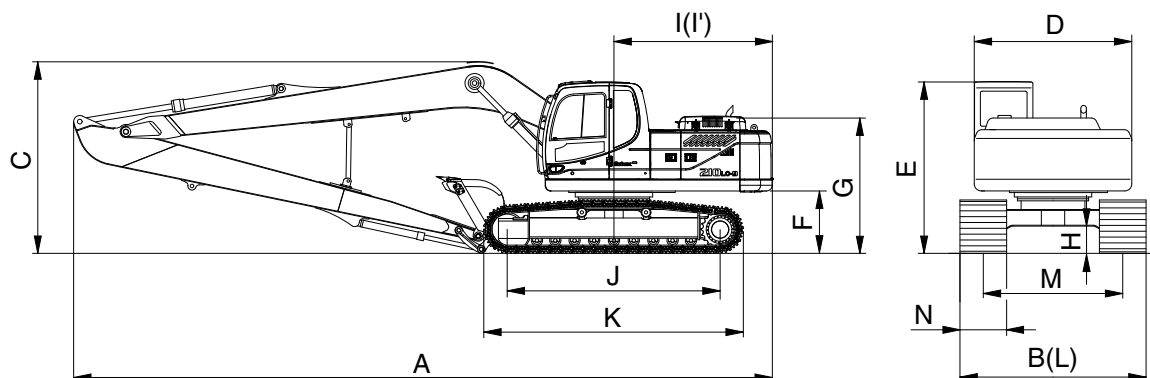


21092SP02

Description		Unit	Specification
Operating weight		kg (lb)	21900 (48280)
Bucket capacity (SAE heaped), standard		m ³ (yd ³)	0.92 (1.20)
Overall length	A	mm (ft-in)	9530 (31' 3")
Overall width, with 600mm shoe	B		2990 (9' 10")
Overall height	C		3030 (9' 11")
Superstructure width	D		2740 (9' 0")
Overall height of cab	E		2920 (9' 7")
Ground clearance of counterweight	F		1060 (3' 6")
Engine cover height	G		2320 (7' 7")
Minimum ground clearance	H		480 (1' 7")
Rear-end distance	I		2770 (9' 1")
Rear-end swing radius	I'		2830 (9' 3")
Distance between tumblers	J		3650 (12' 0")
Undercarriage length	K		4440 (14' 7")
Undercarriage width	L		2990 (9' 10")
Track gauge	M		2390 (7' 10")
Track shoe width, standard	N		600 (24")
Travel speed (low/high)		km/hr (mph)	3.8/5.4 (2.4/3.4)
Swing speed		rpm	11.6
Gradeability		Degree (%)	35 (70)
Ground pressure (600 mm shoe)		kgf/cm ² (psi)	0.46 (6.54)
Max traction force		kg (lb)	21100 (46500)

2) R220LC-9SH LONG REACH

· 8.2 m (26' 11") BOOM and 6.3 m (20' 8") ARM

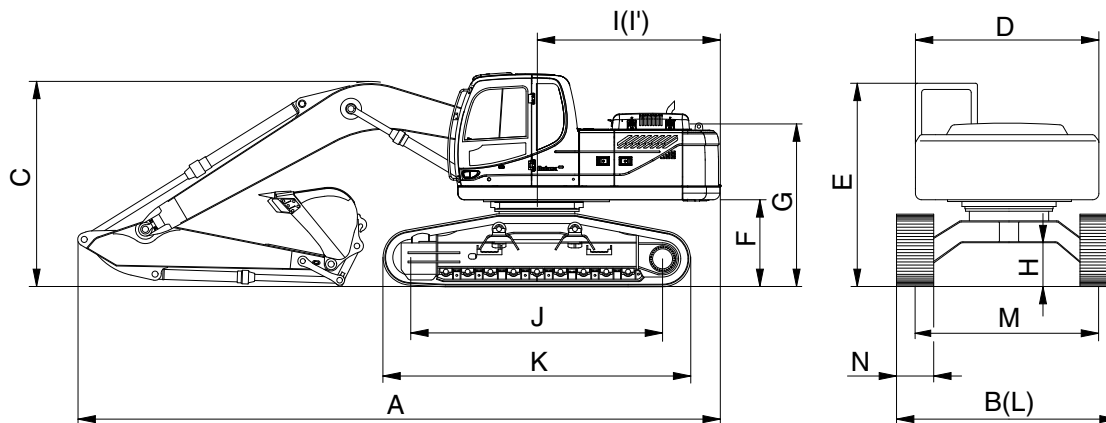


21092SP06

Description		Unit	Specification
Operating weight		kg (lb)	24360 (53700)
Bucket capacity (SAE heaped), standard		m ³ (yd ³)	0.52 (0.68)
Overall length	A	mm (ft-in)	12030 (39' 6")
Overall width, with 800 mm shoe	B		3190 (10' 6")
Overall height	C		3280 (10' 9")
Superstructure width	D		2740 (9' 0")
Overall height of cab	E		2920 (9' 7")
Ground clearance of counterweight	F		1060 (3' 6")
Engine cover height	G		2320 (7' 7")
Minimum ground clearance	H		480 (1' 7")
Rear-end distance	I		2770 (9' 1")
Rear-end swing radius	I'		2830 (9' 3")
Distance between tumblers	J		3650 (12' 0")
Undercarriage length	K		4440 (14' 7")
Undercarriage width	L		3190 (10' 6")
Track gauge	M		2390 (7' 10")
Track shoe width, standard	N		800 (32")
Travel speed (low/high)		km/hr (mph)	3.8/5.4 (2.4/3.4)
Swing speed		rpm	11.6
Gradeability		Degree (%)	35 (70)
Ground pressure (800 mm shoe)		kgf/cm ² (psi)	0.42 (5.97)
Max traction force		kg (lb)	21100 (46500)

3) R220LC-9SH HIGH WALKER

· 5.68 m (18' 8") BOOM and 2.92 m (9' 7") ARM



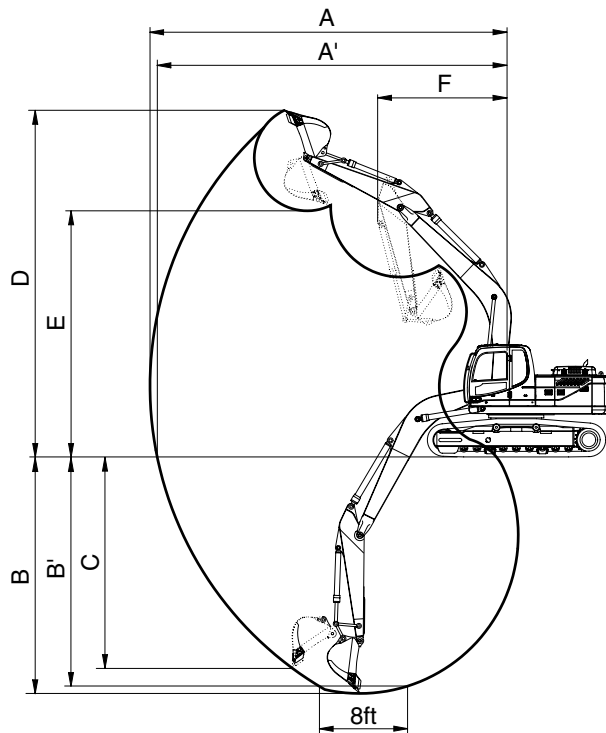
21092SP07

Description		Unit	Specification
Operating weight		kg (lb)	23160 (51060)
Bucket capacity (SAE heaped), standard		m ³ (yd ³)	0.92 (1.20)
Overall length	A	mm (ft-in)	9470 (31' 1")
Overall width, with 600 mm shoe	B		3395 (11' 2")
Overall height	C		3060 (10' 0")
Superstructure width	D		2740 (9' 0")
Overall height of cab	E		3100 (10' 2")
Ground clearance of counterweight	F		1240 (4' 1")
Engine cover height	G		2500 (8' 2")
Minimum ground clearance	H		660 (2' 2")
Rear-end distance	I		2770 (9' 1")
Rear-end swing radius	I'		2830 (9' 3")
Distance between tumblers	J		3650 (12' 0")
Undercarriage length	K		4440 (14' 7")
Undercarriage width	L		3395 (11' 2")
Track gauge	M		2795 (9' 2")
Track shoe width, standard	N		600 (24")
Travel speed (low/high)		km/hr (mph)	3.8/5.4 (2.4/3.4)
Swing speed		rpm	11.6
Gradeability		Degree (%)	35 (70)
Ground pressure (600 mm shoe)		kgf/cm ² (psi)	0.49 (6.97)
Max traction force		kg (lb)	21100 (46500)

3. WORKING RANGE

1) R220LC-9SH

· 5.68 m (18' 8") BOOM



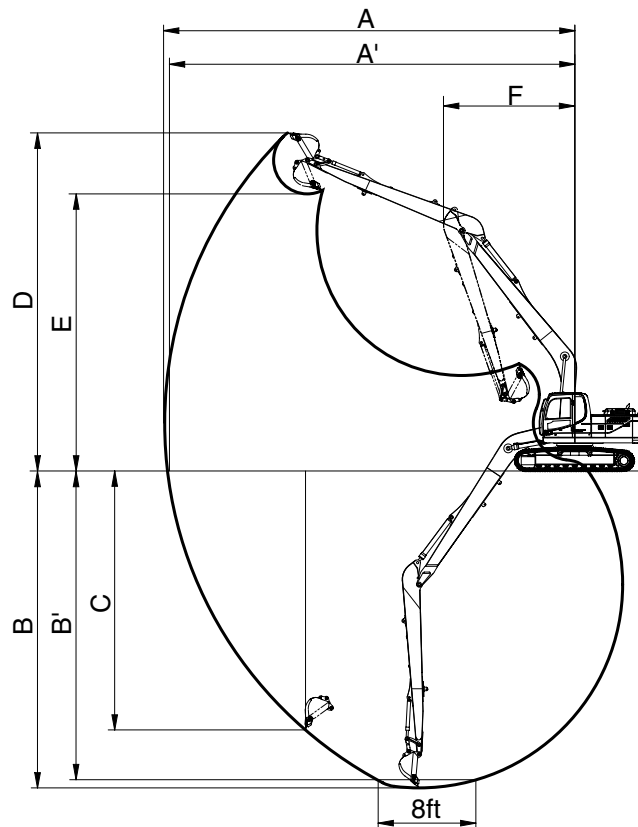
21092SP03

Description		2.0 m (6' 7") Arm	2.40 m (7' 10") Arm	2.92 m (9' 7") Arm	3.90 m (12' 10") Arm
Max digging reach	A	9140 mm (30' 0")	9500 mm (31' 2")	9980 mm (32' 9")	10910 mm (35' 10")
Max digging reach on ground	A'	8960 mm (29' 5")	9330 mm (30' 7")	9820 mm (32' 3")	10770 mm (35' 4")
Max digging depth	B	5820 mm (19' 1")	6220 mm (20' 5")	6730 mm (22' 1")	7720 mm (25' 4")
Max digging depth (8 ft level)	B'	5580 mm (18' 4")	6010 mm (19' 9")	6560 mm (21' 6")	7580 mm (24' 10")
Max vertical wall digging depth	C	5280 mm (17' 4")	5720 mm (18' 9")	6280 mm (20' 7")	7240 mm (23' 9")
Max digging height	D	9140 mm (30' 0")	9340 mm (30' 8")	9600 mm (31' 6")	10110 mm (33' 2")
Max dumping height	E	6330 mm (20' 9")	6520 mm (21' 5")	6780 mm (22' 3")	7290 mm (23' 11")
Min swing radius	F	3750 mm (12' 4")	3740 mm (12' 3")	3740 mm (12' 3")	3650 mm (12' 0")
Bucket digging force	SAE	133.4 [144.8] kN	133.4 [144.8] kN	133.4 [144.8] kN	133.4 [144.8] kN
		13600 [14770] kgf	13600 [14770] kgf	13600 [14770] kgf	13600 [14770] kgf
		29980 [32550] lbf	29980 [32550] lbf	29980 [32550] lbf	29980 [32550] lbf
	ISO	152.0 [165.0] kN	152.0 [165.0] kN	152.0 [165.0] kN	152.0 [165.0] kN
		15500 [16830] kgf	15500 [16830] kgf	15500 [16830] kgf	15500 [16830] kgf
		34170 [37100] lbf	34170 [37100] lbf	34170 [37100] lbf	34170 [37100] lbf
Arm digging force	SAE	144.2 [156.5] kN	119.6 [129.9] kN	102.0 [110.7] kN	84.3 [91.6] kN
		14700 [15960] kgf	12200 [13250] kgf	10400 [11290] kgf	8600 [9340] kgf
		32410 [35190] lbf	26900 [29210] lbf	22930 [24900] lbf	18960 [20590] lbf
	ISO	151.0 [164.0] kN	125.5 [136.3] kN	106.9 [116.1] kN	87.3 [94.8] kN
		15400 [16720] kgf	12800 [13900] kgf	10900 [11830] kgf	8900 [9660] kgf
		33950 [36860] lbf	28220 [30640] lbf	24030 [26090] lbf	19620 [21300] lbf

[] : Power boost

2) R220LC-9SH LONG REACH

· 8.2 m (26' 11") BOOM

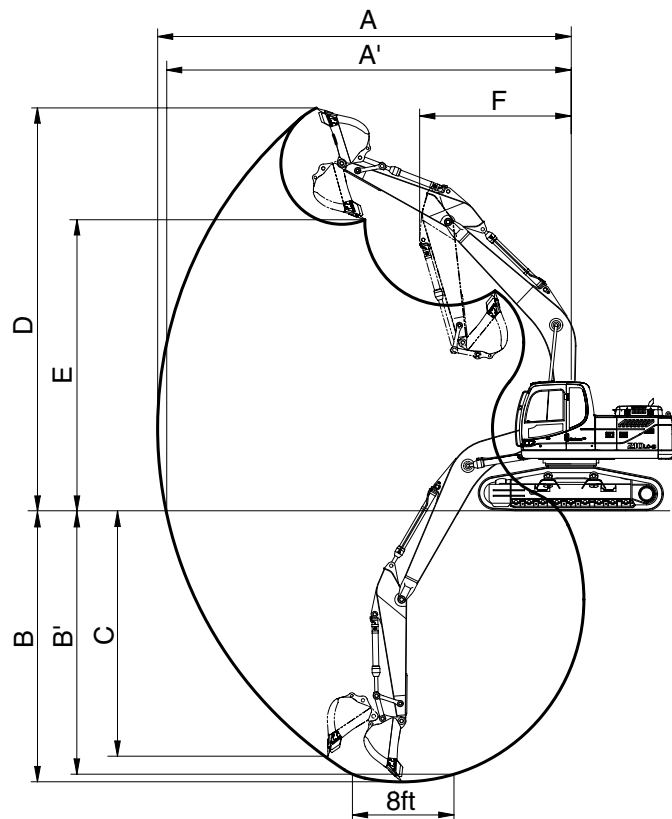


21092SP08

Description		6.3 m (20' 8") Arm
Max digging reach	A	15220 (50' 0")
Max digging reach on ground	A'	15120 (49' 7")
Max digging depth	B	11760 (38' 7")
Max digging depth (8 ft level)	B'	11650 (38' 3")
Max vertical wall digging depth	C	9610 (31' 6")
Max digging height	D	12550 (41' 2")
Max dumping height	E	10280 (33' 8")
Min swing radius	F	4870 (16' 0")
Bucket digging force	SAE	72.6 kN
		7400 kgf
		16310 lbf
	ISO	83.4 kN
		8500 kgf
		18740 lbf
Arm crowd force	SAE	49.0 kN
		5000 kgf
		11020 lbf
	ISO	50.0 kN
		5100 kgf
		11240 lbf

3) R220LC-9SH HIGH WALKER

· 5.68 m (18' 8") BOOM



21092SP09

Description		2.0 m (6' 7") Arm	2.40 m (7' 10") Arm	2.92 m (9' 7") Arm	3.90 m (12'10") Arm
Max digging reach	A	9140 mm (30' 0")	9500 mm (31' 2")	9980 mm (32' 9")	10910 mm (35'10")
Max digging reach on ground	A'	8920 mm (29' 3")	9290 mm (30' 6")	9820 mm (32' 3")	10730 mm (35' 2")
Max digging depth	B	5630 mm (18' 6")	6010 mm (19' 9")	6550 mm (21' 6")	7530 mm (24' 8")
Max digging depth (8 ft level)	B'	5390 mm (17' 8")	5820 mm (19' 1")	6380 mm (20'11")	7390 mm (24' 3")
Max vertical wall digging depth	C	5090 mm (16' 8")	5630 mm (18' 6")	6100 mm (20' 0")	7050 mm (23' 1")
Max digging height	D	9330 mm (30' 7")	9530 mm (31' 3")	9780 mm (32' 1")	10300 mm (33' 9")
Max dumping height	E	6520 mm (21' 5")	6710 mm (22' 0")	6960 mm (22'10")	7480 mm (24' 6")
Min swing radius	F	3750 mm (12' 4")	3740 mm (12' 3")	3740 mm (12' 3")	3650 mm (12' 0")
Bucket digging force	SAE	133.4 [144.8] kN	133.4 [144.8] kN	133.4 [144.8] kN	133.4 [144.8] kN
		13600 [14770] kgf	13600 [14770] kgf	13600 [14770] kgf	13600 [14770] kgf
		29980 [32550] lbf	29980 [32550] lbf	29980 [32550] lbf	29980 [32550] lbf
	ISO	152.0 [165.0] kN	152.0 [165.0] kN	152.0 [165.0] kN	152.0 [165.0] kN
		15500 [16830] kgf	15500 [16830] kgf	15500 [16830] kgf	15500 [16830] kgf
		34170 [37100] lbf	34170 [37100] lbf	34170 [37100] lbf	34170 [37100] lbf
Arm crowd force	SAE	144.2 [156.5] kN	119.6 [129.9] kN	102.0 [110.7] kN	84.3 [91.6] kN
		14700 [15960] kgf	12200 [13250] kgf	10400 [11290] kgf	8600 [9340] kgf
		32410 [35190] lbf	26900 [29210] lbf	22930 [24900] lbf	18960 [20590] lbf
	ISO	151.0 [164.0] kN	125.5 [136.3] kN	106.9 [116.1] kN	87.3 [94.8] kN
		15400 [16720] kgf	12800 [13900] kgf	10900 [11830] kgf	8900 [9660] kgf
		33950 [36860] lbf	28220 [30640] lbf	24030 [26090] lbf	19620 [21300] lbf

[] : Power boost

4. WEIGHT

1) R220LC-9SH

Item	R220LC-9SH	
	kg	lb
Upperstructure assembly	9400	20720
Main frame weld assembly	1920	4230
Engine assembly	530	1170
Main pump assembly	140	310
Main control valve assembly	220	485
Swing motor assembly	240	530
Hydraulic oil tank assembly	240	530
Fuel tank assembly	195	430
Counterweight	3800	8380
Cab assembly	440	970
Lower chassis assembly	8700	19180
Track frame weld assembly	2720	6000
Swing bearing	290	640
Travel motor assembly	300	660
Turning joint	55	120
Track recoil spring	140	310
Idler	170	370
Carrier roller	20	45
Track roller	40	90
Track-chain assembly (600 mm standard triple grouser shoe)	1350	2980
Front attachment assembly (5.68 m boom, 2.92 m arm, 0.92 m³ SAE heaped bucket)	4030	8880
5.68 m boom assembly	1520	3350
2.92 m arm assembly	750	1650
0.92 m³ SAE heaped bucket	765	1690
Boom cylinder assembly	180	400
Arm cylinder assembly	290	640
Bucket cylinder assembly	175	390
Bucket control link assembly	170	370

2) R220LC-9SH LONG REACH

Item	R220LC-9SH LONG REACH	
	kg	lb
Upperstructure assembly	9400	20720
Main frame weld assembly	1920	4230
Engine assembly	530	1170
Main pump assembly	140	310
Main control valve assembly	220	485
Swing motor assembly	240	530
Hydraulic oil tank assembly	240	530
Fuel tank assembly	195	430
Counterweight	5300	11680
Cab assembly	440	970
Lower chassis assembly	8700	19180
Track frame weld assembly	2720	6000
Swing bearing	290	640
Travel motor assembly	300	660
Turning joint	55	120
Track recoil spring	140	310
Idler	170	370
Carrier roller	20	45
Track roller	40	90
Track-chain assembly (800 mm standard triple grouser shoe)	1660	3660
Front attachment assembly (8.2 m boom, 6.3 m arm, 0.52 m³ SAE heaped bucket)	4600	10140
8.2 m boom assembly	2105	4640
6.3 m arm assembly	1100	2430
0.52 m³ SAE heaped bucket	465	1030
Boom cylinder assembly	180	400
Arm cylinder assembly	270	600
Bucket cylinder assembly	130	290
Bucket control rod assembly	170	370

3) R220LC-9SH HIGH WALKER

Item	R220LC-9SH HIGH WALKER	
	kg	lb
Upperstructure assembly	9430	20790
Main frame weld assembly	1950	4300
Engine assembly	530	1170
Main pump assembly	140	310
Main control valve assembly	220	485
Swing motor assembly	240	530
Hydraulic oil tank assembly	240	530
Fuel tank assembly	195	430
Counterweight	3800	8380
Cab assembly	440	970
Lower chassis assembly	9015	19870
Track frame weld assembly	3730	8220
Swing bearing	290	640
Travel motor assembly	300	660
Turning joint	55	120
Track recoil spring	140	310
Idler	170	370
Carrier roller	20	45
Track roller	40	90
Track-chain assembly (600 mm standard triple grouser shoe)	1350	2980
Front attachment assembly (5.68 m boom, 2.92 m arm, 0.92 m³ SAE heaped bucket)	4030	8880
5.68 m boom assembly	1520	3350
2.92 m arm assembly	750	1650
0.92 m³ SAE heaped bucket	765	1690
Boom cylinder assembly	180	400
Arm cylinder assembly	290	640
Bucket cylinder assembly	175	390
Bucket control rod assembly	170	370

5. LIFTING CAPACITIES

1) ROBEX 220LC-9SH

(1) 5.68 m (18' 8") boom, 2.92 m (9' 7") arm equipped with 0.92 m³ (SAE heaped) bucket, 600 mm (24") triple grouser shoe.

Load point height		Load radius										At max. reach		
		1.5 m (5 ft)		3.0 m (10 ft)		4.5 m (15 ft)		6.0 m (20 ft)		7.5 m (25 ft)		Capacity		Reach
														m (ft)
7.5 m (25 ft)	kg lb											*3360 *7410	3150 6940	7.78 (25.5)
6.0 m (20 ft)	kg lb									*2340 *5160	*2340 *5160	*3450 *7610	2460 5420	8.74 (28.7)
4.5 m (15 ft)	kg lb							*4010 *8840	*4010 *8840	*3830 *8440	3180 7010	*3580 *7890	2100 4630	9.32 (30.6)
3.0 m (10 ft)	kg lb			*9780 *21560	*9780 *21560	*6150 *13560	*6150 *13560	*4840 *10670	4460 9830	*4230 *9330	3040 6700	3440 7580	1930 4250	9.59 (31.5)
1.5 m (5 ft)	kg lb			*8810 *19420	*8810 *19420	*7960 *17550	6490 14310	*5750 *12680	4160 9170	*4710 *10380	2880 6350	3390 7470	1880 4140	9.59 (31.5)
Ground Line	kg lb			*9550 *21050	*9550 *21050	*9160 *20190	6090 13430	*6490 *14310	3920 8640	4930 10870	2750 6060	3520 7760	1950 4300	9.31 (30.5)
-1.5 m (-5 ft)	kg lb	*8810 *19420	*8810 *19420	*12610 *27800	11870 26170	*9600 *21160	5940 13100	*6870 *15150	3800 8380	4860 10710	2690 5930	3920 8640	2190 4830	8.72 (28.6)
-3.0 m (-10 ft)	kg lb	*12190 *26870	*12190 *26870	*13980 *30820	12040 26540	*9320 *20550	5960 13140	*6740 *14860	3800 8380			*4460 *9830	2710 5970	7.75 (25.4)
-4.5 m (-15 ft)	kg lb			*11860 *26150	*11860 *26150	*8120 *17900	6140 13540					*4330 *9550	4080 8990	6.16 (20.2)

- Note
1. Lifting capacity are based on SAE J1097 and ISO 10567.
 2. Lifting capacity of the ROBEX series does not exceed 75% of tipping load with the machine on firm, level ground or 87% of full hydraulic capacity.
 3. The load point is a hook located on the back of the bucket.
 4. *indicates load limited by hydraulic capacity.

(2) 5.68 m (18' 8") boom, 2.40 m (7' 10") arm equipped with 0.92 m³ (SAE heaped) bucket, 600 mm (24") triple grouser shoe.

Load point height		Load radius										At max. reach		
		1.5 m (5 ft)		3.0 m (10 ft)		4.5 m (15 ft)		6.0 m (20 ft)		7.5 m (25 ft)		Capacity		Reach
														m (ft)
7.5 m (25 ft)	kg lb											*3700 *8160	3640 8020	7.15 (23.5)
6.0 m (20 ft)	kg lb							*4010 *8840	*4010 *8840			*3780 *8330	2760 6080	8.20 (26.9)
4.5 m (15 ft)	kg lb							*4490 *9900	*4490 *9900	*4230 *9330	3130 6900	*3900 *8600	2340 5160	8.82 (28.9)
3.0 m (10 ft)	kg lb					*6900 *15210	*6900 *15210	*5280 *11640	4400 9700	*4560 *10050	3010 6640	3760 8290	2130 4700	9.11 (29.9)
1.5 m (5 ft)	kg lb					*8560 *18870	6380 14070	*6120 *13490	4130 9110	*4970 *10960	2880 6350	3710 8180	2080 4590	9.10 (29.9)
Ground Line	kg lb			*8790 *19380	*8790 *19380	*9490 *20920	6080 13400	*6740 *14860	3930 8660	4950 10910	2780 6130	3890 8580	2180 4810	8.81 (28.9)
-1.5 m (-5 ft)	kg lb	*9760 *21520	*9760 *21520	*13510 *29780	12060 26590	*9650 *21270	6000 13230	*6960 *15340	3850 8490			4390 9680	2480 5470	8.18 (26.8)
-3.0 m (-10 ft)	kg lb	*14150 *31200	*14150 *31200	*13240 *29190	12280 27070	*9090 *20040	6080 13400	*6590 *14530	3900 8600			*4700 *10360	3190 7030	7.12 (23.4)
-4.5 m (-15 ft)	kg lb			*10630 *23440	*10630 *23440	*7400 *16310	6330 13960							

2) R220LC-9SH LONG REACH

(1) 8.2 m (26' 11") boom, 6.3 m (20' 8") arm equipped with 0.52 m³ (0.68 yd³) (SAE heaped) bucket, 800 mm (32") triple grouser shoe.

•  : Rating over-front

•  : Rating over-side or 360 degree

Load point height		Load radius								At max. reach		
		3.0 m (10.0 ft)		6.0 m (20.0 ft)		9.0 m (30.0 ft)		12.0 m (40.0 ft)		Capacity		Reach
												m (ft)
9.0 m (30.0 ft)	kg							*830	*830	*1330	*1330	13.11
	lb							*1830	*1830	*2930	*2930	(43.0)
6.0 m (20.0 ft)	kg							*1430	*1430	*1410	1160	14.37
	lb							*3150	*3150	*3110	2560	(47.1)
3.0 m (10.0 ft)	kg					*1990	*1990	*1670	1630	*1520	980	14.89
	lb					*4390	*4390	*3680	3590	*3350	2160	(48.9)
Ground Line	kg	*4560	*4560	*4330	*4330	*2650	2430	*1980	1440	*1670	930	14.75
	lb	*10050	*10050	*9550	*9550	*5840	5360	*4370	3170	*3680	2050	(48.4)
-3.0 m (-10 ft)	kg	*5710	*5710	*5250	3920	*3150	2140	*2220	1310	*1860	1020	13.92
	lb	*12590	*12590	*11570	8640	*6940	4720	*4890	2890	*4100	2250	(45.7)
-6.0 m (-20 ft)	kg	*7790	*7790	*5370	3840	*3280	2060			*2090	1330	12.25
	lb	*17170	*17170	*11840	8470	*7230	4540			*4610	2930	(40.2)
-9.0 m (-30 ft)	kg	*8780	*8780	*4510	4110	*2620	2260					
	lb	*19360	*19360	*9940	9060	*5780	4980					

- Note
1. Lifting capacity are based on SAE J1097 and ISO 10567.
 2. Lifting capacity of the ROBEX series does not exceed 75% of tipping load with the machine on firm, level ground or 87% of full hydraulic capacity.
 3. The load point is a hook located on the back of the bucket.
 4. * indicates load limited by hydraulic capacity.

3) R220LC-9SH HIGH WALKER

(1) 5.68 m (18' 8") boom, 2.92 m (9' 7") arm equipped with 0.92 m³ (SAE heaped) bucket, 600 mm (24") triple grouser shoe.

Load point height		Load radius										At max. reach		
		1.5 m (5 ft)		3.0 m (10 ft)		4.5 m (15 ft)		6.0 m (20 ft)		7.5 m (25 ft)		Capacity		Reach
														m (ft)
7.5 m (25 ft)	kg lb											*3370 *7430	*3370 *7430	7.93 (26.0)
6.0 m (20 ft)	kg lb									*2700 *5950	*2700 *5950	*3460 *7630	3130 6900	8.83 (29.0)
4.5 m (15 ft)	kg lb							*4110 *9060	*4110 *9060	*3870 *8530	*3870 *8530	*3600 *7940	2740 6040	9.37 (30.7)
3.0 m (10 ft)	kg lb			*10440 *23020	*10440 *23020	*6400 *14110	*6400 *14110	*4960 *10930	*4960 *10930	*4290 *9460	3930 8660	3680 8110	2560 5640	9.60 (31.5)
1.5 m (5 ft)	kg lb			*8610 *18980	*8610 *18980	*8150 *17970	*8150 *17970	*5860 *12920	5380 11860	*4760 *10490	3770 8310	3650 8050	2530 5580	9.57 (31.4)
Ground Line	kg lb			*9870 *21760	*9870 *21760	*9260 *20410	8080 17810	*6560 *14460	5150 11350	*5150 *11350	3640 8020	3820 8420	2650 5840	9.25 (30.3)
-1.5 m (-5 ft)	kg lb	*9210 *20300	*9210 *20300	*13090 *28860	*13090 *28860	*9600 *21160	7940 17500	*6880 *15170	5040 11110	5200 11460	3590 7910	4280 9440	2980 6570	8.62 (28.3)
-3.0 m (-10 ft)	kg lb	*12660 *27910	*12660 *27910	*13780 *30380	*13780 *30380	*9230 *20350	7990 17610	*6670 *14700	5060 11160			*4470 *9850	3710 8180	7.59 (24.9)
-4.5 m (-15 ft)	kg lb			*11470 *25290	*11470 *25290	*7860 *17330	*7860 *17330					*4250 *9370	*4250 *9370	5.89 (19.3)

- Note
1. Lifting capacity are based on SAE J1097 and ISO 10567.
 2. Lifting capacity of the ROBEX series does not exceed 75% of tipping load with the machine on firm, level ground or 87% of full hydraulic capacity.
 3. The load point is a hook located on the back of the bucket.
 4. *indicates load limited by hydraulic capacity.

(2) 5.68 m (18' 8") boom, 2.4 m (7' 10") arm equipped with 0.92 m³ (SAE heaped) bucket, 600 mm (24") triple grouser shoe.

Load point height		Load radius										At max. reach		
		1.5 m (5 ft)		3.0 m (10 ft)		4.5 m (15 ft)		6.0 m (20 ft)		7.5 m (25 ft)		Capacity		Reach
														m (ft)
7.5 m (25 ft)	kg lb											*3700 *8160	*3700 *8160	7.31 (24.0)
6.0 m (20 ft)	kg lb							*4050 *8930	*4050 *8930			*3790 *8360	3480 7670	8.30 (27.2)
4.5 m (15 ft)	kg lb					*5360 *11820	*5360 *11820	*4580 *10100	*4580 *10100	*4260 *9390	4030 8880	*3920 *8640	3020 6660	8.87 (29.1)
3.0 m (10 ft)	kg lb					*7130 *15720	*7130 *15720	*5390 *11880	*5390 *11880	*4610 *10160	3900 8600	4010 8840	2810 6190	9.12 (29.9)
1.5 m (5 ft)	kg lb					*8720 *19220	8370 18450	*6220 *13710	5360 11820	*5020 *11070	3770 8310	3990 8800	2780 6130	9.08 (29.8)
Ground Line	kg lb			*9350 *20610	*9350 *20610	*9550 *21050	8080 17810	*6790 *14970	5170 11400	5290 11660	3670 8090	4210 9280	2940 6480	8.75 (28.7)
-1.5 m (-5 ft)	kg lb	*10290 *22690	*10290 *22690	*14180 *31260	*14180 *31260	*9620 *21210	8020 17680	*6950 *15320	5100 11240			*4650 *10250	3360 7410	8.07 (26.5)
-3.0 m (-10 ft)	kg lb	*14760 *32540	*14760 *32540	*12990 *28640	*12990 *28640	*8950 *19730	8120 17900	*6470 *14260	5170 11400			*4690 *10340	4350 9590	6.94 (22.8)
-4.5 m (-15 ft)	kg lb			*10150 *22380	*10150 *22380	*7020 *15480	*7020 *15480							

This as a preview PDF file from **best-manuals.com**



Download full PDF manual at **best-manuals.com**