4. When raising heavy components, use a hoist or crane. Check that the wire rope, chains and hooks are free from damage. Always use lifting equipment which has ample capacity. Install the lifting equipment at the correct places. Use a hoist or crane and operate slowly to prevent the component from hitting any other part. Do not work with any part still raised by the hoist or crane.

5. When removing covers which are under internal pressure or under pressure from a spring, always leave two bolts in position on opposite sides. Slowly release the pressure, then slowly loosen the bolts to remove.

6. When removing components, be careful not to break or damage the wiring. Damaged wiring may cause electrical fires.

7. When removing piping, stop the fuel or oil from spilling out. If any fuel or oil drips on to the floor, wipe it up immediately. Fuel or oil on the floor can cause you to slip, or can even start fires.

8. Never use flammable liquids to clean parts, use only non-flammable approved cleaning solutions to clean parts.

9. Be sure to assemble all parts again in their original places. Replace any damaged part with new parts.
   - When installing hoses and wires, be sure that they will not be damaged by contact with other parts when the machine is being operated.

10. When installing high pressure hoses, make sure that they are not twisted. Damaged tubes are dangerous, so be extremely careful when installing tubes for high pressure circuits. Also check that connecting parts are correctly installed.

11. When assembling or installing parts, always use the specified tightening torques. When installing protective parts such as guards, or parts which vibrate violently or rotate at high speed, be particularly careful to check that they are installed correctly.

12. When aligning two holes, never insert your fingers or hand. Be careful not to get your fingers caught in a hole.

13. When measuring hydraulic pressure, check that the measuring tool is correctly assembled before taking any measurements.

14. Take care when removing or installing the tracks of track-type machines. When removing the track, the track separates suddenly, so never let anyone stand at either end of the track.

GENERAL

This shop 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 shop 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. These sections are further divided into each main group of components.

GENERAL

This section lists the general machine dimensions, performance specifications, component weights, and fuel, coolant and lubricant specification charts.

STRUCTURE, FUNCTION AND MAINTENANCE STANDARD

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. In addition, this section gives the judgement standards when inspecting disassembled parts.

TESTING AND ADJUSTING

This section explains checks to be made before and after performing repairs, as well as adjustments to be made at completion of the checks and repairs.

TROUBLESHOOTING

Troubleshooting charts correlating “Problems” to “Causes” are also included in this section.

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.

OTHER

This section has the foldout drawings for the machine.

NOTICE

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

HOW TO READ THE SHOP MANUAL

VOLUMES

Shop manuals are issued as a guide to carrying out repairs. They are divided as follows:

Chassis volume: Issued for every machine model
Engine volume: Issued for each engine series

Electrical volume: Each issued as one to cover all models
Attachment volume: Each issued as one to cover all models

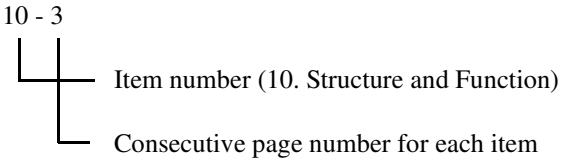
These various volumes are designed to avoid duplication of information. Therefore to deal with all repairs for any model, it is necessary that chassis, engine, electrical and attachment be available.

DISTRIBUTION AND UPDATING

Any additions, amendments or other changes will be sent to your 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 show how to read the page number:
   Example:



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

10-4
10-4-1
10-4-2
Added pages
10-5

REVISED EDITION MARK

When a manual is revised, an edition mark (①②③…) is recorded on the bottom outside corner of the pages.

REVISIONS

Revised pages are shown at the LIST OF REVISED PAGES between the title page and SAFETY 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.
★	Caution	Special technical precautions or other precautions for preserving standards are necessary when performing the work.
	Weight	Weight of parts or systems. Caution necessary when selecting hoisting wire or when working posture is important, etc.
	Tightening torque	Places that require special attention for tightening torque during assembly.
	Coat	Places to be coated with adhesives and lubricants etc.
	Fill	Places where oil, water or fuel must be added, and the capacity.
	Drain	Places where oil or water must be drained, and quantity to be drained.

HOISTING INSTRUCTIONS

HOISTING

WARNING! Heavy parts (25 kg or more) must be lifted with a hoist etc. In the DISASSEMBLY AND ASSEMBLY section, every part weighing 25 kg or more is indicated clearly with the symbol.

- If a part cannot be smoothly removed from the machine by hoisting, the following checks should be made:

1. Check for removal of all bolts fastening the part to the relative parts.
2. Check for existence of another part causing interface with the part to be removed.

WIRE ROPES

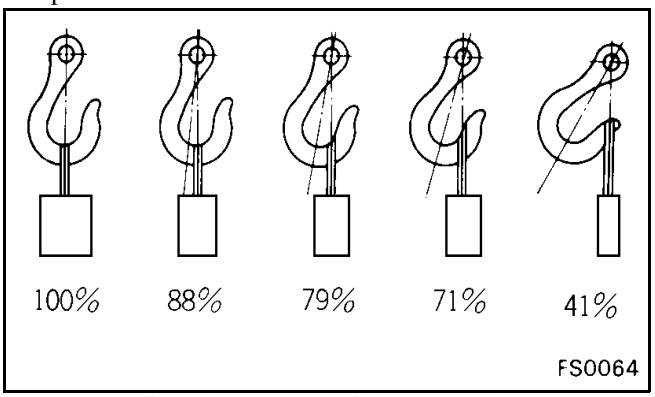
1. Use adequate ropes depending on the weight of parts to be hoisted, referring to the table below:

Wire ropes
(Standard "Z" or "S" twist ropes without galvanizing)

Rope diameter	Allowable load	
mm	kN	tons
10	9.8	1.0
11.2	13.7	1.4
12.5	15.7	1.6
14	21.6	2.2
16	27.5	2.8
18	35.3	3.6
20	43.1	4.4
22.4	54.9	5.6
30	98.1	10.0
40	176.5	18.0
50	274.6	28.0
60	392.2	40.0

★ The allowable load value is estimated to be 1/6 or 1/7 of the breaking strength of the rope used.Sling wire ropes from the middle portion of the hook.

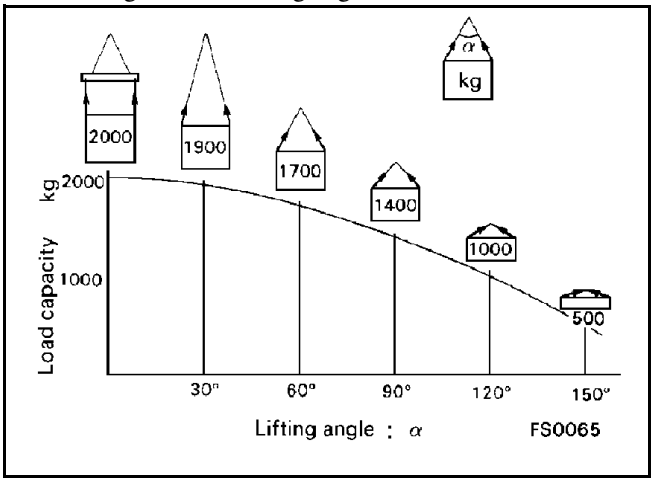
2. Slinging near the edge of the hook may cause the rope to slip off the hook during hoisting, and a serious accident can result. Hooks have maximum strength at the middle portion.



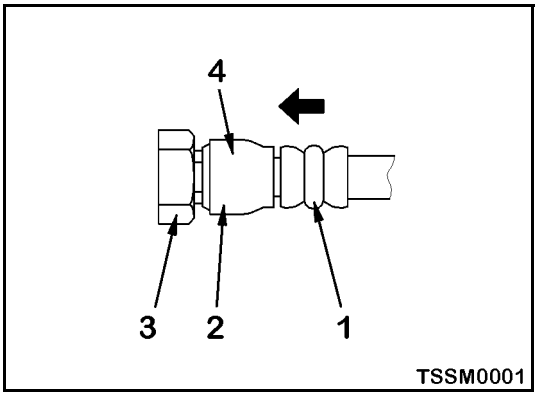
3. Do not sling a heavy load with one rope alone, but sling with two or more ropes symmetrically wound on to the load.

WARNING! Slinging with one rope may cause turning of the load during hoisting, untwisting of the rope, or slipping of the rope from its original winding position on the load, which can result in a dangerous accident

4. Do not sling a heavy load with ropes forming a wide hanging angle from the hook. When hoisting a load with two or more ropes, the force subjected to each rope will increase with the hanging angles. The table below shows the variation of allowable load (kg) when hoisting is made with two ropes, each of which is allowed to sling up to 1000 kg vertically, at various hanging angles. When two ropes sling a load vertically, up to 2000 kg of total weight can be suspended. This weight becomes 1000 kg when two ropes make a 120° hanging angle. On the other hand, two ropes are subject to an excessive force as large as 4000 kg if they sling a 2000 kg load at a lifting angle of 150°.



PUSH PULL COUPLER

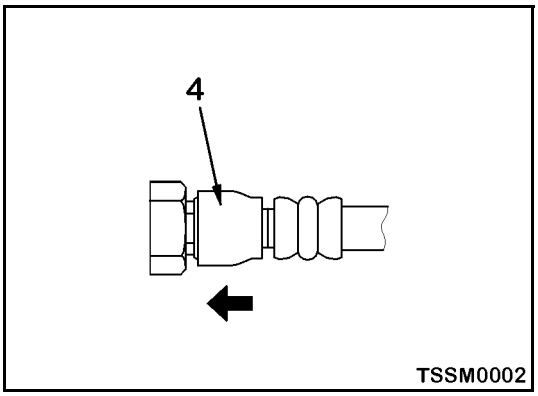


WARNING! Before carrying out the following work, release the residual pressure from the hydraulic tank. For details, see TESTING AND ADJUSTING, Releasing residual pressure from hydraulic tank.

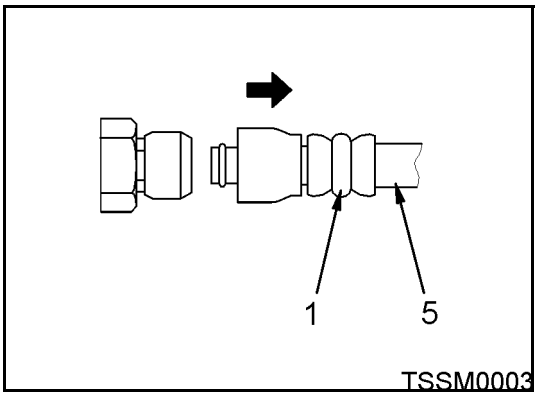
WARNING! Even if the residual pressure is released from the hydraulic tank, some hydraulic oil flows out when the hose is disconnected. Accordingly, prepare an oil receiving container.

TYPE 1

DISCONNECTION

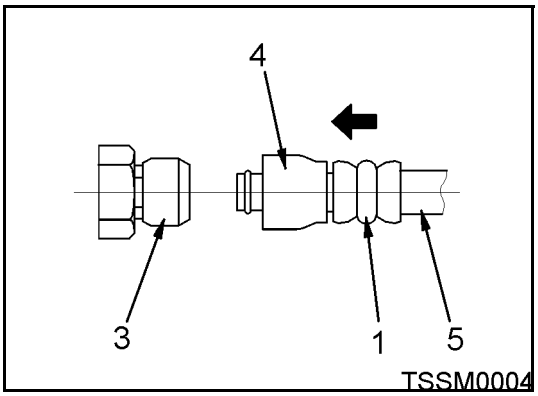


1. Release the residual pressure from the hydraulic tank. For details, see TESTING AND ADJUSTING, Releasing residual pressure from hydraulic tank.
2. Hold the adapter (1) and push the hose joint (2) into the mating adapter (3). The adapter can be pushed in about 3.5 mm. Do not hold the rubber cap portion (4).
3. After the hose joint (2) is pushed into the adapter (3), press the rubber cap portion (4) against the adapter until it clicks.



4. Hold the hose adapter (1) or hose (5) and pull it out. Since some hydraulic oil flows out, prepare an oil receiving container.

CONNECTION

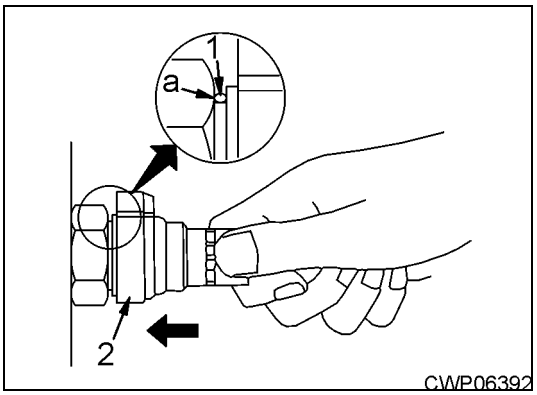


1. Hold the hose adapter (1) or hose (5) and insert it in the mating adapter (3), aligning them with each other. Do not hold the rubber cap portion (4).
2. After inserting the hose in the mating adapter, pull it back to check its connecting condition. When the hose is pulled back, the rubber cap portion moves toward the hose about 3.5 mm. This does not indicate an abnormality.

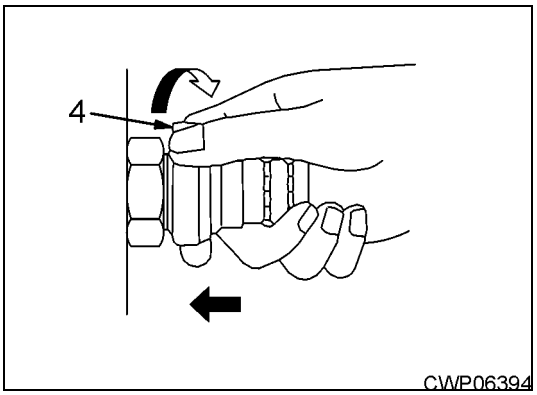
TYPE 2

DISCONNECTION

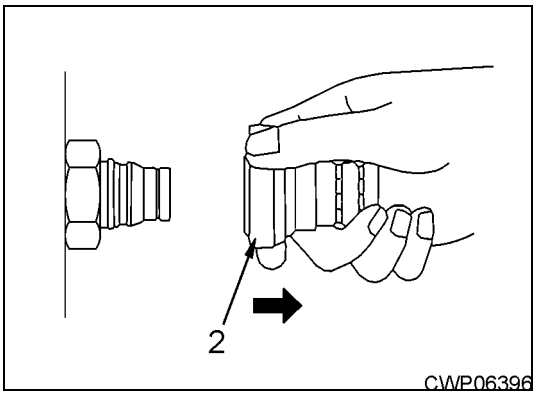
1. Hold the mouthpiece of the tightening portion and push body (2) in straight until sliding prevention ring (1) contacts contact surface **a** of the hexagonal portion at the male end.



2. Hold in the condition in Step 1, and turn the lever (4) to the right - clockwise.

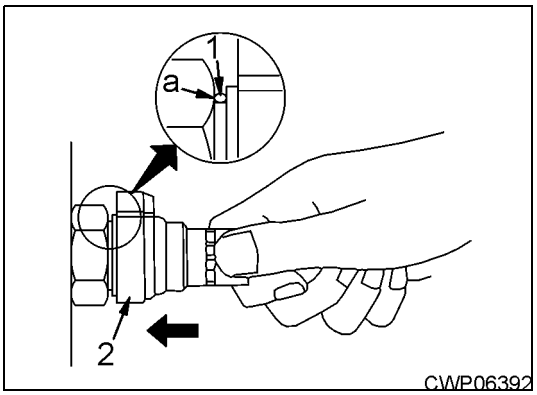


3. Hold in the condition in Steps 1 and 2, and pull out the whole body (2) to disconnect it.



CONNECTION

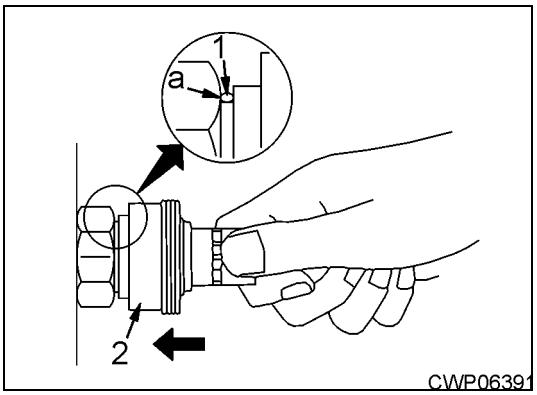
1. Hold the connector of the tightening portion and push body (2) in straight until sliding prevention ring (1) contacts surface **a** of the hexagonal portion at the male end to connect it.



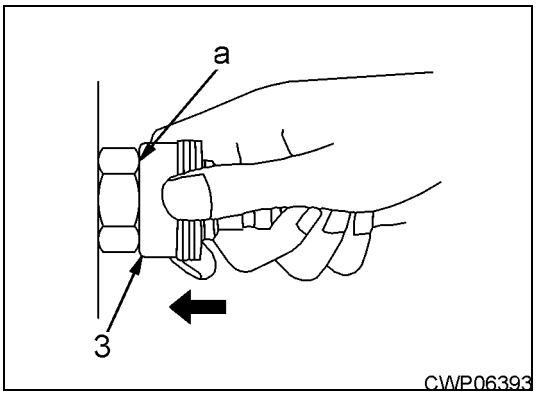
TYPE 3

DISCONNECTION

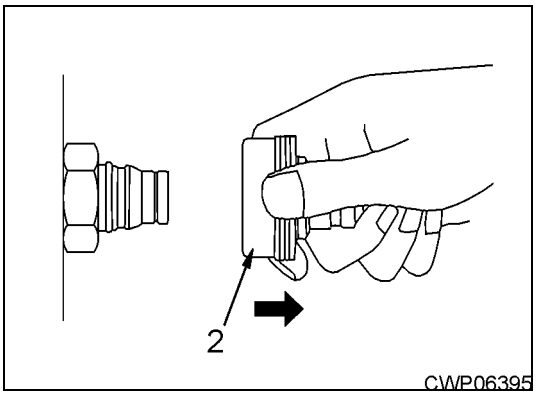
1. Hold the connector of the tightening portion and push the body (2) in straight until sliding prevention ring (1) contacts surface **a** of the hexagonal portion at the male end.



2. Hold in the condition in Step 1, and push until the cover (3) contacts surface **a** of the hexagonal portion at the male end.

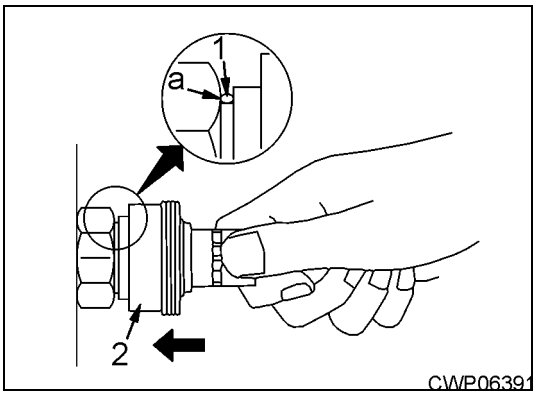


3. Hold in the condition in Steps 1 and 2, and pull out the whole body (2) to disconnect it.



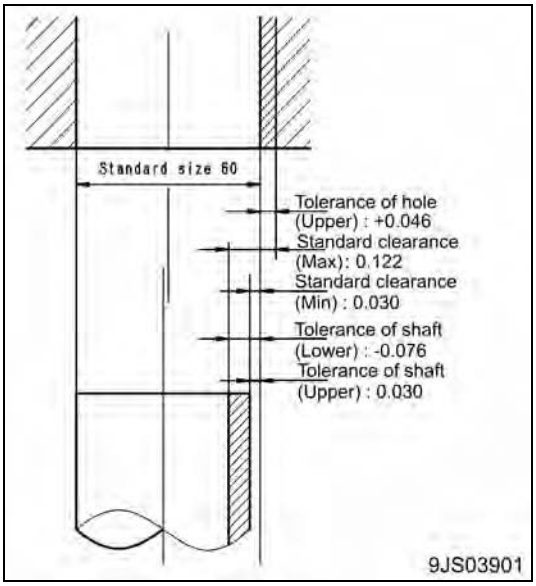
CONNECTION

1. Hold the connector of the tightening portion and push the body (2) in straight until the slide prevention ring (1) contacts surface **a** of the hexagonal portion at the male end to connect it.



EXPLANATION OF MAINTENANCE STANDARD TERMS

● The maintenance standard values necessary for judgment of products and parts are described by the following terms.



1. Standard Size And Tolerance

- To be accurate, the finishing size of parts is a little different from one to another.
- To specify a finishing size of a part, a temporary standard size is set and an allowable difference from that size is indicated.
- The above size set temporarily is called the “standard size” and the range of difference from the standard size is called the “tolerance”.
- The tolerance with the symbols of + or – is indicated on the right side of the standard size.

Example:

Standard size	Tolerance
120	–0.022 –0.126

★ The tolerance may be indicated in the text and a table as [standard size (upper limit of tolerance/lower limit of tolerance)]. Example) 120 (–0.022/–0.126)

- Usually, the size of a hole and the size of the shaft to be fitted to that hole are indicated by the same standard size and different tolerances of the hole and shaft. The tightness of fit is decided by the tolerance.
- Indication of size of rotating shaft and hole and relationship drawing of them

Example:

Standard size	Tolerance	
	Shaft	Hole
60	–0.030 –0.076	+0.046 0

2. Standard Clearance And Standard Value

- The clearance made when new parts are assembled is called the “standard clearance“, which is indicated by the range from the minimum clearance to the maximum clearance.
- When some parts are repaired, the clearance is generally adjusted to the standard clearance.
- A value of performance and function of new products or equivalent is called the “standard value“, which is indicated by a range or a target value.
- When some parts are repaired, the value of performance/function is set to the standard value.

3. Standard Interference

- When the size of a hole is smaller than the size of a shaft because of the standard size and tolerance, the difference between these sizes is called the “interference”.
- The range (A – B) from the difference (A) between the minimum size of the shaft and the maximum size of the shaft to the difference (B) between the maximum size of the shaft and the minimum size of the hole is the “standard interference”.
- After repairing or replacing some parts, measure the size of their hole and shaft and check that the interference is in the standard range.

4. Repair Limit And Allowable Value

- The size of a part changes because of wear and deformation while it is used. The limit of changed size is called the “repair limit”.
- If a part is worn to the repair limit must be replaced or repaired.
- The performance and function of a product lowers while it is used. A value below which the product can be used without causing a problem is called the “allowable value”.
- If a product is worn to the allowable value, it must be checked or repaired. Since the permissible value is estimated from various tests or experiences in most cases, however, it must be judged after considering the operating condition and customer's requirement.

5. Clearance Limit

- Parts can be used until the clearance between them is increased to a certain limit. The limit at which those parts cannot be used is called the “clearance limit”.
- If the clearance between the parts exceeds the clearance limit, they must be replaced or repaired.

6. Interference Limit

- The allowable maximum interference between the hole of a part and the shaft of another part to be assembled is called the “interference limit”.
- The interference limit shows the repair limit of the part of smaller tolerance.
- If the interference between the parts exceeds the interference limit, they must be replaced or repaired.

STANDARD TIGHTENING TORQUE

BOLTS AND NUTS

- Unless there are special instructions, tighten metric nuts and bolts to the torque below. (When using torque wrench)

★ The following table corresponds to the bolts in **Figure A**.

Thread diameter of bolt	Width across flats	Tightning torque	
mm	mm	Nm	lbf ft
6	10	11.8 - 14.7	8.70 - 10.84
8	13	27 - 34	19.91 - 25.07
10	17	59 - 74	43.51 - 54.57
12	19	98 - 123	72.28 - 90.72
14	22	153 - 190	112.84 - 140.13
16	24	235 - 285	173.32 - 210.20
18	27	320 - 400	236.02 - 295.02
20	30	455 - 565	335.59 - 416.72
22	32	610 - 765	449.91 - 564.23
24	36	785 - 980	578.98 - 722.81
27	41	1150 - 1440	848.19 - 1062.09
30	46	1520 - 1910	1121.09 - 1408.74
33	50	1960 - 2450	1445.62 - 1807.02
36	55	2450 - 3040	1807.02 - 2242.19
39	60	2890 - 3630	2131.55 - 2677.35

★ The following table corresponds to the bolts in **Figure B**.

Thread diameter of bolt	Width across flats	Tightning torque	
mm	mm	Nm	lbf ft
6	10	5.9 - 9.8	4.35 - 7.22
8	13	13.7 - 23.5	10.10 - 17.33
10	14	34.3 - 46.1	25.29 - 34.00
12	27	74.5 - 90.2	54.94 - 66.52

Figure A

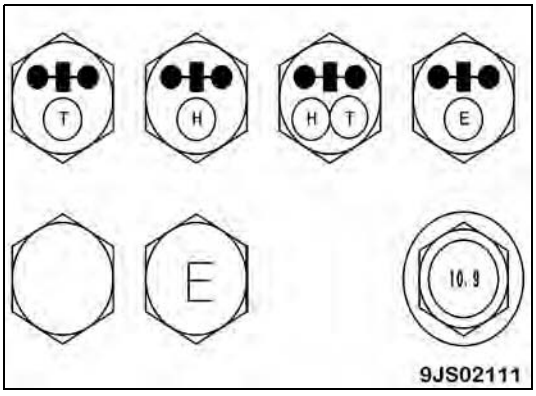
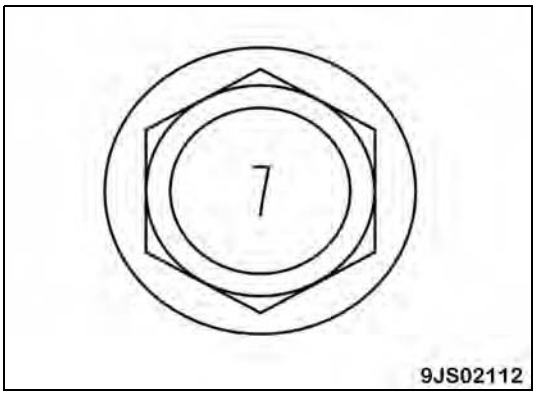


Figure B



TIGHTENING TORQUE OF HOSE NUTS

Use these torques for hose nuts.

Nominal No.	Thread diameter	Width across flat	Tightening torque	
	mm	mm	Nm	lbf ft
02	14	19	19.6 - 29.4	14.5 - 21.7
03	18	24	29.4 - 68.6	21.7 - 50.6
04	22	27	58.9 - 98.1	44.4 - 72.4
05	24	32	107.9 - 166.7	79.6 - 123.0
06	30	36	147.1 - 205.9	108.5 - 151.9
10	33	41	147.1 - 245.1	108.5 - 180.8
12	36	46	196.2 - 294.2	144.7 - 217.0
14	42	55	245.2 - 343.2	180.9 - 253.1

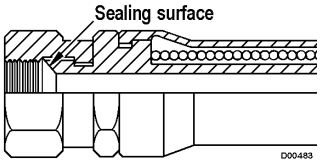
TIGHTENING TORQUE OF SPLIT FLANGE BOLTS

Use these torques for split flange bolts.

Thread diameter	Width across flat	Tightening torque	
mm	mm	Nm	lbf ft
10	14	59 - 74	43.51 - 54.57
12	17	98 - 123	72.28 - 90.72
16	22	235 - 285	173.32 - 210.20

TIGHTENING TORQUE FOR FLARED NUTS

Use these torques for flared part of nut.



Thread diameter	Width across flat	Tightening torque	
mm	mm	Nm	lbf ft
14	19	24.5 ± 4.9	18.0 ± 3.6
18	24	49 ± 19.6	36.1 ± 14.4
22	27	78.5 ± 19.6	57.8 ± 14.4
24	32	137.3 ± 29.4	101.2 ± 21.6
30	36	176.5 ± 29.4	130.1 ± 21.6
33	41	196.1 ± 49	144.6 ± 36.1
36	46	245.2 ± 49	180.8 ± 36.1
42	55	294.2 ± 49	216.9 ± 36.1

TIGHTENING TORQUES FOR O-RING BOSS PIPING JOINTS

★ Unless there are special instructions, tighten the O-ring boss piping joints to the torque below.

Norminal No.	Thread diameter	Width across flat	Tightening torque Nm (lbf ft)	
	mm	mm	Range	Target
02	14	Varies depending on type of connector.	35 - 63 (25.81 - 46.46)	44 (32.45)
03, 04	20		84 - 132 (61.95 - 97.35)	103 (75.96)
05, 06	24		128 - 186 (94.40 - 137.18)	157 (115.79)
10, 12	33		363 - 480 (267.73 - 354.02)	422 (311.25)
14	42		746 - 1010 (550.22 - 744.93)	883 (651.26)

TABLE OF TIGHTENING TORQUES FOR O-RING BOSS PLUGS

★ Unless there are special instructions, tighten the O-ring boss plugs to the torque below.

Norminal No.	Thread diameter	Width across flat	Tightening torque Nm (lbf lb)	
	mm	mm	Range	Target
08	08	14	5.88 - 8.82 (4.33 - 6.50)	7.35 (5.42)
10	10	17	9.8 - 12.74 (7.22 - 9.39)	11.27 (8.31)
12	12	19	14.7 - 19.6 (10.84 - 14.45)	17.64 (13.01)
14	14	22	19.6 - 24.5 (14.45 - 18.07)	22.54 (16.62)
16	16	24	24.5 - 34.3 (18.07 - 25.29)	29.4 (21.68)
18	18	27	34.3 - 44.1 (25.29 - 32.52)	39.2 (28.91)
20	20	30	44.1 - 53.9 (32.52 - 39.75)	49.0 (36.14)
24	24	32	58.8 - 78.4 (43.36 - 57.82)	68.6 (50.59)
30	30	32	93.1 - 122.5 (68.66 - 90.35)	107.8 (79.50)
33	33	_	107.8 - 147.0 (79.50 - 108.42)	124.4 (91.75)
36	36	36	127.4 - 176.4 (93.96 - 130.10)	151.9 (112.03)
42	42	_	181.3 - 240.1 (133.72 - 177.08)	210.7 (155.40)
52	52	_	274.4 - 367.5 (202.38 - 271.05)	323.4 (238.52)

TORQUE TABLE FOR HOSES (TAPER SEAL TYPE AND FACE SEAL TYPE)

★ Tighten the hoses (taper seal type and face seal type) to the following torque, unless otherwise specified.

★ Apply the following torque when the threads are coated (wet) with engine oil.

Nominal size of hose	Width across flats	Tightening torque (Nm (lbf ft))		Taper seal type	Face seal type	
		Range	Target	Thread size (mm)	Nominal thread size - Threads per inch, Thread series	Root diameter (mm) (Reference)
02	19	34 - 54 (25.0 - 39.8)	44 (32.4)	-	9/16 - 18UN	14.3
		34 - 63 (25.0 - 46.4)	44 (32.4)	14	-	-
03	22	54 - 93 (39.8 - 68.5)	74 (54.5)	-	11/16 -16UN	17.5
	24	59 - 98 (43.5 - 72.2)	78 57.5)	18	-	-
04	27	84 - 132 (61.9 - 97.3)	103 (75.9)	22	13/16 - 16UN	20.6
05	32	128 - 186 (94.4 - 137.1)	157 (115.7)	24	1 - 14UNS	25.4
06	36	177 - 245 (130.5 - 180.7)	216 (159.3)	30	1 3/16 - 12UN	30.2
(10)	41	177 - 245 (130.5 - 180.7)	216 (159.3)	33	-	-
(12)	46	197 - 294 (145.3 - 216.8)	245 (180.7)	36	-	-
(14)	55	246 - 343 (181.4 - 252.9)	294 (216.8)	42	-	-

ELECTRIC WIRE CODE

In the wiring diagrams, various colors and symbols are employed to indicate the thickness of wires. This wire code table will help you understand WIRING DIAGRAMS.
Example: 05WB indicates a cable having a nominal number 05 and white coating with black stripe.

CLASSIFICATION BY THICKNESS

Nominal number	Copper wire			Cable O.D. (mm)	Current rating (A)	Applicable circuit
	Number of strands	Dia. Of strand (mm)	Cross section (mm)			
0.85	11	0.32	0.88	2.4	12	Starting, lighting, signal etc.
2	26	0.32	2.09	3.1	20	Lighting, signal etc.
5	65	0.32	5.23	4.6	37	Charging and signal
15	84	0.45	13.36	7.0	59	Starting (Glow plug)
40	85	0.80	42.73	11.4	135	Starting
60	127	0.80	63.84	13.6	178	Starting
100	217	0.80	109.1	17.6	230	Starting

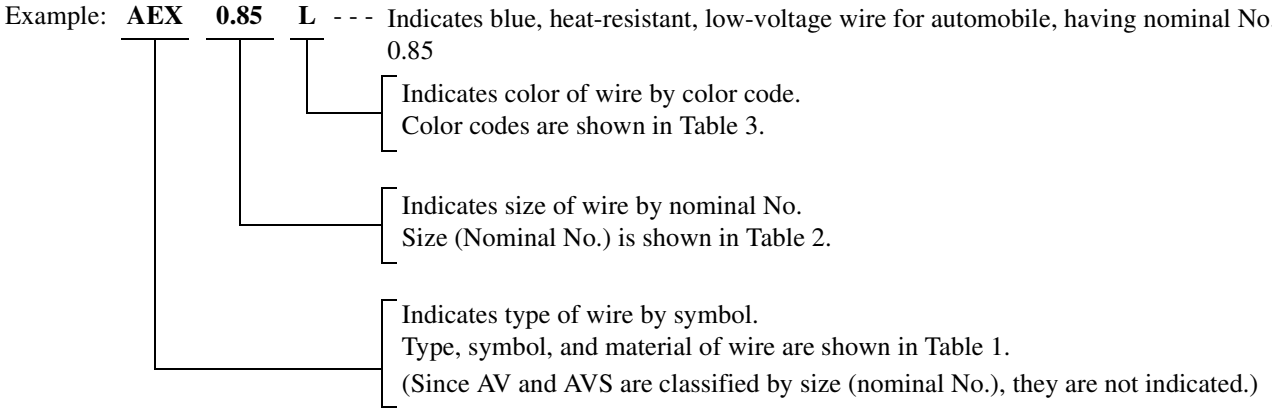
CLASSIFICATION BY COLOR AND CODE

Priority	Circuits Classification		Charging	Ground	Starting	Lighting	Instrument	Signal	Other
1	Primary	Code	W	B	B	R	Y	G	L
		Color	White	Black	Black	Red	Yellow	Green	Blue
2	Auxiliary	Code	WR	—	BW	RW	YR	GW	LW
		Color	White & Red	—	Black & White	Red & White	Yellow & Red	Green & White	Blue & White
3		Code	WB	—	BY	RB	YB	GR	LR
		Color	White & Black	—	Black & Yellow	Red & Black	Yellow & Black	Green & Red	Blue & Red
4		Code	WL	—	BR	RY	YG	GY	LY
		Color	White & Blue	—	Black & Red	Red & Yellow	Yellow & Green	Green & Yellow	Blue & Yellow
5		Code	WG	—	—	RG	YL	GB	LB
		Color	White & Green	—	—	Red & Green	Yellow & Blue	Green & Black	Blue & Black
6		Code	—	—	—	RL	YW	GL	—
		Color	—	—	—	Red & Blue	Yellow & White	Green & Blue	—

HOW TO READ ELECTRIC WIRE CODE

★ The information about the wires unique to each machine model is described in Troubleshooting section, Relational information of troubleshooting.

In the electric circuit diagram, the material, thickness, and color of each electric wire are indicated by symbols. The electric wire code is helpful in understanding the electric circuit diagram.



1. Type, Symbol, And Material

AV and AVS are different in only thickness and outside diameter of the cover. AEX is similar to AV in thickness and outside diameter of AEX and different from AV and AVS in material of the cover.

(Table 1)

Type	Symbol	Material		Using temperature range °C (°F)	Example of use
Low-voltage wire for automobile	AV	Conductor	Annealed copper for electric appliance	–30 to +60 (-22 to +140)	General wiring (Nominal No. 5 and above)
		Insulator	Soft polyvinyl chloride		
Thin-cover low-voltage wire for automobile	AVS	Conductor	Annealed copper for electric appliance		General wiring (Nominal No. 3 and below)
		Insulator	Soft polyvinyl chloride		
Heat-resistant low-voltage wire for automobile	AEX	Conductor	Annealed copper for electric appliance	–50 to +110 (-58 to +230)	General wiring in extremely cold district, wiring at high-temperature place
		Insulator	Heat-resistant crosslinked polyethylene		

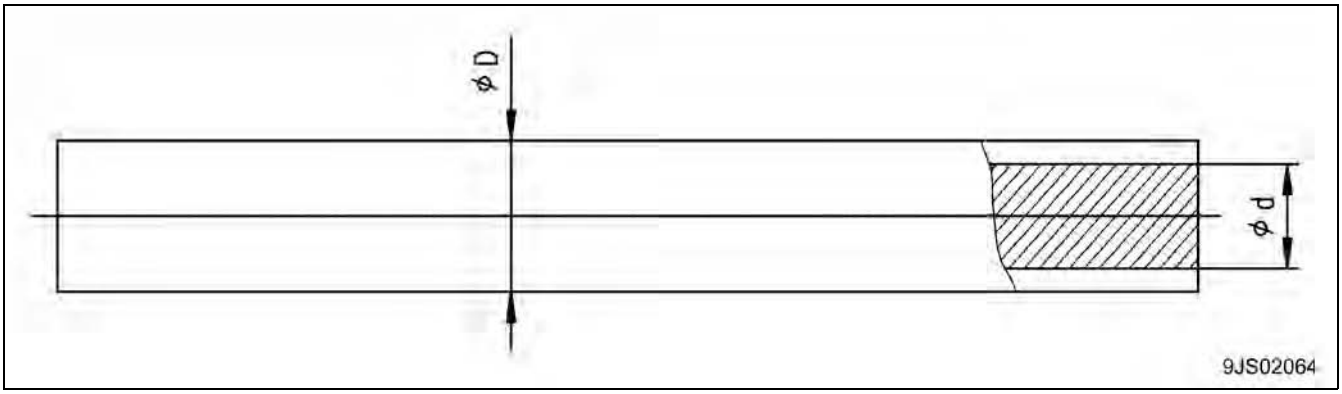
2. Dimensions

(Table 2)

Nominal No.			0.5f	(0.5)	0.75f	(0.85)	1.25f	(1.25)	2f	2	3f	3	5
Conductor		Number of strands/ Diameter of strand	20/0.18	7/0.32	30/0.18	11/0.32	50/0.18	16/0.32	37/0.26	26/0.32	58/0.26	41/0.32	65/0.32
		Sectional area (mm^2)	0.51	0.56	0.76	0.88	1.27	1.29	1.96	2.09	3.08	3.30	5.23
		d (approx.)	1.0		1.2		1.5		1.9	1.9	2.3	2.4	3.0
Cover D	AVS	Standard	2.0		2.2		2.5		2.9	2.9	3.5	3.6	–
	AV	Standard	–		–		–		–	–	–	–	4.6
	AEX	Standard	2.0		2.2		2.7		3.0	3.1	–	3.8	4.6

Nominal No.			8	15	20	30	40	50	60	85	100
Conductor		Number of strands/ Diameter of strand	50/0.45	84/0.45	41/0.80	70/0.80	85/0.80	108/0.80	127/0.80	169/0.80	217/0.80
		Sectional area (mm^2)	7.95	13.36	20.61	35.19	42.73	54.29	63.84	84.96	109.1
		d (approx.)	3.7	4.8	6.0	8.0	8.6	9.8	10.4	12.0	13.6
Cover D	AVS	Standard	–	–	–	–	–	–	–	–	–
	AV	Standard	5.5	7.0	8.2	10.8	11.4	13.0	13.6	16.0	17.6
	AEX	Standard	5.3	7.0	8.2	10.8	11.4	13.0	13.6	16.0	17.6

★ "f" of nominal No. denotes flexible".



3. Color Codes Table

(Table 3)

Color Code	Color of wire	Color Code	Color of wire
B	Black	LgW	Light green & White
Br	Brown	LgY	Light green & Yellow
BrB	Brown & Black	LR	Blue & Red
BrR	Brown & Red	LW	Blue & White
BrW	Brown & White	LY	Blue & Yellow
BrY	Brown & Yellow	O	Orange
Ch	Charcoal	P	Pink
Dg	Dark green	R	Red
G	Green	RB	Red & Black
GB	Green & Black	RG	Red & Green
GL	Green & Blue	RL	Red & Blue
Gr	Gray	RW	Red & White
GR	Green & Red	RY	Red & Yellow
GW	Green & White	Sb	Sky Blue
GY	Green & Yellow	Y	Yellow
L	Blue	YB	Yellow & Black
LB	Blue & Black	YG	Yellow &Green
Lg	Light green	YL	Yellow & Blue
LgB	Light green & Black	YR	Yellow & Red
LgR	Light green & Red	YW	Yellow & White

- In a color code consisting of 2 colors, the first color is the color of the background and the second color is the color of the marking.
  Example: “GW” means that the background is Green and marking is White.

★ Types of circuits and color codes

(Table 4)

Type of wire		AVS or AV						AEX	
Type of circuit	**Charge**	R	WG	–	–	–	–	R	–
	Ground	B	–	–	–	–	–	B	–
	Start	R	–	–	–	–	–	R	–
	Light	RW	RB	RY	RG	RL	–	D	–
	Instrument	Y	YR	YB	YG	YL	YW	Y	Gr
	Signal	G	GW	GR	GY	GB	GL	G	Br
	Others	L	LW	LR	LY	LB	–	L	–
		Br	BrW	BrR	BrY	BrB	–	–	–
		Lg	LgR	LgY	LgB	LgW	–	–	–
		O	–	–	–	–	–	–	–
		Gr	–	–	–	–	–	–	–
		P	–	–	–	–	–	–	–
		Sb	–	–	–	–	–	–	–
		Dg	–	–	–	–	–	–	–
		Ch	–	–	–	–	–	–	–

CONVERSION TABLES

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

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

1. Convert 55 mm into inches.
   A. Locate the number 50 in the vertical column at the left side, take this as ①, then draw a horizontal line from ①.

   B. Locate the number 5 in the row across the top, take this as ②, then draw a perpendicular line down from ②.

   C. Take the point where the two lines cross as ③. This point ③ gives the value when converting from millimeters to inches. Therefore, 55 millimeters = 2.165 inches.

2. Convert 550 mm into inches.
   A. The number 550 does not appear in the table, so divide by 10 (move the decimal one place to the left) to convert it to 55 mm.

   B. Carry out the same procedure as above to convert 55 mm to 2.165 inches.

   C. The original value (550 mm) was divided by 10, so multiply 2.165 inches by 10 (move the decimal one place to the right) to return to the original value. This gives 550 mm = 21.65 inches.

Millimeters to inches — 1 mm = 0.03937 in

	0	1	2	3	4	5 ②	6	7	8	9
0	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	1.969	2.008	2.047	2.087	2.126	2.165 ③	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 **1 mm = 0.03937 in**

	0	1	2	3	4	5	6	7	8	9
0	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 **1 kg = 2.2046 lb**

	0	1	2	3	4	5	6	7	8	9
0	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	59.53	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	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	25.361	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	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

kgm to ft. lb. **1 kgm = 7.233 ft. lb.**

	0	1	2	3	4	5	6	7	8	9
0	0	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	1005.4
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	1352.63	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

kg/cm^2 to lb/in^2 **1 kg/cm^2 = 14.2233lb/in^2**

	0	1	2	3	4	5	6	7	8	9
0	0	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	1863	1877	1892	1906	1920	19324	1949	1963	1977
140	1991	2005	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	2603	2617	2631	2646	2660	2674	2688
190	2702	2717	2731	2745	2759	2773	2788	2802	2816	2830
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 vise versa 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	-7.2	19	66.2	12.2	54	129.2	31.7	89	192.2
-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	30	86.0	18.3	65	149.0	37.8	100	212.0
-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	175	347.0

COATING MATERIALS

★ The recommended coating materials prescribed in the shop manuals are listed below.

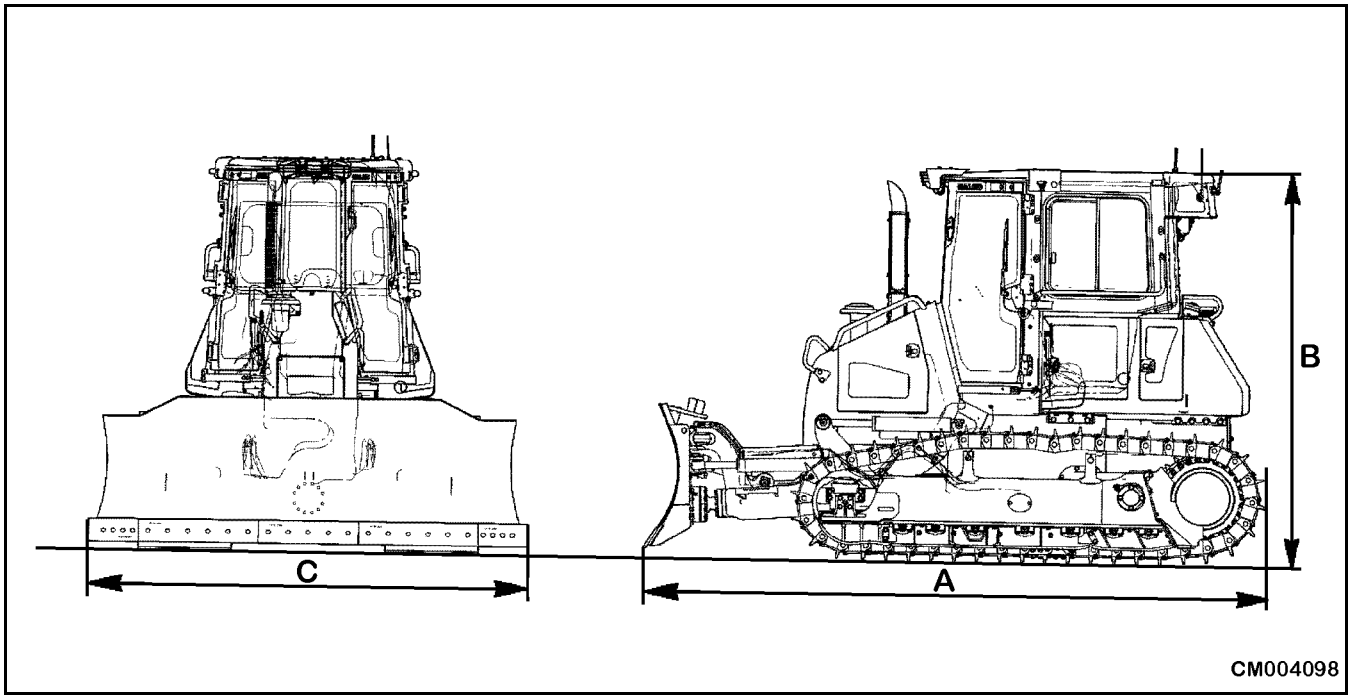
Category	Code	Part No.	Quantity	Container	Main applications, features
Adhesives	LT-1A	790-129-9030	150 g	Tube	● Used to prevent rubber gaskets, rubber cushions and cork plugs from coming out
	LT-1B	790-129-9050	20 g (2 pes.)	Polyethylene container	● Used in places requiring an immediately effective, strong adhesive. ● Used for plastics (except polyethylene, polypropylene, tetrafluoroethylene, and vinyl chloride), rubber, metal and non-metal.
	LT-2	09940-00030	50 g	Polyethylene container	● Features: Resistance to heat, chemicals ● Used for anti-loosening and sealant purposes for bolts and plugs.
	LT-3	790-129-9060 (Set of adhesive and hardening agent)	Adhesive: 1 kg Hardening agent: 500 g	Can	● Used as adhesive or sealant for metal, glass or plastic.
	LT-4	790-129-9040	250 g	Polyethylene container	● Used as sealant for machined holes.
	Holtz MH 705	790-126-9120	75 g	Tube	● Used as heat-resisting sealant for repairing engine.
	Three bond 1735	179-129-9140	2 g	Polyethylene container	● Quick hardening type adhesive. ● Cure time: within 5 sec. to 3 min. ● Used mainly for adhesion of metals, rubbers, plastics and woods.
	Aron-alpha 201	790-129-9130	50 g	Polyethylene container	● Quick hardening type adhesive. ● Quick cure type (max. strength after 30 minutes). ● Used mainly for adhesion of rubbers, plastics and metals.
	Loctite 648-50	79A-129-9110	50 cc	Polyethylene container	● Features: Resistance to heat, chemicals ● Used at joint portions subject to high temperature.
Gasket sealant	LG-1	790-129-9010	200 g	Tube	● Used as adhesive or sealant for gaskets and packing of power train case, etc.
	LG-3	790-129-9070	1 kg	Can	● Features: Resistance to heat ● Used as sealant for flange surfaces and bolts at high temperature locations; used to prevent seizure. ● Used as sealant for heat resistant gasket for at high temperature locations such as engine pre-combustion chamber, exhaust pipe.

Category	Code	Part No.	Quantity	Container	Main applications, features
Gasket sealant	LG-4	790-129-9020	200 g	Tube	● Features: Resistance to water, oil ● Used as sealant for flange surface, thread. ● Also possible to use as sealant for flanges with large clearance. ● Used as sealant for mating surfaces of final drive case, transmission case.
	LG-5	790-129-9080	1 kg	Polyethylene container	● Used as sealant for various threads, pipe joints, flanges. ● Used as sealant for tapered plugs, elbows, nipples of hydraulic piping.
	LG-6	09940-00011	250 g	Tube	● Features: Silicon based, resistant to heat, cold. ● Used as sealant for flange surface, thread. ● Used as sealant for oil pan, final drive case, etc.
	LG-7	09920-00150	150 g	Tube	● Features: Silicon based, quick hardening type. ● Used as sealant for flywheel housing, intake manifold, oil pan, thermostat housing, etc.
	Three bond 1211	790-129-9090	100 g	Tube	● Used as heat-resisting sealant for repairing engines.
Molybdenum disulphide lubricant	LM-G	09940-00051	60 g	Can	● Used as lubricant for sliding parts (to prevent squeaking).
	LM-P	09940-00040	200 g	Tube	● Used to prevent seizure or scuffing of the thread when press fitting or shrink fitting. ● Used as lubricant for linkage, bearings, etc.
Grease	G2-LI	SYG2-400LI SYG2-350LI SYG2-400LI-A SYG2-160LI SYGA160CNLI	Various	Various	● General purpose type
	G2-CA	SYG2-400CA SYG2-350CA SYG2-400CA-A SYG2-160CA SYG2-160CNCA	Various	Various	● Used for normal temperature, light load bearing at places in contact with water or steam.
	Molybdenum disulphide lubricant	SYG2-400M	400 g (10 per case)	Belows type	● Used for places with heavy load.

MEMORANDUM

01 GENERAL

SPECIFICATION DRAWING



D51EX, PX-22 POWER ANGLE, POWER TILT DOZER WITH ROPS CAB

	Item		Unit	D51EX-22	D51PX-22	
				510 mm Single shoe	710 mm Single shoe	720 mm Swamp shoe
	Machine weight		kg	12,600 (12,695)	13,100	13,000
	Engine model		---	Komatsu SAA6D107E-1 diesel engine		
	Engine rated horsepower		kW {HP} /rpm	97 {130} / 2,200		
A	Overall length		mm	4,800		4,820
B	Overall height (not including antenna) (to tip of antenna pipe)		mm	2,997 3,177		3,015 3,195
C	Overall width		mm	3,045 (3,350)	3,350	
	Travel speed (Quick shift mode)	FORWARD (1st/2nd/3rd)	km/h	3.4/5.6/9.0		
		REVERSE (1st/2nd/3rd)	km/h	4.1/6.5/9.0		
	Travel speed (Variable shift mode)	FORWARD	km/h	0 - 9.0		
		REVERSE	km/h	0 - 9.0		

Values in ( ) are for the machines equipped with wide blade.

SPECIFICATION

Machine model				D51EX-22	D51PX-22	
				510 mm Single shoe	710 mm Single shoe	720 mm Swamp shoe
Serial No.				B10001 and up		
Weight	Operating weight ● Bare tractor with ROPS cab ● With power angle tilt dozer + ROPS cab ● With power angle totalizer + ROPS canopy		kg	11,100 12,600 (12,695) 12,240 (12,335)	11,500 13,100 12,740	11,400 13,000 12,640
Performance	Min. turning radius (bare tractor,counter-rotation)		m	2.4	2.6	2.6
	Gradeability		deg	30	30	30
	Stability (front, rear, left, right)		deg	35	35	35
	Travel speed	Quick shift mode Forward (1st/2nd/3rd) Reverse (1st/2nd/3rd)	km/h	3.4/5.6/9.0 4.1/6.5/9.0	3.4/5.6/9.0 4.1/6.5/9.0	3.4/5.6/9.0 4.1/6.5/9.0
		Variable shift mode Forward Reverse	km/h	0 - 9.0 0 - 9.0	0 - 9.0 0 - 9.0	0 - 9.0 0 - 9.0
	Ground pressure	Bare tractor with ROPS cab	kPa {kg/cm^2}	38.9 (0.40)	28.9 (0.30)	28.3 (0.29)
		With power angle tiltdozer + ROPS cab		44.1 (0.45)	32.9 (0.34)	32.2 (0.33)
		With power angle tiltdozer + ROPS canopy		42.8 (0.44)	32.0 (0.43)	31.3 (0.32)
Dimensions	Overall length	Bare tractor	mm	3,660	3,660	3,700
		With power angle tiltdozer + ROPS cab		4,800	4,800	4,820
		With power angle tiltdozer + ROPS canopy		4,800	4,800	4,820
	Overall width	Bare tractor	mm	2,300	2,590	2,610
		Power angle tiltdozer		3,045 (3,350)	3,350	3,350
	Overall height	To tip of exhaust pipe	mm	2,885	2,885	2,905
		To top of operator's compartment with ROPS cab/canopy (not including antenna)		2,997	2,997	3,015
		To top of operator's compartment with ROPS cab/canopy (including antenna)		3,177	3,177	3195
	Track gauge		mm	1,790	1,880	1,880
	Length of track on ground			2,745	2,745	2,745
	Width of track (standard track shoe)			510	710	720
	Min. ground clearance			385	385	455

Values in ( ) are for the machines equipped with wide blade.

Machine model				D51EX-22	D51PX-22	
				510 mm Single shoe	710 mm Single shoe	720 mm Swamp shoe
Serial No.				B10001 and up		
Engine	Model		---	SAA6D107E-1		
	Type		---	4-cycle, water-cooled, in-line vertical type, 6 cylinders, direct injection, with turbocharger, air-cooled after cooler		
	No. of cylinders - bore x stroke		mm	6-107x124		
	Piston displacement		L {cc}	6.69 {6,690}		
	Performance	Rated horsepower	kW {HP}/rpm	99 {133}		
		Max. torque	Nm {kgm}/rpm	585.5 {59.7}		
		High idling	rpm	2,270		
		Low idling	rpm	850		
		Min. fuel consumption ratio	g/kWh {g/HPh}	242 {181}		
	Starting motor		---	24 V, 5.5 kW		
	Alternator		---	24 V, 25 A		
	Battery (*1)		---	12 V, 140 Ah x 2		
	Radiator core type		---	Aluminium bar plate 5.1/2		
Power train system	HST pump	Type, number (main pump) (charge pump)	---	Variable displacement swash-plate piston type x 2 Fix displacement gear type x 1		
		Discharge amount (main pump) (charge pump)	cm^3/rev	95 55		
		Set pressure (main pump) (charge pump)	MPa {kg/cm^2}	41.2 {420} 3.6 {35}		
	HST motor	Type, number	---	Variable displacement angled piston type (with parking brake) x 2		
		Discharge amount	cm^3/rev	160		
	Final drive		---	Planetary gear, 2-stage reduction type, splash type lubrication		
Undercarriage	Suspension		---	Semi-rigid, equalizer beam type		
	Carrier roller		---	2 on each side		
	Track roller		---	7 on each side		
	Track shoe ● Assembly-type single grouser		---	Width: 510 mm Q'ty on each side: 44 pieces Pitch: 175 mm	Width: 710 mm Q'ty on each side: 44 pieces Pitch: 175 mm	---
	● Assembly-type special swamp shoe			---	---	Width: 720 mm Q'ty on each side: 44 pieces Pitch: 175 mm

*1: The battery capacity (Ah) is the 5-hour rate valve.

Machine model				D51EX-22	D51PX-22	
				510 mm Single shoe	710 mm Single shoe	720 mm Swamp shoe
Serial No.				B1001 and up		
Work equipment hydraulic system	Hydraulic pump	Type, number	---	Variable displacement swash-plate piston type x 1		
		Discharge amount	cm^3/rev	45		
		Max. discharge pressure	MPa {kg/cm^2}	27.4 {280}		
	Main control valve	Type, number	---	4-spool valve x 1		
		Operating method	---	Hydraulic pilot type		
	Lift cylinder	Type	---	Double-acting piston type		
		Cylinder bore	mm	ϕ90		
		Outside diameter of piston rod	mm	ϕ50		
		Piston stroke	mm	425		
		Max. distance between pins	mm	1,165		
		Min. distance between pins	mm	740		
	Tilt cylinder	Type	---	Double-acting piston type		
		Cylinder bore	mm	ϕ100		
		Outside diameter of piston rod	mm	ϕ55		
		Piston stroke	mm	150		
		Max. distance between pins	mm	675		
		Min. distance between pins	mm	525		
	Angle cylinder	Type	---	Double-acting piston type		
		Cylinder bore	mm	ϕ90		
		Outside diameter of piston rod	mm	ϕ50		
		Piston stroke	mm	465		
		Max. distance between pins	mm	1,265		
		Min. distance between pins	mm	800		
	Ripper cylinder	Type	---	Double-acting piston type	---	---
		Cylinder bore	mm	ϕ110		
		Outside diameter of piston rod	mm	ϕ60		
		Piston stroke	mm	294		
		Max. distance between pins	mm	994		
		Min. distance between pins	mm	700		
Hydraulic tank			---	Box type (externally mounted control valve type)		
Hydraulic filter			---	Tank return side		
Oil cooler			---	Air-cooled type (Aluminium bar-plate 5.1/2)		

Machine model				D51EX-22	D51PX-22	
				510 mm Single shoe	710 mm Single shoe	720 mm Swamp shoe
Serial No.				B10001 and up		
Work equipment	Type		---	Hydraulic type angle tilt dozer		
	Blade support method		---	Hydraulic cylinder type		
	Performance	Max. lifting height (from ground)	mm	1107	1107	1180
		Max. lowering depth (from ground)	mm	461	461	338
		Max. tilt	mm	459 (505)	505	505
		Max. angle	deg	28.5	28.5	28.5
	Dimensions	Blade width	mm	3045 (3350)	3350	3350
		Blade height	mm	1110	1110	1110
		Blade cutting angle	deg	57	57	59
Ripper	Type			Parallelogram		
	Beam length		mm	700		
	Number of shanks			3		
	Performance	Digging angle (at on the ground/at max. digging depth)	deg	53.5/53.5		
		Adjustment of digging depth		Changeable for 2 level		
		Max. digging depth	mm	430		
		Max. lift	mm	375		
		Shank interval	mm	700		

Values in ( ) are for the machines equipped with wide blade.

WEIGHT TABLE

★ This Weight Table is for reference when handling components or when transporting the machine.

Unit: kg (lb)

Machine model	D51EX-22	D51PX-22
Serial Number	B10001 and up	
Machine weight with ROPS cab with ROPS Canopy	 12,600 (27,800) 12,240 (26,985)	 13,100 (28,900) 12,740 (28,087)
Engine, damper assembly (not including water or oil) ● Engine assembly (including mount bracket, starter, alternator etc.) ● Damper assembly	585 (1,290) 548 (1,210) 37 (81.6)	585 (1,290) 548 (1,210) 37 (81.6)
Fan support bracket assembly (include fan, motor, guard and bracket)	67 (148)	67 (148)
Cooling core ● Radiator ● Oil cooler ● Charge air cooler	 36 (79.4) 25 (55.1) 25 (55.1)	 36 (79.4) 25 (55.1) 25 (55.1)
Fuel tank (not including fuel)	216 (476)	216 (476)
Hydraulic pump assembly (including fittings on pumps) ● HST pump ● Work equipment pump	193 (425) 160 (353) 26 (57.3)	193 (425) 160 (353) 26 (57.3)
Final drive assembly (including motor and sprockets) ● HST motor (each side) ● Final drive (each side) (including sprocket, bolts and nuts) ● Sprocket (each side)	496 (1,090) 180 (397) 316 (697) 5.6 (12.3) x9	496 (1,090) 180 (397) 316 (697) 5.6 (12.3) x9
Frame assembly (including plumbing mount brackets ● Main frame ● Underguard (inspection covers)	1,498 (3,300) 1439 (3,170) 48 (106)	1,498 (3,300) 1439 (3,170) 48 (106)
Track frame assembly (each side) ● Track frame (each side) (include guards and covers) ● Idler assembly (each side) ● Recoil spring assembly (each side) ● Track roller (each side) ● Carrier roller (each side)	1473 (3,250) 709 (1,560) 219 (483) 221 (487) 39 (86) x 4, 44 (97) x 3 18 (39.7) x 2	1477 (3,260) 713 (1,570) 219 (483) 221 (487) 39 (86) x 4, 44 (97) x 3 18 (39.7) x 2
Track shoe assembly ● Single grouser shoe (510 mm) ● Single grouser shoe (560 mm) ● Single grouser shoe (710 mm) ● Swamp shoe (720 mm)	 1,041 (2,300) x 2 1,095 (2,410) x 2 --- ---	 --- --- 1,260 (2,780) x 2 1,065 (2,350) x 2
Hydraulic tank (not including hydraulic oil) (include washer tank)	173 (381)	173 (381)
Charge pump	15 (33.1)	15 (33.1)
Control valve ● 4-spool valve (including fittings and mount plate) ● 5-spool valve (with ripper) (include fittings and mount plate)	 25 (55.1) 28 (61.7)	 25 (55.1) ---

Unit: kg (lb)

Machine model	D51EX-22	D51PX-22
Serial Number	B10001 and up	
Power angle tilt dozer assembly (include center ball, pitch link and pins) ● Blade ● Dozer frame ● Tilt cylinder assembly ● Angle cylinder assembly	1,415 (3,120) 713 (1,570) 464 (1,020) 37 (81.6) 32 (70.5) x 2	1,513 (3,340) 811 (1,790) 464 (1,020) 37 (81.6) 32 (70.5) x 2
Lift cylinder assembly	32 (70.5) x 2	32 (70.5) x 2
Ripper assembly (include ripper cylinder)	842 (1,860)	---
Ripper cylinder assembly	47 (104)	---
ROPS cab assembly (Include floor, seat, air conditioner)	1,176 ((2,590)	1,176 ((2,590)
ROPS canopy assembly (Include floor, seat)	814 (1,790)	814 (1,790)
Operator's seat ● Standard seat ● Hi-back seat ● Air suspension seat	 64 (141) 67 (148) 74 (163)	 64 (141) 67 (148) 74 (163)
Rear mask assembly (include linkage)	78 (172)	78 (172)
Engine hood assembly (include doors, muffler, pre-cleaner, exhaust tubes)	252 (556)	252 (556)
Pivot shaft (each side)	150 (331)	162 (357)
Equalizer bar	89 (196)	93 (205)

MEMORANDUM

TABLE OF FUEL, COOLANT AND LUBRICANTS

Reservoir	Fluid Type	Ambient Temperature	Recommended Komatsu Fluids
		-22 -4 14 32 50 68 86 140 122 °F -30 -20 -10 0 10 20 30 40 50 °C	
Engine oil pan	Engine oil	SAE 0W30EOS and HTHS 3.5min. (Note 1)	Komatsu EOS0W30
		SAE 5W40EOS and HTHS 3.5min. (Note 1)	Komatsu EOS5W40
		SAE 10W30DH	Komatsu EO10W30DH
		SAE 15W40DH	Komatsu EO15W40DH
		SAE 30DH	Komatsu EO30DH
Final drive case	Power train oil (Note 2)	TO 30 (SEA30)	TO30
Idler	Engine oil	SAE 30	EO30DH
Hydraulic system	Hydraulic oil (synthetic type oil)	TOS5W30 (SEA5W30)	TOS5W30
	Power train oil	TO 10	TO10
	Engine oil	SAE10W30DH SAE15W40DH SAE10WDH	EO10W30DH EO15W40DH EO10DH
Grease	Hyper white grease (Note 4)	GO-T (NLGI NO. 0) G2-T (NLGI NO. 2)	GO-T G2-T
	Moly disul. grease	LM-G (NLGI NO. 2)	LM-G
	Lithium grease	LM-G (NLGI NO. 2) LM-G (NLGI NO. 2) LM-G (NLGI NO. 2)	GO-L1 G2-L1 G2-L1-S
	Bio grease	G2-BT (NLGI NO.2)	G2-BT
Engine Cooling system	Super coolant	AF-NAC (Note 5)	AF-NAC
Fuel tank	Diesel fuel	No.2-D No. 1-D	ASTM N0. 2-D ASTM No. 1-D

- API: American Petroleum Institute
- SAE: Society of Automotive Engineers
- ASTM: American Society of Testing and Material

		Engine oil pan	Final drive case (each)	Hydraulic system	Idler (each)	Fuel tank	Cooling system
Specified capacity	liter	23	4.4	123	0.21	270	35
	US gal	6.08	1.16	32.5	---	71.3	9.25
Refill capacity	liter	20	4.0	63	0.21	---	---
	US gal	5.28	1.06	16.64	---	---	---

REMARK

Always use diesel oil for the fuel.
To ensure good fuel consumption characteristics and exhaust gas characteristics, the engine mounted on this machine uses an electronically controlled high-pressure fuel injection device. This device requires high precision parts and lubrication, so if low viscosity fuel with low lubricating ability is used, the durability may drop markedly.

Note 1: SAE0W30EOS and SAE5W40EOS must be fully synthetic and HTHS (High-Temperature High-Shear Viscosity 150°C [302°F]) must be equal to or higher than 3.5 cP. Komatsu EOS0W30 and EOS5W40 are the most suitable oils. If these oils are not available, contact your Komatsu Distributor.

Note 2: Power train oil has different properties from engine oil. Be sure to use the recommended oils.

Note 3: Hyper white grease (G2-TE) has a high performance.
When it is necessary to improve the lubricating ability of the grease in order to prevent squeaking of pins and bushings, the use of G2-TE is recommended.

Note 4: Hyper white grease (G2-TE) is a high performance white grease.
When it is necessary to improve the lubricating ability of the grease in order to prevent squeaking of pins and bushings, the use of G2-TE is recommended.
When it is desired to preserve the external appearance of the machine and prevent it from becoming to dirty due to black grease.

Type of grease	Load performance	Friction resistance	Heat resistance	Water resistance	Biodegrad ability	Remarks
Hyper white grease	▲	▲	▲	▲	◗	Non-black high load
Moly. disul. grease	●	▲	●	●	◗	Molybdenum grease
Lithium grease	❍	●	●	●	◗	—
Biodegradable grease	❍		▲	●	▲	Synthetic grease
	▲: Excellent	●: Good	❍: Normal	◗: Poor		

Note. 5: Supercoolant (AF-NAC)

1) The coolant has the important function of preventing corrosion as well as preventing freezing.
Even in the areas where freezing is not an issue, the use of antifreeze coolant is essential.
Komatsu machines are supplied with Komatsu Supercoolant (AF-NAC). Komatsu Supercoolant (AF-NAC) has excellent anticorrosion, antifreeze and cooling properties and can be used continuously for 2 years or 4000 hours.
Komatsu Supercoolant (AF-NAC) is strongly recommended wherever available.

2) For details of the ratio when diluting super coolant with water, see "CLEAN INSIDE OF COOLING SYSTEM (4-26)" of your Operation and Maintenance Manual.
When the machine is shipped from the factory, it may be filled with coolant containing 30% or more Supercoolant (AF-NAC). In this case, no adjustment is needed for temperatures down to -10°C (14°F). (never dilute with water)

3) To maintain the anticorrosion properties of Supercoolant (AF-NAC), always keep the density of Supercoolant between 30% and 68%.

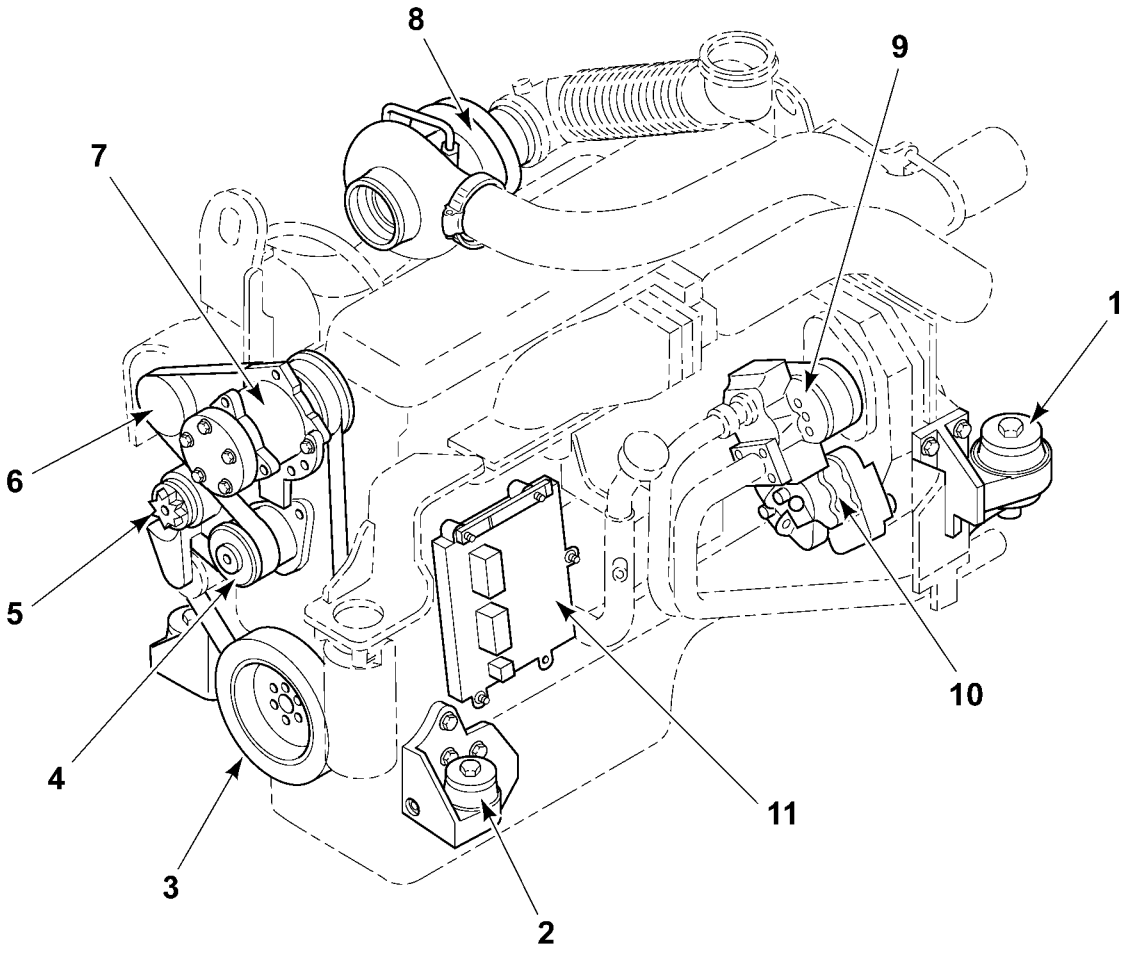
RECOMMENDED PRODUCTS OTHER THAN KOMATSU GENUINE OILS

When using commercially available oils other than Komatsu genuine oil, or when checking the latest specifications, refer to the Komatsu web page or consult your Komatsu distributor.

10 STRUCTURE, FUNCTION AND MAINTENANCE STANDARD

ENGINE AND COOLING SYSTEM

ENGINE RELATED PARTS



1. Rear engine mount
2. Front engine mount
3. Vibration damper
4. Water pump
5. Belt tensioner
6. Alternator
7. Air conditioner compressor (Idler pulley for canopy spec.)
8. Turbocharger
9. HST charge pump
10. Fuel pump
11. Engine controller