

type HDC	subject Cautions for Operating Deck Cranes with Grab Bucket	Ref AS-DC08-001
		Date July 29, 2009

Use of deck cranes has been increased than ever, as the operation rate of bulk carriers with deck cranes has been increased recently. Especially in India and China, deck cranes with grab bucket are used under severe stress with high operation rate, quick cycled operation, heavily loaded operation, etc.

Background of severe operation using grab bucket:

- ① Increase of ports of calling in one voyage where loading and unloading is done.
- ② Increase of quick cycled and continuous operation using grab bucket
- ③ Increase of occasion of loading between barge on the sea and vessel.

Due to the change of operation described above, deck cranes are at increased risk of having damages to hoisting reduction gear, slewing reduction gear, jib, wire rope, sheave and so on. Specific cases of trouble are as follows:

Items	Damage	Cause of Damage
Hoisting reduction gear	Abnormal wear / breakage of internal bearing	<ul style="list-style-type: none"> ▪ Risen-face-pressure of bearing at overload condition ▪ Lack of lubricating on bearing race due to the deterioration of the performance of lubricating oil
Slewing reduction gear	Breakage of internal carrier	<ul style="list-style-type: none"> ▪ Abnormal torque caused by slant pulling of cargo
Structure	Bending of jib	<ul style="list-style-type: none"> ▪ Abnormal increase of the lateral direction force caused by slant pulling of cargo
Lifting device	Damage of sheave(s)	<ul style="list-style-type: none"> ▪ Jib tip sheave(s) <ul style="list-style-type: none"> → Lateral direction force caused by slant pulling ▪ Post top sheave(s) <ul style="list-style-type: none"> → Jumping out of the wire by rough handling (crane operation in rough manners)

As for the cautions for operating deck crane with grab bucket, they are described on "Maintenance and Inspection / Instructions to be followed in operation for Deck Crane with grab bucket" which is inserted into finished plan and indicated on the caution-plate provided in operator's cabin. However, please pay attention again according to the following instructions, for the safer and longer use of deck cranes.

1. Cautions and Instruction for Operating Deck Crane with Grab Bucket Safely

(1) Excess stress by over load and shock load at grab handling

At the grab handling, shock load can be occurred during grabbing operation and/or at the moment of lifting up from ground.

Safety valves are provided as safety interlock device (relief valve) to prevent the occurrence of hoisting overload operation, however, this interlock does not work for luffing and slewing operation (it works only for hoisting operation).

Especially it is very stressful in the case that operator try to pull the grab aggressively (with luffing and or slewing motion) to recover the grab from overturning or burying into the cargo (coal, nickel, etc.).

Therefore it is very important to wake the caution about CONTROL OF THE MAXIMUM LOAD AT THE GRAB HANDLING.

(2) Periodical check and earlier exchange of lubricating oil

Planetary reduction gear is equipped to hoisting, luffing and slewing appliance.

Gear oil is filled in the reduction gear and it is very important to carry out periodical check and earlier exchange of lubricating oil in accordance with following table.

<Interval of inspection / exchange of lubricating oil>

Items	Interval	Comment
Inspection	6 months	Check the level of contamination by visual inspection
Exchange of lubricating oil (to new oil)	1 year (or 2000H)	Exchange the oil with new one, if following phenomenon is found on lubricating oil. • Contamination • Discoloration • Deterioration

<Check items>

Items	Measures	Comment
Quantity	Check by level gauge	Correct quantity or not
Color	Appearance check	Exchange oil before it becomes dark brown*
Viscosity	Check by appearance and hand feeling	In case viscosity of oil seems insufficient in comparison with new oil, exchange with new oil is necessary.
Contamination	Sampling check (appearance, etc.)	If sampling includes metal powder or fragments, exchange with new oil is necessary.
Lubricant Analysis	Periodic analysis by qualified company	Most recommended method to monitor the condition of oil

* Please refer to the attached 6, which shows sample of color of oil.

(3) Recommendation for using synthetic gear oil

Generally, synthetic gear oil keeps enough lubrication performance better than mineral oil, especially in the stressful condition, so use of synthetic gear oil is recommended.

As for the brand of synthetic oil is shown in the attached recommendation list.

2. Addition of caution plate

We provide the additional caution plate for your vessels, so please indicate them to the proper place.

- Attached 1 : Caution plate (Previous type, 4 types)
- Attached 2 : Location of caution plate
- Attached 3 : Caution plate for preventing overload (Addition)
- Attached 4 : Caution plate for proper lubrication (Addition)
- Attached 5 : Recommendation list of synthetic gear oil
- Attached 6 : Sample of color of oil

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三菱油圧デッキクレーン操作手順

運転前

デッキクレーンを操作する前に、室内に設置された「警告銘板」記述事項を熟読し、次の手順に従い操作すること。

1. 電源スイッチ (1) を入れ、電源ランプ (5) の点灯を確認。
2. オイルタンク油面の確認、並びに各油圧機器、バルブからの油漏れ有無を確認する。
(オイルがレベル以下になると機械は自動的にストップします。)(赤ランプ(9))
3. 操作ハンドル中立位置の確認。
(最初に操作ハンドルが中立位置にセットされてないと電動機は起動しません。)
4. スタートボタン (12) を押し、「運転」の緑ランプ (6) の点灯を確認。
5. 寒冷時は油体運転を行う。(作動油温を 20°C 位上げる)
油温が 20°C 以下の場合、ジブの上げ下げ操作や旋回操作が出来ない様に安全装置を設けています。(赤ランプ(9))
6. 通常の運転時はバイパススイッチ (15) を "NORMAL" にして下さい。
"BY-PASS" 状態で荷役作業を行ってはいけません。

運転中

1. 振動、異常音が発生したら周囲の安全を確認して非常停止ボタンを押して下さい。(13)
2. 各安全装置が作動するとクレーンの全動作は自動的に停止します。
(この時は赤ランプが点灯してブザーが鳴ります。)
再起動は次の手順で行ってください。
(1) 操作ハンドルを中立位置にもどす。(図3)
(2) ブザー停止ボタンを押す。(14)
(3) スタートボタンを押す。(12)

【注意】

リミットスイッチが作動するとクレーンの全動作が自動的に停止します。停止後、再起動し運転ができるまで約 5~10 秒かかるので取り扱いに注意してください。

運転後

1. ジブを格納するためジブ下限リミットを解除するときはバイパススイッチを「BY-PASS」に切替えて下さい。(15)
その場合、次のリミットは利かなくなるので注意下さい。(赤ランプ(9))
(1) "フォーリングブロックとジブ先端衝突防止のリミット"
(2) "俯仰下限リミット"
(3) "巻き上げワイヤーたるみ検出リミット"
尚、バイパススイッチはジブレスト作業が完了したら必ず "NORMAL" の位置にセットし、キーを抜き取って本船の OFFICER が保管して下さい。
2. スペースヒータ用のスイッチ (4) は運転中、運転完了後も ON にしておいて下さい。
(スペースヒータ用船内電源は切らないでください。)
3. 各部のドアを完全に閉めること。

非常時の脱出ルート

クレーン機械室内で火災が発生した場合は、運転室側面の開閉窓を開けて外部へ脱出して下さい。

OPERATING PROCEDURE OF DECK CRANE

BEFORE OPERATION

Before you start crane operation, be sure to read the warning instruction written in a "WARNING" plate with attention. And, do operation in accordance with the following operating procedure.

1. Source switch "ON". (1)
Make sure the source lamp lights. (5)
2. Check the oil level of oil tank and no oil leakage from hydraulic parts or valves.
(If the oil level becomes lower (9), the electric motor stops automatically.)
3. Set the control levers at the neutral position.
(If the handle levers are not set at the neutral position, the electric motor won't start.)
4. Press the start button. (12)
Make sure the green lamp ("MOTOR RUN") lights. (6)
5. Warm up the working oil (up to abt. 20°C) by idling the oil pumps in cold atmosphere. When oil temperature is 20°C or less, safety device is prepared so that operation of luffing and slewing cannot be performed. (9)
6. Make sure the by-pass sw. to be set in "NORMAL" position. (15)
Don't operate cargo handling in the "BY-PASS" position.

DURING OPERATION

1. Press the emergency stop button (13) after making sure of safety around the crane as soon as vibration and the abnormal sound are found.
2. When a limit switch works, the crane stops automatically.
(At this time the red lamp lights with the buzzer sound.)
Restart the main motor in the following procedure.
1) Reset the control lever at the neutral position. (Fig.3)
2) Press the buzzer reset button. (14)
3) Repress the start button. (12)

[Caution]

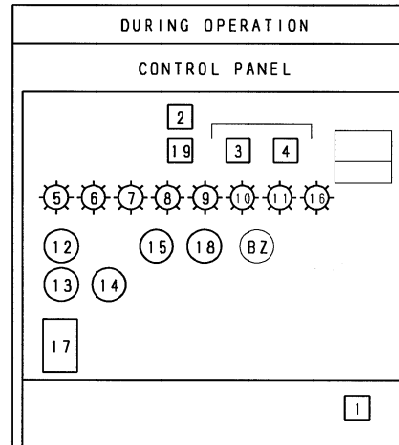
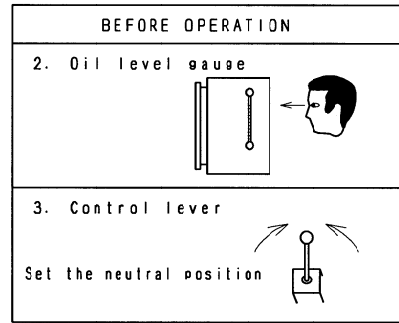
When the limit switch is actuated, all motion of the crane is stopped automatically in the moment. After the stopping, do restarting operation, then it takes approximately 5~10 seconds to restore the operation condition. So, take the above thing in your mind for operation.

AFTER OPERATION

1. When the jib is lowered below lower limit (for resting jib), the by-pass sw. to be set in "BY-PASS" position (15), and the following limit functions can't work due to the by-pass switch. (9)
1) Prevention from the collision of jib tip with the falling block.
2) Luffing lower limit
3) Slack-over detection of hoisting wire rope.
After finishing the jib resting work, the by-pass sw. to be set in "NORMAL" position again and the by-pass key to be kept by ship officer always.
2. Space heater switch (4) to be kept "ON" during and after operation.
(Do not disconnect the power for space heater from ship's power)
3. Close each door after operation.

ESCAPE ROUTE IN CASE OF EMERGENCY

If the fire breaks out at the machinery room in the crane, open the side window (openable type) of the cab and go out of the cab through the window immediately.

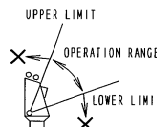
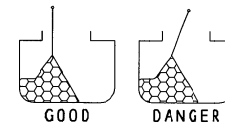


1. SOURCE SW.
2. CON. ROOM LIGHT SW.
3. MERCURY LAMP SW.
4. SPACE HEATER SW. (KEEP ON)
5. SOURCE LAMP
6. MOTOR RUN LAMP
7. OIL TEMP HIGH
8. MOTOR OVER LOAD LAMP
9. OVER LIMIT LAMP
10. OIL LEVEL LOW LAMP
11. LIMIT BYPASS LAMP
12. START BUTTON
13. EM'CY STOP BUTTON
14. BUZZER RESET BUTTON
15. BYPASS SWITCH (NORMAL-BYPASS)
16. OIL TEMP LOW
17. LIGHT CONTROL SW.
18. HOOK-GRAB SW.
19. 1kW ROOM HEATER SW.



WARNING

TO AVOID SERIOUS ACCIDENT AND PERSONAL INJURY, BE SURE TO READ FOLLOWING ITEMS AND OBEY THEM.

INSTRUCTION TO BE FOLLOWED STRICTLY	WHAT CAN HAPPEN IF THE INSTRUCTION(LEFT) IS NOT FOLLOWED/DEGREE OF RISK
(1) DO NOT OPERATE THE CRANE IF YOU DO NOT HAVE APPROPRIATE LICENSE.	(1) UNEXPECTED ACCIDENT DUE TO MISHANDLING, WHICH WILL RESULT IN DEATH OR SERIOUS INJURY.
(2) DO NOT OPERATE THE CRANE WHEN YOU ARE DRUNK OR INTOXICATED.	(2) UNEXPECTED ACCIDENT DUE TO MISHANDLING OR SAFETY NEGLIGENCE, WHICH WILL RESULT IN DEATH OR SERIOUS INJURY.
(3) DO NOT OPERATE THE CRANE BEFORE YOU READ THE INSTRUCTION BOOK AND FULLY UNDERSTAND THE FUNCTION OF THE CRANE.	(3) UNEXPECTED ACCIDENT DUE TO MISHANDLING, WHICH WILL RESULT IN DEATH OR SERIOUS INJURY.
(4) OPERATE THE CRANE ONLY AFTER CONFIRMING THAT THE CRANE IS UNDER GOOD CONDITION. (IF ANY TROUBLE OR ABNORMAL CONDITION IS FOUND, REPAIR THE CRANE IMMEDIATELY.)	(4) UNEXPECTED ACCIDENT DUE TO ABNORMAL CONDITION OF THE CRANE, WHICH WILL RESULT IN DEATH OR SERIOUS INJURY.
(5) COMMUNICATE WELL WITH OTHER WORKERS OUTSIDE THE CAB USING PROPER INSTRUCTIONS IN OPERATION OF THE CRANE.	(5) COLLISION OF THE LIFTING CARGO WITH WORKER, WHICH WILL RESULT IN DEATH OR SERIOUS INJURY.
(6) OPERATE THE CRANE ONLY AFTER CONFIRMING SURELY THAT NO ONE IS UNDER THE LOAD OR ON THE LINE ALONG WHICH THE LOAD WILL BE MOVED OR CONVEYED.	(6) CARGO FALLING DOWN ON WORKERS OR HITTING WORKERS, WHICH WILL RESULT IN DEATH OR SERIOUS INJURY.
(7) OPERATE THE CRANE ONLY AFTER MAKING SURE THAT NO ONE IS ON OR AROUND THE MOVING/ROTATING PART OF THE CRANE.	(7) WORKERS MAY BE PINCHED AND CAUGHT IN MACHINE, WHICH WILL RESULT IN DEATH OR SERIOUS INJURY.
(8) DO NOT OPERATE THE CRANE UNDER LOW OR POOR VISIBILITY.	(8) UNEXPECTED ACCIDENT DUE TO MISHANDLING OR SAFETY NEGLIGENCE, WHICH WILL RESULT IN DEATH OR SERIOUS INJURY.
<p>(9) DO NOT OPERATE THE CRANE BEYOND THE LIMITS OF USE.</p>  <ul style="list-style-type: none"> ·MAKE SURE THAT BYPASS SWITCH TO BE SET IN "NORMAL" POSITION. (DO NOT USE THE CRANE FOR CARGO HANDLING IN "BYPASS" POSITION.) ·KEEP THE WORKING ANGLE OF CRANE JIB IN THE NORMAL OPERATION RANGE. 	<p>(9) ANY OPERATION BEYOND THE LIMITS, EITHER UPPER OR LOWER, HAVE THE CRANE OVER-LOADED, WHICH WILL TRIGGER THE FOLLOWING ACCIDENTS AND RESULT IN DEATH OR SERIOUS INJURY.</p> <ul style="list-style-type: none"> ·WIRE ROPE BREAKING/SIPPING OFF FROM SHEAVES ·BENDING OF JIB/FALLING OFF ·TURN-OVER OR COLLAPSE OF CRANE ITSELF <p>SINCE THE COLLISION PREVENTING LIMIT IS BY-PASSED, THE HOOK MAY MAKE COLLISION WITH THE JIB AT THE END DUE TO MISHANDLING AND WILL CAUSE THE FOLLOWING ACCIDENTS.</p> <ul style="list-style-type: none"> ·WIRE ROPE BREAKING/SIPPING OFF FROM SHEAVES ·CARGO FALLING DOWN. <p>THESE ACCIDENTS WILL RESULT IN DEATH OR SERIOUS INJURY.</p> <p>(CAUTION) WHEN THE LIMIT SWITCH IS ACTUATED, ALL MOTION OF THE CRANE IS STOPPED AUTOMATICALLY IN THE MOMENT. AFTER THE STOPPING DO RESTARTING OPERATION, THEN IT TAKES APPROXIMATELY 5-10 SECONDS TO RESTORE THE OPERATING CONDITION. SO, TAKE THE ABOVE THING IN YOUR MIND FOR OPERATION.</p>
<p>(10) OPERATE THE CRANE ALWAYS CONFIRMING THAT THE CARGO IS JUST UNDER THE SHEAVE OF THE JIB TIP AND THE HOISTING WIRE ROPE HANGS DOWN VERTICALLY. (DO NOT PULL THE CARGO SLANTLY.)</p> 	<p>(10) ·WIRE ROPE BREAKING/SIPPING OFF FROM SHEAVES ·BENDING OF JIB/FALLING OFF ·TURN-OVER OR COLLAPSE OF CRANE ITSELF. ·IF CRANE IS OPERATED PULLING SLANTLY, IT CAN CAUSE DAMAGES TO GOOSENECK OF CRANE JIB AND WIRE ROPES. THESE ACCIDENTS WILL RESULT IN DEATH OR SERIOUS INJURY.</p> <p>(11) ·WIRE ROPE BREAKING/SIPPING OFF FROM SHEAVES ·BENDING OF JIB/FALLING OFF ·TURN-OVER OR COLLAPSE OF CRANE ITSELF OR CARGO HITS WORKERS DUE TO CARGO SWINGING. THESE ACCIDENTS WILL RESULT IN DEATH OR SERIOUS INJURY.</p>
(11) DO NOT OPERATE THE CRANE WITH SUDDEN START AND STOP.	(11) FALLING OFF OF JIB AND CARGO, WHICH WILL RESULT IN DEATH OR SERIOUS INJURY.
(12) WHEN YOU STOP THE OPERATION, DO NOT LEAVE THE CARGO SUSPENDED IN THE AIR.	(12) CRANE MOVES UNEXPECTEDLY, WHICH WILL RESULT IN DEATH OR SERIOUS INJURY.
(13) PUSH THE STOP BUTTON OF THE CRANE WHENEVER YOU LEAVE OPERATOR'S SEAT.	(13) FIRE WILL BREAK, WHICH WILL RESULT IN DEATH OR SERIOUS INJURY.
(14) DO NOT SMOKE IN MACHINERY ROOM OF THE CRANE.	(14) ·SLING WIRE BREAKING/CARGO FALLING DOWN ·CARGO SWINGING OR FALLING DOWN THESE ACCIDENTS WILL RESULT IN DEATH OR SERIOUS INJURY.
(15) SELECT AND USE THE CORRECT SLING WIRE. (DO NOT LIFT CARGO WITH SINGLE SLING WIRE IN CASE OF CARGO IN LONG SIZE.)	(15) WORKERS MAY BE STRUCK BY ELECTRICITY, WHICH WILL RESULT IN DEATH OR SERIOUS INJURY.
(16) DO NOT TOUCH WITH BARE HANDS ON ELECTRICAL PARTS IN ANY CASE WHEN CRANE IS OPERATED OR STOPPED.	(16) SINCE SAFETY DEVICES DO NOT WORK WELL, THE FOLLOWING ACCIDENTS MAY HAPPEN.
(17) DO NOT REMOVE THE VARIOUS SAFETY DEVICES AND PROTECTION DEVICES OF THE CRANE, NOR CHANGE THE SETTING CONDITION OF THEM.	<ul style="list-style-type: none"> ·WIRE ROPE BREAKING/SIPPING OFF FROM SHEAVES ·BENDING OF JIB/FALLING OFF ·TURN-OVER OR COLLAPSE OF CRANE ITSELF. ·FALLING OFF OF JIB AND CARGO <p>THESE ACCIDENTS WILL RESULT IN DEATH OR SERIOUS INJURY.</p>
<p>(18) BEFORE DOING MAINTENANCE AND INSPECTION WORK, ·CUT OFF THE POWER SWITCH FOR THE CRANE IN SHIP. ·PUT THE INDICATION SAYING THAT "NOW WORKING FOR INSEPCTION. DO NOT POWER ON WITHOUT PERMISSION" ON THE SITE.</p>	(18) WORKERS MAY BE STRUCK BY ELECTRICITY, PINCHED AND CAUGHT IN MACHINE, WHICH WILL RESULT IN DEATH OR SERIOUS INJURY.

グラブ荷役デッキクレーンに対する保守点検項目及び運転上の注意事項
 Maintenance and Inspection/Instructions to be followed in operation for Deck Crane with a grab bucket
 (The inspection items and instructions described below shall be practiced as the operation is very severe for grab handling use.)

保守点検項目
 Maintenance and inspection

項目 items to be checked	周期 intervals	保守点検内容	Points for check / Maintenance
ターンテーブルベアリング turn table bearing	毎日 Everyday	・取付ボルトについては、ハンマリングを行い緩みの有無を確認する。 ・ターンテーブル軸受部の給脂は運転時毎日行う。 グリースは固体潤滑剤入グリースを使用すること。 ・内接歯車及びピニオン部へO.Gグリースを給脂する。(船体付固定ポスト内より)	・Inspect the fastening bolts for looseness by hammering . ・When operate the crane , supply grease to turntable bearing (T.T.B) every day . Use of grease with a solid lubricant . ・Supply O.G. grease to the inner gear tooth of T.T.B and pinions . (from the inside of the fixed post)
油圧モータ・油圧ポンプ oil motor , oil pump	6ヶ月 6 months	・作動音、ケーシング温度、振動等に異常がないか確認する。 ・圧力、速度に異常がないか確認する。 (異常が認められたら早めに修理交換する)	・Check whether abnormal working noise , casing temperature , vibration etc. are found or not . ・Check whether abnormal oil pressure and the speed are found or not . (If abnormal condition is found , repair or replace with new one .)
	4年 4 years	・開放点検を実施する。	・Oil motors , pumps are to be inspected (overhaul) .
ワイヤロープ wire rope	荷役前 Before operating	・ワイヤーの断線、キンク、型くずれ等の異常がないことを確認する。 ・内部断線や錆による損傷等が発生する可能性があるため10ヶ月毎(又は700時間 [※])に新品ワイヤーと交換する。	・Confirm that there are not abnormal conditions such as breakage ,kink and deformation of wire . ・Replace with new wire rope every 10 months(or 700 hours [※]) because there is a possibility that damage due to breaking of wire or rust may occur .
滑車及び滑車軸受 sheeve and sheeve bearing	6ヶ月 6 months	・滑車フランジ部が変形又は、破損していないか確認する。 ・滑車溝部が極度に摩耗していないか確認する。 摩耗量が取替基準値を超えたものは新品に交換する。 (異常が認められたら早めに修理交換する)	・Check whether flange part of sheave is deformed or broken . ・Check whether the grooved part of sheave is extremely worn away or not . When the grooved part is worn away over standard amount (7mm .), replace with new one . (If abnormal condition is found , repair or replace with new one .)
フック hook	6ヶ月 6 months	・摩耗(断面積の15%)、口開き、亀裂が生じていないか確認する。 異常が発見されたら、新品に交換する	・Check whether abrasion (about 15 % of sectional area) , deformation or cracks are found or not . If looseing is found , replace with new one .
作動油 working oil	6ヶ月 6 months	・ラインフィルターの点検を2ヶ月(又は300時間)毎に行う。 ・油の汚染度を目視にて確認する。 ・但し1年(又は2000時間)毎に新油と交換する。	・Inspect line filter every 2 months (or every 300 hours) . ・Inspect pollution of lubricating oil with eyes . ・Exchange the oil for new one every 1 year (or 2000 hours) .
潤滑油 (巻上・俯仰ウインチ、旋回減速機) lubricating oil (hoisting and luffing winch, reduction gear of slewing devise)	6ヶ月 6 months	・油の汚染度を目視にて確認する。 ・但し1年毎に新油と交換する。	・Inspect pollution of lubricating oil with eyes . ・Exchange the oil for new one every 1 year .
ジブグースネック軸及び軸受 jib gooseneck shaft and bearing	6ヶ月 6 months	・エンドプレートのボルトの緩みを確認する。 緩みが発見されたら増締めする。	・Check whether the loosening of the bolts for endplate or not . If the loosening is found , tighten bolts seurely .

運転上の注意事項

- 吊荷の斜め引きは絶対に避けること。
斜め引き状態でクレーンを使用すると、ジブ本体、ジブグースネック部及びワイヤロープ等が損傷し、重大な人身事故につながる恐れがある。
- 強風下及び悪天候下での荷役は極力避けること。(天候が回復するまで荷役を見合わせる)
- グラブ荷役時の制限荷重は必ず守ること。
- リリーフ弁の設定圧力を勝手に変更しないこと。
- バイパススイッチを”BY-PASS”に切り替えての荷役作業禁止。
- 運転中、特に始動時と停止時には、出来るだけショックがないようにスムーズな運転を行うこと。
- グリース給脂箇所及び給脂周期については、別紙「グリース給脂箇所一覧表」を参照のこと。

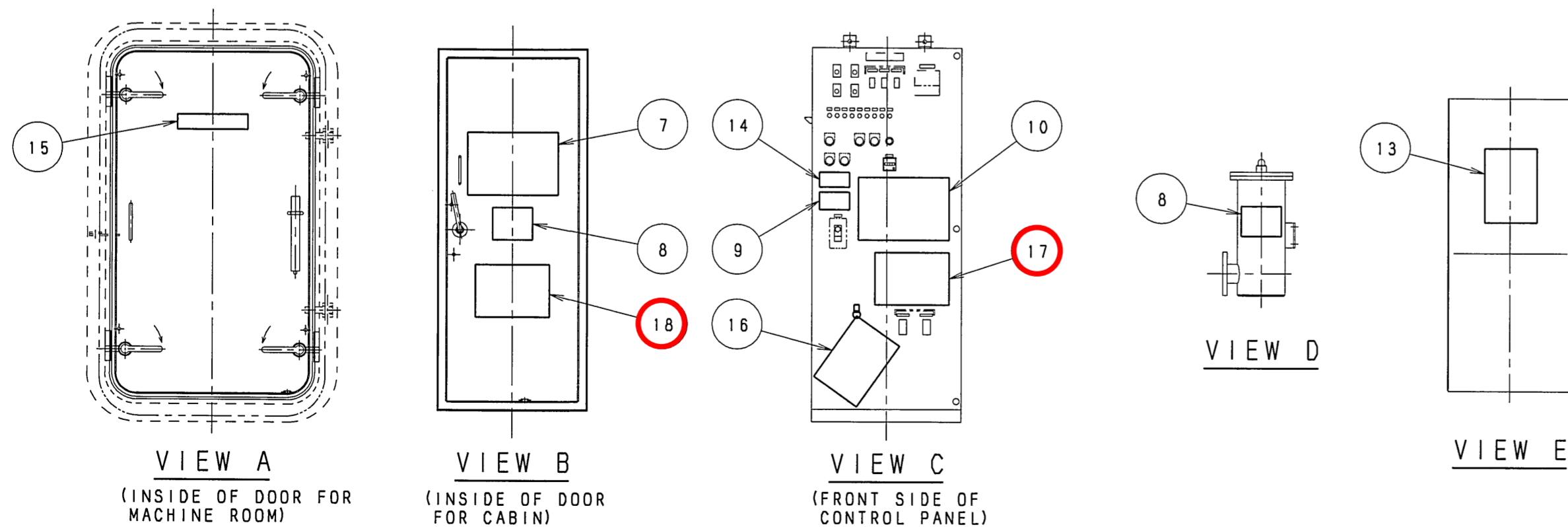
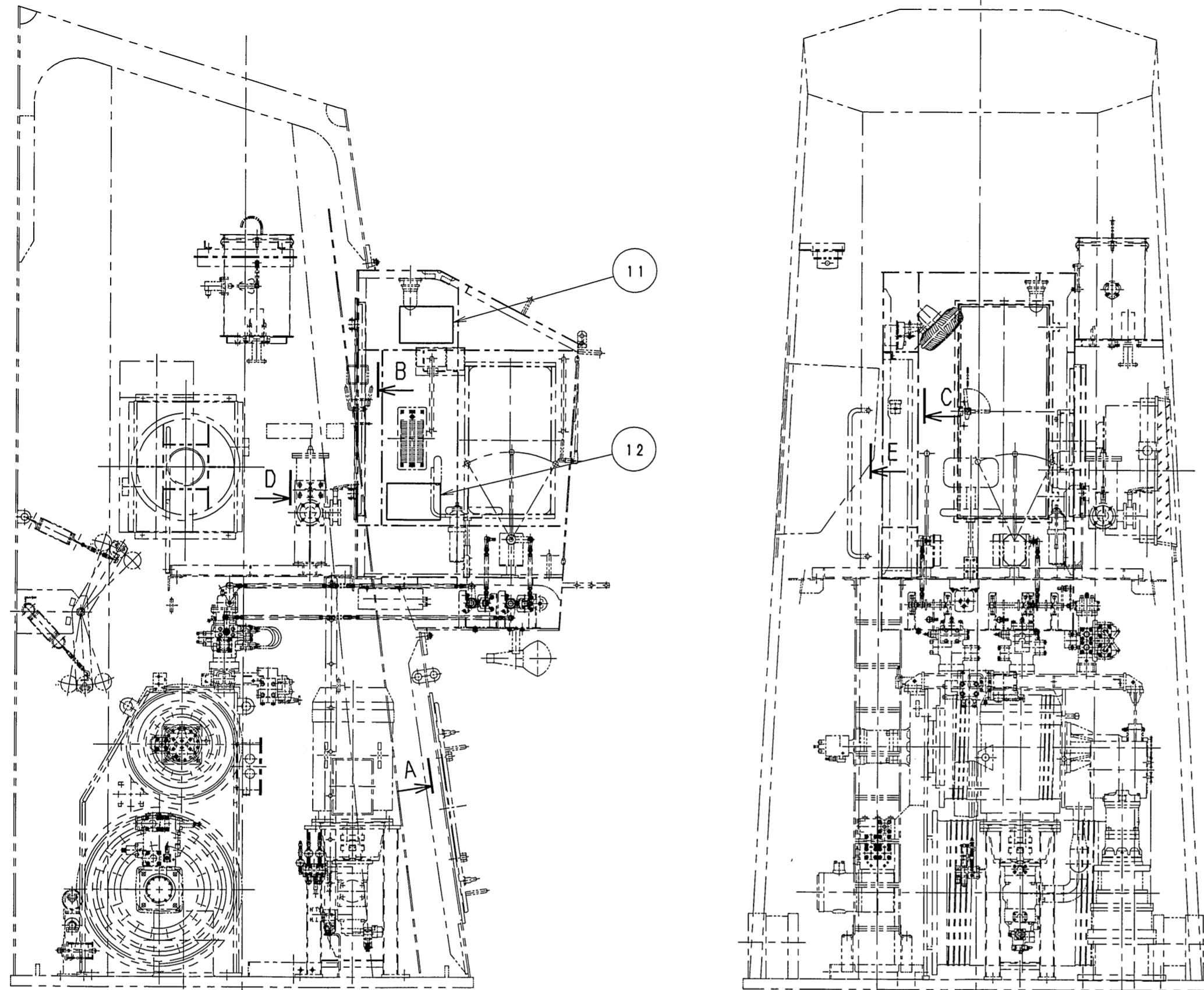
※ 三菱の推奨するワイヤーを使用した場合の理論寿命時間を示す。

Instructions to be followed in operation

- Do not pull the cargo slantly .
If crane is operated pulling slantly , it may cause damages to jib , gooseneck of crane jib and wire ropes and will result in death or serious personnel injury .
- Do not operate the crane under a strong wind and bad weather circumstance .
(Stop cargo handling operation until weather become good .)
- Do not lift over capacity when operate the crane with a grab bucket .
- Do not change the setting pressure of relief valve without any reason .
- Do not operate the crane for cargo handling in ”BYPASS” mode of bypass switch .
- During operation , the shock at starting and stopping should be avoided as far as possible and smooth operation should be kept by operating the handles gradually .
- As for lubricating points and intervals of grease , refer to sheet ”CHART OF GREASE LUBRICATING POINTS ”.

※ Theoretical life time (In case of using wire rope recommended by MHI)

THIS PLAN WAS DRAWN AT
THIS WORKS FOR.
R1. ('08. 12. 9)
R2. ('09. 1. 23)



18	2	CAUTION PLATE (MAINTENANCE OF LUBRICANT FOR REDUCTION GEARBOX)	SEAL	1			DSD7109701
17	2	CAUTION PLATE (PRECAUTIONS IN GRAB OPERATING)	SEAL	1			DSD7109691
16	1	INSTRUCTIONS (CAUTION UP STARTING OPERATION IN COLD CONDITION)		1			
15	1	CAUTION PLATE (OPENING DOOR)	SEAL	1			DSD7104320
14	1	CAUTION PLATE (OVERHAUL)		1			DSD7103000
13	0	CAUTION PLATE (DUCT COVER)		1			
12	0	CAUTION PLATE (WARNING/JAPANESE)		1			
11	0	CAUTION PLATE (WARNING/ENGLISH)		1			
10	0	LABEL OF OPERATING MANUAL		1			
9	0	CAUTION PLATE (BUZZER)		1			
8	0	CAUTION PLATE (FILTER)		2			
7	0	LABEL OF GREASING POINTS	SEAL	1			
6	0	TAG FOR PRESSURE GAUGE	PLASTIC	1			DSC7688042
5	0	TAG FOR PRESSURE GAUGE		1			DSC7688022
4	0	TAG FOR PRESSURE GAUGE		1			DSC7688012
3	0	TAG FOR EMERGENCY BRAKE VALVE		1			DSB7312031
2	0	TAG FOR EMERGENCY BRAKE VALVE		1			DSB7312021
1	0	TAG FOR EMERGENCY BRAKE VALVE	PLASTIC	1			DSB7312011
No.		NAME	MATERIAL	TOTAL QUANT'Y	A PIECE	TOTAL MASS (kg)	REMARKS


MACHINERY DESIGNING SECTION. V6SERIES
 APPROVED *[Signature]*
 CHECKED *[Signature]*
 DRAWN *[Signature]*
 SCALE _____
 ORDER _____ ITEM _____ DRAWING NO. _____
 備付標準図 DSD7100492

t x m (R) HYDRAULIC DECK CRANE
 ARRANGEMENT OF CAUTION PLATE/LABELS/TAGS
 MITSUBISHI HEAVY INDUSTRIES, LTD.
 SHIMONOSEKI SHIPYARD & MACHINERY WORKS


工番	工事号	注文先用途 又は所在地	納期 使用年月日	製造数	記号

改訂		認可
改番・日付	符号	内容
改1 H21.1.22		英文を追加、他。
改		
改		

2
293
2



注意


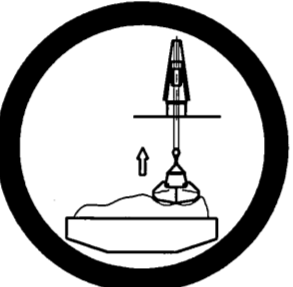


CAUTION

Grab荷役運転時の注意事項

クレーン装置に深刻なダメージを与える恐れがありますので、次の注意事項を守って運転を実施下さい。

- 吊荷の斜め引きを絶対に行わないこと。


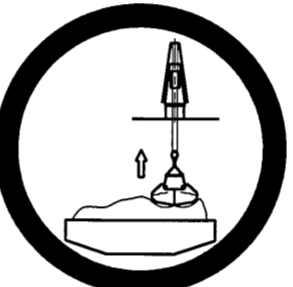
- Grab荷役時の制限荷重を守ること。過負荷運転を絶対に行わないこと。
- スムーズな運転を行うこと。
 - クレーンや吊荷に衝撃が発生しない運転を心がけること。
 - 急ハンドル操作を行わないこと。
 - 急停止、急発進を行わないこと。

例) Grabバケットの下げ ⇒ 掴み ⇒ 地切り時の急操作
- 高サイクル連続運転を極力避けること。

Precautions in grab operating

Be sure to observe following items to avoid serious damages to cranes.

- Do NOT lift or pull cargos slantwise.

- Do NOT use cranes beyond the restricted load at "GRAB" mode.
- Use cranes with smooth operation.
 - Operate cranes paying attention NOT to make impact loads.
 - Do NOT operate cranes in rapid lever stroke.
 - Do NOT operate cranes with sudden starts or stops.

Ex) Lowering ⇒ Grabbing
⇒ Rapid hoisting off the ground
- Avoid repeating consecutive high-speed-cycle operation.

(DSD7109691)

備考

- 彩色
 - (赤) : 赤色
 - (緑) : 緑色
 - 背景 : 白色
 - (黄) : 黄色
 - 線 : 黒色
 - 文字 : 黒色
 - ▲ (黒) : 黒色

Grab荷役運転時の注意事項、
Precautions in grab operating
は赤色とする。

- 書体 : 丸ゴシック体とする。
- 裏面は強力な接着剤(対鋼板用)付きとする。
- 張付位置は、銘板配置図参照のこと。


出図先

注意銘板	Z80	ネ-マ#75	1		
符号	改番	名称	品目コード	材料記号	備考
投影法	機械部機械設計グループ			V6SERIES	
三角法	認可	検図	製図		
水圧試験	1.26	21.1.26	矢野		
尺度	1/1				
工事番号	備付標準図			図番	図型
Ka1/cm ² (x0.098Mpa)				DSD7109691	A2
品目コード	Z80			三菱重工株式会社 下関造船所	
製図日付	出図日付	MF化	初回	改正	
H16.4.20		発印			


S記号	0.8MT	6.3MT	25MT	50MT	なめらかな 生地(黒色)	普通許容差 (削り加工)	許容差 (mm)	0.5以上 6MT	6を超え 30MT	30を超え 120MT	120を超え 315MT	315を超え 1000MT	1000を超え 2000MT	2000を超え 4000MT	4000を超え 8000MT
▽	▽	▽	▽	▽	~	(mm)	許容差	± 0.1	± 0.2	± 0.3	± 0.5	± 0.8	± 1.2	± 1.6	± 2.0

CRIG 専用

工 番 号	注 文 先 用 途 又 は 所 在 地	納 期 使 用 年 月 日	製 造 数	記 事	図
					本図は 向けとして当所に 於て計画調整す
					改 訂
改 番 ・ 日 付	符 号	内 容		認 可	
改 1 H21.1.22		英文を追加、他。			
改 2 H21.2.6		誤記訂正			
改 .					



注意



CAUTION

減速機の潤滑油管理

潤滑油の劣化や油量不足により、減速機に深刻な損傷を及ぼす恐れがあります。潤滑油の定期的な点検と早めの交換を実施下さい。

1. 基準

- ・点検：6ヵ月毎
- ・交換：1年または下表の様な劣化が確認された場合

※高サイクル、高負荷運転を行った場合、非常に短期に潤滑油が劣化する場合があります。潤滑油に汚れ、変色、劣化等の異常が見られた場合、速やかに新油と交換下さい。

2. 潤滑油チェック項目

チェック項目	確認内容	判定目安
L _o の量	油面	油面ゲージに対して正しいレベルか
L _o の色相	色、透明度を観察	黒褐色になる前交換
L _o の粘度	手触り、油滴のたれ	新油との比較で良否判定
金属粉、異物の介在	サンプリングの状態観察	金属物、異物があれば交換
L _o の分析	客観的な定量分析	粘度、清浄度、酸化状態を評価

MAINTENANCE OF LUBRICANT FOR REDUCTION GEARBOX

Deterioration or shortage of lubricant in the gearbox may cause serious damages of reduction gears. Make sure to carry out periodic check and keep the interval for change of lubricant.

1. Intervals

- ・Check: every 6 months
- ・Change: every 1 year or if any following deteriorations are found

※High-speed-cycle or high-load operation may cause early deterioration of lubricant. If any following deteriorations are found, renew the lubricant with new one immediately.

2. Check items for lubricant

Items	Measures	Comment
Quantity	Level gauge	To be proper amount
Color	Observation	Renew before becoming dark-brown
Viscosity	Comparison with new one	Evaluate by comparing a state of dropping and feels with new one
Contamination (Powder, fragment)	Observation	If sampling includes metal powder or fragments, renew at once
Lubricant Analysis	Periodic analysis by qualified company	Obtain evaluation from specialist

(DSD7109701)

- 備考
1. 彩色 : は黄色とし、他は黒色とする。
 2. 書体 : 丸ゴシック体とする。
 3. その他 : 裏面は強力な接着剤(対鋼板用)付きとする。
 4. 張付位置は、銘板配置図参照のこと。

S 記 号 の 記 号	0.8μm	6.3μm	25μm	50μm	なめらかな 生地(黒色)	普通許容差 (前加工) (mm)	呼び寸法 の区分	0.5以上 6以下	6を超え 30以下	30を超え 120以下	120を超え 315以下	315を超え 1000以下	1000を超え 2000以下	2000を超え 4000以下	4000を超え 8000以下
表面粗さ (μm)	▽▽▽▽	▽▽▽	▽▽	▽	~	許容差		± 0.1	± 0.2	± 0.3	± 0.5	± 0.8	± 1.2	± 1.6	± 2.0

注意銘板		Z80	ネ-マ#75	1					
符号	改 番	名 称	品 目 コ ー ド	材 料 記 号	常 備 数	合 計 個 数	一 個 重 量 (Kg)	合 計 重 量	備 考
投 影 法		機 械 部 機 械 設 計 グ ル ー P			V6SERIES				
三 角 法		認 可 校 図 製 図			注 意 銘 板 (減速機の潤滑油管理)				
水 圧 試 験		尺 度			1/1				
工 事 番 号		備 付 標 準 図			DSD7109702			図 型 A2	
品 目 コ ー ド		Z80			三 菱 重 工 業 株 式 会 社 下 関 造 船 所				
製 図 日 付		出 図 日 付		MF 化 量 印		初 回		改 正	
H16.4.20									

CRIG製用

出 図 先	
出 図 日	
出 図 部	
出 図 人	
出 図 機	
出 図 係	
出 図 課	
出 図 室	
出 図 組	
出 図 長	
出 図 副	
出 図 係	
出 図 員	
出 図 控	
出 図 計	

RECOMMENDED OIL TABLE FOR MITSUBISHI HYDRAULIC DECK MACHINERY AND DECK CRANE

As of April 16, 2018

MAKER	HYDRAULIC OIL		LUBRICATING OIL				GREASE (FOR BEARING ETC)	HYDRAULIC OIL FOR REMOTE CONTROL		FLUSHING OIL	
			FOR ENCLOSED GEAR (PLEASE SELECT THE OIL COMPLYING WITH DIN 51517-3:2004)		FOR OPENED GEAR			P-M TYPE	PM-P TYPE		
	MINERAL	SYNTHETIC	MINERAL	SYNTHETIC	MINERAL	SYNTHETIC					
JX Nippon oil & Energy	Super Hyrando 68 Hyrando Wide 68 Super Hurando SE68	-	Bonnoc M220	Bonnoc AX220	OG Grease 500 Cranoc compound 2	-	OG Grease 500 Cranoc compound 2	Multinoc Grease 2 EPNOC Grease AP(N)2 Toughlix Grease MP2	Super Marupas DX10 Power Fluid 10	Super Marupas DX22 Power Fluid 18 Hyrando Wide15	Turbine Oil 32 RIX Turbine 32
IDEMITSU	Daphne Super Hydro 68A Daphne Super Hydro 68X	-	Daphne Super Gear Oil 220 Daphne Versatile Force 220	Daphne Alpha Gear 220	Daphne Open Gear Oil NO.2	-	Daphne Open Gear Oil NO.2	Daphne Eponex Grease SR NO.2	Daphne Hydro GT	Daphne Super Hydro 15X	Diana Fresia S-32
KYGNUS	Unit Oil WR68 Unit Oil E68	-	Sunep Oil 220 Gear Oil ML220	-	NPC Gear Compound NO.2	-	NPC Gear Compound NO.2	MP Grease NO.2	Unit Oil P7	Unit Oil P22	(※1)
COSMO	Cosmo Hydro AW 68 Cosmo Hydro HV68 Cosmo Allpus 68 Cosmo Super Epoch ES68	-	Cosmo Gear SE220 Cosmo Gear M0220 Cosmo ECO Gear EPS 220	-	Cosmo Gear Compound NO.2	-	Cosmo Gear Compound NO.2 Cosmo Rope Grease SP NO.2	Cosmo Grease Dynamax EP NO.2 Cosmo Grease Dynamax NO.2	Cosmo Hydol 8D	Cosmo Hydro HV22	Cosmo Flushing 32
SHOWA SHELL	Shell Tellus S2V 68 Shell Tellus S2VX 68 Shell Tellus S2M 68 Shell Tellus S2MX 68 Tellus Oil ST68	-	Shell Omala S2G 220	Tivela Oil SB	(※1)	-	Malleus Fluid RL	Alvania Grease S2 Alvania EP Grease 2	Aeroshell Fluid 41	Tellus Oil 32 Tellus Oil ST22 Shell Tellus S2V 22 Shell Tellus S2V 15	(※1)
BP MARINE	Energol SHF-HV 68	-	Energol GR-XP220	Energol HTX220 Energol SG-XP220	BP Energol MP-MG2	-	BP Energol MP-MG2	BP Energol MP-MG2	Energol SHF-LT 15	Energol SHF-HV 15	(※1)
CASTROL	Hyspin AWH-M68	BioBar68(※2)	Alpha SP220	Alphasyn EP220 BioTrans 220 (※2)	Spheerol SX2	BioTac EP2 (※2)	Spheerol SX2	Spheerol SX2	Aero HF 18 Aero HF585B Brayco Micronic 756	Hyspin AWH-M15	(※1)
EXXON MOBIL (MOBIL)	Mobil SHC 526 Mobil DTE Oil Heavy Medium DTE 10 EXCEL 68	-	Mobilgear 600XP220	Mobil SHC630	Mobiltec 375NC	-	Mobiltec 375NC Mobilarm 798	Mobilgrease XHP 222	Mobil Aero HF	Mobil DTE 10 EXCEL 15	(※1)
CHEVRON	Rando HDZ68	Clarity Synthetic Hydraulic AW68 (※2)	Meropa 220	Pinnacle Marine Gear 220 Clarity machine oil 220 (※2)	Texclad 2	-	Texclad 2	Multifak EP2	Rando HDZ15	Rando HDZ15	Regal R&O32
TOTAL	VISGA 68 AZOLLA ZS 68 BIO HYDRAN TMP68 (※2)	-	EPONA Z 220 CARTER BIO 220(※2)	EPONA SA 220	CERAN AD PLUS	-	CERAN AD PLUS	CERAN XM 220	VISGA 15	VISGA 22	(※1)
LUKOIL	RENOLIN B HVI 68	-	RENOLIN CLP 220	-	RENOLIT CXI 2	-	RENOLIT CXI 2	RENOLIT CXI 2	RENOLIN B HVI 15	RENOLIN B HVI 15	(※1)
GULF OIL MARINE	Gulfsea Hydraulic HVI Plus 68 Gulfsea Hydraulic HVI ZF 68	-	Gulfsea Gear Oil 220	-	Gulfsea Hyperbar Super CS	-	Gulfsea Hyperbar Super CS	Gulfsea Hyperbar CS2	Gulfsea Hydraulic HVI Plus 15	Gulfsea Hydraulic HVI Plus 15, 22, 32	Gulfsea HT Oil 32

※1 : There NO suitable oil for our products. Please apply nominated oil by other maker.

※2 : Biodegradable Oil

MITSUBISHI HEAVY INDUSTRIES MACHINERY SYSTEMS, LTD.

COLOR OF LUBRICATION OIL FOR CLOSED GEARBOX

The following table shows the color grades of lubrication oil for closed reduction gearboxes. Please use it as one of easy measures of deterioration.

ASTM grade	Color	Remarks
L0.0		
L0.5		
L1.0		
L1.5		New oil (The color depends on its brand)
L2.0		
L2.5		
L3.0		
L3.5		
L4.0		
L4.5		Deterioration might be occurring. Analysis by specialist or replacement with new one is recommended.
L5.0		
L5.5		
L6.0		
L6.5		
L7.0		
L7.5		
L8.0		

- *1: The color of the oil is to be observed at the oil level gauge on each gearbox.
- *2: The table above is given as one of easy measures of deterioration, so analysis by a specialist is recommended for more particular observation.
- *3: The color of new oil depends on its brand and some brands differ from the table above. So if you have any questions about it, please contact us.