



TQ508-70Y

HYDRAULIC CASING TONG

OPERATION MANUAL

(Parts, Operation & Maintenance)

Goldenman Petroleum Equipment Co., Ltd

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I. Introduction

The manual includes instructions for installation, operation and maintenance, as well as problem diagnosis information. It also includes drawings and parts list which serve as a reference for operation and maintenance. Please read the manual and observe maintenance instructions. If you have any questions on our manual, please contact Goldenman Petroleum Equipment Co., Ltd.

TQ508-70Y hydraulic casing tong can work normally not only in the warm weather, but also under extreme cold climate. Its structure is simple and reliable and can be dismantled without the use of special tools. Only simple maintenance can elongate its service life. All supporting parts are of high-performance alloy steel and are strong due to appropriate heat treatment and strict machining. Important parts like motor are imported to secure its reliable and safe running.

II. Specifications

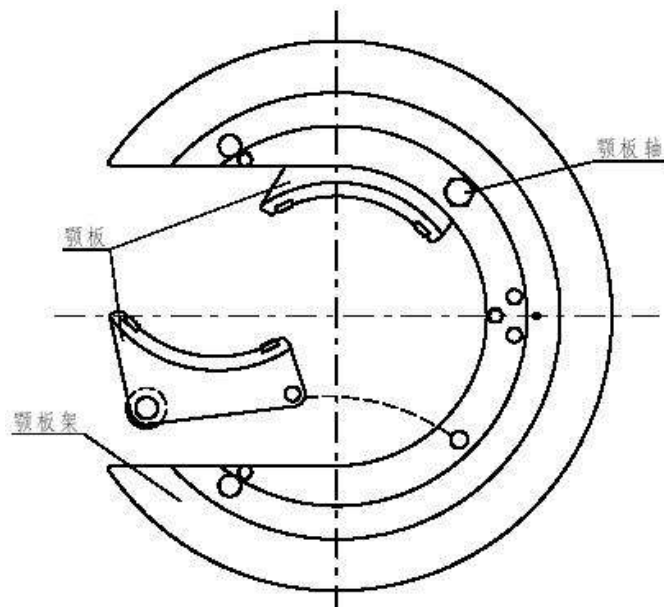
1.Capacity	Φ 245- Φ 508mm (95/8"-20")
2.Maximum working pressure	20Mpa(TQ508-70Y) 18.8MPa(TQ508-65Y) 17.5MPa(TQ508-60Y)
3.Work flow	110-170L/min
Maximum flow:	200L/min
4.Speed	high gear 26-43.6rpm low gear 4.0-6.6rpm
5.Max torque	high gear 8.4-10.7kN.m low gear 48.9-70kN.m
6.High gear ratio of transmission	3.47
Low gear ration of transmission	22.37
7.Torque arm length	1320.8mm (52")
8.Space required on pipe	254mm(10")
9.Overall dimensions	L*W*H=2080*1280*760mm ³
10.Weight	1550kg
11.Connection	High pressure hose port: NPT1 or M30*1.5 Return hose port: NPT1-1/4 or M42*2 Drain port: M18*1.5

12. Jaws available for casing sizes (normally): 9-5/8", 13-3/8", 16", 18-5/8" and 20"

III. Assembly

1. Jaw installation (see illustration)

To install the jaws, remove the two jaw pivot bolts. Plate one jaw at a time between the upper and lower cage plates. Align the hole in the jaw with the matching hole in the cage plates, and insert the jaw pivot bolts.

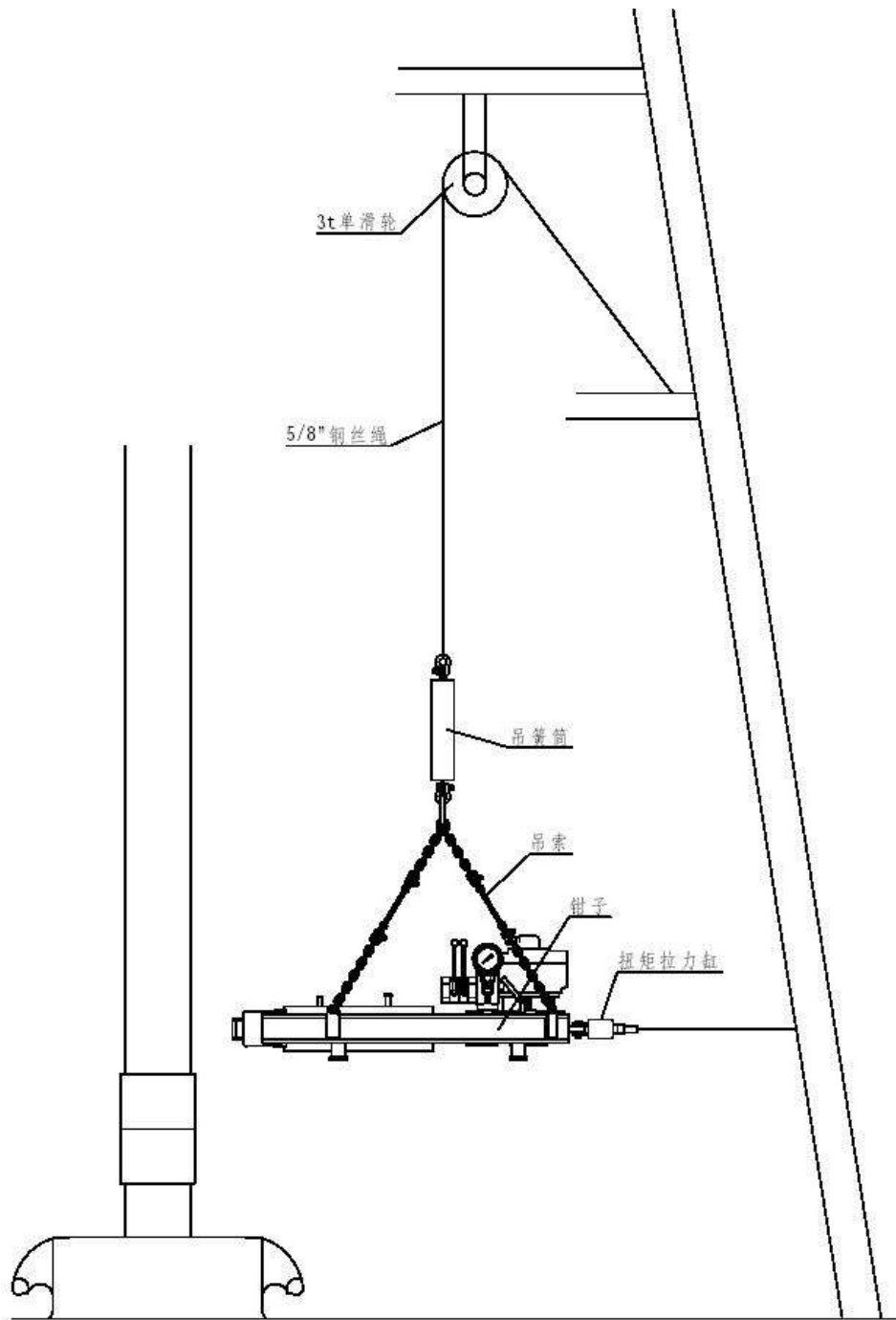


2. Tong rig-up

The tong should be suspended by 5/8" diameter (minimum) wire rope and from a location in the derrick high enough to assure easy handling and maneuvering of the tong. The hang line should be placed in a position as near the center of the rotary as possible without interfering with the movement of the hoisting equipment.

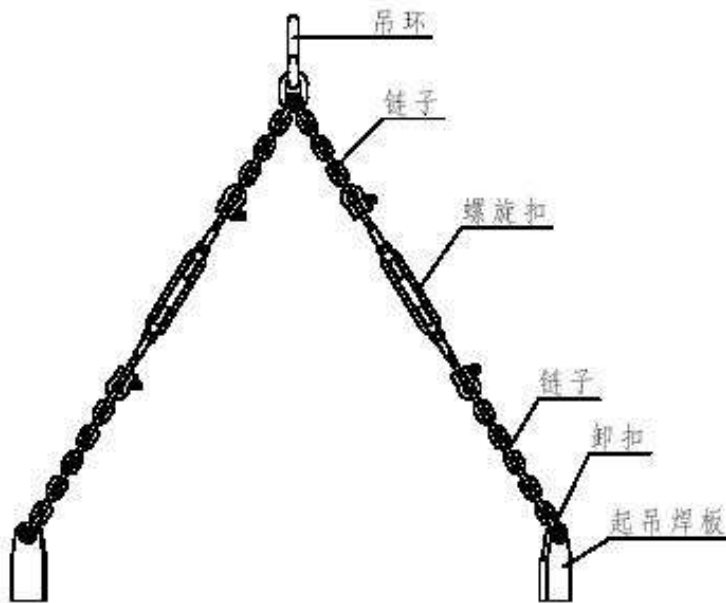
This line may either be extended over a pulley (over 3ton) and balanced by a counterweight equal to the weight of the tong or simply tied off in the derrick to form a dead line. In cases where the dead line arrangement is used, it is necessary to use the spring hanger assembly, which allows the tong to compensate for the downward movement of the casing as the thread made-up. (See illustration-next

page):



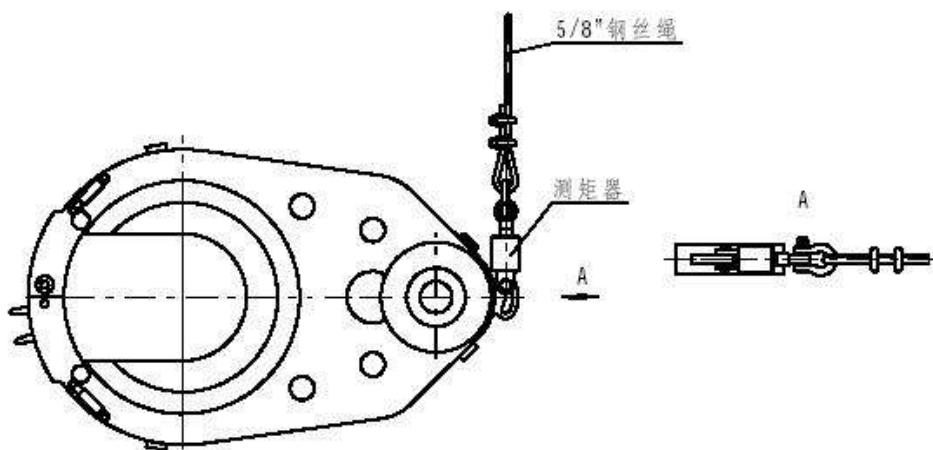
3. Leveling tongs

To insure even gripping action of the dies, and smooth running of the rotary gear, it is essential that the tong be hung level. This can be accomplished by making a few simple adjustments once the tong is hung. To level the tong, turn the turnbuckles on the bridle assembly to the desired tong alignment with the pipe. (See illustration.)



4. Back-up line

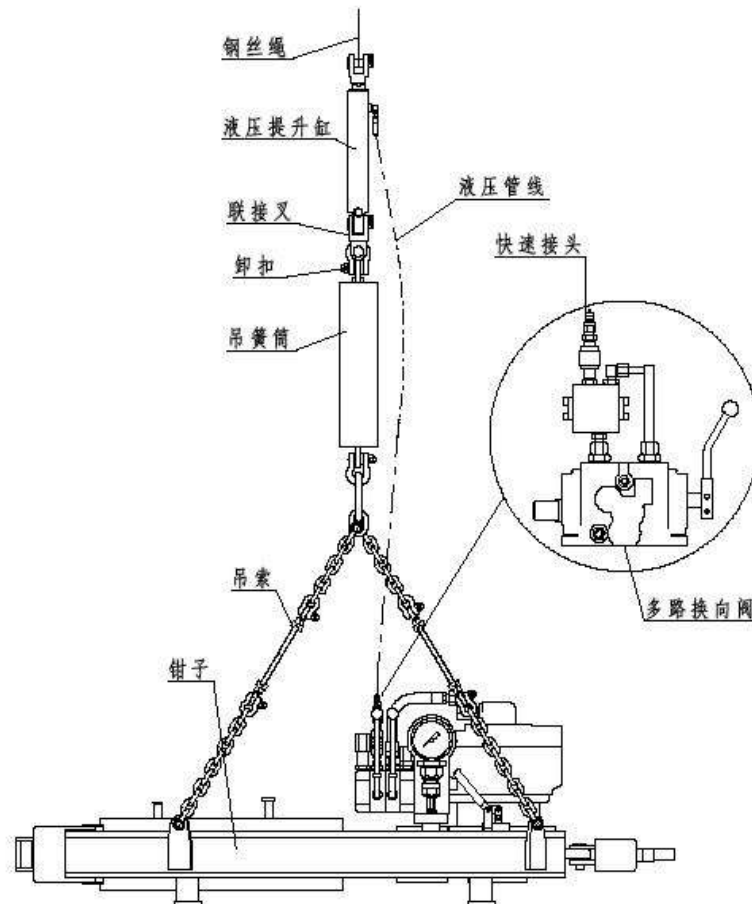
The use of a 5/8' or larger wire rope is recommended for the tong back-up line. It should be securely connected to the load cell at the rear of the tong and tied off to a suitable anchor. To assure accurate operation of the load cell and torque gauge, the back-up line should be connected at a 90 degree angle with the tong, and in the same horizontal plane. (See illustration).



5. Lift cylinder connection

Hydraulic lift cylinder is available to favor the upward and downward movement of the tong. The lift cylinder and power tong share the same hydraulic source. And

multi-way reverse valve and hydraulic check valve are to control their action. Lift cylinder is installed on the top of the spring hanger assembly. Cylinder end connects with the shackle of spring hanger assembly through connection fork. One end of the hose is to attach oil inlet on the cylinder and the other end is to attach the quick change joint on the multi-way reverse valve. (See illustration).



6. Hydraulic hoses

When the power unit is not running, the hydraulic hoses may be installed to the tong. Both 1"high-pressure hose and 1-1/4"return hose are equipped with self-seal type couplings, and care should be taken to insure complete engagement to prevent partial closure of the check valve in the coupling.

IV. Tong Operation

1. Start up procedure

Note: Be sure the doors are closed and securely latched before power unit is started to insure safety for operation personnel.

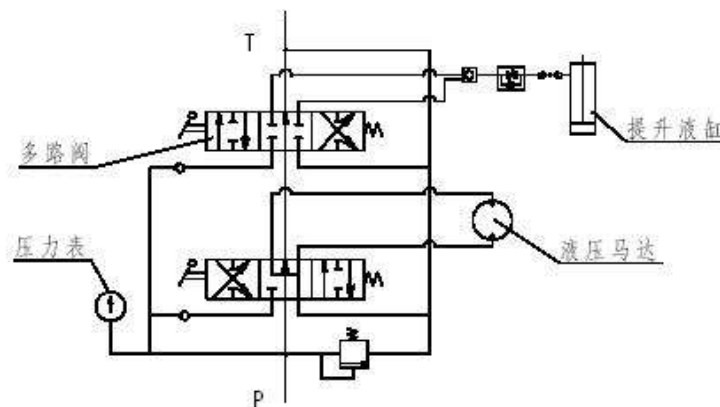
Start up the power unit by following operation manual of power unit. Prior to starting engine, loosen relief valve and make an inspection to assure proper lube oil level in the pump and engine, and hydraulic oil level in the hydraulic tank. Check all pressure and return line hose connections to make sure they are securely installed.

Note: Failure to have these hose connections tight will stop or restrict oil flow and result in high pressure on the power unit hydraulic system.

Start the power unit engine and make the hydraulic oil circulate for approximately 10 minutes, adjust relief valve to set the circulating pressure up to 2Mpa. Place the tong gear shifter in low gear and control multi-reverse valve to rotate the tong slowly in forward and reverse directions. Once this has been done and the proper size jaws have been installed, the tong is then ready to run pipe.

2. Hydraulic control system

Multi-reverse valve controls the action of motor and lift cylinder. The hydraulic circuit is parallel connection. Motor and lift cylinder can act individually or simultaneously. (See illustration.)



3. Direction and speed control

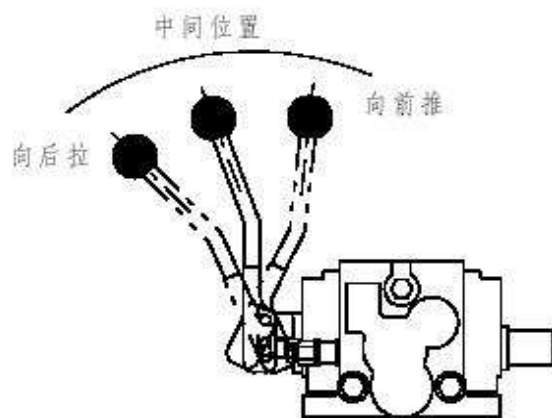
Multi-reverse valve controls direction and speed of rotation. For clockwise rotation,

push the valve handle forward, and for reverse rotation, pull the valve handle in the opposite direction. Speed in either direction is proportional to the distance that the valve handle is moved from the center position, as the valve core of multi-reverse valve has the throttle function.

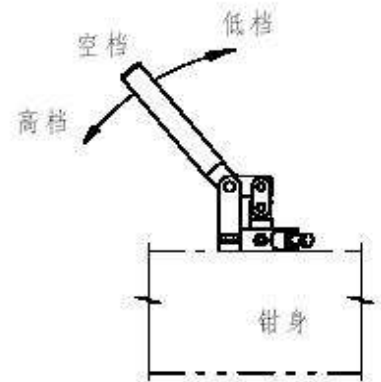
4.High and low gear

The gearbox provides for high and low gear operation. For low gear the shifting handle is simply move upward from neutral position, and for high gear, the shifting handle is moved from down from neutral position. (see illustration).

Warning: Stop the tong when shifting high or low gear.



direction and speed control



high and low gear control

Note: Do stop the tong when shift high and low gear.

5.Make up of casing

5.1 Align door opening with gear opening.

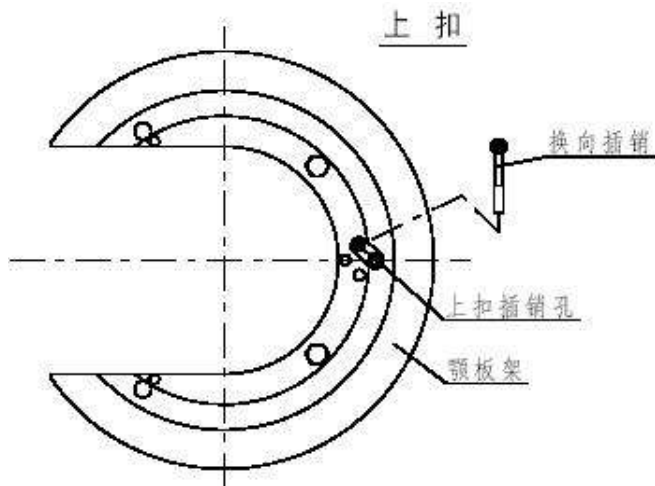
5.2 Place tong around casing.

5.3 Close the safety door completely.

5.4 Place the backing pin in the “make-up” hole. (See illustration)

5.5 Shift transmission into high gear.

5.6 Gently push the multi-reverse valve handle forward until casing threads begin to make up.

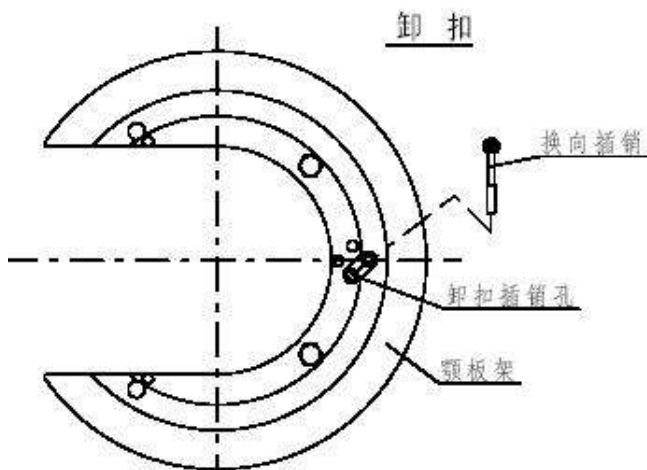


Proper location of backing pin for make-up

- 5.7 When casing threads begin to make up, push the valve handle to full forward until the tong begins to stall.
- 5.8 Release the multi-reverse valve handle and shift to low gear.
- 5.9 Engage throttle and make-up casing to desired torque.
- 5.10 Pull the multi-reverse valve handle backward slightly to reverse tong to disengage jaws and rotate until rotary gear aligns with the door opening.
- 5.11 Open the door and remove the tong from pipe.

6. Break out of casing

- 6.1 Align door opening with gear opening.
- 6.2 Place tong around casing.
- 6.3 Close the safety door completely.
- 6.4 Place the backing pin in the "break-out" hole. (see illustration)



Proper location of backing pin for break-out

6.5 Shift transmission into high gear.

6.6 Pull the multi-reverse valve handle to full position.

6.7 It is recommended to break out in low gear until the joint is completely unscrewed.

6.8 Push the multi-reverse valve handle forward slightly to reverse tong to disengage jaws and rotate until rotary gear aligns with the door opening.

6.9 Open the door and remove the tong from pipe.

7. General comments

7.1 It is recommended that both idler gears be in drive position when the tong is gripping under high torque. Also it is recommended to frequently check the tightness of the door and make periodic adjustments to assure a secure door fit.

7.2 When making-up integral (shouldered) joints, it is essential to make up the last turn of the threads in low gear. This reduces the tendency of an instant stop or a sudden increase in torque, which induces high stresses to the gear train.

7.3 When pulling a string, do not employ the “snap break” method of breaking out joints. This is accomplished by leaving slack in the “jaw-pipe” engagement, and then quickly pulling the throttle valve control lever allowing the tong to snap into its high torque conditions. This method, although very affective in breaking out joints, highly stresses the gear train and very frequently causes gear breakage. And this method is also dangerous to operating personnel.

8. Extreme cold weather operation procedures

8.1 Consult operation manual of the power unit for any possible cold weather operation precautions.

8.2 Select gear and bearing lubricant compatible with expected operating climate.

8.3 Select hydraulic oil compatible with expected operating climate.

8.4 After the power unit has been started, in cold weather climates, the hydraulic oil should be allowed to circulate up to approximately 20 minutes prior to activating the casing tong.

8.5 When cleaning tong parts in extreme cold climates, it is important to dry the tong prior to lubricating.

V. Maintenance

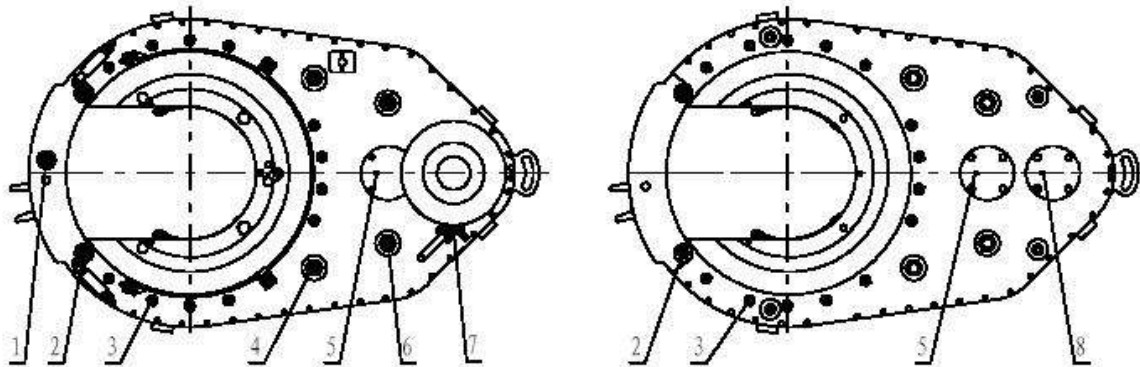
It is suggested that a regular maintenance program be established to assure dependable operation of the hydraulic tong. Clean, lubricate and adjust the tong in accordance with the following recommendations to enhance the life expectancy of the tong and assure safety to operating personnel.

1. Cleaning

The tong should be thoroughly cleaned with a good petroleum base cleaning agent after each job, prior to storage. It is recommended that periodically the motor and valve assembly be removed, along with the top tong plate, so that cams, rollers and gears can be properly cleaned.

2. Lubrication

A good grade of multipurpose bearing lubricant is recommended at the completion of each job prior to storage. See the following diagram for lubricating sites.



2.1 Clutch bearings

Grease should be applied to these bearings through the grease fittings (8) in the motor flange and the bearing seat located at the bottom face of the tong.

2.2 Triple gears

Grease should be applied to these bearings through the grease fittings (5) in the bearing seat located at the top and bottom face of the tong.

2.3 Rotary idler and pinion idler bearings

Grease should be applied to these bearings through the grease fittings (4,6) in the end of the shaft located at the top face of the tong.

2.4 Support rollers

Grease should be applied to these rollers through the grease fittings at the end of the shafts located at the top and bottom face of the tong.

2.5 Big and small rollers between top and bottom face of the tong.

Coat the surface of the rollers with a thin layer of grease.

2.6 Shifting shaft

Apply grease to the shifting shaft at the bushings through the grease fitting (7).

2.7 Door latch shaft

Grease should be applied to the shaft through the grease fitting (1) at the door latch shaft.

2.8 Door restoring rod assembly

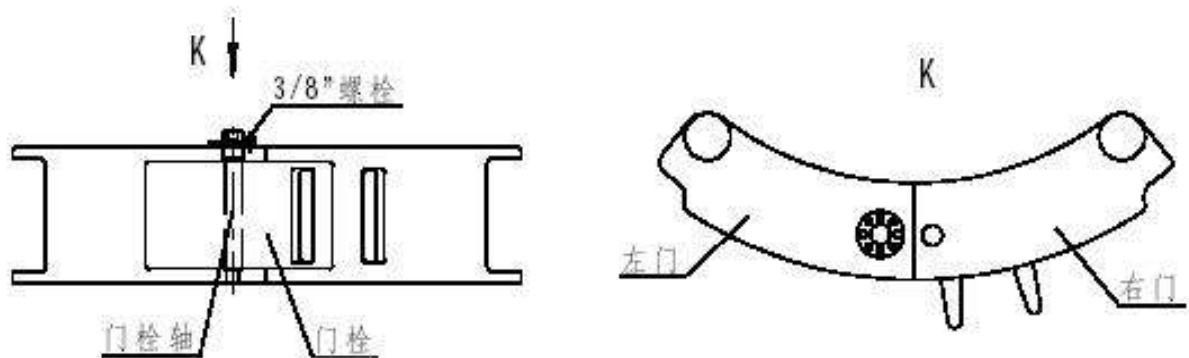
At assembly the spring and piston should be coated with a thin layer of grease.

It is recommended that surface of cam and jaw roller should be coated with grease when installing jaws. It is recommended to take out periodically the two side inspection plates, and apply grease to clutch gear, gear bush and shifting shaft.

3.Adjustments

3.1Door latch adjustment

During normal operation of the tong, the door latch may experience wear which will cause the door to develop a loose fit at the latch. When this occurs, an adjustment can easily be made to assure a secure door fit. This is accomplished by adjusting door latch shaft.

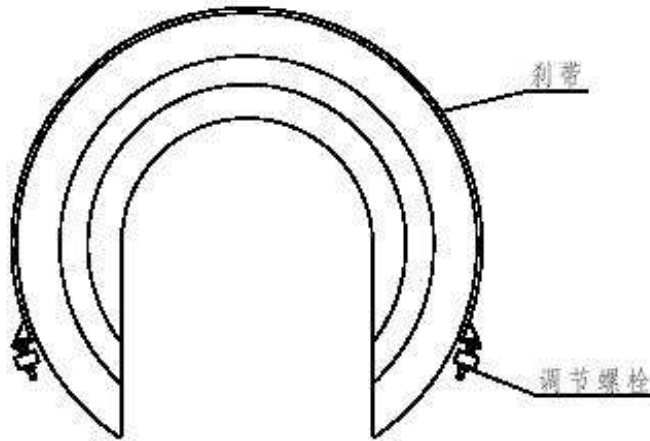


The door shaft located in the left door is an eccentric shaft. On the top of the shaft is a flange plate, which has eight positioning holes. The door shaft is secured to the left door by a 3/8" hex head bolt. To make any adjustment in door alignment, remove the 3/8" bolt, then turn the door shaft to a appropriate angle. When desired alignment is achieved, screw in 3/8" bolt and tighten.

Note: It is important to keep a secure fit at the doors as this helps maintain proper

gear alignment, reduce possibility of transmission impact and assures safety to operating personnel.

2.Brake band adjustment: (see illustration)



As the tong is used, it becomes necessary at times to adjust the brake bands to provide a smoother and more efficient jaw cam action. When brake band is loose, cage plate will turn along with rotary gear , the jaw will not cam properly and therefore, will not bite on the pipe. By tightening two adjustment bolts at the two ends of the bands will tighten brake band, enough frictional resistance occurs to allow jaws to cam properly and grip the casing.

4.Periodic check

4.1 Hanging rope and rear rope

Regular check on the hanging rope and rear rope should be done to assure safety and reliability.

4.2 Door lock spring

To enable the door latch mechanism to snap closed properly, the springs inside the door should have enough strength. Spring fatigue will result in a sluggish latch operation. When this occurs, the latch springs inside the door should be replaced.

4.3 Shifting shaft

To regularly check the nut secured the shifting yoke to the shifting shaft. And the match of shifting shaft with the guide sleeve on the housing should be precise.

4.4 Torque gauge

Periodic calibration of the torque gauge is recommended to assure accurate torque readings.

4.5 Backing pin

After each job, check the backing pin for wear or cracks. If stress cracks or excessive wear exists, the pin should be replaced.

5. Overhaul procedure

If the need arise to overhaul the tong, do as follows:

Note: *All maintenance and overhaul can be accomplished from the top. Therefore, the bottom plate of the tong should never be removed.*

5.1 Remove the motor-valve assembly.

5.2 Disconnect and remove the linkage between the shifting handle and the shifting shaft.

5.3 Remove the detent bolts (7/16"-14*11/2") in the guide sleeve, and take out the ball and spring from the groove in the shifting shaft.

5.4 Remove the motor mount. This is accomplished by removing the 5/8" bolts and lifting the motor mount out of place.

5.5 Remove the door.

5.5.1 Remove the two restoration rods by removing the two 1/2" bolts.

5.5.2 Remove the top lock nuts from the door roller shafts.

5.5.3 Remove the grease fittings from the end of the door roller shafts and drive the shafts out. This then allows the doors to be removed.

Note: When removing the doors make careful note of the bearing shims, which align the doors. At reassembly of the doors after overhaul, it will still be necessary to reassemble door bearing shims in the same sequence to assure desired door alignment.

5.5.6 Loosen brake band. Back off the brake band adjustment bolts at two ends until the nut is flush with the end of the bolt.

5.5.7 Remove the upper and lower jaws. Remove the three nuts on the locating shafts, and press downward the bolts. Then the upper and lower jaws can be taken out.

Note: *To prevent the bottom cage plate from falling to damage parts or personnel, it is recommended that the bottom cage plate be braced while removing the nuts on the locating shafts.*

5.5.8 Pull the top bearing cap from the triple gear assembly.

5.5.9 Remove the nuts and pads for the rotary and pinion idler gears.

5.5.10 Remove the 14 top roller shaft nuts.

5.5.11 Remove the 3/8" bolts around the perimeter of the tong which secure the top plate.

5.5.12 After all the above steps, the top tong plate can be lift off providing access to the inside of the gear case.

6. Problem Diagnosis

6.1 Hydraulic system overheating

6.1.1 Excess discharge pressure (relief valve set too high).

Solution: Reset the relief valve.

6.1.2 Oil viscosity too high or too low.

Solution: Change oil.

6.1.3 Excessive internal leaking of hydraulic system

Solution: Repair or replace any worn parts.

6.1.4 Leaks in hydraulic valves.

Solution: Repair or replace.

6.1.5 Oil level in tank too low for proper cooling.

Solution: Maintain proper oil level.

6.1.6 Pump discharge being restricted.

Solution: Check operation of throttle valve or relief valve. Check all self seal connections for proper engagement.

Note: Large pump volumes should not be allowed to remain at high pressure for a long period of time.

6.2 Tong running too slowly

6.2.1 Pump intake line plugged.

Solution: Clean intake line.

6.2.2 Oil level in the tank is too low and intake line is beyond oil level.

Solution: Add oil.

6.2.3 Air leak in pump intake line.

Solution: Repair leak.

6.2.4 Pump speed too slow.

Solution: Check manufacturer's speed recommendations.

6.2.5 Excessively worn or damaged pump or tong.

Solution: Replace worn parts by following manufacturer's recommendations.

6.2.6 Viscosity of oil too high.

Solution: Change oil.

6.2.7 Restriction in line between power unit and tong.

Solution: Check self seal couplings to insure they are properly engaged.

6.2.8 Relief valve not functioning.

Solution: Repair or replace.

6.3 Tong will not develop sufficient torque

6.3.1 Relief valve not working.

Solution: To check if the relief valve is set too low, or stuck or leaking. Repair or replace.

6.3.2 Pump speed too slow.

Solution: Check manufacturer's speed recommendations.

6.3.3 Viscosity of oil too high and pump may not prime.

Solution: Change oil.

6.3.4 Viscosity of oil too low and system overheating.

Solution: Change oil.

6.3.5 Tong motor worn or damaged.

Solution: Repair or change the motor.

6.3.6 Bearings or gears damaged in transmission assembly, causing excessive drag.

Solution: Repair or replace worn parts.

6.3.7 Restriction in hydraulic line between power unit and tong.

Solution: Check line. Check to insure proper engagement of self-seal coupling.

6.3.8 Defective torque gauge or load cell.

Solution: Replace defective components. Make sure gauge has been calibrated to proper torque arm length.

6.4 Failure of jaws to grip pipe

6.4.1 Dull dies.

Solution: Replace dies.

6.4.2 Brake band insufficiently adjusted, not allowing jaws to cam properly.

Solution: Adjust brake bands to give proper resistance to cage plates.

6.4.3 Jaw roller broken or worn.

Solution: Replace roller.

6.5 Failure of tong

6.5.1 Pressure too low.

Solution: Reset relief valve.

6.5.2 Multi-reverse valve damaged.

Solution: Repair or change the valve.

6.5.3 Clutch damaged.

Solution: Repair or replace damaged parts.

6.6 General comments

The following factors contribute highly to inefficient hydraulic operation.

6.6.1 Failure to change oil frequently enough, or have proper filtration.

6.6.2 Failure to select proper hydraulic oil.

6.6.3 Defective packing or seals in components of the hydraulic system.

6.6.4 Inadequate understanding of hydraulic system components, causing inadequate operation of the equipment.

VII. Storage Recommendations.

1 When storing the tong, an effort should be made to locate the unit in a clean, dry and ventilated area.

2 The tong, while in storage, should be well lubricated.

3 Wearable parts, if required to remain in storage for a long period of time, should be coated with a good corrosion inhibitor, and should be stored in a good dry environment.

4 All O-rings, seals, packings, gaskets, etc., should be stored in a good moisture proof, airtight container.

5 All bearings should be well lubricated and stored in a dust free box or container, protected from moisture.

**VIII. Recommended Torque for Steeth round thread 8⁵/₈"-20" casing
(Extracted from API RP 5C1-1999)**

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
ID No.	O. D.	Torque						
		ST&C		LT&C				
Size	Weight	D (in)	D _m (mm)	Steelgrade	ft-lb	N.m	ft-lb	N.m
8.625	28.00	8.625	219.08	H40	2330	3150	—	—
8.625	32.00	8.625	219.08	H40	2790	3780	—	—
8.625	24.00	8.625	219.08	J55	2440	3310	—	—
8.625	32.00	8.625	219.08	J55	3720	5050	4170	5660
8.625	36.00	8.625	219.08	J55	4340	5580	4860	6590
8.625	24.00	8.625	219.08	K55	2630	3570	—	—
8.625	32.00	8.625	219.08	K55	4020	5460	4520	6130
8.625	36.00	8.625	219.08	K55	4680	5880	5260	7140
8.625	24.00	8.625	219.08	M65	2850	3860	—	—
8.625	28.00	8.625	219.08	M65	3620	4910	—	—
8.625	32.00	8.625	219.08	M65	4350	5890	4870	6600
8.625	36.00	8.625	219.08	M65	5060	6860	5670	7690
8.625	40.00	8.625	219.08	M65	—	—	6490	8800
8.625	36.00	8.625	219.08	L80	—	—	6780	9190
8.625	40.00	8.625	219.08	L80	—	—	7760	10,530
8.625	44.00	8.625	219.08	L80	—	—	8740	11,840
8.625	49.00	8.625	219.08	L80	—	—	9830	13,320
8.625	36.00	8.625	219.08	N80	—	—	6880	9330
8.625	40.00	8.625	219.08	N80	—	—	7880	10,680
8.625	44.00	8.625	219.08	N80	—	—	8870	12,020
8.625	49.00	8.625	219.08	N80	—	—	9970	13,520
8.625	36.00	8.625	219.08	C90	—	—	7490	9330
8.625	40.00	8.625	219.08	C90	—	—	8580	10,680
8.625	44.00	8.625	219.08	C90	—	—	9650	12,020
8.625	49.00	8.625	219.08	C90	—	—	10,850	14,710
8.625	36.00	8.625	219.08	C95	—	—	7890	10,700
8.625	40.00	8.625	219.08	C95	—	—	9040	12,260
8.625	44.00	8.625	219.08	C95	—	—	10,170	13,790
8.625	49.00	8.625	219.08	C95	—	—	11,440	15,510

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
ID No.		O. D.			Torque			
					ST&C		LT&C	
Size	Weight	D (in)	D _m (mm)	Steelgrade	ft-lb	N.m	ft-lb	N.m
8.625	36.00	8.625	219.08	T95	—	—	7890	10,700
8.625	40.00	8.625	219.08	T95	—	—	9040	12,260
8.625	44.00	8.625	219.08	T95	—	—	10,170	13,790
8.625	49.00	8.625	219.08	T95	—	—	11,440	15,510
8.625	40.00	8.625	219.08	P110	—	—	10,550	14,300
8.625	44.00	8.625	219.08	P110	—	—	11,860	16,090
8.625	49.00	8.625	219.08	P110	—	—	13,350	18,100
8.625	49.00	8.625	219.08	Q125	—	—	14,960	20,280
9.625	32.30	9.625	244.48	H40	2540	3440	—	—
9.625	36.00	9.625	244.48	H40	2940	3990	—	—
9.625	36.00	9.625	244.48	J55	3940	5340	4530	6140
9.625	40.00	9.625	244.48	J55	4520	6120	5200	7050
9.625	36.00	9.625	244.48	K55	4230	5740	4890	6630
9.625	40.00	9.625	244.48	K55	4860	6950	5610	7610
9.625	36.00	9.625	244.48	M65	4600	6230	5290	7170
9.625	40.00	9.625	244.48	M65	5280	7150	6070	8230
9.625	43.50	9.625	244.48	M65	—	—	6790	9210
9.625	47.00	9.625	244.48	M65	—	—	7450	10,100
9.625	40.00	9.625	244.48	L80	4600	6230	7270	9860
9.625	43.50	9.625	244.48	L80	—	5280	7150	8130
9.625	47.00	9.625	244.48	L80	—	—	8930	12,100
9.625	53.50	9.625	244.48	L80	—	—	10,470	10,100
9.625	58.40	9.625	244.48	L80	—	—	11,510	15,600
9.625	40.00	9.625	244.48	N80	—	—	7370	10,000
9.625	43.50	9.625	244.48	N80	—	—	8250	11,190
9.625	47.00	9.625	244.48	N80	—	—	9050	12,270
9.625	53.50	9.625	244.48	N80	—	—	10,620	14,390
9.625	58.40	9.625	244.48	N80	—	—	11,670	15,820
9.625	40.00	9.625	244.48	C90	—	—	8084	10,900
9.625	43.50	9.625	244.48	C90	—	—	8990	12,190
9.625	47.00	9.625	244.48	C90	—	—	9870	13,380
9.625	53.50	9.625	244.48	C90	—	—	11,570	15,690
9.625	58.40	9.625	244.48	C90	—	—	12,720	17,250

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
ID No.	O. D.	Torque						
		ST&C		LT&C				
Size	Weight	D (in)	D _m (mm)	Steelgrade	ft-lb	N.m	ft-lb	N.m
9.625	40.00	9.625	244.48	C95	—	—	8470	11,490
9.625	43.50	9.625	244.48	C95	—	—	9480	12,850
9.625	47.00	9.625	244.48	C95	—	—	10,400	14,100
9.625	53.50	9.625	244.48	C95	—	—	12,200	16,540
9.625	58.40	9.625	244.48	C95	—	—	13,410	18,180
9.625	40.00	9.625	244.48	T95	—	—	8470	11,490
9.625	43.50	9.625	244.48	T95	—	—	9480	12,850
9.625	47.00	9.625	244.48	T95	—	—	10,400	14,100
9.625	53.50	9.625	244.48	T95	—	—	12,200	16,540
9.625	58.40	9.625	244.48	T95	—	—	13,410	18,180
9.625	43.50	9.625	244.48	P110	—	—	11,050	14,980
9.625	47.00	9.625	244.48	P110	—	—	12,130	16,440
9.625	53.50	9.625	244.48	P110	—	—	14,220	19,280
9.625	58.40	9.625	244.48	P110	—	—	15,630	21,200
9.625	47.00	9.625	244.48	Q125	—	—	13,600	18,440
9.625	53.50	9.625	244.48	Q125	—	—	15,950	21,630
9.625	58.40	9.625	244.48	Q125	—	—	17,540	23,700
10.750	32.75	10.750	273.05	H40	2050	2790	—	—
10.750	40.50	10.750	273.05	H40	3140	4250	—	—
10.750	40.50	10.750	273.05	J55	4200	5700	—	—
10.750	45.50	10.750	273.05	J55	4930	6680	—	—
10.750	51.00	10.750	273.05	J55	5650	7660	—	—
10.750	40.50	10.750	273.05	K55	4500	6100	—	—
10.750	45.50	10.750	273.05	K55	5280	7160	—	—
10.750	51.00	10.750	273.05	K55	6060	8210	—	—
10.750	40.50	10.750	273.05	M65	4910	6660	—	—
10.750	45.50	10.750	273.05	M65	5760	7810	—	—
10.750	51.00	10.750	273.05	M65	6610	8960	—	—
10.750	55.50	10.750	273.05	M65	6610	8960	—	—
10.750	51.00	10.750	273.05	L80	7940	10,760	—	—
10.750	55.50	10.750	273.05	L80	8840	11,990	—	—

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
ID No.		O. D.			Torque			
					ST&C		LT&C	
Size	Weight	D (in)	D _m (mm)	Steelgrade	ft-lb	N.m	ft-lb	N.m
10.750	51.00	10.750	273.05	N80	8040	10,900	—	—
10.750	55.50	10.750	273.05	N80	8950	12,140	—	—
10.750	51.00	10.750	273.05	C90	8970	11,920	—	—
10.750	55.50	10.750	273.05	C90	9790	13,270	—	—
10.750	60.70	10.750	273.05	C90	10,890	14,770	—	—
10.750	65.70	10.750	273.05	C90	11,980	16,240	—	—
10.750	51.00	10.750	273.05	C95	9270	12,560	—	—
10.750	55.50	10.750	273.05	C95	10,320	13,990	—	—
10.750	51.00	10.750	273.05	T95	9270	12,560	—	—
10.750	55.50	10.750	273.05	T95	10,320	13,990	—	—
10.750	60.70	10.750	273.05	T95	11,480	15,570	—	—
10.750	65.70	10.750	273.05	T95	12,630	17,130	—	—
10.750	51.00	10.750	273.05	P110	10,790	14,630	—	—
10.750	55.50	10.750	273.05	P110	12,020	16,300	—	—
10.750	60.70	10.750	273.05	P110	13,370	18,130	—	—
10.750	65.70	10.750	273.05	P110	14,710	19,950	—	—
10.750	60.70	10.750	273.05	Q215	15,020	20,360	—	—
10.750	65.70	10.750	273.05	Q215	16,520	22,400	—	—
11.750	42.70	11.750	298.45	H40	3070	4170	—	—
11.750	47.00	11.750	298.45	J55	4770	6460	—	—
11.750	54.00	11.750	298.45	J55	5680	7700	—	—
11.750	60.00	11.750	298.45	J55	6490	8800	—	—
11.750	47.00	11.750	298.45	K55	5090	6900	—	—
11.750	54.00	11.750	298.45	K55	6060	8220	—	—
11.750	60.00	11.750	298.45	K55	6930	9400	—	—
11.750	47.00	11.750	298.45	M65	5570	7560	—	—
11.750	54.00	11.750	298.45	M65	6640	9000	—	—
11.750	60.00	11.750	298.45	M65	7590	10,290	—	—

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
ID No.		O. D.			Torque			
					ST&C		LT&C	
Size	Weight	D (in)	Dm (mm)	Steelgrade	ft-lb	N.m	ft-lb	N.m
11.750	60.00	11.750	298.45	L80	9130	12,370	—	—
11.750	60.00	11.750	298.45	N80	9240	12,520	—	—
11.750	60.00	11.750	298.45	C90	10,110	13,710	—	—
11.750	60.00	11.750	298.45	T95	10,660	14,460	—	—
11.750	60.00	11.750	298.45	C95	10,660	14,460	—	—
11.750	60.00	11.750	298.45	P110	12,420	16,830	—	—
11.750	60.00	11.750	298.45	Q215	13,950	18,920	—	—
13.375	48.00	13.375	339.73	H40	3220	4370	—	—
13.375	54.50	13.375	339.73	J55	5140	6970	—	—
13.375	61.00	13.375	339.73	J55	5950	8070	—	—
13.375	68.00	13.375	339.73	J55	6750	9160	—	—
13.375	54.50	13.375	339.73	K55	5470	7410	—	—
13.375	61.00	13.375	339.73	K55	6330	8580	—	—
13.375	68.00	13.375	339.73	K55	7180	9740	—	—
13.375	54.50	13.375	339.73	M65	6020	8160	—	—
13.375	61.00	13.375	339.73	M65	6970	9440	—	—
13.375	68.00	13.375	339.73	M65	7910	10,720	—	—
13.375	68.00	13.375	339.73	L80	9520	12,910	—	—
13.375	72.00	13.375	339.73	L80	10,290	13,950	—	—
13.375	68.00	13.375	339.73	N80	9630	13,060	—	—
13.375	72.00	13.375	339.73	N80	10,400	14,110	—	—
13.375	68.00	13.375	339.73	C90	10,570	14,330	—	—
13.375	72.00	13.375	339.73	C90	11,420	15,480	—	—
13.375	68.00	13.375	339.73	C95	11,140	15,110	—	—
13.375	72.00	13.375	339.73	C95	12,040	16,320	—	—
13.375	68.00	13.375	339.73	T95	11,140	15,110	—	—
13.375	72.00	13.375	339.73	T95	12,040	16,320	—	—
13.375	68.00	13.375	339.73	P110	12,970	17,580	—	—
13.375	72.00	13.375	339.73	P110	14,010	18,990	—	—

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
ID No.		O. D.			Torque			
					ST&C		LT&C	
Size	Weight	D (in)	D _m (mm)	Steelgrade	ft-lb	N.m	ft-lb	N.m
13.375	72.00	13.375	339.73	Q125	15,760	21,360	—	—
16.000	65.00	16.000	406.40	H40	4390	5950	—	—
16.000	75.00	16.000	406.40	J55	7100	9630	—	—
16.000	84.00	16.000	406.40	J55	8170	11,080	—	—
16.000	75.00	16.000	406.40	K55	7520	10,190	—	—
16.000	84.00	16.000	406.40	K55	8650	11,730	—	—
16.000	75.00	16.000	406.40	M65	8320	11,280	—	—
16.000	84.00	16.000	406.40	M65	9570	12,980	—	—
18.625	87.50	18.625	473.08	H40	5590	7580	—	—
18.625	87.50	18.625	473.08	J55	7540	10,220	—	—
18.625	87.50	18.625	473.08	K55	7940	10,770	—	—
18.625	87.50	18.625	473.08	M65	8840	11,980	—	—
20.000	94.00	20.000	508.00	H40	5810	7870	6730	9120
20.000	94.00	20.000	508.00	J55	7830	10,620	9070	9120
20.000	106.50	20.000	508.00	J55	9130	12,370	10,560	14,320
20.000	133.00	20.000	508.00	J55	11,920	16,160	13,790	18,700
20.000	94.00	20.000	508.00	K55	8230	11,160	9550	12,950
20.000	106.50	20.000	508.00	K55	9590	13,000	11,130	15,090
20.000	133.00	20.000	508.00	K55	12520	16,980	14,530	19,700
20.000	94.00	20.000	508.00	M65	9180	12,450	10,630	14,410
20.000	106.50	20.000	508.00	M65	10,700	14,510	12,380	16,790