Chapter 1 Introduction

Tubing, API 5CT Tubing
Tubing – a pipe through which the oil or gas is produced from the wellbore.
Tubing joints are generally around 30 ft [9 m] long with a thread connection on each end.
There are more than thirty breeds of tubing in total such as grades of J55 &N80&L80&P110,etc; types of NUE&EUE;
Specifications of 1.9, 2-3/8, 2-7/8; 3-1/2, 41/2 inches .and also the left hand thread .
The fabrication of thread uses full suite of digital-controlled lathe; the coupling tightening uses hydraulic machine with advanced digital-torsion meter; the company has four-channel intelligent eddy current detector ,magnetic particle detector ,We possesses two advanced upset tubing assembly lines, which can be used to the external upset shaping of plain-end tubing(J55, N80 and L80).
This production line is totally automatic from feed-in to returned material; owing to adopting advanced second-forming artwork to upset pipe end, high-quality product is guaranteed. portable thickness tester, and single thread measuring instrument, etc.

The strength of several experienced specific technologists provides our products with powerful technology support.

Oil well pipes of us are widely used in the exploration of land oil field and pipe convey, being the safe and durable products. To acknowledge the support to us from petroleum industry and mass users for years, make the products have best performance in uses and help oil field technicians know the products deeply; we compile the Manual in particular. Users are advised to read the manual carefully when choose, transport, load and unload, store, inspect and repair our oil well pipes.

Oil well pipes made by us are mostly used in the process of oil field development for the task purposes of oil extraction, fracturing, acidification, affuse, gas injection and well workover. The body stocks of oil well pipe adopt the technologies of electric steel making, vacuum degassing, secondary steel making processes, which make products with equal component and good metallurgy quality. Roller trio skew rolling and 12- frame tension reducing technology can guarantee the good shape, high precision dimension and nice mechanical properties; finishing and nondestructive technology (ultrasonic and eddy current testing) can assure the excellent exterior and interior quality; moreover, the parameter of screw thread made by high precision numerical control lathe is 30% stricter than API standard, which leaves the properties of anti-thread gluing, anti-slipping and sealability up to set values of API standard.

The oil well pipe products are well sold in both domestic and foreign market. The oil well pipes are widely exported to Canada, Middle East regions.

For the operation instruction of thread oil well pipe, see this manual, and see also API RP 5C1Care and Use Of Casing and Tubing、ISO10405 Petroleum and natural gas industries--Care and Use of Casing and Tubing. Contact the manufacturer directly for the BAODA thread oil well pipe that needs to return for repair.

Chapter 2 Guidance to Oil Well Pipe Selection

1.1 Introduction

Oil well pipe, the sole channel for oil extraction and gas production hold a significant position in the exploitation of oil field. For recent years, we have established product standard, rules or technological conditions for order supplement when employ API standard. All the standards are to guarantee the production, inspection, transport and quality control in use. However, there is no standard recommended operation for the choosing of oil well pipe serving diverse well depth, pressure, temperature, and purpose. Some oil well pipes up to API standard may have accident usually. It's far from satisfaction that the product merely meet API standard. With the constant development of our oil and gas exploitation, there will be plenty of complex working condition of water injection well、gas injection well、thermal recovery well、deep well、ultra-deep well、high pressure oil and gas field as well as fracturing, acidification, polymer. In these harsh working conditions, proper choose of oil well pipe is much more important, which will directly influence the production and benefit of oil and gas well. Because of thread gluing、surge、leakage、break、corrosion、fatigue fracture by selecting the improper oil well pipe, the loss of them is quite big.

This chapter is compiled according to API standard and the field use, offering the general principle and recommended operation for the choosing of oil well pipe in oil exploitation. However, as to the specific conditions of well, there cannot be forcing choosing of the oil well pipe. Technicians must make deeper and more specific analysis to the working condition when reading this chapter, so as to better choose and use our oil well pipe.

2.2 Length

	Grade 1 Length	Grade 2 Length
Length Range	6.10~7.32m （20~24ft）	8.53~9.75m （28~32ft）
100% Carload Length Range:		
Allowed Max. Length Variation……	0.61m（2ft）	0.61m（2ft）
Min. Allowed Length……	6.10m（20ft）	8.53m（28ft）

2.3 Basic Parameter of Oil Well Pipe

API Non-Upset Round Thread Oil Well Pipe

Weight		External Diameter Size				Steel Grade	Min. Functional Performance				Internal Pressure		
Nominal Weight With Coupling and Thread	Plain End	Pipe Body			Coupling		External Pressure		Tension		Hydraulic Test Value	80%Min. Internal Yield Strength	Min. Yield Strength
		Wall Thickness	Inside Diameter	Diameter	External Diameter		Setting Depth	Pressure	Setting Depth	Yield Load			
Kg/m		mm					m	MPa	m	kg	MPa		
External Diameter——60.3mm (2 3/8″)													
5.96	5.87	4.24	51.84	49.45	73.03	H-40	2835	36.1	1530	13665	20.7	31.0	33.9
						J-55	3898	49.6	2106	18796	20.7	42.7	46.7
						N-80、L-80	5410	68.8	3060	27331	62.1	62.1	67.8
						C-90	5928	75.4	3444	30736	69.0	69.0	76.3
6.85	6.60	4.83	50.67	48.29	73.03	H-40	3191	40.6	1588	16299	20.7	35.2	38.6

						J-55	4389	55.8	2185	22428	20.7	48.3	53.1
						N-80、L-80	6383	81.2	3176	32597	69.0	69.0	77.2
						C-90	7181	91.4	3575	36683	69.0	69.0	86.9
						T-95	7577	96.4	3773	38726	69.0	69.0	91.7
						P-110	8376	111.2	4170	44855	69.0	97.2	106.2
8.64	8.56	6.45	47.42	45.03	73.03	N-80、L-80	8281	105.4	3609	46717	69.0	69.0	103.2
						C-90	9318	118.5	4060	52528	69.0	69.0	116.1
						T-95	9836	125.1	4285	55479	69.0	69.0	122.6
						P-110	10869	144.9	4737	64241	69.0	122.5	142.0
External Diameter——73.03mm (2 7/8″)													
9.53	9.18	5.51	62.00	59.61	88.90	H-40	3027	38.5	1676	23926	20.7	33.1	36.4
						J-55	4161	53.0	2304	32915	20.7	45.5	50.1
						N-80、L-80	6050	77.0	3353	47852	66.9	66.9	72.9
						C-90	6712	85.4	3770	53844	69.0	69.0	82.0
						T-95	7010	89.2	3981	56841	69.0	69.0	86.5
						P-110	7599	100.3	4398	65830	69.0	91.7	100.2
12.81	12.59	7.82	57.38	54.99	88.90	N-80、L-80	8294	105.5	3764	72277	69.0	69.0	103.4
						C-90	9330	118.7	4234	81311	69.0	69.0	116.3
						T-95	9848	125.3	4471	85851	69.0	69.0	122.8
						P-110	10887	145.1	4941	99381	69.0	126.2	142.2

API Non-Upset Round Thread Oil Well Pipe

Weight		External Diameter Size				Steel Grade	Min. Functional Performance				Internal Pressure		
Nominal Weight with Coupling and	Plain End	Pipe Body			Coupling		External Pressure		Tension		Hydraulic Test Value	80%Min.Internal Yield Strength	Min. Yield Strength
		Wall Thickness	Inside Diameter	Diameter	External Diameter		Setting Depth	Pressure	Setting Depth	Yield Load			
Kg/m		mm					m	MPa	m	kg	MPa		
External Diameter——88.9mm (3 1/2″)													
11.47	11.29	5.49	77.93	74.75	107.95	H-40	2512	31.9	1716	29510	20.7	26.9	29.8
						J-55	3237	41.2	2362	40588	20.7	37.2	41.0
						N-80、L-80	4264	54.3	3435	59020	54.5	54.5	59.6
						C-90	4627	58.9	3865	66420	61.4	61.4	67.0
						T-95	4798	61.0	4078	70098	64.8	64.8	70.7
13.70	13.12	6.45	76.00	72.82	107.95	H-40	2917	37.1	1756	36048	20.7	31.7	35.0
						J-55	4011	51.0	2417	49577	20.7	44.1	48.2
						N-80、L-80	5712	72.7	3514	72141	64.1	64.1	70.1
						C-90	6270	79.8	3953	81130	69.0	69.0	78.8
						T-95	6544	83.3	4173	85670	69.0	69.0	83.2
						P-110	7074	93.3	4612	99199	69.0	88.3	96.3
15.19	14.76	7.34	74.22	71.04	107.95	H-40	3286	41.8	1844	41995	20.7	36.5	39.9

						J-55	4517	57.4	2536	5775	20.7	50.3	54.8
						N-80、L-80	6568	83.6	3688	8399	69.0	69.0	79.7
						C-90	7388	94.0	4148	94477	69.0	69.0	89.7
						T-95	7800	99.2	4380	99698	69.0	69.0	94.7
18.92	18.65	9.53	69.85	66.68	107.95	N-80、L-80	8297	105.6	3941	111775	69.0	69.0	103.4
						C-90	9333	118.7	4435	125758	69.0	69.0	116.4
						T-95	9851	125.4	4682	132750	69.0	69.0	122.8
						P-110	10887	145.1	5176	153724	69.0	88.3	142.2
External Diameter——101.6 (4″)													
14.15	13.57	5.74	90.12	86.94	120.65	H-40	2198	27.9	1539	32688	20.7	24.8	27.3
						J-55	2771	35.2	2118	44946	20.7	34.5	37.5
						N-80、L-80	3572	45.4	3082	65376	49.6	49.6	54.5
						C-90	3837	48.8	3466	73548	55.8	55.8	61.4
						T-95	3959	50.4	3658	77634	59.3	59.3	64.7
External Diameter——114.3mm (4 1/2″)													
18.77	18.23	6.88	100.53	97.36	132.08	H-40	2435	31.0	1682	47398	20.7	26.9	29.1
						J-55	3103	39.5	2313	65149	20.7	36.5	40.0
						N-80、L-80	4066	51.7	3365	94750	53.1	53.1	58.1
						C-90	4401	56.0	3786	106599	60.0	60.0	65.4
						T-95	4557	58.0	3996	112547	63.4	63.4	69.0

2.4 Oil Well Pipe Varieties

oil well pipe and thread tie-in are API series in major.

2.5 Choosing of Well Depth

As to the oil well pipes of diverse external diameter wall thickness, make the choice according to the strength level of different range. Upset oil pipe is recommended for the horizontal well with the depth over 3000m or vertical well over 3500m deep.

Table 2.5 gives out the recommended selection of oil well pipes in diverse well depths.

Table 2.5 Oil Pipe Recommended for Diverse Well Depth

Well Depth	Work Condition	Environment	Recommended Choice
<1500	General	On the land	H-40、J-55、K-55
		On the sea	J-55、K-55、N-80、L-80
1500~3000	General	On the land	J-55、K-55、N-80
		On the sea	J-55、K-55、N-80、L-80
3000~4500	General	On the land	N-80、P-110
		On the sea	L-80、C-90、T-95

>4500	General	On the land	N-80、L-80、C-90、T-95、P-110
		On the sea	

Note :1、On the sea includes shallow sea, offing and deep sea.

2、Commonly, the oil well pipes used on the sea are one level higher than that of the same well depth used on the land.

2.6 Pressure Condition

Choose the suitable oil well pipe according to the oil, gas well and working condition in different well mouth pressure.

API Round Thread or API Round thread + special thread seal grease are recommended for the gas well with the well mouth pressure less than 28Mpa.

Chapter 3 Transport, Load & Unload and Store

3.1 Introduction

Generally, threads of oil pipe are precisely made, so load and unload both the old and new ones carefully. For both the new or old oil well pipe, wear them thread protector during the process of transport, load and unload, and store, place them on the stand without stone, sand or dirt (except slurry in well field), the wood plate or mental plate. If the oil well pipe is accidentally dragged into the dirt, clean the thread once again and reuse after the required treatment.

3.2 Transport

3.2.1 Water transport

3.2.1.1 Arrange special people to supervise during the loading and unloading of pipe;

3.2.1.2 Avoid the movement of pipes owing to the improper underlay or insufficient support when the ship inclines;

3.2.1.3 Avoid putting the oil well pipes to the places with sewage, poisonous chemicals or other corrosive material;

3.2.1.4 Avoid heaping, dragging and pulling the oil well pipes along the pipe;

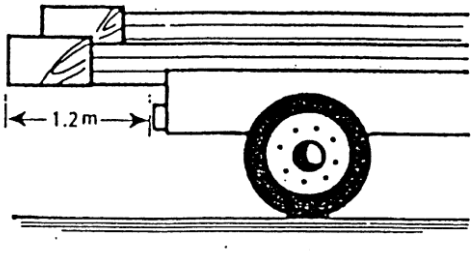
3.2.1.5 Avoid hook coupling or thread protector, or strike to the edge of hatch, guardrail and hull of ship.

3.2.1.6 No heavy goods are allowed if the lading reaches some height.

3.2.2 Land transport

3.2.2.1 Oil well pipe should be placed on the stow-wood and packed tightly. For the long pipes (L>9m), fastness in middle part is suggested;

3.2.2.2 Coupling end of all pipes should be placed in the same end of the carriage, and cannot place beyond the vehicle end by more than 1.2m; see the picture 1;



Picture 1

3.3.2.3 Load and unload with care, pack tightly, Avoid abrasion and collision between pipe ends;

3.2.2.4 Over load and over high pile of casings on a same vehicle is not safe. If there is abnormal evidence, unload or repack them midway;

3.2.2.5 After the moving for certain distance, repack the goods tightly in case that it looses;

3.2.2.6 Pack fastness for small amount transport of oil well pipe is recommended.

3.2.3 Railway transport

3.2.3.1 Horizontally place crosstie at the bottom of the truck in order to support the pipe and provide space for lifting, keep ventilated at the bottom part and not be polluted;

3.2.3.2 Level up the bottom of truck and keep the same plane of the pile of pipes;

3.2.3.3 Coupling and upset part of oil well pipe should not be placed on the crosstie;

3.2.3.4 Oil well pipe should be fixed and avoid move

3.3 Load and unload

3.3.1 All casings（new or old）must wear thread protector , screw down to the original position, and thread protector must be clean and in good condition;

3.3.2 Avoid injuring of the oil well pipe, avoid load and unload in haste, don't drag and hit on the ground;

3.3.3 Load and unload each pipe with rope or steel wire, the quantity of each loading and unloading depends on whether you can fully control the them;

3.3.4 Don't bind the pipe just at one end and lift it, don't throw the oil pipe from the transport vehicle such as truck and rain;

3.3.5 When oil pipes chute, pipes should roll paralleling with pipe pile. Mass rolling down of pipe and striking on the end are not allowed;

3.3.6 Before the sliding pipe reach the front one, push it to proper position with hand.

3.3.7 Use wood board or other underlay for pipe piles.

3.4 Store

3.4.1 Store the oil pipe on the dry and ventilated rack above 0.5m high. The rack foundation should be firm and leveled;

3.4.2 3～4m span between pipe rack, ensure at least three support points for each pipe, align the stow-wood , and line them vertically with the pipe body;

3.4.3 Oil pipe should be put according to category; inside and outside thread respectively align in a direction so as to facilitate lifting;

3.4.4 Align each layer of pipe, crisscro dispose of up and down layers, stagger about one coupling length;

3.4.5Heigh of stock pipes cannot be higher than 3m, pipes pile at the well site cannot be more than 5 layers;

3.4.6 During store, oil well pipe should be prevented from rust and corrosion regularly, not accumulate water, slurry or oil dirt, dust sand in the inner wall of pipe;

3.4.7 There shouldn't be heavy, acid and alkaline chemical in the stored place of pipes, and no electrical and gas-soldering operations is allowed neither;

3.4.8 Carry out 1～2 times thread inspection each year and coat the store grease for long term store.

Chapter 4 Inspection

4.1 Introduction

Inspection involves that of arrived product, of repaired product (include the inspection of working procedure), and of class production before tripping. Users can carry out inspections aiming at diverse situation. Besides the prescribed sampling inspection rate、items, method and measure for inspection, classification of reused and repaired oil well pipe are needed for the inspection result, so as to determine the application of them.

Inspection of oil well pipe commodity and finished product should be done according to product standard and supplementary technology condition of order by special personnel. Production inspection and grade of oil well pipe are done by the professional workers from the manufacturer.

4.2 Preparation

Line the oil well pipe on the rack in case the thread tie-in has dirt, sand or dust, leave enough space and allow each pipe can roll in all direct for the inspection and cleaning of thread.

Use the steel rope or special rope for lifting the oil well pipe, do not use pipe hook、pipe tongs、pipe grabber and etc.. When remove the thread protector at both ends, don't use tools that may injure inner wall of pipe as well as the thread, Pay more attention to the inner coating layer.

Use the compressed air to clean the inner surface (from blow from coupling inside thread to the outside one), in order the clean out the mud and residue in pipe. Clear away the accumulated grease on the thread surface in order to clean out the mud and residue. When clear away the accumulated grease on the surface or thread seal grease, small pressure equipment is recommended, and non-mental brush, saw powder or oil solvent. Fully dry the thread after cleaning, steel wire brush cannot be used.

Clean thread protector, throw away the bad thread protector.

Clean organic solvent again at the tie-in. When the environment is lower than zero, check the ice residue at the bottom and tooth of inner thread.

4.3 New Oil Well Pipe Inspection

There will be sample inspection and nearly 5%～10% of the arrived goods will be checked according to API SPEC 5CT、API STD 5B、API RP 5B1 standard and relating technological conditions of the order. Newly recommended Inspection items are listed in table 4.1

Table 4.1 Inspection Items of New Oil Well Pipe

No.	Inspection Item	No.	Inspection Item
1	Appearance and Size Inspection	2.6	Thread Appearance
1.1	Appearance Quality	2.7	Coupling External Diameter
1.2	Marker、Coating	2.8	Coupling Length
1.3	External Diameter	2.9	Bevel Edge
1.4	Wall Thickness	3	Crack Detection Inspection
1.5	Length	3.1	Pipe Body Crack Detection
1.6	Straightness	3.2	Pipe End Crack Detection (Upset oil pipe)
1.7	Diameter	3.3	Thread Surface Magnetic Powder Crack Detection
1.8	Upset End Size	4	Material Inspection
1.9	Weight	4.1	Chemical Composition Analysis of Pipe Body Material
2	Thread and Coupling Size Inspection	4.2	Chemical Composition Analysis of Coupling Material
2.1	Conicity	4.3	Mechanical Property Test of Pipe Body Material
2.2	Pitch	4.4	Mechanical Property Test of Coupling Material

2.3	Tooth Depth	4.5	Metallography Analysis of Pipe Body Material
2.4	Stand-off (or Pitch Diameter)	4.6	Metallography Analysis of Coupling Material
2.5	Thread Length		

4.4 Inspection of Reused Oil Well Pipe

As to the used oil well pipe , inspect the recycled or repaired casing via visual method、mechanical measure method、Crack Detection（include Electromagnetism Crack Detection、Ultrasonic Crack Detection、Whirlpool Crack Detection or Radial Crack Detection）.The inspections are limited to confirm the crack, pit and the place of defect on the surface including: corrosion damage of casing surface; internal and external transverse crack; inside surface steel rope pull (lengthways); inside surface sucker rod abrasion and inside and outside big tongs slips damage.

4.4.1 Pipe Body Inspection

Use wall thickness micrometer or ultrasonic thickness tester (with error less than 2%) to measure pipe body wall thickness. The measurement will be classified according to the min residual wall thickness (see table 4.2) and work out the application scope of reused oil well pipe according to the residual strength estimated by min. wall thickness.

Reused oil well pipes are graded according to the measured min. residual wall thickness.

Table 4.2 Category of Thickness Measure for Reused Oil Well Pipe

Category	Wall Thickness Loss%	Min. Residual Wall Thickness%	Mark
2	0~15	85	Yellow
3	16~30	70	Blue
4	31~50	50	Green
5	>50	<50	Red

Note: pipes of the fifth category oil pipe are not recommended for use, pipes of the first category are new ones.

4.4.2 Thread Tie-in Inspection

Inspection of reused oil well pipe thread includes API round thread distortion in length、thread gluing, fatigue crack by final thread jiggle and thread appearance.

If the pitch at the joggle enlarges, it shows the thread has been lengthened, and serving load exceeds the yield strength of tie-in. They may work next time, but the property of connecting and sealing won't be so well, not suitable for reuse.

Thread gluing is the frequent failure of oil pipe break-up. If the thread tooth shape doesn't change greatly, the influence to connecting and sealing won't be large. However, to thread gluing with serious adhesive abrasion, metal surface of thread tooth has trails, or even with the obvious change of buckle shape, depose or repair them, for thread gluing is often the inducement of leakage.

Alternate tension of oil pipe string often lead to fatigue crack, low carrying capacity, or failures in next use. Repair the buckle until it can be used.

Judge the quality of reused oil pipe according to the serious grade of thread distortion, injury, thread gluing, piercing, worn crack.

Chapter 5 Process of Oil Well Pipe Tripping and Requirement

5.1 Preparation of oil well pipe trip

5.1.1 Check if the equipment, tools, materials can meet the list of operation.

5.1.2 Examine the equipment, tools, materials in accordance with relating operation regulations and see whether the specification、property and quality can reach the requirement of operation. If not, revise them in time. Main inspection items include:

5.1.2.1Hydraulic power tongs（include model、tongs mouth size、length of connecting-rod, oil well pipe with coupling, main and back tongs, connecting-rod Length 230mm,extreme-line or narrow clearance coupling oil pipe, main and back tongs connecting-rod Length≥500mm）;

5.1.2.2 Hydraulic driver;

5.1.2.3 Hydraulic line;

5.1.2.4 Stabbing board;

5.1.2.5 Elevator and slips;

5.1.2.6 Torsion gage and sensor;

5.1.2.7 Spring hanger and hydraulic expansion joint;

5.1.2.8 Rig tools;

5.1.2.9 Power tongs tail rope and connecting fittings;

5.1.2.10 Fast removal of thread protector.

5.2 Tripping of Oil Well Pipe

5.2.1 Lift with balance and suspend with even speed, lift, forbid the sudden fierce operations.

5.2.2 When use hydraulic tongs for operation ,extreme-line oil well pipe and narrow clearance coupling oil pipe, break-up operation back tongs are not allowed to chuck coupling .

Make-up	Break-up	Make and break
Main Tongs	Main Tongs	Main Tongs
Non-Upset	Back Tongs	Extreme-line Type
Upset		
Back Tongs		Back Tongs

5.2.3 Remove the oil pipe、pup joint、tools of tripping out, clean the inside and outside thread .

5.2.4 Check if the inside and outside surface, airproof side and shoulder have serious distortion, nick and mar. Find out the unqualified oil well pipes.

5.2.5 Screw on the thread protector for the qualified oil well pipe after inspection, and put them in the proper place.

5.3 Preparation of oil pipe tripping

5.3.1 Check if the equipment, tools, materials can meet the list of operation.

5.3.2 Examine the equipment, tools, materials in accordance with relating operation regulations and see whether the specification、property and quality can reach the requirement of operation. If not, revise them in time. The major inspection items include:

5.3.2.1Hydraulic power tongs（include model、bite size、connecting-rod length≥500mm）;

5.3.2.2 Hydraulic driver、hydraulic line;

5.3.2.3 Stabbing board、elevator and slips;

5.3.2.4 Torsion gage and sensor;

5.3.2.5 Spring hanger and hydraulic expansion joint;

5.3.2.6 Rig tools;

5.3.2.7 Accessories、pup joints for all sorts of oil well pipes;

5.3.2.8 Power tongs tail rope and connecting fittings;

5.3.2.9 Thread compound;

5.3.2.10 Check the centering of lift equipment and the well mouth, prevent the stabbing and cross threading during tripping.

5.3.3 Examine that if the steel grade、specification、quantity、pipe end form, and make and break of tripping pipe are up to engineering standard.

5.3.4 Check the oil pipe of trip and the thread, replace the damaged pipe immediately.

5.3.5 Number the oil pip, measure the length, and examine the diameter.

5.4 Tripping of oil pipe

5.4.1 Lift the oil pipe, remove the thread protector, and coat the thread compound.

5.4.2 Center the oil pipe, and spin-up speed≤25r/min.

5.4.3 Do the tightening operation of API Thread tie-in according to the recommended torque values in table 5.1.

5.4.4When use hydraulic tongs to operate, for the flat oil well pipe、upset oil well pipe or extreme-line oil pipe, back tongs can not chuck coupling ,but the pipe body（See picture 2）.

5.4.5 Choose the right hydraulic tongs and hydraulic driver according to the steel grade, specification and recommended torque range of the oil well pipe. To the hydraulic tongs with pressure limiting valve and without torquemeter, you can know the spin-up pressure and torque via the adjustment of auxiliary valve.

5.4.6 For the homemade hydraulic tongs without torquemeter and pressure limiting valve, do choose the low rating torque and big tongs according to the steel grade and specification of the oil well pipe.

5.4.7 Spin-up torque curve in the field is not agree with recommended picture, break-up, check inside and outside thread, and replace the damaged oil pipe.

5.4.8 Oil pipe Tightening reaches the prescribed torque, spin-up position can be decided by the residual 1~2 buckles.

5.4.9 When use pneumatic slips, brake first and then turn off slips, and remove the elevator. Never turn off the pneumatic slips during tripping.

5.4.10 Do the tripping of oil pipe as the design requirements. When near to Inflexion, seal section and design position, going-in speed should not exceed 5m/min, Normal going-in speed should not exceed 25 pieces/h. Recommended tightening torque refers to Table 5.1.

Table 5.1 Recommended Torque for Oil Well Pipe Tightening

Specification		Nominal Weight lb/ft With Thread and Coupling		Steel Grade	Recommended Torque							
					Non-Upset				Upset			
					ft-lb		Nm		ft-lb		Nm	
in	mm	Non-Upset	Upset		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
2 3/8	60.33	4.00	---	J-55	460	610	624	827	---	---	---	---
		4.60	4.70		550	730	746	990	970	1161	1315	1574
		4.00	---	L-80	620	830	841	1125	---	---	---	---
		4.60	4.70		740	990	1003	1342	1320	1584	1790	2148
		5.80	5.95		1070	1420	1451	1925	1640	1971	2224	2672
		4.00	---	N-80	640	850	868	1152	---	---	---	---
		4.60	4.70		770	1020	1044	1383	1350	1620	1830	2196
		5.80	5.95		1100	1460	1491	1979	1680	2016	2278	2733
		4.00	---	C-90	680	910	922	1234	---	---	---	---
		4.60	4.70		810	1080	1098	1464	1440	1632	1952	2213
		5.80	5.95		1160	1550	1573	2102	1800	2032	2440	2754
		4.60	4.70	P-110	960	1280	1302	1735	1700	1930	2305	2616
		5.80	5.95		1380	1840	1871	2495	2120	2406	2874	3261
2 7/8	73.03	6.40	6.50	J-55	790	1050	1071	1424	1240	1485	1681	2013
		6.40	6.50	L-80	1070	1430	1451	1939	1690	2025	2291	2746
		7.80	7.90		1440	1910	1952	2590	2030	2439	2752	3307
		8.60	8.70		1620	2160	2196	2929	2210	2655	2996	3600
		6.40	6.50	N-80	1100	1470	1491	1993	1730	2070	2346	2807
		8.60	8.70		1660	2210	2251	2996	2270	2718	3078	3685
		6.40	6.50	C-90	1180	1570	1600	2129	1850	2091	2508	2835
		8.60	8.70		1770	2370	2400	3213	2420	2746	3281	3722
		6.40	6.50	P-110	1390	1850	1885	2508	2180	2474	2956	3354
		8.60	8.70		2090	2790	2834	3783	2890	3239	3918	4391
3 1/2	88.90	7.70	---	J-55	910	1210	1234	1641	---	---	---	---
		9.20	9.30		1110	1480	1505	2007	1710	2052	2318	2782
		10.20	---		1290	1720	1749	2332	---	---	---	---
		7.70	---	L-80	1250	1660	1695	2251	---	---	---	---
		9.20	9.30		1520	2030	2061	2752	2350	2817	3186	3819
		10.20	---		1770	2360	2400	3200	---	---	---	---
		12.70	12.95		2360	3140	3200	4257	3150	3780	4271	5125
		7.70	---	N-80	1280	1700	1735	2305	---	---	---	---
		9.20	9.30		1550	2070	2102	2807	2400	2880	3254	3905
		10.20	---		1810	2410	2454	3268	---	---	---	---
		12.70	12.95		2410	3210	3268	4352	3220	3861	4366	5235
		7.70	---	C-90	1360	1820	1844	2468	---	---	---	---
		9.20	9.30		1670	2220	2264	3010	2570	2916	3484	3953
		10.20	---		1940	2590	2630	3512	---	---	---	---
		12.70	12.95		2580	3440	3498	4664	3450	4149	4678	5313
		9.20	9.30	P-110	1970	2620	2671	3552	3044	3443	4127	4667
		12.70	12.95						4070	4616	5518	6258
4	101.60	9.50	---	J-55	930	1240	1261	1681	---	---	---	---
		---	11.00		---	---	---	---	1920	2304	2603	3124
		9.50	---	L-80	1280	1710	1735	2318	---	---	---	---
		---	11.00		---	---	---	---	2650	3177	3593	4307
		9.50	---	C-90	1410	1870	1912	2535	---	---	---	---
		---	11.00		---	---	---	---	2900	2440	3932	3308
		9.50	---	N-80	1310	1740	1776	2359	---	---	---	---
		---	11.00		---	---	---	---	2700	3240	3661	4393
4 1/2	114.30	12.60	12.75	J-55	1310	1740	1776	2359	2150	2574	2915	3490
		12.60	12.75	L-80	1800	2400	2440	3254	2960	3546	4013	4808
		12.60	12.75	N-80	1830	2440	2481	3308	3020	3618	4095	4905
		12.60	12.75	C-90	1980	2630	2685	3566	3250	3681	4406	4990

Torque Unit Conversion Factor:1ft-lb=1.355818J.

Chapter 6 Operation Process with Import Hydraulic Tongs and Requirements

6.1 Choose the bite size of hydraulic tongs、make and break torque and spindle speeds according to oil pipe steel grade、specification、pipe end and tie-in form.

6.2 Hydraulic tongs spin-up、break-up chucking operation according to picture 2 .

6.3 When make and break the pipe body with back tongs, string must use the slips fixed position, when use back tongs for coupling break-up, string can use seat elevator operation.

6.4 Set the recommended torque value by pipe manufacturer in the torsion gauge or torque monitoring system.

6.5 Operate according to the operator.

6.6 When work at the well mouth, take strict precautions against the stuff dropping down to the well.

6.7 Make and break operation can refer to API RP 5C1.

6.8 Precisely record the running of tongs、hydraulic driver、torque monitoring system, including rotate speed of diesel engine、oil pressure、oil(water) temperature、air pressure; hydraulic pump oil temperature、displacement; oil pipe tongs spin-up max. torque of 、back tongs、pressure、oil pipe specification, size, quantity; torque setting value of torque monitoring system and etc.

Chapter 7 Operation Process with Homemade Hydraulic Tongs and Requirement

7.1 Choose the bite size of hydraulic tongs、make and break torque and spindle speeds according to oil pipe steel grade、specification、pipe end and tie-in form.

7.2 Choose hydraulic tongs according to the recommended torque value in table 5.1 and application range in table 7.1.

7.3 When install the hydraulic tongs of torquemeter and pressure limiting valve, refer to Chapter 5.

Table 7.1 Application Range for Homemade Hydraulic Tongs

Hydraulic Tongs Model	Max. Rating Torque	Application Scope To Oil Well Pipe	
XYQ1.8 Model	1800Nm	60.3×4.83mm NU J-55	60.3×4.83mm EU J-55
		60.3×4.83mm NU N-80	/
		60.3×6.45mm NU N-80	/
		60.3×4.83mm NU C-90	/
		60.3×6.45mm NU C-90	/
		60.3×4.83mm NU P-110	/
XYQ3 Model	3000Nm	/	60.3×4.83mm EU N-80
		/	60.3×6.45mm EU N-80
		/	60.3×4.83mm EU C-90
		/	60.3×6.45mm EU C-90
		/	60.3×4.83mm EU P-110
		60.3×6.45mm NU P-110	60.3×6.45mm EU P-110
		73×5.51mm NU J-55	73×5.51mm EU J-55
		73×5.51mm NU N-80	73×5.51mm EU N-80
		73×5.51mm NU C-90	73×5.51mm EU C-90
		73×5.51mm NU P-110	/
		88.9×6.45mm NU J-55	88.9×6.45mm EU J-55
		88.9×6.45mm NU N-80	/
		88.9×6.45mm NU C-90	/
XYQ6B Model	6000Nm	/	73×5.51mm EU P-110
		/	88.9×6.45mm EU N-80
		/	88.9×6.45mm EU C-90
		88.9×6.45mm NU P-110	88.9×6.45mm EU P-110

7.4 Hydraulic tongs without torquemeter and pressure limiting valve must operate as follows:

7.4.1Operate strictly according to 7.2 section, choose the proper oil pipe hydraulic tongs and corresponding hydraulic source system.

7.4.2 Connecting Rod between main tongs and back tongs ≥500mm, chuck pipe body, make and break according to picture 2.

7.4.3 Lift oil pipe、coat thread compound ,center the thread ,rotate speed≤25r/min for two circles spin-up, and then spin-up to the prescribed torque place, and max. 1~2 buckles are allowed outside.

7.4.4 Control with the operation of flat buckle is not allowed..

7.4.5Generally back tongs are not allowed to hold the upper end of coupling..

7.4.6 When work at the well mouth, take strict precautions against the stuff dropping down to the well.

7.5 For hydraulic tongs without torquemeter and pressure limiting valve, the distance of connecting rod between back tongs and main tongs cannot be lengthened, that is operation of picture 2 is not applicable to it, so the make and break must do as follows:

7.5.1 Operate strictly according to 6.2 section, choose the right hydraulic tongs and corresponding hydraulic source system.

7.5.2 Lift oil well pipe, coat thread compound, centering thread, spin-up with manual tool, and spin up for

two rings at the low torque .（in spin-up, try to use the back tongs at the below end）.

7.5.3 After tightening 1~2buckles are allowed outside.

7.5.4 To avoid cross threading, hydraulic tongs are not allowed to stabbing directly and spin-up continuously.

7.5.5 Control with the operation of flat buckle is not allowed.

7.5.6 When work at the well mouth, take strict precautions against the stuff dropping down to the well.

Chapter 8 Causes of Invalid Oil Well Pipe

8.1 Causes of Thread Gluing of the Tie-in

8.1.1 Incomplete inspection of oil well pipe before trip, improper control land maintenance in store, rusty thread surface;

8.1.2 Careless load and unload, and transport, or injured thread owing to thread protector loosing, coupling distortion;

8.1.3 Not operate in accordance with the instruction in the trip, the spin-up speed is too fast (over 25r/min), torque is over big (exceed those in table 5.1), over hammer to coupling, over holding force, coupling and pipe body distorts;

8.1.4 If the thread surface of coupling is, replace the worn coupling with non standard one;

8.1.5 Unclean thread, thread compound foreign body left on the thread;

8.1.6 Improper tolerance of processed thread of repaired oil well pipe, thread fastener has burr;

8.1.7 Use the unqualified hydraulic tongs;

8.1.8 Cross threading spin-up.

8.2 Causes of oil well pipe surge、break

8.2.1 Improper choose of strength and use, especially when there is need of upset oil pipe but non-Upset oil pipe is used;

8.2.2 Use the worn and mismatching equipment, chuck、big tongs、tongs tooth and pipe wrench. When tripping out the oil pipe, there is lack of spin-up torque (or no torque control), external thread doesn't reach the set position, or spin-up torque of outside thread is too large and go beyond the coupling midline;

8.2.3 Surface fatigue caused by the final thread joggle, which has no effective remedy measures. Use the upset oil well pipe instead of non-upset oil pipe and delay the failure occurrence.

8.2.4 improper installation of well mouth、christmas tree、pumping unit（non-concentric）,oil pipe string thread tie-in declines;

8.2.5 Because of thread gluing or fatigue source by processing tool, the fatigue stress in oil extraction causes the crack expands and breaks;

8.2.6 Oil well pipe with serious thread gluing.

8.3 Causes of the Tie-in Leaking

8.3.1 Improper selection or use of the thread compound, thread compound is diluted or quality is inferior;

8.3.2 Corrosion and rusting owing to the dirty thread or the use of antisepsis material;

8.3.3 Thread is not tightened or over tightened; and coupling is distorted by hammering and beating;

8.3.4 Thread abrasion caused by dirt and other staff、cross threading、thread gluing、injury, improper grinding in field repair of thread;

8.3.5 Sudden lift and pull of pipe or much repeating trips;

5.3.6 Oil well pipe with serious thread gluing.

8.4 Causes of corrosion

8.4.1 Improper material choosing of pipe, cannot select the suitable anti-corrosion oil pipe aiming at the serving environment;

8.4.2 Not use the pipe inner coating for the strong corrosive well of H_2S+CO_2;

8.4.3 Not use well on the beam and gas-lift well, not use the corrosion inhibitor to fill in the annulus between casing and oil well pipe, not use packer to jam the annulus room in flowing well;

8.4.4 Charge of water injection well hasn't been deoxidized;

8.4.5 Corrosion by complex factors, uncertain influences;

8.5 Causes of Pipe Body Break

8.5.1 Coupling abrasion and abrasion of sucker rod to pipe inner wall;

8.5.2 Sucker rod is seriously damaged;

8.5.3 Inner wall of pipe body corrosion or the inner surface-folding defect that hasn't been detected;

8.5.4 Improper sort selection of reused oil pipe and use the left oil well pipe with too small wall thickness;

8.5.5 Wrong selection of steel grade and specification for the broken oil well pipe

Chapter 9 Repair

Oil well pipe that is injured by use or misuse can be reused after repair. The repair must do in accordance with API SPEC 5CT and API STD 5B standard, and the usability of repaired product can be confirmed after the inspection of 5.4 section in this manual.

Appendix: Table of Oil Well Pipe Basic Parameter in British System

API Non-Upset Round Thread Oil Well Pipe

Weight		External Diameter Size				Steel Grade	Min. Functional Performance				Internal Pressure		
Nominal Weight with Coupling	Plain End	Pipe Body			Coupling		External Pressure		Tension		Hydraulic Test Value	80%Min. Internal Yield Strength	Min. Yield Strength
		Wall Thickness	Inside Diameter	Diameter	External Diameter		Setting Depth	Pressure	Setting Depth	Yield Load			
Lb		In					Ft	Psi	Ft	Lb	Psi		
External Diameter——2 3/8″													
4.00	3.94	0.167	2.041	1.947	2.875	H-40	9300	5230	5020	30100	3000	4500	4920
						J-55	12790	7190	6910	41400	3000	6200	6770
						N-80 and	17750	9980	10040	60200	9000	9000	9840
						C-90	19450	10940	11300	67700	10000	10000	11070
4.60	4.43	0.19	1.995	1.901	2.875	H-40	10470	5890	5210	35900	3000	5100	5600
						J-55	14400	8100	7170	49400	3000	7000	7700
						N-80、L-80	20940	11780	10420	71800	10000	10000	11200
						C-90	23560	13250	11730	80800	10000	10000	12600
						T-95	24860	13980	12380	85300	10000	10000	13300
						P-110	27480	16130	13680	98800	10000	14100	15400
5.80	5.75	0.254	1.867	1.773	2.875	N-80、L-80	27170	15280	11840	102900	10000	10000	14970
						C-90	30570	17190	13320	115700	10000	10000	16840
						T-95	32270	18150	14060	122200	10000	10000	17780
						P-110	35660	21010	15540	141500	10000	17770	20590
External Diameter——2 7/8″													
6.40	6.16	0.217	2.441	2.347	3.500	H-40	9930	5580	5500	52700	3000	4800	5280
						J-55	13650	7680	7560	72500	3000	6600	7260
						N-80 and	19850	11170	11000	105400	9700	9700	10570
						C-90	22020	12380	12370	118600	10000	10000	11890
						T-95	23000	12940	13060	125200	10000	10000	12550
						P-110	24930	14550	14430	145000	10000	13300	14530
8.60	8.45	0.308	2.259	2.165	3.500	N-80、L-80	27210	15300	12350	159200	10000	10000	15000
						C-90	30610	17220	13890	179100	10000	10000	16870
						T-95	32310	18170	14670	189100	10000	10000	17810
						P-110	35720	21040	16210	218900	10000	18300	20620

API Non-Upset Round Thread Oil Well Pipe

Weight		External Diameter Size				Steel Grade	Min. Functional Performance				Internal Pressure		
Nominal Weight with Coupling	Plain End	Pipe Body			Coupling		External Pressure		Tension		Hydraulic Test Value	80%Min. Internal Yield Strength	Min. Yield Strength
		Wall Thickness	Inside Diameter	Diameter	External Diameter		Setting Depth	Pressure	Setting Depth	Yield Load			
Lb		In					Ft	Psi	Ft	Lb	Psi		
External Diameter——3 1/2″													

7.70	7.58	0.216	3.068	2.943	4.25	H-40	8240	4630	5630	65000	3000	3900	4320
						J-55	10620	5970	7750	89400	3000	5400	5940
						N-80 and	13990	7870	11270	130000	7900	7900	8640
						C-90	15180	8540	12680	146300	8900	8900	9720
						T-95	15740	8850	13380	154400	9400	9400	10260
9.20	8.81	0.254	2.992	2.867	4.25	H-40	9570	5380	5760	79400	3000	4600	5080
						J-55	13160	7400	7930	109200	3000	6400	6990
						N-80 and	18740	10540	11530	158900	9300	9300	10160
						C-90	20570	11570	12970	178700	10000	10000	11430
						T-95	21470	12080	13690	188700	10000	10000	12070
						P-110	23210	13530	15130	218500	10000	12800	13970
10.2	9.91	0.289	2.922	2.797	4.25	H-40	10780	6060	6050	92500	3000	5300	5780
						J-55	14820	8330	8320	12720	3000	7300	7950
						N-80 and	21550	12120	12100	18500	10000	10000	11560
						C-90	24240	13640	13610	208100	10000	10000	13010
						T-95	25590	14390	14370	219600	10000	10000	13730
12.7	12.52	0.375	2.75	2.625	4.25	N-80 and	27220	15310	12930	246200	10000	10000	15000
						C-90	30620	17220	14550	277000	10000	10000	16880
						T-95	32320	18180	15360	292400	10000	10000	17810
						P-110	35720	21050	16980	338600	10000	12800	20630
External Diameter——4″													
9.50	9.11	0.226	3.548	3.423	4.75	H-40	7210	4050	5050	72000	3000	3600	3960
						J-55	9090	5110	6950	99000	3000	5000	5440
						N-80 and	11720	6590	10110	144000	7200	7200	7910
						C-90	12590	7080	11370	162000	8100	8100	8900
						T-95	12990	7310	12000	171000	8600	8600	9390
External Diameter——4 1/2″													
12.60	12.24	0.271	3.958	3.833	5.200	H-40	7990	4490	5520	104400	3000	3900	4220
						J-55	10180	5730	7590	143500	3000	5300	5800
						N-80 and	13340	7500	11040	208700	7700	7700	8430
						C-90	14440	8120	12420	234800	8700	8700	9490
						T-95	14950	8410	13110	247900	9200	9200	10010

Standard: API 5CT & 5B
Material: H40、J55、K55、N80、M65、L80、C90、T95、P110.
Connection: NUE, EUE.
Specialty: L80 9Cr, 13Cr Tubing available

Technical Parameters of Non-upset Tubing

No.	Specs.	OD of pipe	Wall Thickness	OD of coupling	Nominal Linear mass	Grade	Hydrostatic Test Pressure	Internal Yield Pressure Strength	Collapse Resistance	Ultimate tension of thread	Recommended tighten torque
		mm	mm	mm	Kg/m		Mpa	Mpa	Mpa	kN	N.m
1	1.9	48.26	3.68	55.88	4.09	J55	46	50.68	53.43	116.77	420-700
						N80	67.5	73.64	77.77	169.8	585-975
						L80	67.5	73.64	77.77	169.8	570-590
						P110	--	--	--	--	--
2	2 3/8	60.32	4.83	73.02	6.85	J55	48.5	53.09	55.85	220.18	750-1230
						N80	69	77.22	81.22	318.93	1320-2180
						L80	69	77.22	81.22	318.93	1012.5-1687.5
						P110	69	101.4	106.6	420	1305-2175
3	2 7/8	73.02	5.51	88.9	9.52	J55	46	50.06	52.95	322.94	1080-1770
						N80	66.5	72.88	76.95	443.48	1690-2790
						L80	66.5	72.88	76.95	443.48	1455-2425
						P110	69	95.6	96.6	616.66	1882.5-3137.5
4	3 1/2	88.9	6.45	107.95	13.69	J55	44	48.19	51.02	486.63	1510-2500
						N80	64	70.05	72.6	633.87	2320-3860
						L80	64	70.05	72.6	633.87	2060.5-4437.5

						P110	69	92	90	929.438	2662.5-4437.5
5	4	101.6	5.74	120.65	14.14	J55	34.5	37.5	35.2	440.37	1690-2100
						N80	50	54.5	45.4	640.54	2360-2950
						L80	50	54.5	45.4	640.54	1710-2850
						P110	69	--	--	--	--
6	4 1/2	114.3	6.88	132.08	18.75	J55	36.5	39.99	39.4	638.31	1780-2950
						N80	53	58.12	51.71	928.34	2490-4130
						L80	53	58.12	51.71	928.34	2437.5-4062.5
						P110	69	--	--	--	--

Technical Parameters of Non-upset Tubing

No.	Specs.	OD of pipe	Wall Thickness	OD of coupling	Nominal Linear mass	Grade	Hydrostatic Test Pressure	Internal Yield Pressure Strength	Collapse Resistance	Ultimate tension of thread	Recommended tighten torque
		mm	mm	mm	Kg/m		Mpa	Mpa	Mpa	kN	N.m
1	1.9	48.26	3.68	63.5	4.32	J55	46	50.68	53.43	195.59	2280-3800
						N80	67.5	73.64	77.77	484.51	2310-3850
						L80	67.5	73.64	77.77	284.51	1207.5-2012.2
						P110	69	--	--	--	--
2	2 3/8	60.32	4.83	77.8	6.99	J55	48.5	53.09	55.85	319.82	1050-1730

						N80	69	77.22	81.22	463.94	1830-3050
						L80	69	77.22	81.22	463.94	1792.5-2987.5
						P110	69	101.4	106.6	609.09	2310-3850
3	2 7/8	73.02	5.51	93.17	9.67	J55	46	50.06	52.95	469.73	1500-2490
						N80	66.5	72.88	76.95	644.99	2350-3900
						L80	66.5	72.88	76.95	644.99	2287.5-3812.5
						P110	69	95.6	96.6	846.68	2955-4925
4	3 1/2	88.9	6.45	114.3	13.84	J55	44	48.19	51.02	707.71	2100-3510
						N80	64	70.05	72.6	921.67	3180-5300
						L80	64	70.05	72.6	921.67	3180-6862.5
						P110	69	92	90	1210.18	4117.5-6862.5
5	4	101.6	6.65	127	16.37	J55	39.5	43.4	45.4	752.805	2603-4337
						N80	58	63.2	60.7	1094.948	3660-6100
						L80	58	63.2	60.7	1094.948	3585-5975
						P110	69	--	--	--	--
6	4 1/2	114.3	6.88	141.3	18.97	J55	36.5	40	39.4	880.942	2903-4837
						N80	53	58.1	51.7	1281.37	4088-6812
						L80	53	58.1	51.7	1281.37	4005-6675
						P110	69	--	--	--	--

Technical Parameters of Upset Tubing								
No.	Specs.	OD of the Pipe mm	Wall Thickness mm	OD of Thickening part mm	Grade	Hydrostatic Test Pressure Mpa	Internal Yield Pressure Strength Mpa	Collapse Resistance Mpa
1	1.9	48.26	3.68	53.19	J55	46	50.68	53.43
					N80	67.5	73.64	77.77
					L80	67.5	73.64	77.77
					P110	--	--	--
2	2 3/8	60.32	4.83	65.89	J55	48.5	53.09	55.85
					N80	69	77.22	81.22
					L80	69	77.22	81.22
					P110	69	101.4	106.6
3	2 7/8	73.02	5.51	78.59	J55	46	50.06	52.95
					N80	66.5	72.88	76.95
					L80	66.5	72.88	76.95
					P110	69	95.6	96.6
4	3 1/2	88.9	6.45	95.25	J55	44	48.19	51.02
					N80	64	70.05	72.6
					L80	64	70.05	72.6
					P110	69	92	90

5	4	101.6	6.65	107.95	J55	34.5	43.4	45.4
					N80	50	63.2	60.7
					L80	50	63.2	60.7
					P110	69	--	--
6	4 1/2	114.3	6.88	120.65	J55	36.5	40	39.4
					N80	53	58.1	51.7
					L80	53	58.1	51.7
					P110	69	--	--