

GOST 631-75 UPSET-END DRILL PIPE AND COUPLINGS

Drill pipe to this standard shall be seamless with upset ends and with conical stabilizing belts.

Size range. Drill pipe shall be internal-upset with couplings (type 1) shown in Fig.1a, Table 1; external-upset with couplings (type 2) shown in Fig.1a, Table 2; internal-upset and conical stabilizing belts (type 3) shown in Fig.1b, Table 3; external-upset and conical stabilizing belts (type 4) shown in Fig.1b, Table 4.

Drill pipe types 1 and 2 shall have right-hand and left-hand thread; types 3 and 4 shall have right-hand thread; left-hand thread is made on special agreement.

Drill pipe with specified diameter of 60 to 102 mm shall have the length of 6; 8 and 11.5 meters; for specified diameter of 114 to 168 mm the length shall be 11.5 meters. A lot of drill pipe with specified diameter 114 to 168 mm may have up to 25% lengths shorter than 8 meters and up to 8% with 6 meters lengths. Specified diameters 114 mm may have lengths 6 and 8 meters on special agreement.

Table 1 Dimensions, (mm) of drill pipe type 1 (internal-upset) and couplings

Труба (Pipe body)										Муфта (Coupling)					
D усл	D	S	M1	d	Высадка (Upset end)				M2	Dm	Lm	d0	l0	B	M3
					13	14	d1	d1'							
					min										
60	60.3	7	9.15	46.3	90	40	32	40	1.2	80	140	63.5	3	2	2.7
		9	11.30	42.3			24	32	1.4						
		7	11.40	59.0			45	54	1.6						
73	73.0	9	14.20	55.0	100	40	34	43	2.4	95	166	76.2	3	6	4.2
		11	16.80	51.0			28	37	2.2						
		7	14.2	75.0			60	69	2.4						
89	88.9	9	17.8	71.0	100	40	49	58	3.4	108	166	92.0	3	6	4.4
		11	21.2	67.0			45	54	3.2						
		7	16.4	87.6			74	83	3.0						
102	101.2	8	18.5	85.6	115	55	70	79	3.4	127	184	104.8	3	7	7.0
		9	20.4	83.6			66	75	3.8						
		10	22.4	81.0			62	71	4.0						
		7	18.5	100.3			82	91	4.6						
		8	20.9	98.3			78	87	5.8						
114	114.3	9	23.3	96.3	130	53	74	83	6.0	140	204	117.5	3	7	9.0
		10	25.7	94.3			70	79	6.6						
		11	28.0	92.3			68	77	6.4						
		7	20.7	113.0			95	104	5.8						
		8	23.5	111.0			91	100	6.4						
127	127.0	9	26.2	109.0	130	55	87	96	7.0	152	204	130.2	3	7	10.0
		10	28.9	107.0			83	92	7.6						
		8	26.0	123.7			105	114	7.0						
140	139.7	9	29.0	121.7	130	55	101	110	7.6	171	215	144.5	3	8	14.0
		10	32.0	119.7			100	106	8.2						
		11	35.0	117.7			91	100	9.6						
168	168.3	9	35.3	150.3	130	55	128	137	9.8	197	229	171.5	3	8	16.7
		10	39.0	148.3			124	133	10.8						

Symbols for table 1

Дусл - условный диаметр (nominal bore);
 D - наружный диаметр (outside diameter);
 S - толщина стенки (wall thickness);
 M1 - масса 1 м трубы, кг (mass per metre length, kg);
 d - внутренний диаметр (inside diameter);
 l3min - длина по переходной части (length to runout);
 l4 - длина переходной части (runout length);
 d1 и d1' - диаметры прохода (diameters of bores);
 M2 - масса двух высадок, кг (mass of two upset ends, kg);
 Dm - наружный диаметр (outside diameter);
 Lm - длина (length);
 d0 - диаметр расточки (diameter of recess);
 l0 - глубина расточки (depth of recess);
 B - ширина торцевой плоскости (width of end surface);
 M3 - масса муфты (coupling mass).

Limit tolerances for specified dimensions:

	Точность изготовления (accuracy)	
	Обычная (normal) тип (types) 1-4	Повышенная (improved) тип (types) 1-2
Диаметр наружный, %: Outside diameter, %:		
трубы (pipe)	±1.0	±0.75
муфты (coupling)	±1.0	±1.0
Толщина стенки, % Wall thickness, %	-12.5	-10
Диаметр расточки муфты, мм Diameter of recess in coupling, mm	+1.0	+1.0
Длина трубы, мм: Pipe length, mm:		
для труб (for tubes) 6 & 8 м	+0.6	+0.6
для труб (for tubes) 11,5 м	+0.9	+0.9
Длина муфты, мм Coupling length, mm	±3.0	±3.0
Масса трубы, % Pipe mass, %	±9.0	+6.5

External-upset pipe type 2 may have an increase of outside diameter up to 1 mm on a length up to 100 mm next to the runout part; pipe type 4 may have up to 4 mm diameter increase on a length up to 150 mm. Pipe types 1 and 2 may have improved dimensional accuracy on special agreement. Pipe ovality and wall thickness variation shall leave the dimensions within specified tolerances.

Pipe curvature on end parts equal to 1/3 of total length shall not exceed 1.3 mm per meter length. Total pipe curvature measured in its middle shall be not over 1/2000 of its total length.

Drill pipe to GOST 631-75.

Drill pipe thread profile (left: types 1 and 2; right: types 3 and 4).

Table 2 Dimensions (mm) of drill pipe type 2 (external upset) and couplings

D усл	Труба (Pipe body)								Муфта (Coupling)						
	D	S	M1	d	D1	Высадка (Upset end)			M2	Dm	Lm	d0	10	B	M3
						13 min	14	15							
60	60.3	7	9.5	46.3	67.46	110	65	1.5	86	140	70.6	3	5	5	2.7
73	73.0	7	11.3	42.3	81.76	120	65	2.5	105	165	84.9	3	6	6	4.7
		9	14.2	55.0											
		11	16.8	51.0											
89	89.0	7	14.2	75.0	97.13	120	65	3.5	118	165	100.3	3	7	7	5.9
		9	17.8	71.0											
102	101.6	8	18.5	85.6	114.30	145	65	4.5	140	204	117.5	3	7	7	9.0
		9	20.4	83.6											
		10	22.4	81.6											
114	114.3	8	20.9	98.3	127.00	145	65	5.0	152	204	130.2	3	7	7	11.0
		9	23.3	96.3											
		10	25.7	94.3											
		11	28.0	92.3											
140	139.7	8	26.0	123.7	154.00	145	65	7.0	185	215	157.2	3	8	8	15.0
		9	29.0	121.7											
		10	32.0	119.7											
		11	35.0	117.7											

Symbols for table 2

Дусл - условный диаметр (nominal bore);
D - наружный диаметр (outside diameter);
S - толщина стенки (wall thickness);
M1 - масса 1 м трубы, кг (mass per metre length, kg);
d - внутренний диаметр (inside diameter);
D1 - наружный диаметр (outside diameter);
l3min - длина по переходной части (length to runout);
l4 - длина переходной части (runout length);
M2 - масса двух высадок, кг (mass of two upset ends, kg);
Dm - наружный диаметр (outside diameter);
Lm - длина (length);
d0 - диаметр расточки (diameter of recess);
l0 - глубина расточки (depth of recess);
B - ширина торцевой плоскости (width of end surface);
M3 - масса муфты (coupling mass).

Technical requirements.

Chemical composition of steel is not specified, except that sulphur and phosphorus contents shall be under 0.045 % each.

Drill pipe and coupling may be produced of different steel grades (see Table 5). Pipe of steel grade P and T shall be produced on special agreement.

Pipe and couplings shall be delivered heat treated. Threads on pipe and couplings shall be zinc-coated or phosphate treated. Outside surfaces of pipe and couplings shall be painted for corrosion protection. Pipe of steel grades D, K, E and L shall withstand a flattening test. Pipe types 1 and 2 having the length of 6, 8 and 11.5 m shall be supplied without couplings; couplings are furnished on special agreement. Outside surface painting may be substituted by oiling.

Thread connections.

Thread profile for drill pipe types 1 and 2 (left and right hand) is shown in Fig.2.

Thread sizes are given below (types 1 and 2) mm:

thread pitch P

3.175

thread depts h1	1.810
working height h	1.374
radii of rounding:	
r	0.508
r1	0.432
gap z	0.076
angle	1°47'24"
taper 2tg	1:16
thread surface roughness, Rz, mkm <20	

Limit dimensional tolerances for thread sizes on pipe types 1 and 2:

thread pitch:	
on 25.4 mm length	± 0.075
on the whole length	± 0.150
taper on 100 mm length:	
pipe	(+0.30)-(-0.20)
couplings	(+0.20)-(-0.30)
thread depth	(+0.05)-(-0.10)
thread length on pipe	(+3.2)-(-1.6)

Table 3 Dimensions (mm) of drill pipe type 3 (internal upset) and conical stabilizing belts

Дусл	D	S	M1	d	d1	Dsmin	Lmin	lmin	M2
89	89.0	9	17.28	71.0	57	89.9	150	145	3.9
		11	21.2	67.0	54	89.0	150	145	3.4
102	101.6	9	20.4	83.6	68	101.9	150	145	5.1
		10	22.4	81.6	66	101.9	150	145	5.0
114	114.3	9	23.3	96.3	78	115.2	160	155	7.3
		10	25.7	94.3	76	115.2	160	155	7.1
		11	28.0	92.3	74	115.2	160	155	6.9
127	127.0	9	26.2	109.0	92	130.2	160	155	7.8
		10	28.2	107.0	90				
140	139.7	9	29.0	121.7	102	140.2	160	155	11.0
		10	32.0	119.7	100				10.2
		11	35.0	117.7	100				9.2

Symbols for table 3

Дусл - условный диаметр (nominal bore);
 D - наружный диаметр (outside diameter);
 S - толщина стенки (wall thickness);
 M1 - масса 1 м гладкой трубы, кг (mass per metre length (plain), kg);
 d - внутренний диаметр (inside diameter);
 d1 - диаметр прохода (diameter of bores);
 D_{min} - минимальный наружный диаметр высадки для механически обработанной поверхности (minimum outside diameter for machined surface);
 L_{min} - длина высадки (length of upset end);
 l_{min} - длина высадки до плоскости d1 (length of upset to plane d1);
 M2 - увеличение массы одной трубы вследствие высадки обоих концов, кг (mass increase due to upset of both ends, kg).

Thread profile for pipe types 3 and 4 is shown in Fig. 2b.

Dimensions (mm) of threads on pipe types 3 and 4 are given below:

thread pitch P	5.08
taper 2tg	1:32
angle	0°53'54"
depth h1	1.7 ± 0.5
width b	1.99
width b1	2.18+0.05
radius r	0.3+0.1
radius r1	0.3+0.1

Table 4 Dimensions (mm) of drill pipe type 4 (external upset) and conical stabilizing belts

Дусл	D	S	M1	d	d1	Dвmin	Lmin	L	M2
73	73.0	9	14.2	55.0	52.0	85.9	150	155	3.7
		11	16.8	51.0	48.0				
89	89.0	9	17.8	71.0	68.0	101.9	150	145	4.5
		11	21.2	67.0	44.0				
102	101.6	9	20.4	83.6	80.6	115.2	160	165	5.7
		10	22.4	81.6	78.6				
114	114.3	9	23.3	96.3	93.3	130.2	160	165	7.9
		10	25.7	94.3	91.3				
		11	28.0	92.3	89.3				

Symbols for table 4

Дусл - условный диаметр (nominal bore);
 D - наружный диаметр (outside diameter);
 S - толщина стенки (wall thickness);
 M1 - масса 1 м гладкой трубы, кг (mass per metre length plain, kg);
 d - внутренний диаметр (inside diameter);
 d1 - диаметр прохода (diameter of bores);
 Dвmin - минимальный наружный диаметр высадки (minimum outside diameter of upset end);
 Lmin - длина высадки (length of upset end);
 L - длина высадки до плоскости d1 (length of upset to plane d1);
 M2 - увеличение массы одной трубы вследствие высадки обоих концов, кг (mass increase due to upsetting of two ends, kg).

Roughness of the surface of the conical stabilizing belt and of tube end shall not exceed 20 micrometers (GOST 2789-73).

Table 5 Mechanical properties of drill pipe

Механические свойства Mechanical properties	Значение для стали группы прочности Values for different grades						
	Д	К	Е	Л	М	Р	Т
Временное сопротивление разрыву, МПа Tensile strength, МПа	638	687	736	785	883	981	1079
Предел текучести, МПа Yield limit, МПа	373	491	540	638	736	883	981
Ударная вязкость, кДж/м ² Impact toughness, kJ/sq.mm	392	392	392	392	392	294	294

Note. Elongation values (12 %) shall be equal for all grades except grade D. Grade D elongation shall be 16 %.

Testing.

Mechanical properties of metal shall be measured by using longitudinal samples taken from the upset pipe ends and from couplings.

Flattening test are accomplished by using full-section specimens from non-upset part of each tube length (2 pcs).

Tensile and impact tests are obligatory.

Inside diameter tolerances for outside upset parts are checked on length of 400 mm both ends with a drift mandrel of 150 mm length.

Threads on pipe and couplings shall be greased and protected by caps.