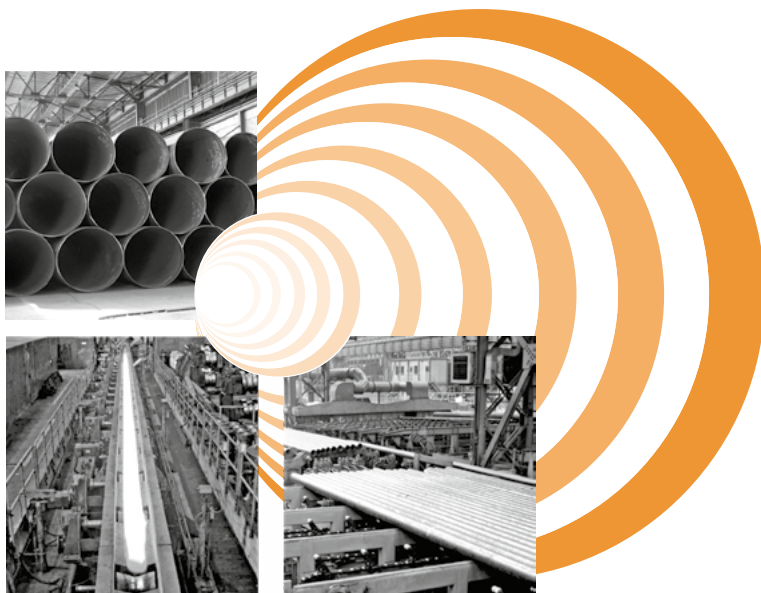




Line Pipe

TMK manufactures a wide range of line pipe for onshore and offshore applications. Line pipe is available in sizes ranging from 0.500 to 100 inches and can be produced by seamless, ERW, SAWL and SAWH methods according to API Spec 5L, CSA, DIN EN, BS EN and DNV standards.

In 2008, TMK launched a 650,000 tpa Haeusler RB(E) SAWL pipe mill at our Volzhsky plant (Russia) that is certified according to DNV-OSS-313. Operating its own coating facilities, pipes can be supplied with 3-layer FBE or PE external and internal coating. The pipe is inspected for internal and external defects using automated electromagnetic and ultrasonic inspection equipment. Pipe ends undergo magnetic-fluoroscopic detection after beveling. For wall thicknesses exceeding 16 mm, ends can be double beveled. The pipe also undergoes tensile, flattening and hydrostatic testing. The pipe is automatically packed in bundles and tied with steel banding or wires in compliance with API loading and transportation standards.

Line Pipe Producers

Plant Location	Method	OD	WT	Standards/Grades
Volzhsky Pipe Plant /Russia/	SAWL	20" - 56"	0.312" - 1.250"	API Spec 5L, X42-X100, DNV 485 FD
	SAWH	22" - 100"	0.250" - 1.000"	API Spec 5L DIN EN ISO 3183
	Seamless	6.625" - 16"	0.280" - 1.062"	API Spec 5L, DNV 250-450 S/F/P/D
Seversky Tube Works /Russia/	Seamless	8.626" - 12.752"	0.315" - 0.984"	API Spec 5L, PSL 1,2 AB, X42-X60
	ERW	0.839" - 20"	0.114" - 0.500"	API Spec 5L PSL 1, AB, X42-X60
Sinarsky Pipe Plant /Russia/	Seamless	1.315" - 6.625"	0.133" - 0.562"	API Spec 5L, PSL1,2 AB, X42-X65
TAGMET /Russia/	Seamless	0.260" - 0.720"	4,500" - 8,625"	API Spec 5L, PSL1,2 AB, X42-X65
Artrom /Romania/	Seamless	0.840" - 8.625"	0.109" - 1.000"	API 5L, A,B, X42-X60, DIN EN ISO 3183 , L210GA-L360GA DIN EN ISO 3183, L245NB

Seamless Line Pipe Dimensional Range

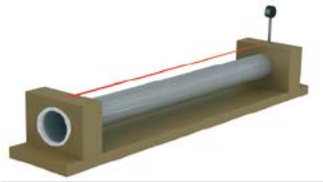
OD,		Wall Thickness																												
	in	mm	0,065	0,079	0,118	0,131	0,137	0,157	0,196	0,216	0,255	0,275	0,295	0,314	0,354	0,374	0,393	0,433	0,472	0,511	0,551	0,590	0,629	0,669	0,748	0,787	0,866	0,944	0,984	1,063
	in	mm	1,65	2,0	3,0	3,35	3,5	4,0	5,0	5,5	6,5	7,0	7,5	8,0	9,0	9,5	10,0	11,0	12,0	13,0	14,0	15,0	16,0	17,0	19,0	20,0	22,0	24,0	25,0	27,0
0,673	17,1																													
0,838	21,3																													
1,051	26,7																													
1,314	33,4																													
1,661	42,2																													
1,902	48,3																													
2,374	60,3																													
2,874	73																													
3,500	88,9																													
4,000	101,6																													
4,500	114,3																													
5,562	141,3																													
6,625	168,3																													
8,625	219,1																													
9,625	244,5																													
10,748	273,0																													
12,748	323,8																													
14,000	355,6																													
16,000	406,4																													

- Cold drawn

- Hot rolled

Seamless Line Pipe Finishing Process

1. Geometrics inspection



2. Beveling



3. Hydrostatic testing



4. Magnetic-fluoroscopic flaw inspection of pipe ends



5. Ultrasonic inspection



6. Coating application (on Customer's request)



7. Marking, packing, storage



Longitudinally Welded Line Pipe Dimensional Range SAWL acc. to API Spec 5L

OD		Wall Thickness																		
		Weight, kg/m																		
	in	0,311	0,342	0,374	0,406	0,437	0,468	0,500	0,562	0,625	0,688	0,751	0,811	0,874	0,937	1,000	1,063	1,125	1,188	1,251
	mm	7,9	8,7	9,5	10,3	11,1	11,9	12,7	14,3	15,9	17,5	19,1	20,6	22,2	23,8	25,4	27	28,6	30,2	31,8
20	508	97,43	107,12	116,78	126,41	136,01	145,58	155,12	174,10	192,95	211,68	230,27	247,60							
22	559	107,36	118,06	128,73	139,37	149,97	160,55	171,09	192,08	212,95	233,68	254,30	273,51	293,87	314,11					
24	610	117,30	129,00	140,68	152,32	163,93	175,51	187,06	210,07	232,94	255,69	278,32	299,41	321,79	344,05	366,17				
26	660	127,04	139,73	152,39	165,02	177,62	190,19	202,72	227,70	252,55	277,27	301,87	324,81	349,16	373,39	397,49				
28	711	136,97	150,67	164,34	177,98	191,58	205,15	218,70	245,68	272,54	299,28	325,89	350,72	377,09	403,32	429,44				
30	762	146,91	161,61	176,29	190,93	205,54	220,12	234,67	263,67	292,54	321,29	349,91	376,63	405,01	433,26	461,38				
32	813	156,84	172,56	188,24	203,88	219,50	235,09	250,64	281,65	312,54	343,30	373,93	402,54	432,93	463,19	493,32				
34	864	166,78	183,50	200,18	216,84	233,46	250,05	266,61	299,64	332,54	365,31	397,95	428,44	460,85	493,12	525,27				
36	914	176,52	194,22	211,90	229,54	247,15	264,72	282,27	317,27	352,14	386,88	421,50	453,84	488,22	522,47	556,59				
38	965	186,46	205,17	223,85	242,49	261,11	279,69	298,24	335,25	372,14	408,89	445,52	479,75	516,14	552,40	588,53	624,54	660,42	696,18	731,80
40	1016	196,39	216,11	235,79	255,45	275,07	294,66	314,22	353,24	392,13	430,90	469,55	505,66	544,06	582,33	620,48	658,50	696,39	734,16	771,80
42	1067		227,05	247,74	268,40	289,03	309,62	330,19	371,22	412,13	452,91	493,57	531,57	571,98	612,26	652,42	692,45	732,36	772,14	811,79
44	1118		237,99	259,69	281,35	302,99	324,59	346,16	389,21	432,13	474,92	517,59	557,47	599,90	642,19	684,37	726,41	768,33	810,12	851,79
46	1168		248,72	271,40	294,05	316,67	339,26	361,82	406,84	451,73	496,50	541,14	582,87	627,27	671,54	715,68	759,70	803,59	847,36	890,99
48	1219		259,66	283,35	307,01	330,63	354,23	377,79	424,82	471,73	518,51	565,16	608,78	655,19	701,47	747,63	793,66	839,56	885,34	930,99
52	1321			307,25	332,92	358,55	384,16	409,74	460,79	511,72	562,53	613,20	660,60	711,03	761,34	811,52	861,57	911,50	961,30	1010,98
56	1422			330,91	358,57	386,20	413,80	441,37	496,41	551,32	606,11	660,77	711,91	766,32	820,61	874,78	928,82	982,73	1036,52	1090,18

Helically Welded Line Pipe Dimensional Range SAWH acc. to DIN EN ISO 3183

Outside Diameter, mm	Wall Thickness, mm													
	Weight, kg/m													
	5,6	6,3	7,1	8	8,8	10	11	12,5	14,2	16	17,5	20	22,2	25
559	76,4	85,9	96,6	109	119	135	149							
610	83,5	93,8	106	119	130	148	162							
660	90,4	102	114	129	141	160	176							
711	97,4	109	123	139	152	173	190	215						
762	104	117	132	149	163	185	204	231						
813	112	125	141	159	175	198	218	247						
864			150	169	186	211	231	262	298					
914			159	179	196	223	245	278	315					
1016			177	199	219	248	273	309	351					
1220			212	239	263	298	328	372	422					
1420			247	279	306	348	382	434	492	554	605	691	765	
1620									562	633	692	789	875	
1820									632	712	778	888	984	
2020									702	791	864	986	1094	1230
2220										870	951	1085	1203	1353
2520										988	1080	1233	1367	1538

Longitudinal Process Flowchart 20" - 56" /508 - 1422 mm/

1. Infeed of plates Identity check



2. Milling of longitudinal plate edges



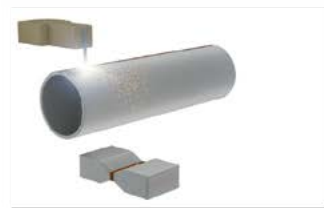
3. Forming by the 3-roll bending process



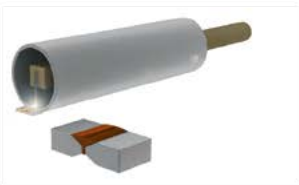
4. Post-bending of the longitudinal plate edges



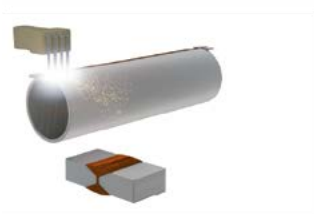
5. Tack welding



6. Inside welding



7. Outside welding



8. Visual control



9. UT of weld



10. X-ray testing of weld seam



11. Mechanical expanding



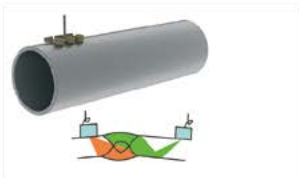
12. Grinding of weld at pipe ends and beveling



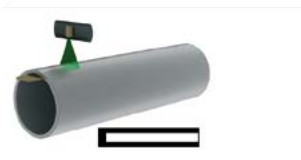
13. Hydrostatic testing



14. UT of weld seam



15. X-ray testing of weld seam and pipe ends



16. Magnetic particle and ultrasonic inspection of both pipe ends



17. Inspection, weighing, marking, stamping



18. Storage



Mechanical Properties PSL 2, API Spec 5L

Steel Grade	Pipe body (seamless and welded)				Weld Seam
	Yield Strength $R_{10,5f}$ MPa (psi)		Tensile Strength R_m MPa (psi)		Tensile Strength R_m MPa (psi), min.
	min	max	min	max	
X42/L290	290 (42 100)	495 (71 800)	415 (60 200)	760 (110 200)	415 (60 200)
X46/L320	320 (46 400)	525 (76 100)	435 (63 100)	760 (110 200)	435 (63 100)
X52/L360	360 (52 200)	530 (76 900)	460 (66 700)	760 (110 200)	460 (66 700)
X56/L390	390 (56 600)	545 (79 000)	490 (71 100)	760 (110 200)	490 (71 100)
X60/L415	415 (60 200)	565 (81 900)	520 (75 400)	760 (110 200)	520 (75 400)
X65/L450	450 (65 300)	600 (87 000)	535 (77 600)	760 (110 200)	535 (77 600)
X70/L485	485 (70 300)	635 (92 100)	570 (82 700)	760 (110 200)	570 (82 700)
X80/L555	555 (80 500)	705 (102 300)	625 (90 600)	825 (119 700)	625 (90 600)
X90/L625	625 (90 600)	775 (112 400)	695 (100 800)	915 (132 700)	695 (100 800)
X100/L690	690 (100 100)	840 (121 800)	760 (110 200)	990 (143 600)	760 (110 200)
X120/L830	830 (120 400)	1050 (152 300)	915 (132 700)	1 145 (166 100)	915 (132 700)

Chemical Composition for PSL 2, API Spec 5L

Steel Grade (Steel Name)	Mass fraction, based upon heat and product analyses % maximum									Carbon equivalent %, max	
	C ^b	Si	Mn ^b	P	S	V	Nb	Ti	other	CE _{IW}	CE _{cm}

Seamless and welded pipes

L245R or BR	0,24	0,4	1,2	0,025	0,015	*	*	0,04	*		
L290R or X42R	0,24	0,4	1,2	0,025	0,015	0,06	0,05	0,04	*		
L245N or BN	0,24	0,4	1,2	0,025	0,015	*	*	0,04	*		
L290N or X42N	0,24	0,4	1,2	0,025	0,015	0,06	0,05	0,04	*		
L320N or X46N	0,24	0,4	1,4	0,025	0,015	0,07	0,05	0,04	*		
L360N or X52N	0,24	0,45	1,4	0,025	0,015	0,1	0,05	0,04	*		
L390N or X56N	0,24	0,45	1,4	0,025	0,015	0,1	0,05	0,04	*		
L415N or X60N	0,24	0,45	1,4	0,025	0,015	0,1	0,05	0,04	*		
L245Q or BQ	0,18	0,45	1,4	0,025	0,015	0,05	0,05	0,04	*		
L290Q or X42Q	0,18	0,45	1,4	0,025	0,015	0,05	0,05	0,04	*		
L320Q or X46Q	0,18	0,45	1,4	0,025	0,015	0,05	0,05	0,04	*		
L360Q or X52Q	0,18	0,45	1,5	0,025	0,05	0,05	0,05	0,04	*		
L390Q or X56Q	0,18	0,45	1,5	0,025	0,015	0,07	0,05	0,04	*		
L415Q or X60Q	0,18	0,45	1,70	0,025	0,015	*	*	*	*		
L450Q or X65Q	0,18	0,45	1,70	0,025	0,015	*	*	*	*		
L485Q or X70Q	0,18	0,45	1,80	0,025	0,015	*	*	*	*		
L555Q or X80Q	0,18	0,45	1,90	0,025	0,015	*	*	*	*		

Welded pipes

L245M or BM	0,22	0,45	1,2	0,025	0,015	0,05	0,05	0,04	*	0,43	0,25
L290M or X42M	0,22	0,45	1,3	0,025	0,015	0,05	0,05	0,04	*	0,43	0,25
L320M or X46M	0,22	0,45	1,3	0,025	0,015	0,05	0,05	0,04	*	0,43	0,25
L360M or X52M	0,22	0,45	1,4	0,025	0,015	*	*	*	*	0,43	0,25
L390M or X56M	0,22	0,45	1,4	0,025	0,015	*	*	*	*	0,43	0,25
L415M or X60M	0,12	0,45	1,6	0,025	0,015	*	*	*	*	0,43	0,25
L450M or X65M	0,12	0,45	1,60	0,025	0,015	*	*	*	*	0,43	0,25
L485M or X70M	0,12	0,45	1,7	0,025	0,015	*	*	*	*	0,43	0,25
L555M or X80M	0,12	0,45	1,85	0,025	0,015	*	*	*	*	0,43	0,25
L625M or X90M	0,1	0,55	2,1	0,02	0,01	*	*	*	*	–	0,25
L690M or X100M	0,1	0,55	2,1	0,02	0,01	*	*	*	*		0,25
L830M or X120M	0,1	0,55	2,1	0,02	0,01	*	*	*	*		0,25

* Calculated according to API Spec 5L/ISO 3183

ERW Process Flowchart

1. Strip Storage



2. Uncoiling



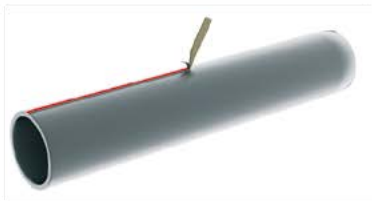
3. Strip forming



4. High Frequency Induction Welding



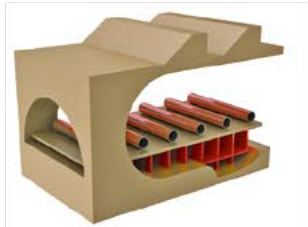
5. Fin removing



6. Straightening



7. Heating in continuous furnace



8. Preliminary reduction



9. Induction heat treatment



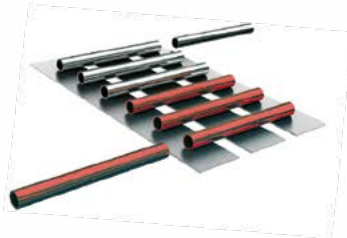
10. Pipe reducing and sizing



11. Specified lengths sawing



12. Pipe handling, cooling and passing to the finishing lines



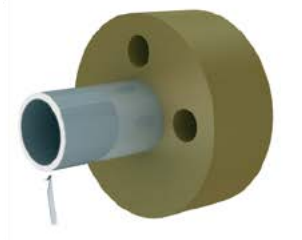
13. Pipe straightening



14. Cutting



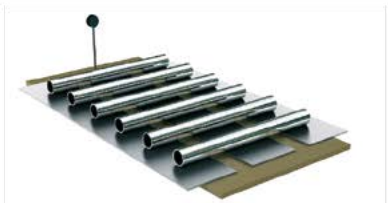
15. End machining (beveling)



16. Hydrostatic testing



17. Inspection and weighing



18. Bundling



Seamless Line Pipe Dimensional Range acc. to DNV-OS-F101

NS	OD	Wall Thickness																					
		Weight, kg/m																					
6 5/8	in	0,280	0,312	0,322	0,344	0,365	0,375	0,406	0,432	0,438	0,469	0,500	0,562	0,625	0,688	0,719	0,750	0,812	0,875	0,938	1,000	1,062	
8 5/8	mm	7,1	7,9	8,2	8,7	9,3	9,5	10,3	11,0	11,1	11,9	12,7	14,3	15,9	17,5	18,3	19,1	20,6	22,2	23,8	25,4	27,0	
10 3/4	168,3	28,22	31,25		34,24		37,20		42,67			48,73	54,31	59,76		67,69	70,27		79,98				
12 3/4	219,1		41,14	42,65	45,14		49,10			56,94		64,64	72,02	79,67		90,62	94,20	100,84	107,79		121,32		
14	273,0					60,50				71,87		71,72	81,55	91,26		100,85		114,99	128,27	137,36	146,30		
16	323,8						73,65	79,65		85,62		97,46	109,18	120,76	132,23		143,56	154,08	165,17	176,13	186,97	197,68	
30	355,6							87,71		94,30	100,86	107,39	120,36	133,19	145,91		158,49	170,18	182,52	194,74	206,83	218,79	
	406,4										115,77	123,30	138,27	153,11	167,87		182,42	195,98	210,33	224,55	238,64	252,61	

Mechanical Properties

SMYS (MPa) (T+L)	SMTS (MPa) (T)	YS/TS ratio	Hardness		Elongation		Charpy V-notch energy (KVT), J	
			(HV 10) BM, WM, HAZ		A ₅ min % (T+L)		average	
245	370	0,9	270		22		27	
290	415	0,9	270		21		30	
360	460	0,9	270		20		36	
415	520	0,92	270		18		42	
450	535	0,92	270		18		45	
485	570	0,92	300		18		50	
555	625	0,92	300		18		56	

Chemical Composition

maximum %													Pern			CE	
SMYS	C	Mn	Si	P	S	Cu	Ni	Mo	Cr	AL	Nb	V	Ti	N	B	t ≤ 15 15<t<26	t ≤ 15 15<t<26
245	0,14	1,35	0,4	0,02	0,01	0,35	0,3	0,1	0,3	0,06	-	-	-	0,01	0,000	0,20 0,21	0,34 0,35
290	0,14	1,65	0,4	0,02	0,01	0,35	0,3	0,1	0,3	0,06	0,04	0,04	0,04	0,01	0,000	0,20 0,21	0,34 0,35
360	0,14	1,65	0,45	0,02	0,01	0,5	0,5	0,5	0,5	0,06	0,05	0,07	0,04	0,01	0,000	0,21 0,22	0,37 0,38
415	0,14	1,65	0,45	0,02	0,01	0,5	0,5	0,5	0,5	0,06	0,05	0,08	0,04	0,01	0,000	0,22 0,23	0,39 0,4
450	0,15	1,65	0,45	0,02	0,01	0,5	0,5	0,5	0,5	0,06	0,05	0,09	0,06	0,01	0,000	0,23 0,24	0,4 0,41