



General Liner Overview

Polycore Tubular Linings liners have successfully proven the use of thermoplastic liners in downhole applications since 1992. Operators are experiencing drastic reductions in operating costs associated with rod-on-tubing wear and tubing corrosion failures. The liner material incorporates a proprietary lubricant to aid in mitigating wear and corrosion failures in beam-pumped and progressive cavity pumped wells. Benefits can be realized in highly deviated, dog-legged, and horizontal wells without additional costs for slim hole rod boxes or rod guides. The liners have been equally successful in controlling tubular corrosion in other artificially lifted wells and disposal wells. The extremely smooth liner surface is helping many operators experience decreased pressure drops, electrical cost savings, and increased production due to fundamental hydraulic benefits.

The liners have also proven resistant to wire line, acid, and chemical damage. Additionally, a unique mechanical bond allows reuse of used and lower quality tubing saving on steel costs. The bonding procedure allows lining pipe with surface imperfections including the ability to line over damaged used internal plastic coatings without the additional cost of removal. The connection system is the most reliable and easiest to install in the OCTG corrosion control industry. Some uses or application of these products may be covered by one or more patents.

Polycore High Density Polyethylene Liner

Polycore[™] is a High Density Polyethylene (HDPE) liner as specified by the Plastic Pipe Institute's Specification PE 3608. This product is highly abrasion resistant which accounts for its success in the mitigation of rod on tubing wear, wire line, mechanical, and handling damage. HDPE is chemically inert to corrosive materials enhancing its use as a corrosion barrier. The mechanically bonded seam- less tube is tolerant to minor surface imperfections of pipe and eliminates concerns with holidays or voids as in adhesive or thermally bonded liners and coatings. Maximum Temperature 160^o F (71^o C) Oil, 180^o F (82^o C) Aqueous

Enertube Polyolefin Liner

EnertubeTM is a liner manufactured from a specially formulated blend of polyolefins. This liner is similar in mechanical properties to the field proven Falcon PolycoreTM liner with a moderate increase in tensile strength and temperature resistance. This second generation of Falcon liners is specifically designed to operate in wells too hot for PolycoreTM and is a seamless mechanically bonded liner providing a smooth tubing surface. Maximum Temperature 210° F (99° C) in all services

Ultratube Engineering Thermoplastic Liner

UltratubeTM is a high performance liner manufactured from a proprietary blended polyphenylene sulfide thermoplastic resin specially formulated for use in downhole oil and gas production environments. This third generation liner has a significant increase in temperature stability, tensile strength, abrasion and chemical resistance over the other proven liners. The innovative polymers in this liner offer the broadest range of resistance to solvents, steam, strong bases, fuel, and acids. The new polymers are specifically designed to limit (not prevent) the permeability of acid gases such as CO_2 and H_2S . Maximum Temperature 350° F (175° C) in all services

Extremetube Engineering Thermoplastic Liner for Extreme Conditions

ExtremetubeTM is a high performance liner for the most extreme operating conditions. This unique liner is made from PEEK[™] Polymer and is the highest tensile strength and highest temperature liner available. Extremetube[™] is an excellent alternative to corrosion resistant alloy (CRA) tubulars and offers protection against corrosion and wear problems under the most severe environmental conditions. Maximum Temperature 500⁰ F (260⁰ C)

ApplicationsBeam Pumped WellsPC Pumped Wells	Disposal WellsInjection WellsFlow Lines	Steam floodSolution MiningHigh Temperature wells	 Submersible Pumped Wells Gas Lift Wells Dewatering
 PC Pumped Wells Plunger Lift Wells	Flow Lines	• High Temperature wells	Dewatering

Benefits

- · Mitigates rod on tubing wear
- Corrosion control
- · Reduce well servicing frequency and cost
- Reduce tubing and rod replacement
- · Reduce corrosion inhibitor requirements
- · Reduce friction and peak polish rod load

- · Eliminate rod guides
- · Apply over used coatings
- · Optimize your current inventory by utilizing lower quality tubing
- No field service technician required
- · Decrease pressure drop in high velocity flow
- · Environment benefits helping reduction in carbon fingerprints and phantom gases

Specifications

- · Coated couplings to protect J-area against corrosion eliminating inserts and barrier seals
- Minimum API torque recommended during tubing make-up
- · No special position make-up required

- Contact representative when considering use in elevated pressure/concentrations of CO_2

SEE REVERSE SIDE FOR COMMON OILFIELD DIMENSIONS AND THERMOPLASTIC LINER SPECIFICATIONS



Common Oilfield Dimensions and Thermoplastic Liner Specifications

	Veight	kg/m	09.0	0.70	0.95	1.41	
	Liner V	lb/ft	0.40	0.47	0.64	0.95	
ications	ickness	mm	3.048	3.556	4.064	4.572	
rift Specif	Liner Th	in.	0.120	0.140	0.160	0.180	
Tubing D	r Drift	mm	40.64	50.80	63.50	86.36	
Lined	Line	in.	1.60	2.00	2.50	3.40	
	oing	mm	60.3	73.0	88.9	114.3	
	Tuk	in.	2 3/8	2 7/8	3 1/2	4 1/2	

					2	m
ig OD	n Hole	աա	13.91	38.78	106.1	129.3
Couplir	Slin	in.	2.910	3.460	4.180	5.094
UE 8rd	ılar	mm	77.80	93.16	114.3	141.3
APIE	Regu	in.	3.063	3.668	4.500	5.563
ons	ameter	шш	40.64	50.80	63.50	86.36
Dimensi	Drift Dia	in.	1.600	2.000	2.500	3.400
I Tubing	al ID	աա	43.68	54.86	67.81	93.47
Lined	Nomin	in.	1.720	2.160	2.670	3.680
	ameter	mm	48.28	59.61	72.82	97.35
	Drift Dia	in.	1.901	2.347	2.867	3.833
	ial ID	mm	50.67	62.00	75.99	100.53
ions	Nomin	in.	1.995	2.441	2.992	3.958
d Dimensi	ckness	mm	4.83	5.51	6.45	6.88
Standar	Wall Thi	in.	0.190	0.217	0.254	0.271
AP	Ihts	kg/m	6.99	9.67	13.84	18.97
	Weig	lb/ft	4.70	6.50	9.30	12.75
	iameter	mm	60.3	73.0	88.9	114.3
	Tubing D	in	2 3/8	2 7/8	3 1/2	4 1/2

asing D	iameter	Weig	ghts	Wall Thi	ckness	Nomin	nal ID	Drift Di	ameter	Nom	inal ID	Drift D	iameter	Regu	ular	Slim	Hole
in.	mm	lb/ft	kg/m	'n.	mm	in.	mm	in.	mm	in.	mm	in.	mm		mm	i.	mm
4 1/2	114.3	9.50	14.14	0.205	5.21	4.090	103.9	3.965	100.7	3.750	95.25	3.500	88.90	5.000	127.0	N/A	N/A
4 1/2	114.3	10.50	15.63	0.224	5.69	4.052	102.9	3.927	2.66	3.700	93.98	3.500	88.90	5.000	127.0	N/A	N/A
4 1/2	114.3	11.60	17.26	0.250	6.35	4.000	101.6	3.875	98.4	3.640	92.45	3.500	88.90	5.000	127.0	N/A	N/A
5 1/2	139.7	14.00	20.83	0.244	6.20	5.012	127.3	4.887	124.1	4.600	116.84	4.500	114.3	6.050	153.6	N/A	N/A
5 1/2	139.7	15.50	23.07	0.275	6.98	4.950	125.7	4.825	122.6	4.550	115.57	4.400	111.76	6.050	153.6	N/A	N/A
5 1/2	139.7	17.00	25.30	0.304	7.72	4.892	124.3	4.767	121.1	4.490	114.04	4.300	109.22	6.050	153.6	N/A	N/A
5 1/2	139.7	20.00	29.76	0.361	9.17	4.778	121.4	4.653	118.2	4.380	111.25	4.200	106.68	6.050	153.6	N/A	N/A

0)	Suck	er Rod I	Dimensi	ions	
^a		Reg	ular	Slim	Hole
		Coupli	ng OD	Coupli	ng OD
	ι	in.	աա	in.	աա
2	~	N/A	N/A	1.00	25.4
ю. 0		1.500	38.1	1.250	31.7
9.1		1.625	41.3	1.500	38.1
2.2		1.813	46.1	1.625	41.2
7.4		2.188	22.6	2.000	20.8
8.6		2.375	60.3	N/A	A/N

	Size		mm	60.3	73.0	88.9			
	Tubing		in.	2 3/8	2 7/8	3 1/2			
	Мах	1610	2200	2060	2810	2850	3910	3580	4930
(sc	Opt	1290	1760	1650	2250	2280	3130	2866	3940
ll/ll) ənk	Min	026	1320	1240	1690	1710	2350	2150	2960
API Tore		J-55	L-80	J-55	L-80	J-55	L-80	J-55	L-80
	Tubing	2 3/8	60.3mm	2 7/8	73.0mm	3 1/2	88.9mm	4 1/2	114.3 mm

47.6 59.5

1.875 1.531

2.344

50.8

2.00 1.50

38.8 шш

in.

шш 41.2 44.4 57.1

. L

шш

1.625 1.750 2.250

31.7 38.1

1.25

60.3 73.0 88.9

Hold Down No-Go Seat

Barrel OD

Insert Bore

Insert Pump

a
Ŭ
0.
2
0
Ũ
A
7
2
ż
2
-2
2
Ź
2
6
4
S
S
S.
+
47
47
<u>л</u> .
\mathcal{S}
0
4
• .
5
2
0
ti
a
\dot{c}
F
2
š
SI
10
11
0
S
a
61
q
_
ct
uct
duct
oduct
roduct
product
r product
or product

Polycore Tubular Linings Corporation recommends connection make up between API Minimum and Optimum torque.