

Light Weight Corrosion Resistant High Pressure

DOWNSTRONG® REDBOX®



RTR Down-Hole Tubing & Casing Solutions for Highly Corrosive Production, Injection and Chemical Disposal Wells

Applications

- Production Wells (Oil, Gas, Thermal)
- Disposal Wells (Salt Water, Chemical Effluent, and Waste)
- Injection Wells (Salt Water, CO₂)
- Liners for the repair of corroded steel casing
- Municipal and Commercial Water Wells

Product Introduction

Downstrong® Redbox® Tubing & Casing is a machine-made composite material produced by the filament winding method combining high strength continuous glass fiber filaments and corrosion resistant epoxy resin onto a steel mandrel. Special predetermined and precise winding angle patterns have been developed by FPI expanding its product range to deeper higher pressure downhole applications. The material is specially formulated to result in a structurally and chemically optimized product. The resin system employed is a Bisphenol-A based epoxy resin heat cured with an aromatic amine based hardener; this formulation produces the highest mechanical strength, thermal resistance and corrosion resistance of all commercially available resin systems used in fabrication of fiberglass piping.

Joint sealing is obtained with fiberglass material itself; sealing strength is enhanced by means of high-performance Composite Machined & Moulded Threads. Downstrong® Redbox® Tubing & Casing threaded joints utilize the reliable, time-proven 8 round (8RD) threads for smaller size tubing made as per API specification 5B to the same tolerances prescribed for steel products. Larger size products are threaded with FPI own 6 Round tapered thread which is also made to the API tolerances. This 6 round thread was developed by FPI for the larger sizes to facilitate the make-up procedure. This is due to the fact that 8 round (8 threads per inch) threads on large diameter tubing are prone to cross threading during the make-up procedure.

Success story: DuPont's 3 KM depth disposal wells of very corrosive HCL with a bottom-hole temperature of over a 100°C in Mississippi, USA. This is one of the most severe downhole service in the fiberglass industry. FPI has been supplying Downstrong® Redbox® Tubing for these wells since 1988. Each strings lasts up to 10 years and is then replaced. There are currently five such wells. Dependent on the particular well, the tubing is 4-1/2, 5-1/2, and 6-5/8, all 2,500 psi rated pressure.



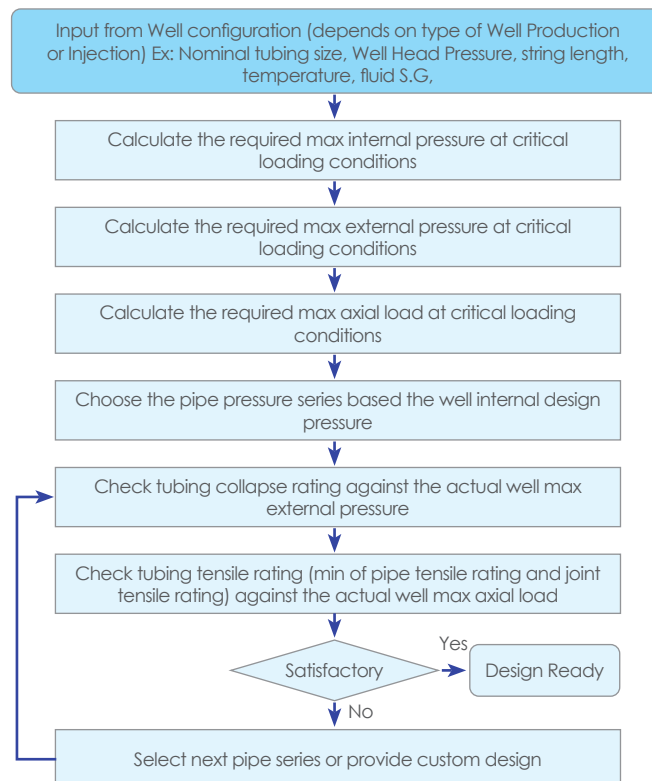
Design Summary

Downstrong® Redbox® Tubing & Casing follows the API specification 15HR for high pressure pipes. However, since API 15HR specification focuses on line pipe, FPI has created its own internal down-hole design to enhance the axial strength of its Downstrong® Redbox® Products to reach a well depth up to 12,000 ft.

All factories producing our Downstrong® Redbox® products comply with the requirements stated in API 15HR, ISO 9001, and API Q1. Few are listed below:

- Service life
- Long term & short term hydrostatic and mechanical strength
- Raw material control
- Manufacturing process
- Process control and quality control
- Visual and dimensional control
- Marking
- Performance verification testing
- Handling, packaging, storing and shipping

Design Methodology For Wellstrong® Redbox® Tubing & Casing



Product Range

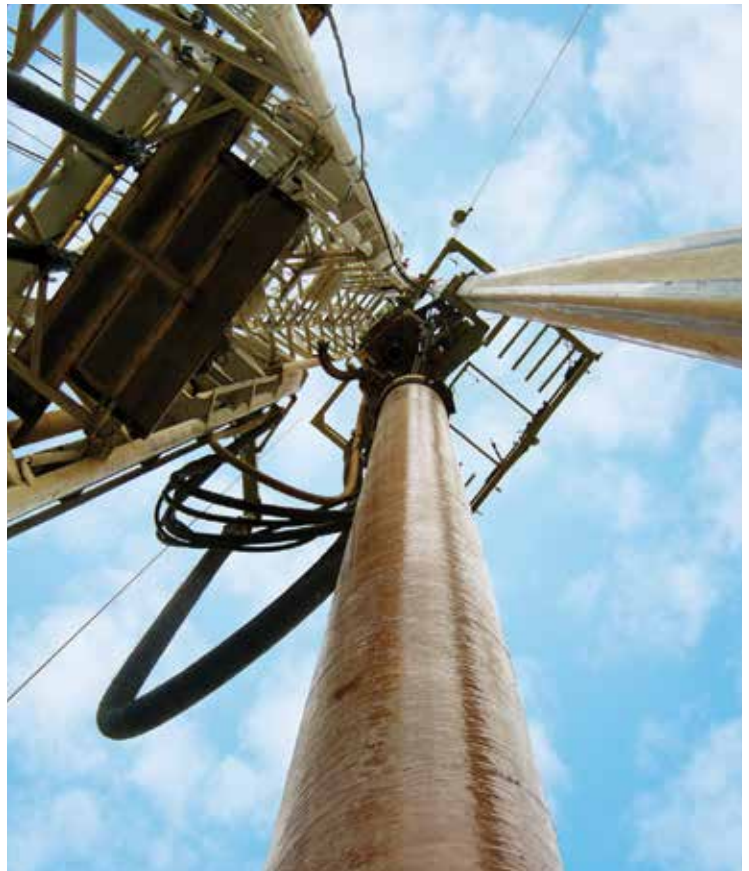
Nominal Pipe Size (Inches)	Pressure Rating (PSI)								
	1000 Series	1250 Series	1500 Series	1750 Series	2000 Series	2250 Series	2500 Series	2750 Series	3000 Series
2-3/8	√	√	√	√	√	√	√	√	√
2-7/8	√	√	√	√	√	√	√	√	√
3-1/2	√	√	√	√	√	√	√	√	√
4	√	√	√	√	√	√	√	√	
4-1/2	√	√	√	√	√	√	√	√	
5-1/2	√	√	√	√	√	√	√		
6-5/8	√	√	√	√	√	√	√		
7	√	√	√	√					
7-5/8	√	√	√	√	√	√	√		
9-5/8	√	√	√	√	√	√	√		
10-3/4	√	√	√	√	√	√	√		
11-3/4	√	√	√	√					
13-3/8	√	√	√	√					
16	√	√	√	√					
18	√	√	√						
20	√	√	√						
24	√	√							

Overview of Installation Method

Downstrong® Redbox® Tubing & Casing incorporate threaded joints wherein the male end (pin) is carefully inserted into the female end (box). After ensuring correct alignment, the pin is rotated into the box until a pre-defined torque is reached. RTR tightening torque levels are significantly lower than those required for steel connections.

Joint sealing is obtained with fiberglass material itself, assisted by the use of a thread compound at the interface of pin and box. Joint installation is relatively fast, wherein it is possible to install up to 800 metres per day for small diameter tubing.

Even though there is a great similarity between RTR Tubing installation and steel tubing installation, RTR differs from steel in its handling techniques. Also the method of Downstrong® Redbox® Tubing & Casing manufacturing results in dimensions that do not always correspond with steel tubular dimensions. Of particular concern are the variations in outside body and upset diameters which do not, in general, correspond with the standard dimensions of steel tubing. RTR dimensions should be used for the proper size selection of down-hole running equipment and tools (Example: elevators, slips, well head, etc.)



Reference List

Future Pipe Industries has been supplying tubing and casing since 1988. The following is a partial listing of some US end users in the past 5 years for production, injection and disposal wells.

Order Date	Product	Business Partner	Item Description	Unit	Order Qty
2016	Blue Box	PB Energy Storage Services Inc	2"	ft	4200
2016	Blue Box	Albemarle	4" & 7"	ft	16680
2016	Red Box	Layne Christensen Company	6", 11", 20"	ft	6712
2016	Red Box	Youngquist Brothers	18"	ft	8910
2016	Red Box	Indesco	2" & 3"	ft	32400
2016	Red Box	Petrobras America Inc	2"	ft	4470
2016	Red Box	Florida Design Drilling Corp	4.5"	ft	2000
2016	Red Box	Boart Longyear Company	4.5"	ft	3000
2016	Red Box	Youngquist Brothers	6", 7", 24"	ft	13176
2016	Red Box	Global Vision General Trading Co	9"	ft	60666
2017	Red Box	Layne Christensen Company	6", 8", 11"	ft	8150
2017	Red Box	SMP	13"	ft	1080
2017	Red Box	Youngquist Brothers	6", 16", 18", 20", 24"	ft	12556
2017	Red Box	Indesco	2", 3", 7"	ft	54900
2017	Red Box	Trinity EOR LLC	3"	ft	1800
2017	Red Box	Class VI Solutions Inc	3.5"	ft	1173
2017	Red Box	Rowe Drilling	6.6"	ft	1850
2017	Red Box	Hole Products	6.6"	ft	1360
2018	Red Box	Layne Christensen Company	5.5" & 10"	ft	12000
2018	Red Box	Youngquist Brothers	4", 4.5", 6", 9", 18"	ft	22830
2018	Red Box	Florida Design Drilling Corp	4.5", 16"	ft	6150
2018	Red Box	Indesco	2", 3", 7" & 9"	pc	2562
2018	Red Box	Salamander Group	4.5"	m	988
2018	Red Box	INOVYN Enterprises Ltd.	4.5" & 9"	m	1760
2018	Red Box	Excelsior Mining Arizona Inc	8"	ft	25390
2018	Downstrong	Saudi Aramco	5.5"	ft	1,500



Order Date	Product	Business Partner	Item Description	Unit	Order Qty
2019	Red Box	Layne Christensen	10", TC-Repai	ft	2700
2019	Red Box	Florida Design Drilling	5.5", 7", 10", 16"	ft	8920
2019	Red Box	Youngquist Brothers	6", 7", 16"	ft	3221
2019	Red Box	All Webb Enterprise	22"	ft	2040
2019	Red Box	Excelsior Mining Arizona Inc	2" & 8"	ft	18000
2019	Red Box	Indesco	2", 3", 7"	pc	2474
2019	Red Box	RW Turner & Sons Pump & Windmill Co.	4.5"	ft	1380
2019	Red Box	AC Schultes	6"	ft	1234
2019	Red Box	Southeast Drilling Services	6"	ft	1400
2019	Red Box	Rowe Drilling	6"	ft	2090
2019	Red Box	Applied Drilling Engineering	6" & 7"	ft	3060
2019	Red Box	CEPSA	7"	m	2640
2019	Downstrong	Saudi Aramco	2-3/8"	ft	2,000
2020	Red Box	All Webb Enterprise	5", 16", 22"	ft	4780
2020	Red Box	Youngquist Brothers	26" RB 1250, TC	ft	19058
2020	Red Box	Indesco	2" & 3.5"	ft	10270
2020	Red Box	Excelsior Mining JCM	3.5"	ft	4000
2020	Red Box	Victoria University of Wellington	3.5"	ft	3280
2020	Red Box	RW Turner Sons & Pump	3" & 4"	ft	4090
2020	Downstrong	Saudi Aramco	11"	ft	7,245
2020	Downstrong	Saudi Aramco	19.7"	ft	3,565
2020	Downstrong	Saudi Aramco	7"	ft	16,000
2021	Downstrong	Saudi Aramco	5.5"	ft	6,000
2021	Downstrong	Saudi Aramco	7"	ft	2,000
2022	Downstrong	Saudi Aramco	2-3/8"	ft	10,000
2022	Downstrong	Saudi Aramco	3.5"	ft	10,000
2022	Downstrong	Saudi Aramco	4"	ft	10,000



