



Exploration & Production

Control Lines & Flatpacks

Flatpacks

ENCAPSULATION & FLATPACKS

Flatpacks are designed to simplify installation and reduce the number of installation spooler units required during well completion. Flatpacks are available in a wide range of configurations with options of single pass encapsulation and dual pass encapsulation for added protection. Individual components and tubes can be color coded and custom printed for immediate identification and if additional crush resistance is needed, bumper bars and /or wire rope can be specified.

APPLICATION

Flatpacks are commonly used when several different lines are terminated at approximately the same depth in the well. Common applications include intelligent well systems, deep-set chemical injection lines with downhole gauge cable and safety valve lines with shallow set chemical injection lines. For some applications bumper bars are also encapsulated into the flatpack to provide additional crush resistance.

STANDARDS & APPROVALS

Control Lines are manufactured according to applicable ASTM standards for each specific material.

Tubes can be supplied flushed, filled, and filtered per client requirements and to the appropriate NAS/SAE standards.

QUALITY & TESTING

- Manufactured in accordance with Standard Inspection and Quality Plans

DESIGN & CONSTRUCTION

- Encapsulation for single and multiple lines
- Optional Bumper Bars
- Safety-Strip® Encapsulation (standard)
- Up to 8 lines can be flatpacked
- Encapsulation profiles to suit customer application
- Custom Line Marking
- Full range of application materials
- Optional Flush & Fill

Components (Or Combination)

- TEC
- TEF
- Hybrid
- Control Lines
- Bumper Bars

Encapsulation Materials

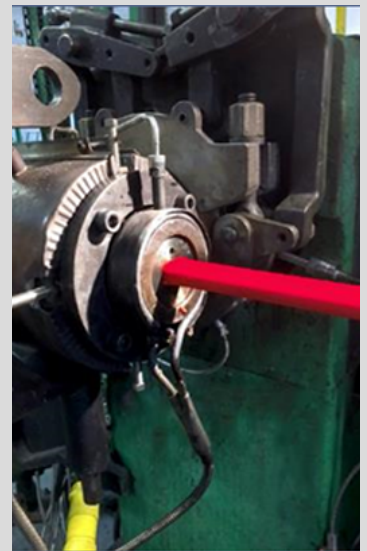
- PP (Polypropylene) /TPR (Santoprene) / PA (Nylon) / PVDF / ETFE (Tefzel) / ECTFE (Halar) FEP / PFA / ECA 3000

Bumper Bars

- 5/16" / 7/16" / 1/4" / 3/8/ Galvanized

Pressure Ratings

*Note: Flatpacks will be rated to the line with the lowest pressure rating.





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Encapsulation is a plastic that is extruded over metal tubes and/or bumper bars. Encapsulation prevents damage to the metal tubes during the manufacturing process. The encapsulation also provides additional abrasion resistance and is required if cable protectors are installed to enhance the holding force over each production tubing connection.

Safety-Strip® Encapsulation

The standard Prysmian Downhole Technology encapsulation design uses the patented Safety-Strip® encapsulation. A continuous tear cord is incorporated into the encapsulation to allow safe and fast removal of the outer jacket without the risk of damage to the underlying tube and significantly improves operator safety, by eliminating the need to use open blades or similar mechanical devices to strip the cable. Safety-Strip® can be supplied on TEC, Fiber Optic Cable, Control Lines, Bumper Bars (wire rope) and Flatpacks. It is available in a full range of configurations with different tube sizes and encapsulation materials. Safety-Strip® is available with single and dual pass encapsulation.

Why Remove Encapsulation?

- Termination to downhole devices
- Dry tree to feed through the tubing hanger and tree
- Terminate to subsea tubing hanger connector
- Splices when the cable has been damaged RIH
- Feed through packers to pass through ports in the packer and to be spliced above the packer
- By-pass slots in tight clearance assemblies
- To split line(s) from a multi line Flatpack to terminate the line at a different setting depth.
- To fit bare cable into sealing slots on swell packers

Single Pass

Each line has a color coated jacket that provides additional coating to the surface of the tube. Color coating eliminates incorrect lines connected.

Dual Pass

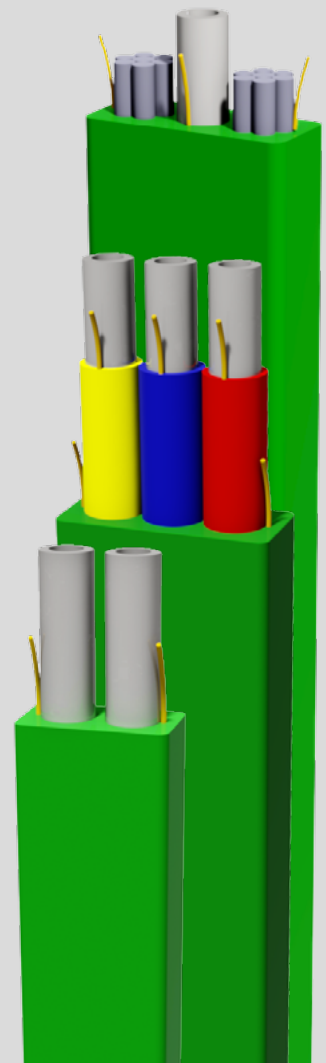
A cost effective solution that provides protection of tubes and bumper bars. Tubes can also be identified in a range of colors. Each tube is encapsulated with a skim coat jacket of plastic prior to being flatpacked to the required profile. The skim coat provides extra protection to the tube with the benefit of protecting the tubes during THE termination process. Color coating eliminates incorrect lines being terminated.

Custom Extrusions

Custom extrusion such as curved or contoured flatpacks may be provided to accommodate the OD of the production tubing.

TEC + CL + FIBER, ETC.

Combination of TEC, TEF, Control Line products, and bumper bars can be encapsulated in a single pass / dual pass profile.





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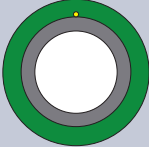
Flatpacks


ENCAPSULATION MATERIALS

MATERIAL	ENCAPSULATION OF DOWNHOLE CABLES, CONTROL LINES, AND FLATPACKS
Polypropylene	To 150°C (302F) for Brine Only
Santoprene	To 150°C (302F) for Brine Only
Nylon	To 150°C (302F) for Hydrocarbons Only
PVDF	To 150°C (302F) for Brine or Hydrocarbons
Halar (ECTFE)	To 175°C (347F) for Brine or Hydrocarbons
Tefzel (ETFE)	To 175°C (347F) for Brine or Hydrocarbons
FEP	To 200°C (392F) for Brine or Hydrocarbons
PFA	To 250°C (482F) for Brine or Hydrocarbons
ECA 3000	To 300°C (572F) for Brine or Hydrocarbons
Galvanized Steel Bumpers	Available

STANDARD ENCAPSULATION PROFILES

Safety-Strip Single Line Encapsulation Profiles

ROUND	ITEM	STANDARD DIMENSIONS
	1/8" Line	0.250" Dia (6.35 mm)
	1/4" Line	0.433" Dia (11.0 mm)
	3/8" Line	0.535" Dia (13.6 mm)
	1/2" Line	0.660" Dia (16.8 mm)

SQUARE	ITEM	STANDARD DIMENSIONS
	1/8" Line	0.250" x 0.250" (6.35 mm x 6.35 mm)
	1/4" Line	0.433" x 0.250" (11.0 mm x 11.0 mm)
	3/8" Line	0.535" x 0.535" (13.6 mm x 13.6 mm)
	1/2" Line	0.660" x 0.660" (16.8 mm x 16.8 mm)

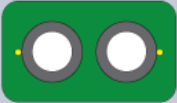


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1/4" FLAT PACK ENCAPSULATION PROFILES

2 LINE DUAL & SINGLE PASS	ITEM	STANDARD DIMENSIONS
	(2) 1/4" Flatpacks	Width: 0.788" (20.0 mm) Height: 0.474" (12.0 mm)
		Width: 0.710" (18.0 mm) Height: 0.410" (10.4 mm)
3 LINE DUAL & SINGLE PASS	ITEM	STANDARD DIMENSIONS
	(3) 1/4" Flatpacks	Width: 1.102" (28.0 mm) Height: 0.474" (12.0 mm)
		Width: 0.990" (25.1 mm) Height: 0.410" (10.4 mm)
4 LINE DUAL & SINGLE PASS	ITEM	STANDARD DIMENSIONS
	(4) 1/4" Flatpacks	Width: 1.416" (36.0 mm) Height: 0.474" (12.0 mm)
		Width: 1.280" (32.5 mm) Height: 0.410" (10.4 mm)

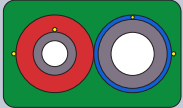
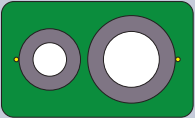



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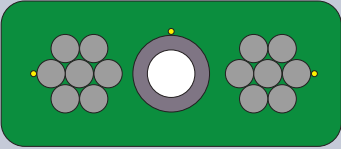
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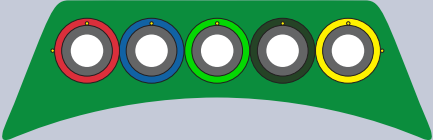
1/4" & 3/8" COMBINATION FLAT PACK ENCAPSULATION PROFILES

2 LINE DUAL & SINGLE PASS	ITEM	STANDARD DIMENSIONS
	(1) 1/4" Flatpacks and	Width: 1.038" (26.4 mm) Height: 0.599" (15.2 mm)
	(1) 3/8" Flatpacks	Width: 0.825" (21.0 mm) Height: 0.535" (13.6 mm)
	(2) 1/4 and (1) 3/8" Flatpacks	Width: 1.285" (32.6 mm) Height: 0.535" (13.6 mm)

FLATPACK WITH BUMPER BARS

CONTROL LINE WITH BUMPER BAR SINGLE PASS	ITEM	STANDARD DIMENSIONS
	1/4" Flatpack with Bumper Bars	Width: 1.417" (36 mm) Height: 0.551" (14 mm)

5 1/2" TUBING - CURVED FLATPACK ENCAPSULATION PROFILE

CURVED FLAT PACK DUAL PASS	ITEM	STANDARD DIMENSIONS
	5-1/2" Profile (5) 1/4" Line Flatpacks	Width: 2.080" (52.8 mm) Height: 0.670" (17.0 mm)