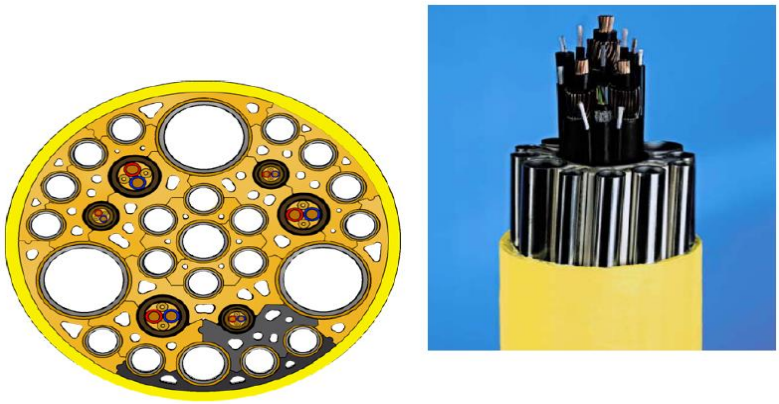
Umbilicals

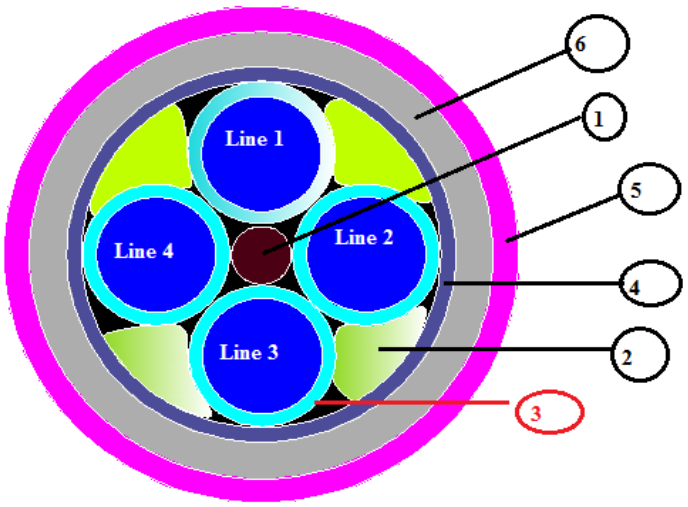
The umbilical system provides a means of robust connection between the topside control facilities and the subsea control elements. The umbilical comprises control lines which are used in the operation, maintenance and control of subsea installations and equipment.
Umbilicals enable control of subsea operations such as the closure of a well from the surface. Depending on the design requirements, umbilicals consist of cores which carry different control signals from the topsides to subsea facilities and vice versa. They also hold chemicals injection cores used directly in the x-tree or flowlines for corrosion control or other requirements as necessary. In addition they can have power and signal lines to provide electrical power to subsea equipment and monitoring respectively.
The umbilical are an assembly of super duplex tubes and cables bound by a polyethylene outer sheathing.
Figure below shows a cross section of umbilical



Cross section of umbilical

1- Main Hydraulic Umbilical

Main umbilical consist of hydraulic and electrical umbilical that the hydraulic one transports control fluids (HP and LP hydraulic) and methanol from the topside facility to the subsea system. The umbilical has a spare umbilical tube.
The umbilical has a steel armor for protection during pull-in operations and for additional protection from fishing activities in the event that the trench –fill should erode over time.
Figure below shows a cross section for a main hydraulic umbilical as follow



Cross section for a main hydraulic umbilical

Table 1The description of the main components of the main Hydraulic umbilical

Position	Description
1	Filler element center
2	Interstices
3	Super duplex steel tube
4	Wrapping
5	Wrapping
6	Inner sheath

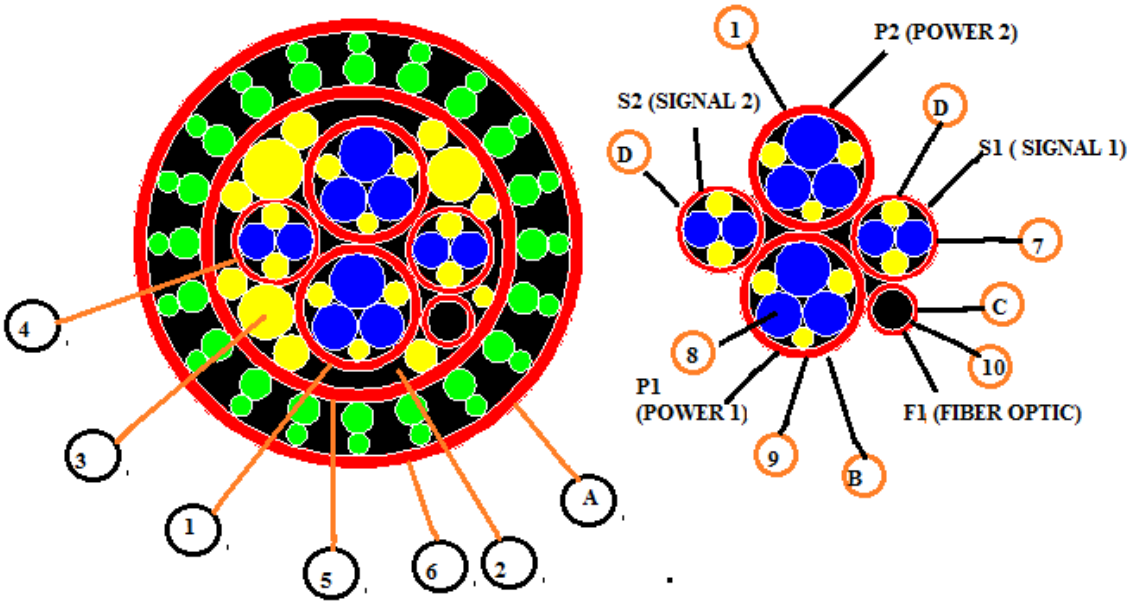
Table 2 The main functions for the main hydraulic umbilical

Line ID	Function	Fluid
1	LP Supply	Transaqua HT
2	HP Supply	Transaqua HT
3	MeoH	Methanol
4	Spare	Transaqua HT

2- Main Electrical Umbilical

The main electrical umbilical conveys power and control signals from the topside facility to the subsea system, this umbilical contains redundant power and signal/control conductors. A fiber optic signal/control cable is included for possible future use. It constructed in one continuous length.

Figure below shows a detailed cross section for main electrical umbilical [**2**]



Detailed cross section for main electrical umbilical

Tables 3 The description of main electrical umbilical's component

Position	QTY	Description
A		**Outer Sheath**
1	2	Power Triple
2	1	Fiber Optic Element
3	23	Fillers
4	2	Signal Pair
5		Wrapping
6		Inner sheath
B	**2**	**Power Triad**
8		Power Conductor
9		Sheath
10		Steel Tube
C	**1**	**Fiber optic element**
7		Sheath
D		**Signal Pair**