XFEL Cabling Requirements of Laser Based Synchronisation

History

Version	Date	Authors	Description
0.01	14.06.2011	M. Bousonville	First Draft
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1 Fibre Optical Cables

1.1 Standard Cables

For all connections SMF (Standard Single-mode Fibres) are used.

		Unit
Fibre type	SMF	
ITU-T Recommendation	G.652.D	
PMD Link Design Value	0.06	ps/√ km
PMD Maximum Individual Fibre	0.1	ps/√ km
Cable Type	Loose tube, Bündelader	

Table 1 Optical fiber cable specification

1.2 PSOF

For some long distant connections special fibres called PSOF (Phase Stabilised Optical Fibres) will be laid additionally.

1.3 Cable Tube

The cables in XTL will be laid in cable tubes. If radiation damage the fibre optical cables or rather the transmission properties they can be replaced by new cables.

1.4 Cable Duct

Our cables have to be laid in the most temperature stable environment. That means for the XTL the marked cable duct in Figure 1.

2 Patch Bay

In the Sync-Hutch 282 connectors are needed. So we want to use 6 patch bays with 48 connectors (=> 288 connections) plus 1 reserve of the type:
19" 1 HE FibereasyRack 24xE2000 kompakt (24er Duplex Variante, Splicebox, ausfahrbar).

3 Connectors

E2000 APC connectors with grade B/1 are used for all connections.

Grade	Insertion Loss (for 97 %) [dB]	Insertion Loss typ. [dB]	Return Loss [dB]	Return Loss typ. [dB]	Max. Power [W]
B/1	< 0.25	< 0.12	> 65	> 85	< 1

Table 2 Specification of the E2000 APC B/1 connector.

4 Cabling

4.1 Cable ducts and trays

In the XTL (tunnel linac) the cable of laser based synchronisation have to be laid in the concrete cable duct. If the special cables (PSOF) are not fits in they can be laid on the cable tray at the other side (see Figure 1).
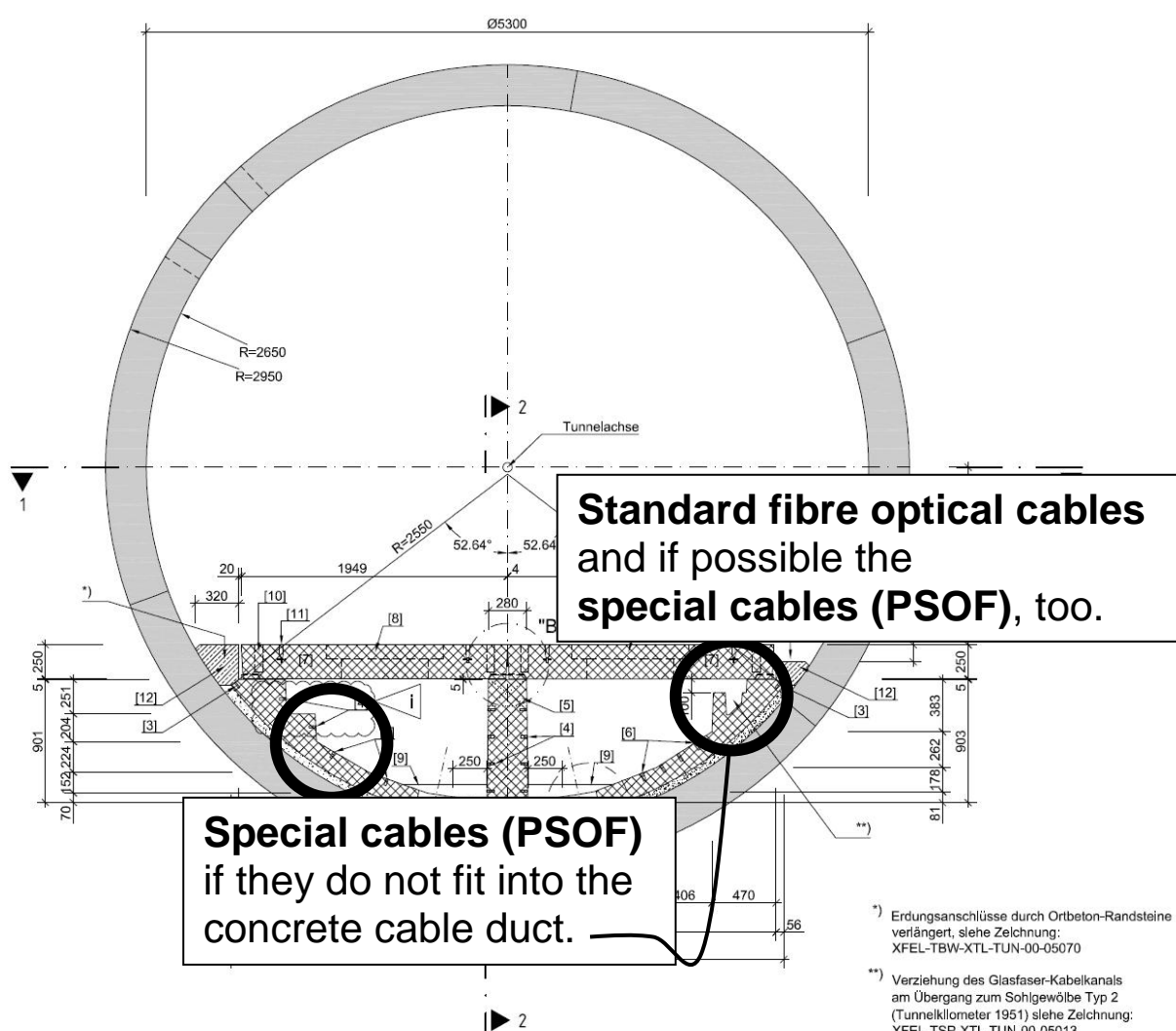
Figure 1 Cable duct in XTL for the fibre optical cables of WP18.

4.2 Cable Runs

The necessary cable runs in XFEL are depicting in Figure 2. These fibre connections are necessary for the following work packages:

 a) Photon Arrival Monitors: WP-74
 b) Lasers: WP-78
 c) All other: WP-18

It is possible to lay additional cables in all racks except the XTL for future applications.

4.3 Number of Fibres per Connection

Per connection 4 fibres are needed (see Table 3).

Connections	Purpose	More precise
1	Pulse transmission	
1	Diagnostic	Spectrum monitoring in Sync-Hutch
1	Diagnostic	Power monitoring in Sync-Hutch
1	Spare	

Table 3 Needed connections per End-Point

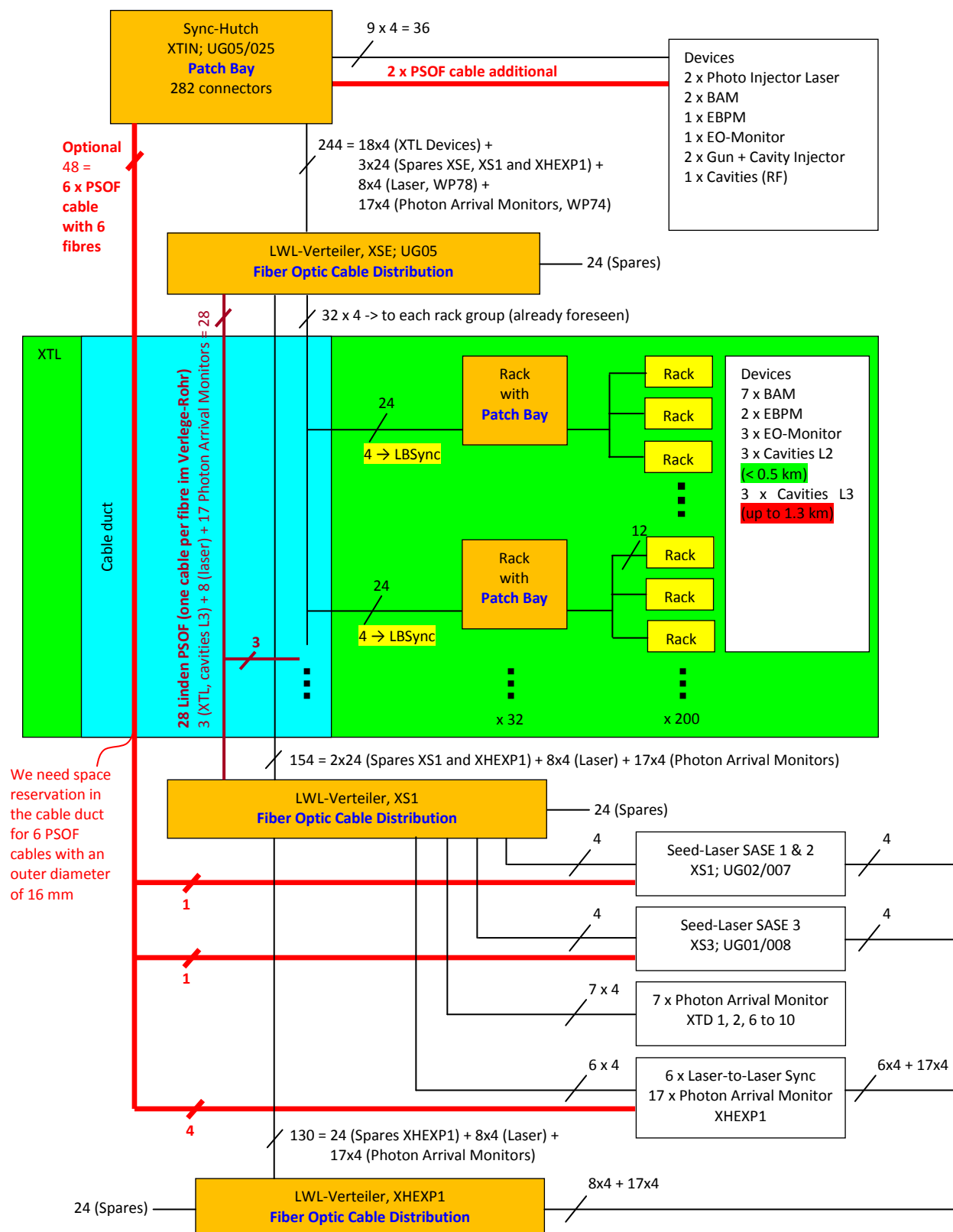# XFEL Cabling Requirements of Laser Based Synchronisation

Figure 2 Cable runs in XFEL