Attenuation Chart (PDF) optical fibres

The **attenuation chart for optical fibers** typically displays signal loss (measured in dB/km) across different wavelengths, with specific attention to standard communication bands. Here's a synthesized overview based on available resources:

Key Features of Optical Fiber Attenuation Charts

1. **Low vs. High OH Fiber**
   - **Low OH fibers** (e.g., "dry fibers") minimize water peak attenuation, enabling low-loss transmission in the **1310–1625 nm range** (common for single-mode fibers)[1].
   - **High OH fibers** exhibit higher attenuation near **1383 nm** due to water absorption[1].
2. **Wavelength-Specific Attenuation**
   - **Standard operating wavelengths**:
     - **850 nm**: ~3 dB/km (multimode fibers)[2].
     - **1310 nm**: ~0.3–0.5 dB/km (single-mode fibers)[3].
     - **1550 nm**: ~0.2–0.25 dB/km (lowest loss for long-haul single-mode systems)[2] [3].
   - **Attenuation spikes** occur at **OH absorption peaks** (e.g., ~1383 nm)[1] [4].
3. **Measurement and Calculation**
   - **Formula**:
     $$\text{Attenuation (dB/km)} = \frac{10}{L} \log_{10} \left(\frac{P_i}{P_o} \right)$$
     where P_i = input power, P_o = output power, and L = fiber length in km[5] [4].
   - **Simulation tools**: Software like OptiSystem can model attenuation by varying fiber lengths and wavelengths[5].
4. **Practical Considerations**
   - **Total link attenuation** accounts for connectors (C), splices (J), and cable length ($L \times \alpha$):
     $$\text{Total Attenuation} = n \times C + c \times J + L \times \alpha + \text{Margin (3 dB)}$$
     (Example: For 1310 nm, α = 0.38–0.5 dB/km)[3].
   - **Guaranteed specifications** for commercial fibers include maximum attenuation per wavelength (e.g., ≤0.4 dB/km at 1310 nm)[6].

Sample Attenuation Data

From experimental results (1550 nm wavelength)[5]:

Length (km)	Input Power (dBm)	Output Power (dBm)	Attenuation (dB/km)
0.5	23.22	19.84	1.366
1	23.22	19.73	0.707
1.5	23.22	19.64	0.484
2	23.22	19.55	0.373
2.5	23.22	19.47	0.305

(Note: Higher attenuation at shorter lengths in this experiment may reflect measurement setup or connector losses.)

How to Access Attenuation Charts

- **Vendor-specific charts**: Molex provides separate charts for Low/High OH fibers[1].
- **Standards documents**: Technical specifications (e.g., OPGW fibers) include guaranteed attenuation values[6].
- **Simulation studies**: Research papers detail wavelength-dependent loss profiles[5] [2].

For precise values, refer to manufacturer datasheets or peer-reviewed measurements tailored to your fiber type.

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1. https://www.molex.com/content/dam/molex/molex-dot-com/en_us/pdf/product-reference-guides/polymicro/user-guidelines/oh_optical_fiber_attenuation_charts.pdf?inline
2. https://www.fibersystems.com/pdf/whitepapers/Basics-of-Fiber-Optics.pdf
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4. http://www.fiberoptics4sale.com/wordpress/optical-fiber-loss-and-attenuation/
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