

Figure 2 – Relevant specified bending radii for ITU-T G.652 and ITU-T G.657

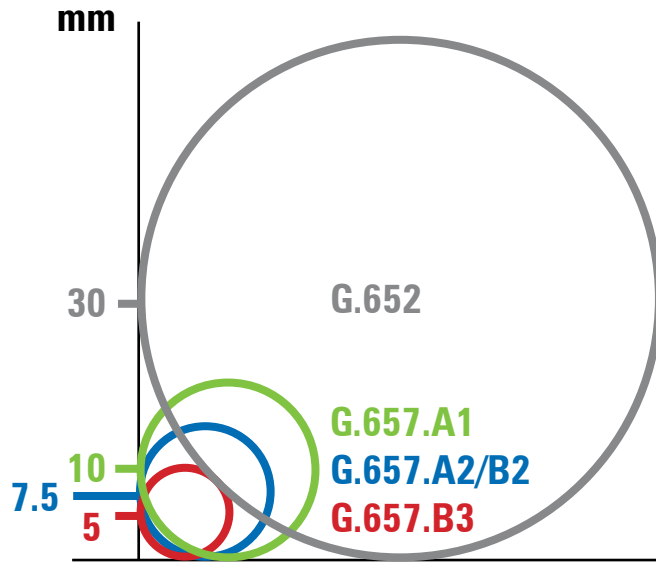
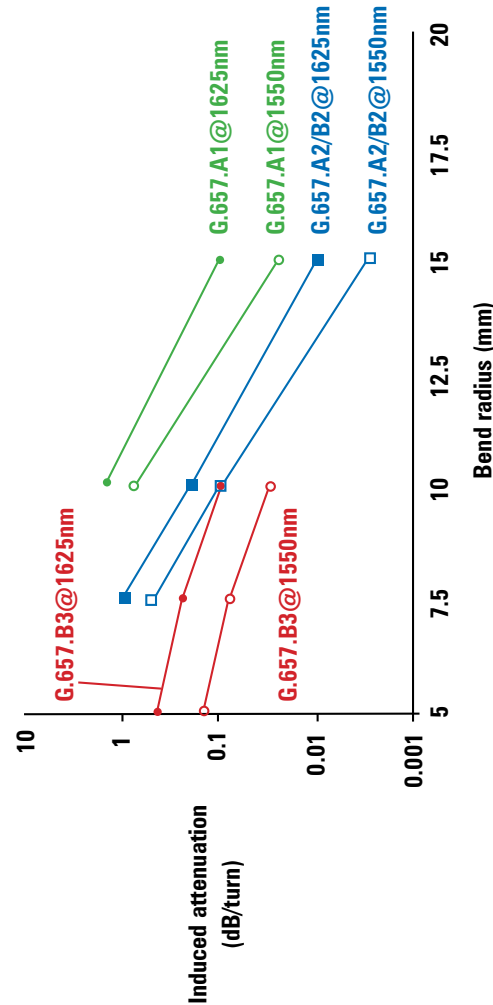


Figure 3 – Macrobending loss limits for ITU-T G.657 fibres



# ITU-T G.657 Fibres:

Bend-insensitive  
single-mode fibres  
for access  
networks and  
customer premises

For more information on optical fibre and cable Recommendation activity, please check the ITU-T Study Group 15 website at: [www.itu.int/ITU-T/com15](http://www.itu.int/ITU-T/com15)

Workshops: [www.itu.int/ITU-T/worksem](http://www.itu.int/ITU-T/worksem)  
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# ITU-T

## The long-time leader in optical single-mode fibre and cable standardization

### Recommendation ITU-T G.657: "Characteristics of a bending-loss insensitive single-mode optical fibre and cable for the Access network"

#### Background and history:

- The roll out of fibre-to-the-home (FTTH) networks has been of global importance since the early 2000s, requiring a dedicated single-mode fibre cable Recommendation.
- Operators and manufacturers jointly worked on swift introduction of this Recommendation in 2006 and its updates in 2009 and 2012.
- Since its introduction, ITU-T G.657 optical fibre cables have seen a steady increase in the total optical fibre cable market.

#### Benefits:

- ITU-T G.657 optical fibre cable offers flexible characteristics for easier deployment in streets, buildings and homes.
- ITU-T G.657 optical fibre cable reduces the roll-out cost for operators and the total cost of ownership (TCO) of an FTTH network.
  - Increased flexibility in optical fibre cables, allowing improved installation in tight corners of buildings.
  - Smaller cabinets, pedestals, enclosures and terminations, which are important where space is at a premium. (e.g., in apartment buildings).
  - More engineer-friendly installation leading to less re-work.

#### Main aspects / attributes:

- **ITU-T G.657** is split into two main parts:
  - Category A fibres for Access networks.
  - Category B fibres for short distances at the end of Access networks in bending-rich environments (e.g., buildings).
- Each category (A and B) is divided into two sub-categories:
  - **G.657.A1** and **G.657.A2**
  - **G.657.B2** and **G.657.B3**
- These sub-categories have the following minimum specified bending radii:
  - **G.657.A1:** 10 mm
  - **G.657.A2** and **G.657.B2:** 7.5 mm
  - **G.657.B3:** 5 mm
- **ITU-T G.657.A1** and **ITU-T G.657.A2** fibres are fully compliant with **ITU-T G.652.D** fibres.
  - Compliance here means adherence to the referenced Recommendation (**ITU-T G.652, category D**) meeting or exceeding the values of the specified attributes.
- **ITU-T G.657.B2** and **ITU-T G.657.B3** fibres are fully compatible with **ITU-T G.652.D** fibres (only small differences in chromatic dispersion and polarization mode dispersion (PMD)).
  - Compatibility here means that these fibres will introduce negligible system impairment or deployment issues, but may not be compliant to the referenced Recommendation (**ITU-T G.652.D**).

Additionally, another favoured application is in central offices where **ITU-T G.657** fibres mitigate the risk of communication failure and/or high power damage under inadvertent bending. Care needs to be taken to not impact long-term reliability. Examples of the relationship between minimum bend radius and maximum power can be found in IEC TR62547.

Figure 1 – Structure of ITU-T G.657 (2012)

G.657 (2012)	
For access networks G.652.D compliant all bands 1260-1625nm	For end of Access networks (e.g., in/near buildings) G.652.D compatible all bands 1260-1625nm
<b>A1</b> $R_{min} = 10 \text{ mm}$	<b>B2</b> $R_{min} = 7.5 \text{ mm}$
<b>A2</b> $R_{min} = 7.5 \text{ mm}$	<b>B3</b> $R_{min} = 5 \text{ mm}$