**BHUTAN STANDARD**

**Polyethylene greenhouse – Basic requirement**



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**BHUTAN STANDARDS BUREAU**

The National Standards Body of Bhutan

THIMPHU 11001

1. **Scope**

This standard specifies the basic requirement for polyethylene greenhouse commercially available.

1. **Normative reference**

For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

1. IS 14462.1997 layout design and construction of green house
2. IS.15827.2009 plastic film for green house
3. Technical Standard for green house
4. ISO\_4591\_1992(E) Plastics - Film and sheeting -Determination of average thickness of a Sample, and average thickness and yield of a roll, by gravimetric techniques
5. ISO\_4592\_1992(E) Plastics - Film and sheeting -Determination of length and width
6. ISO 4593: 1993(E) Plastics - Film and sheeting -Determination of thickness by mechanical scanning.
7. ISO\_7765-1\_1988(E) Plastics film and sheeting - Determination of impact resistance by the free-falling dart method
8. ISO\_FDIS\_527-1(E) Plastics — Determination of tensile properties
9. ISO\_FDIS\_527-3(E) Plastics — Determination of tensile properties
10. **Definition**

For the purpose of this standard, the following definition shall apply:

* 1. **Green house**

Green house is a structure in which plants requiring regulated climatic condition are grown.

* 1. **UV radiation**

A form of [electromagnetic radiation](https://en.wikipedia.org/wiki/Electromagnetic_radiation) with [wavelength](https://en.wikipedia.org/wiki/Wavelength) from 10 to 400 [nm](https://en.wikipedia.org/wiki/Nanometre).

* 1. **Film (Plastic)**

Is a term to describe polyethylene, copolymers plastic, polyvinyl plastics or polycarbonate plastic that are used for sheeting.

* 1. **Clear film**

Sheeting having light transparency more than 85%.

* 1. **Thermic film**

Plastic films that block infrared (7-14µm) radiation.

* 1. **Diffusion film**

Plastic film that are used when the temperature gradient is very large.

* 1. **Anti-drip**

A property that reduces surface tension allowing condensation to flow rather than form droplets.

* 1. **Anti-fog**

A property prevents condensation of water from forming small droplets on the surface of plastic.

* 1. **GSM**

The measurement of mass per unit area and expressed as g/m2

* 1. **Diffusivity/Haze**

A measure of the percentage of light rays at which it can spread through a film.

* 1. **Photosynthesis active radiation (PAR)**

The visible portion of spectrum from 400 to 700nm regarded as being critical for proper plant growth.

* 1. **Infrared rays**

The portion of spectrum more than 700 to nm (Specify Range) which is used for heating greenhouse.

* 1. **UV rays**

The portion of spectrum less than 400nm (Specify Range) which is responsible for degradation of properties of greenhouse plastic film.

* 1. **Elasticity**

The tendency of a material to return to its natural size and shape after removal of deforming load.

* 1. **Elongation**

The increase in length of a material being loaded in tension.

1. **The general standard for greenhouse shall cover;**
	1. Structure requirement
	2. Properties requirement
	3. Test sample
	4. **Structure requirement**
		1. Footing should be set to the minimum depth of (verify footing) (SC) 600mm below the ground surface.
		2. Distance between the vertical poles shall be maintained 500mm apart with a material thickness of <1.2mm and 1000mm apart with >1.2 mm thickness.
		3. Structure shall be equipped with minimum of 5 supporting purlins and 4 arch support at each corner.
		4. The greenhouse rafter, end walls, side post and purlins shall be corrosion resistance (Galvanize coating).
		5. Each member of roof should be capable of supporting 45kg of concentrated load when applied at center.
	5. **Properties requirement**
		1. Different types of plastic shall have minimum elongation of 30% (steady load) with application of 4 Mpa load for the duration of 100 h.
		2. Different types of plastic shall have elongation of 400-500% (at break) with application of 4 Mpa load.
		3. Different types of plastic for greenhouse shall have a light diffusivity (Haze) of 25-35%.
		4. Different types of plastic for greenhouse shall have a visible light transmittance of 80-90%.
		5. Different types of plastic for greenhouse shall have a IR effectiveness of 65-70%.
		6. Different types of plastic for greenhouse shall have UV stabilizer/absorber.
		7. Film of greenhouse shall have Anti-drip and anti-fog properties.
		8. Photosynthesis Active Radiation (PAR) shall be 400-700nm.
		9. GSM of plastic material shall be >140.
	6. **Test sample**

4.6.1 Test sample shall be on new film and structure of polyethylene greenhouse. It shall be adjusted and prepared as per the test requirements.