



# Technical Approval

SINTEF Building and Infrastructure confirms that

## BIIG 4mm, BIIG 4mm HP, BIIG 5mm and BIIG 5mm HP

meets the provisions regarding product documentation given in Norwegian building regulations, with properties, fields of application and conditions as stated in this document

### 1. Holder of the approval

IIGO Srl.  
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### 2. Manufacturer

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### 3. Product description

BIIG 4mm, BIIG 4mm HP, BIIG 5mm and BIIG 5mm HP are single sheet roofing membranes made of APP modified bitumen, reinforced with composite polyester stabilised with longitudinal glass fibres. BIIG 4mm and 5mm are produced with 55 g/m<sup>2</sup> glass fibers and 150 g/m<sup>2</sup> polyester reinforcement. BIIG 4mm HP and 5mm HP are produced with 55 g/m<sup>2</sup> glass fibers and 250 g/m<sup>2</sup> polyester reinforcement. The lower face has a thin plastic film which melts off when the joints are welded. Measures and tolerances for the membranes are shown in Table 1.

Table 1  
Dimensions and tolerances for BIIG 4, 4 HP, 5 and 5 HP

Property	BIIG				Unit	Tolerance
	4mm	4 HP	5mm	5 HP		
Thickness	4	4	5	5	mm	± 5 %
Weight	4,25	4,9	5,7	5,9	kg/m <sup>2</sup>	± 5 %
Width	1,1	1,1	1,1	1,1	m	± 1 %
Roll length	7,27	7,27	7,27	7,27	m	-0/+2 %
Weight reinforcement	205	305	205	305	g/m <sup>2</sup>	-0/+2 %

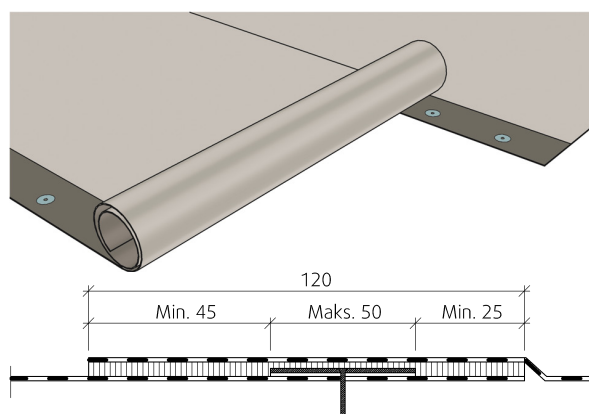


Fig. 1  
BIIG 4mm, BIIG 4mm HP, BIIG 5mm and BIIG 5mm HP mechanically fastened in a 120mm welded side overlap

### 4. Fields of application

BIIG 4mm, BIIG 4mm HP, BIIG 5mm and BIIG 5mm HP flexible roofing membranes are used as single layer membranes for covering sloping and flat roofs.

The systems are designed specially for use as mechanically fixed single layer roofing membranes. See fig. 1.

The slope of the roof must be sufficient to allow rain and melting water to drain away. SINTEF Building and Infrastructure recommends a slope of at least 1:40 for all roofs.

In general BIIG 4mm, BIIG 4mm HP, BIIG 5mm and BIIG 5mm HP flexible roofing membranes can be used for accessible and non accessible roofs, green roofs, terrace roofs and parking roofs. For green roofs, terrace roofs and parking decks the HP version is recommended.

### 5. Properties

#### Material properties

Product properties for fresh material are shown in Table 2.

Table 2

Product properties for fresh material of BIIG 4mm, 4mm HP, 5mm and 5mm HP single layer bituminous roofing membranes.

Property	Test method	Control limit <sup>1)</sup>				Unit
		BIIG 4	BIIG 4 HP	BIIG 5	BIIG 5 HP	
Dimensional stability (L/T)	EN 1107-1:1999	± 0,25	± 0,25	± 0,25	± 0,25	%
Flexibility at low temperature	EN 1109-1:1999	≤ -20	≤ -20	≤ -20	≤ -20	°C
Flow resistance at elevated temperature	EN 1110:1999	≥ 120	≥ 120	≥ 120	≥ 120	°C
Water tightness 10 kPa/24 h	EN 1928:2000 (A)	Tight	Tight	Tight	Tight	-
Adhesion of granules	EN 12039:2000	no granules used on this products				%
Resistance to tearing, nail shank	L T EN 12310-1:2000	≥ 200 ≥ 240	≥ 250 ≥ 270	≥ 200 ≥ 240	≥ 250 ≥ 240	N
Tensile strength	L T EN 12311-1:2000	≥ 700 ≥ 600	≥ 700 ≥ 600	≥ 870 ≥ 830	≥ 870 ≥ 830	N/50 mm
Elongation	L T EN 12311-1:2000	≥ 35 ≥ 35	≥ 35 ≥ 35	≥ 35 ≥ 35	≥ 35 ≥ 35	%
Average peel resistance of joints	L T EN 12316-1:2000	≥ 50 ≥ 50	≥ 50 ≥ 50	≥ 50 ≥ 50	≥ 50 ≥ 50	N/50 mm
Shear resistance of joints	L T EN 12317-1:2000	≥ 600 ≥ 600	≥ 600 ≥ 600	≥ 700 ≥ 700	≥ 700 ≥ 700	N/50 mm
Resistance to puncturing	Impact +23 °C Impact -10 °C Static load EN 12691:2006 (A) EN 12691:2001 EN 12730:2001 (A)	≥ 1500 ≤ 30 ≥ 20	≥ 1500 ≤ 30 ≥ 20	≥ 1500 ≤ 30 ≥ 20	≥ 1500 ≤ 30 ≥ 20	mm mm diam. kg
Watertightness after stretching at low temperature, (10% at -10 °C)	EN 13897:2005	Tight	Tight	Tight	Tight	-

<sup>1)</sup> The declared values are control limits both for internal control at the producer and for supervising control. If nothing else is mentioned, the control limits concern both direction of the product where relevant.

#### Properties related to fire

BIIG 4mm, BIIG 4mm HP, BIIG 5mm and BIIG 5mm HP fulfils the requirements of class B<sub>ROOF</sub> (t2) according to EN 13501-5 as shown in table 3. The products have been tested in accordance with CEN/TC 1187-2.

Table 2

BIIG single sheet roofing membranes achieves reaction-to-fire classification B<sub>ROOF</sub> (t2) on the following substrates

Substrate	BIIG single sheet
EPS	Yes
Rock wool	Yes
Wooden sheeting	Yes
Concrete	Yes
Reroofing on old membrane on EPS	Yes
Reroofing on old membrane on rock wool	Yes
Reroofing on old membrane on wooden sheeting	Yes
Reroofing on old membrane on concrete	Yes

#### Durability

BIIG 4mm, BIIG 4mm HP, BIIG 5mm and BIIG 5mm HP has shown satisfying properties after artificially ageing based on both type testing and annual control testing. In

respect of that the product has no granules on top it is also satisfactorily tested after longtime UV-radiation ageing over 5 000 hours according to EN 4892-2.

#### Calculation of fasteners

The capacity for anchoring the membrane with different fasteners is shown in table 4 and applies to the connection between the membrane and the fastener according to EN 16002. For weak underlays the connection between the underlay and the fastener might limit the capacity. This must be considered. The lowest value for membrane/underlay must always be used. Calculation of fastener spacing is carried out according to SINTEF Building Research Design Sheet no. 544.206 and "TPF Informs No. 5".

Table 4

Design capacities ( $\gamma_M=1,3$ ) at ultimate limit state for fastening in BIIG single sheet membranes as shown in figure 1.

Fastener / screw	Capacity (N/psc)
Eurofast DVP-EF-5010N / Eurofast EDS-S-48120	550
Eurofast DVP-EF 8040D / Eurofast EDS-S-48120	680
Guardian RP-45 / Guardian BS-4,8	900
SFS intec RP-45 / SFS intec BS-4,8	900

## 6. Environmental aspects

### *Substances hazardous to health and environment*

BIIG 4mm, BIIG 4mm HP, BIIG 5mm and BIIG 5mm HP are containing no hazardous substances with priority in quantities that pose any increased risk for human health and environment. Chemicals with priority include CMR, PBT or vPvB substances.

### *Effect on soil, surface water and ground water*

The leaching properties of the products are evaluated to have no negative effects on soil or ground water.

### *Waste treatment/recycling*

BIIG 4mm, BIIG 4mm HP, BIIG 5mm and BIIG 5mm HP shall be sorted as mixed waste on the building/demolition site. The products shall be delivered to an authorized waste treatment plant for energy recovery.

### *Environmental declaration*

No environmental declaration (EPD) has been worked out for BIIG 4mm, BIIG 4mm HP, BIIG 5mm and BIIG 5mm HP.

## 7. Special conditions for use and installation

### *Fasteners*

Fastening with ordinary steel washers in longitudinal overlaps may be used on firm underlays such as wood-based sheathing or concrete.

On underlays of thermal insulation with good compression strength, such as expanded polystyrene (EPS) with compression strength of at least 80 kN/m<sup>2</sup> (level CS (10) 80 according to EN 13162/13163), steel washers with deep collars or telescopic plastic washers should be used.

Fasteners with good telescopic effect must be used when the membrane is installed on thermal insulation materials with lower compressive strength. The tightening of the fasteners must be specially checked.

### *Installation*

The joints of BIIG 4mm, BIIG 4mm HP, BIIG 5mm and BIIG 5mm HP are torched or hot air welded, and shall be installed in accordance with the principles shown in SINTEF Building Design Sheets 544.203, 544.204 and 544.206 and in "TPF informs No. 5".

Mechanical fasteners shall be placed at welded overlaps with a minimum width of 120 mm. The fasteners must be positioned at a distance from the membrane edges that provides minimum 25 mm bonding on the inside and minimum 45 mm bonding on the outside of the fastener, see fig. 1.

Transverse joints must have a 150 mm overlap. The underlying corner is fastened, and the overlying corner is cut at an angle. A good result is achieved by 'drowning' the surfaces in bitumen before the joint is fully welded.

### *Underlay*

When a fire classification is required the underlay must be in accordance with the provisions stated in section 5 "Properties related to fire".

For re-roofing on old roofing that contains softeners as for example PVC a separate migration barrier of approximately 150 g/m<sup>2</sup> polyester felt has to be used.

### *Traffic on the roof*

Special precautionary measures should be taken to protect the roofing membrane if the roof is expected to have more traffic than is necessary for inspection and maintenance purposes only.

### *Maintenance*

Before repairing the roofing membrane, the surfaces have to be cleaned before welding starts.

### *Storage*

BIIG 4mm, BIIG 4mm HP, BIIG 5mm and BIIG 5mm HP must be stored in an upright position.

## 8. Factory production control

Manufacturing of BIIG 4mm, BIIG 4mm HP, BIIG 5mm and BIIG 5mm HP is subject to supervisory factory production control at PLUVITEC S.p.A. according to contract between SINTEF Building and Infrastructure and Takringen AS; Drammen; Norway concerning Technical Approval.

PLUVITEC S.p.A. has a qualitymanagementsystem which is certified according to ISO 9001. PLUVITEC S.p.A. is also certified according to ISO 14001 and OHSAS 18001.

## 9. Basis for the approval

Productproperties have been determined by initial type testings on fresh and aged material, audit testing under annual control, documented in following reports:

- VTT Finland, Rapport VTT-S-337-07, datert 2007-01-15, Branntest. -
- KIWA Netherlands, Rapport K14350/03, datert 2007-04-01, Typetesting
- VTT Finland, Rapport VTT-S-10828, datert 2008-12-10, Kontrolltesting
- KIWA Netherlands, Inspeksjonsrapport, datert 2009-06-03, Kontrolltesting
- MFPA L Germany, Rapport P-SAC02/5.1/08-222, datert 2010-02-11, Typetesting
- MFPA L Germany, Rapport P-SAC02/5.1/08-223, datert 2010-02-11, Typetesting
- MFPA L Germany, Rapport 02/5.1/08-224, datert 2010-02-26, Typetesting
- TUM Germany, Rapport 51-10-0012/001, datert 2010-07-15, Kontrolltesting
- TUM Germany, Rapport 51-10-0012/002, datert 2010-07-15, Kontrolltesting
- SINTEF Norway, Rapport 3D1088.02, datert 2011-08-26, Punktering mot slag ved -10°C

- BDA Keur Netherlands, Rapport 0368-L-12/1, datert 2012-11-05, Testing av vindmotstand
- CONSTRUCTECH Sverige, Rapport 20140429-18-1, datert 02.05.2014, Testing av vindmotstand
- CONSTRUCTECH Sverige, Rapport 201404229-18-12, datert 02.05.2014, Testing av vindmotstand

#### 10. Marking

Materialwrapping shall be marked with product description and production date.

The approval mark for SINTEF Technical Approval No. 20142 may also be used.



Approval mark

#### 11. Liability

The holder/manufacturer has sole product responsibility according to existing law. Claims resulting from the use of the product cannot be brought against SINTEF beyond the provisions of Norwegian Standard NS 8402

#### 12. Technical management

Project manager for this approval is Holger Halstedt, SINTEF Building and Infrastructure, dep. Materials and Structures, Trondheim.

for SINTEF Building and Infrastructure

Hans Boye Skogstad  
Approval Manager