

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Sandwich Adhesives

with type designation(s)

NORPOL® FI-177 and NORPOL® FI-177-10

Issued to

Reichhold AS

SANDEFJORD, Norway

is found to comply with

DNV GL class programme DNVGL-CP-0085 – Type approval – Sandwich adhesives

DNV GL rules for classification – High speed and light craft

Det Norske Veritas Standards' for Certification No. 2.21, Craft, 2010

Det Norske Veritas' Standards for Certification No. 2.20, Lifeboats and Rescue Boats, 2007

Application :

Grade 1 sandwich adhesive for use according to stated Rules/Standards. The use in hull structures will be evaluated during approval of classified objects.

Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.

This Certificate is valid until **2021-08-18**.

Issued at **Høvik** on **2016-08-19**

DNV GL local station: **Sandefjord**

Approval Engineer: **Gisle Hersvik**

for **DNV GL**

Martin Strande
Head of Section

This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid. The validity date relates to the Type Approval Certificate and not to the approval of equipment/systems installed.

Job Id: **262.1-004557-3**
Certificate No: **TAK00000FB**

Product description

NORPOL® FI-177, with variant **NORPOL® FI-177-10**; Light weight sandwich adhesive (filler) based on isophthalic polyester resin, for filling joints between core materials.

According to the information received from the manufacturer, NORPOL® F1-177 has the following mechanical properties:

Property	Test Method	Results			
Flatwise tensile strength, +20 °C	ASTM C 297	min.	8,4	MPa	1)
Flatwise tensile strength, +45 °C	ASTM C 297	min.	6,8	MPa	1)
Water resistance: Retained strength after 4 weeks in sea water	ASTM C 297	min.	8,4	MPa	1)
Tensile strength, -10 °C	ISO 527	min.	13	MPa	2)
Tensile strength, 0 °C	ISO 527	min.	12	MPa	2)
Tensile strength, +23 °C	ISO 527	min.	11	MPa	2)
Tensile strength, +50 °C	ISO 527	min.	5	MPa	2)
Ultimate tensile strain, -10 °C	ISO 527	min.	1,6	%	2)
Ultimate tensile strain, 0 °C	ISO 527	min.	1,8	%	2)
Ultimate tensile strain, +23 °C	ISO 527	min.	3,8	%	2)
Ultimate tensile strain, +50 °C	ISO 527	min.	10,0	%	2)
Shear strength, +23 °C	ASTM D 2733-70	min.	5,5	MPa	
Linear shrinkage	-		1,6	%	3)
Viscosity	-				4)
Density, +23 °C	ISO 2811				5)

Notes:

1) Obtained between laminates.

2) Tensile strength and strain values may be lower in real life applications due to pores, etc.

3) ± 0,1 %.

4) Viscosity, Brookfield HBT sp. B/5 rpm: 120000 - 190000 cps.

5) Density: 580 - 630 kg/m³.

Manufactured by

Reichhold AS, Øraveien 8/19, NO-1630 Gamle Fredrikstad, Norway

DNV GL local station: Sandefjord

Reichhold Srl, Via Romagnoli 23, 43056 San Polo di Torrile (Parma), Italy

DNV GL local station: Milan

Responsibility

The Company (stated on the front page of this Certificate) takes the responsibility that both design and production are in compliance with Rules, Standards and/or Regulations listed on page 1 of this certificate.

Application/Limitation

The tensile elongation at -10°C is below DNV GL Rules requirement of 2.0%, and the use in hull structures will therefore be evaluated during approval of classified objects.

Type Approval documentation

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.

Tests carried out

Type Testing carried out according to **Type Approval documentation**.

Marking of product

Product shall be marked with *manufacturer's name, place of production, batch no./date of production* and *type designation*.

The marking is to be carried out in such a way that it is visible, legible and indelible. The marking of product is to enable traceability to the DNV GL Type Approval Certificate.

Periodical assessment

The scope of the Periodical Assessment is to verify that the conditions stipulated for the Type Approval is complied with and that no alterations are made to the product design or choice of materials.

Periodical Assessment to be performed after 2 years (Certificate Retention) and at renewal after 5 years (Certificate Renewal).

The main elements of the Periodical Assessment are to:

- Ensure that **Type Approval documentation** is available.
- Review design, materials, production process, and performance with respect to possible changes, in order to ensure compliance with **Type Approval documentation** and/or referenced material specifications.
- Ensure traceability between manufacturer's product marking and the DNV GL Type Approval Certificate.

END OF CERTIFICATE