



## APPROVAL CERTIFICATE FOR MANUFACTURING PROCESS

**Certificate No.** : SEL34005-VP001

**Initial Approval** : 26th August, 2016

**Product** : Acrylic Viewport

**Manufacturer** : KOA Tech. Ltd.

173, Bonghyeon-ro, Jinjeop-eup, Namyangju-si, Gyeonggi-do, Korea

**Product Description:** Acrylic Viewport for Submersible

See "Appendix 1"

**Approval Condition:** See "Appendix 1"

**THIS IS TO CERTIFY** that the manufacturing process for the above mentioned product has been approved in accordance with the relevant requirement of this Society's Rules and / or of the recognized standards as follows and entered in the "List of Approved Manufacturer and Type Approved Equipment".

Ch. 3, Sec. 1 of the Guidance for Approval of Manufacturing Process and Type Approval, etc., Ch. 5, Sec. 3 of the Rules and Guidance for the Classification of Underwater Vehicles and Manufacturer's Specification.

This Certificate is valid until 25th August, 2021

Issued at Busan, Korea on 26th August, 2016



**KOREAN REGISTER OF SHIPPING**

*General Manager of  
Marine & Ocean Equipment Team*

*Note : 1 : The approval will be automatically suspended and the Certificate become invalid from the expiry date of the Certificate in the event that the extension has not been granted or the renewal of the Certificate is not underway.*

*2 : The manufacturer should notify this Society of any modification or changes that may affect the validity of this Certificate.*

Appendix 1

## Product Description and/or Approval Condition

Certificate No : SEL34005-VP001

Date of Issue :26th August, 2016

1. Product Description : Acrylic Viewport for Submersible

- Materials of construction : MMA (Methyl Methacrylate Monomer)  
PMMA (Poly Methyl Meta Acrylate)

2. Specification

The following specified values have been verified by testing.

Property	Test method	Specified Values
Ultimate tensile strength, Elongation at break, Elastic modulus	ASTM D638	$\geq 62$ N/mm <sup>2</sup> $\geq 2$ % $\geq 2760$ N/mm <sup>2</sup>
Compression yield strength, Elastic modulus	ASTM D695	$\geq 103$ N/mm <sup>2</sup> $\geq 2760$ N/mm <sup>2</sup>
Flexural strength	ASTM D790	$\geq 97$ Mpa
Compressive deformation subject to 27.7 N/mm <sup>2</sup> at 50°C for 24 hours	PVHO-1	$\leq 1$ %
Ultraviolet rays penetration ratio	ASTM E308	$\leq 5$ %
Visual clarity	PVHO-1	Clear and readable
Total residual monomer Methyl Methacrylate	PVHO-1	$\leq 1.6$ %

3. Approval Condition

- 1) This approval is granted on the basis of test results witnessed by the Surveyor and test report No.59431 dated on 12th Apr. and 16th Jun. 2016 from Smithers Rapra in UK.
- 2) Each casting shall be made by marking at least on the position a manufacturing number, manufacturer's name, dates constructed and a serial number.
- 3) At the edge of the viewports not to be put under the stress, the viewports shall be permanently marked with design pressure, design temperature, approved stamp by the Society and serial number with date, but not use of punching.
- 4) The manufacturer should inform this Society of any changes to the product construction.
- 5) This approval does not cover the characteristics such as service life and environmental properties, etc. other than specified value.
- 6) The manufacturer shall issue the material certificates according to Ch. 5, Sec. 3, 302.2 of the Guidance for the Classification of Underwater Vehicles.
- 7) The products should be manufactured according to approved drawings of each vehicle.
- 8) Individual Product Certification is required with all tests for each Lot No. or project.

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