BUREAU VERITAS INDUSTRY & FACILITIES

H₂ READY CERTIFICATE n° 01/25/GS/sb_rev.00

1. General:

Name and address of the Manufacturer factory: ALFA ENGINEERING SOC. COOP – via W.A. Mozart, 91 - 41122 Modena (MO) Italy.

Type(s) of product manufactured: Monolithic insulation joint, from PN10 to PN100, family type "Monolithic insulation joint (MIJ) Hydrogen Ready".

H₂ Ready tests as per ALFA ENGINEERING certificate: CF_MIJ_HYDROGEN-READY of 01/04/2025.

2. Type Approval scope:

Hydrogen technical compliance verification and issuance of H_2 ready certificate for the use of the product in natural gas mixtures with hydrogen percentage up to 100% pure hydrogen at 100 bar max.

To check the material compatibility, the considered tests are made with samples of the same material in a reference environment (N_2) to obtain a mean value of the tensile stress at the notch (NTSR), and in hydrogen environment to obtain NTSH. If the ratio RNTS= NTSH/NTSR is bigger than 0,50 the material is considered eligible for qualification use.

3. Type description:

Tested product:

Monolithic insulation joint PN100, family type MIJ 100% H_2 - general arrangement drawing n° DW_MIJ_HYDROGEN-READY_Rev.01* – s.n. P01.

- Materials considered:
 - o carbon steel API 5L X65;
 - o carbon steel ASTM A694 F65;
 - VERMILION[®] FIVE (James Walker HNBR compound);
 - NEMA G11 ASTM D 709 insulator;
 - Synertech HNBR 70.
- Operating conditions :
 - Up to 100 % hydrogen;
 - Design temperature: -40°C ÷ +150°C;
 - o Design pressure of the equipment: max. 100 bar.



4. Conclusion:

Following documental review and witness of hereafter tests:

Leak Test made on Monolithic insulation joint family type Monolithic insulation joint (MIJ) Hydrogen Ready – s.n. P01 according to PR/CO0010/He_rev.01 (ALFA ENGINEERING Helium Leak Test Procedure).

The undersigned, Bureau Veritas Inspector, certifies that the above materials meet the applicable requirements.

The test demonstrates the tightness and suitability for use in service with blending up to 100% hydrogen and at maximum pressure of 100 bar.

This approval will be valid until no relevant changes are made to the facility, in production and its quality system.

In relation to the H2 ready certificate, its validity will persist until there are no relevant alterations to materials and treatments, and for a maximum duration of 3 years.

This document excludes uses with phenomena related to the stationary nature of the gas within the pressure equipment assembled with the above materials that may lead to separation of gases and consequent localized accumulation of hydrogen.

Attachments: (all the examined documents with BV "Reviewed" stamp)

- ALFA ENGINEERING HLT_MIJ_HYDROGEN -READY_rev.01_Helium leak test report of Monolithic insulation joint family type MIJ 100% H2 – s.n. P01.

- Drawing of Monolithic insulation joint family type MIJ 100% H2 – s.n. P01 DW-HYDROGEN -READY_rev.01.

ALFA ENGINEERING Welding book WPS-PR100H2.

- Inspection certificate 3.1 acc. to EN10204:2005 #2402349 (17/01/2025) of forged ring ASTM A694 F65.

- Inspection certificate 3.1 acc. to EN10204:2005 #770v15 (11/02/2015) of pipe API spec. 5L X65.

- LETOMEC Test report "offerta 2024FB-399_rev.01" (05/08/2024) about gaseous permeability of NEMA G11 and HNBR70.

- JAMES WALKER Test report #C5963-3_rev.0 (01/02/2023) of VERMILION FIVE according to API 6A, section F.1.13.5.2.

Report IIS SIDER H2 n°.25-006 R0 date 14/03/2025 - SSRT Test.

<i>Inspected by:</i> Name: Stefano Bagalini	Checked by Name: Giuseppe SIGNORETTA
Signature:	Signature: 1828 Juseffe figuoritte
Date of issue: 08/04/2025	Expiration date: 07/04/2028
Distribution : D CLIENT	