



CERTIFICATE NUMBER	22-2194526-PDA
EFFECTIVE DATE	07-Mar-2022
EXPIRY DATE	06-Mar-2027
ABS TECHNICAL OFFICE	Houston ESD - Piping

CERTIFICATE OF Product Design Assessment

This is to certify that a representative of this Bureau did, at the request of

HENKEL AG & CO. KGAA

located at

**HENKELSTRASSE 67, HENKELSTRASSE 67, D-40589
DUSSELDORF, Germany**

assess design plans and data for the below listed product. This assessment is a representation by the Bureau as to the degree of compliance the design exhibits with applicable sections of the Rules. This assessment does not waive unit certification or classification procedures required by ABS Rules for products to be installed in ABS classed vessels or facilities. This certificate, by itself, does not reflect that the product is Type Approved. The scope and limitations of this assessment are detailed on the pages attached to this certificate.

Product: Metal-Hard Composites
Model: Loctite PC 7210 / Loctite 5085, Loctite PC 7211/Loctite 5085
Endorsements:
Tier: 3 - Type Approved, unit certification not required

This Product Design Assessment (PDA) Certificate remains valid until 06/Mar/2027 or until the Rules and/or Standards used in the assessment are revised or until there is a design modification warranting design reassessment (whichever occurs first).

Acceptance of product is limited to the "Intended Service" details prescribed in the certificate and as per applicable Rules and Standards.

This Certificate is valid for installation of the listed product on ABS units which exist or are under contract for construction on or previous to the effective date of the ABS Rules and standards applied at the time of PDA issuance. Use of the Product for non-ABS units is subject to agreement between the manufacturer and intended client.

American Bureau Of Shipping

Yongjin Lee, Engineer/Consultant

NOTE: This certificate evidences compliance with one or more of the Rules, Guides, standards or other criteria of ABS or a statutory, industrial or manufacturer's standards. It is issued solely for the use of ABS, its committees, its clients or other authorized entities. Any significant changes to the aforementioned product without approval from ABS will result in this certificate becoming null and void. This certificate is governed by ABS Rules 1-1-A3/5.9 Terms and Conditions of the Request for Product Type Approval and Agreement (2010)

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Product: Metal-Hard Composites
Model: Loctite PC 7210 / Loctite 5085, Loctite PC 7211/Loctite 5085
Endorsements:

Intended Service:

Marine & Offshore Applications: Cargo Lines, Crude Oil Washing Lines, Process Lines, Produced Water Lines, Inert Gas Lines, Fuel Oil Lines, Lubricating Oil Lines, Hydraulic Oil Lines, Cooling Sea/Fresh Water Lines, Bilge Lines, Firemain Lines, Water Spray Lines, Deluge Lines, Foam Lines, Ballast Lines, Fresh Water Lines, Sanitary/Drains/Scuppers Lines, Control and Service Air Lines, Brine Lines & Vents/Sounding.

Composite repair system Class 1, Class 2, and Class 3 may be installed in the subject piping in sizes 2 inches through 40 inches in locations, as specified in the Fire Endurance Matrix, 4-6-3/Table 1 of the ABS Marine Vessel Rules or A1-2/Table 3 of the ABS Facilities Rules, where no fire endurance test is required.

Description:

The Loctite PC 7210 / Loctite 5085, Loctite PC 7211/Loctite 5085 repair systems consist of the use of polymeric matrix composite materials directed to the carbon and stainless steel pipes with through wall and non-through wall defects by the means of full encompassing (wrapped) in accordance with ISO 24817 and ASME PCC-2. Loctite PC 7210 / Loctite 5085 - The composite repair system consists of the two-component epoxy resin Loctite PC 7210 A and B, the carbon glass fiber textile Loctite PC 5085, the filler Loctite EA 3478, and optional post-wrapping with Loctite PC 5090. Loctite PC 7211/Loctite 5085 - The composite repair system consists of the two-component epoxy resin Loctite PC 7211 A and B, the carbon glass fiber textile Loctite PC 5085, the filler Loctite EA 3488, and the peel-ply Loctite PC 5090 as well as the optional top-coating Loctite PC 7234.

Rating:

Loctite PC 7210 / Loctite 5085
264.00 bar with defects up to 80% of thickness loss for not through-wall defects at design temperatures up to 80 °C.
39.20 bar for through-wall defects of up to 10 mm diameter at temperatures up to 70 °C.
30.75 bar for through-wall defects of 10 mm up to 15 mm diameter at temperatures up to 70 °C.
23.30 bar for through-wall defects of 15mm up to 25 mm diameter at temperatures up to 70 °C.

Loctite PC 7211/Loctite 5085
227.87 bar with defects up to 80% of thickness loss for not through-wall defects at design temperatures up to 130 °C.
46.08 bar for through-wall defects of up to 10 mm diameter at temperatures up to 120 °C.
21.57 bar for through-wall defects of 10 mm up to 15 mm diameter at temperatures up to 120 °C.
19.22 bar for through-wall defects of 15mm up to 25 mm diameter at temperatures up to 120 °C.

Service Restriction:

- 1) ABS Surveyor acceptance of any application of composite repair system is required regardless this certification.
- 2) Composite repair systems may be acceptable for "Long Lifetime" repairs provided that meet the following conditions:
 - a) Composite repair calculation, for each repair, is to be submitted by the shipowner or by installer company on behalf of the shipowner for approval of an ABS Engineering Office.
 - b) Repair lifetime is to be considered in the calculations and verified annually by the attending Surveyor. Repairs records (quarterly in the first year, semesterly on the second year, and once a year until the end of the designed lifetime), and approved calculations are to be available for the satisfaction of the attending Surveyor.
 - c) The repairs installation must be done by an installer company that has confirmation of product type approval for such purpose. Only installer companies that have the purpose of "Long Lifetime" repairs have their composite repair system tested under all conditions of the applicable International Standards, and

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d) Shipowner composite repair system procedure is to be provided for the guidance of the crew. This procedure is to be reviewed by ABS and shall demonstrate repair system design and qualification, testing, repair inspection, assessments, repair records as required by the applicable International Standards. Otherwise, composite repair systems may only be acceptable for "Short Lifetime" or as temporary repairs, pending the next available repair period.

3) Any composite repair system application is to be designed, qualified, installed, tested, and inspected in accordance with ISO 24817 and/ or Part 4 ASME PCC-2. A risk assessment associated with both defect and the repair method is to be completed prior to application and is to consider all factors in the design methodology flowchart in 7.5 of ISO 24817 and/ or 401-1.3 of ASME PCC-2.

4) The requirements for fire performance (i.e., flame spread and smoke generation) are to be identified in the risk assessment, as per 7.5.9.4 of ISO 24817 and/ or 401-3.4.10.3 of ASME PCC-2.

5) ABS Surveyor shall test the composite repair system before the repaired piping system comes into operation. In some cases previously agreed, ABS Surveyor is to attend upon completion of surface cleaning and surface preparation as specified and immediately prior to application of the composite repair system.

6) Personnel involved in the installation of the repair system are to be trained and qualified in accordance with Annex I (normative) Installer qualification of ISO 24817 and/or Article 401, Appendix VII, of ASME PCC-2. The installers qualification certificate is to be submitted together with the calculations for verification of an ABS Engineering Office. These certificates shall also be available for the satisfaction of the attending Surveyor.

7) When required by the service environment, the installation must be coated with a UV-blocking, weather resistance coating, and corrosion protecting surface treatment specified by the manufacturer.

8) Not to be used for patch repair or for any structural applications.

9) Unit Certification is not required for this product. If the manufacturer or purchaser request an ABS Certificate for compliance with a specification or standard, the specification or standard, including inspection standards and tolerances, must be clearly defined.

Comments:

1) The Manufacturer has provided a declaration about the control of, or the lack of Asbestos in this product.
2) The term "piping" refers to assemblies of piping components and pipe supports of the piping system as defined in Section 4-6-1 of the Marine Vessel Rules. The piping consists of the following components: straight pipes, tubes, pipe fittings such as sleeves, elbows, tees, bends, flanges, reducers, etc., which are used to join together sections of pipe. This composite repair system is not allowed to be installed in valves, pumps, pressure vessels, heat exchangers, and equipment in general. Refer to 2-1/2 of the Guidance Notes on Composite Repairs of Steel Structures and Piping.

Notes/Drawing/Documentation:

Drawing No. 2020-12-17_Method Statement_Installation_High Temp, Manual

Drawing No. 2020-12-17_Method Statement_Installation_Standard, Manual

Drawing No. PC 7210-EN, Technical Data Sheet

Drawing No. PC 7211-EN, Technical Data Sheet

Drawing No. PC 5085-EN, Technical Data Sheet

Drawing No. PC 5090-EN, Technical Data Sheet

Drawing No. EA 3488-EN, Technical Data Sheet

Drawing No. PC 7234-EN, Technical Data Sheet

Drawing No. PC 7255-EN, Technical Data Sheet

Drawing No. SF 7515-EN, Technical Data Sheet

Drawing No. Loctite 3478-EN, Technical Data Sheet

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Drawing No. 11-018839_C, 7210 Test Report ISO TS 24817 Annex C, Henkel, GL, 2013

Drawing No. 11-018839_D, 7210 Test Report ISO TS 24817 Annex D, Henkel, GL, 2013

Drawing No. 11-018839_E, 7210 Test Report ISO TS 24817 Annex E, Henkel, GL, 2013

Drawing No. 11-018839_F, 7210 Test Report ISO TS 24817 Annex F, Henkel, GL, 2014

Drawing No. 15-065665_C, 7211 Test Report ISO 24817 Annex C, DNV GL, 2016

.Drawing No. Test Report_D, 7211 Test Report ISO 24817 Annex D & ASME PCC-2 Appendix IV, Henkel, DNV GL, 2016

Drawing No. Test Report_E, 7211 Test Report ISO 24817 Annex E & ASME PCC-2 Appendix V-2.1, Henkel, DNV GL, 2016

Drawing No. Test Report_F, 7211 Test Report ISO 24817 Annex F & ASME PCC-2 Appendix VI, Henkel, DNV GL, 2016

Drawing No. 127294/17, Thermal Expansion, SKZ, 2016

Drawing No. Test Report, 7211 Test Report ISO 24817 Annex B & ASME PCC-2 Appendix II, Shore D Hardness, Henkel, DNV GL, 2016

Drawing No. SR0798_Shear, 7211 Test Report ASTM D 5379 Shear Properties, Henkel, 2016

Drawing No. SR0798_Tensile, 7211 Test Report DIN EN ISO 527-4 Tensile Properties, Henkel, 2016

Drawing No. Declaration, Declaration Tests Validity

Drawing No. 114241-12, Audit Report Henkel, GL

Drawing No. 2021-02 Certificate TUV Rheinland Henkel, German Technical Inspection Agency Certificate

Drawing No. DNV_7211_08-2026, Type Approval Certificate

Drawing No. DNV_Loctite PC 7210_11-2023, Type Approval Certificate

Drawing No. DNV_PR training_01-2023, Type Approval Certificate

Drawing No. LR PR approval - 11-2025, Type Approval Certificate

Drawing No. 9059-15-32122-189, 2015 Approval Letter new repair systems

Drawing No. 262.1-023320-J-2, Approval Letter Loctite PC 7211

Correspondence, Email - Composite Laboratory Test Reports

Correspondence, Email - Additional Test Reports

Terms of Validity:

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STANDARDS

ABS Rules:

2022 Rules for Conditions of Classification, Part 1 - 1-1-4/7.7, 1-1-A3, 1-1-A4, which covers the following:
2022 Rules for Building and Classing Marine Vessel Rules: 4-6-3/Table1.

2022 Rules for Conditions of Classification, Part 1 - Offshore Units and Structures 1-1-4/9.7, 1-1-A2, 1-1-A3, which covers the following:

2022 Rules for Building and Classing Mobile Offshore Units: 4-2-2/Table2.

2022 Rules for Building and Classing Facilities on Offshore Installations: Appendix 1/Table 3.

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2021 Guidance Notes on Composite Repairs of Steel Structures and Piping: Chapter 2.

National:

NA

International:

ISO 24817:2017, Petroleum, petrochemical and natural gas industries — Composite repairs for pipework —

Qualification and design, installation, testing and inspection

ASME PCC-2 (2018), Repair of Pressure Equipment and Piping

Government:

NA

EUMED:

NA

OTHERS:

NA