Certificate No: **2601222016371247**
TL Project No: **25-4491**

# TYPE APPROVAL CERTIFICATE

This is to certify that the

## Metal Expansion Joint with Floating Flanges

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|---|---|---|
| Manufacturer | : | **HACI AYVAZ ENDÜSTRİYEL MAMULLER SANAYİ VE TİCARET ANONİM ŞİRKETİ** |
| Address | : | **Hadımköy Mahallesi Mustafa İnan Cad. No: 44 Arnavutköy, İstanbul** |
| Product Type | : | **PN2.5, PN6, PN10, PN16** |
| Reference Rule | : | **TL Rules, Part E, Chapter 103 - Metallic Materials, Special Materials for Naval Ships, 01.01.2022**<br>**TL Rules, Part E, Chapter 107 - Naval Ship Technology, Ship Operation Installations and Auxiliary System, 01.01.2022**<br>**TL Rules, Part A, Chapter 2, Material, 01.07.2024**<br>**TL Rules, Part B, Chapter 4, Machinery, 01.07.2024** |

Subject to the conditions referred to in the following pages, this certificate is valid until **30.08.2030**

Surveyor: **Sezer Mahir TUĞCU**

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Issued at **İSTANBUL** on **26.01.2026**

***This document is electronically signed and does not require a manual signature***

***Click here for the verification website***

**Emrah SÖĞÜTÇÜ**
*New Building Division Manager*
TÜRK LOYDU

Expire Date of Previous Certificate: 30.08.2025

For Information Only

**This certificate is subject to terms and conditions described below:**
Any significant change in design or construction may render this Certificate invalid. Certificate is not valid for equipment, the design or manufacture of which has been varied or modified from the specimen tested. This certificate is not valid for products without marking above mentioned. The manufacturer should notify TÜRK LOYDU of any modifications or changes to equipment in order to obtain valid certificate. This certificate shows that tested specimens as representative of the product complies of the TÜRK LOYDU rules, and relevant international instruments that apply to it.

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| Product | **: Metal Expansion Joint with Floating Flanges** |
| Product Description | **: Metal axial expansion joint with floating flanges intended for pipes of ship. It may be used pipe of ships and marine industry according to Türk Loydu rules.** |
| Approval No / Date | **: PAE-EPAS/023681/25-4491/VA, 22.01.2026** |
| Class Indication | **: Class III** |
| Performed Tests | **: - Quality Management System Audit<br>- Visual inspection<br>- Controls according to the approved drawings<br>- Pressure Test<br>- Endurance Test<br>- Burst Test<br>were found satisfactory.** |
| Test Place | **: HACI AYVAZ ENDÜSTRİYEL MAMULLER SAN. VE TİC. A.Ş. İSTANBUL** |
| Last Inspection Date | **: 23.01.2026** |
| Surveyor Remarks | **: - The flange material (St 37.2 /1.0038) is not suitable for use above 50 ° C. For this reason, flange material must be selected in accordance with the design temperature range. The flange material to be used in exhaust systems is to be stainless steel. The flange material can be chosen the same as the bellow material** |
| Application/Limitation | **: 1-The expansion joints may be used for the following service on board,<br>-Steam pressure line.<br>-Exhaust gas lines.<br>-Water line.<br>2-The use of floating flanges is only permitted for Class III water pipes and open - ended lines.<br>3-The used of stainless steel is to be restricted as per the requirements of the Turk Loydu Rules.<br>4-The calculated maximum values of axial and/or lateral movements at 1000 full cycles are to<br>be exceeded.<br>5-The expansion joints are to be installed according to manufacturer 's instructions and Türk Loydu Rules.<br>6-The expansion joints must only be fitted in areas where they are always accessible.<br>7- The flange material (1.0038) is not suitable for use above 50 ° C. For this reason, flange material must be selected in accordance with the design temperature range. The flange material to be used in exhaust systems is to be stainless steel.<br>8- The compensators are to be permanently marked with the following particulars:<br>-Manufacturer's mark or symbol,<br>-Date of manufacturing,<br>-Type,<br>-Nominal diameter,<br>-Maximum allowable working pressure respectively nominal pressure,<br>-Test certificate number and the sign of the responsible TL inspection office.** |

| | Type of Product | No of Node | Nominal Diameter | Design Pressure | Test Pressure | Burst Pressure | Minimum Design Cycle | Axial Expansion |
|---|---|---|---|---|---|---|---|---|
| 1 | PN2.5 | 11 | DN65 | 2.5 Bar | 3,75 Bar | 10 Bar | 1000 | + 10mm-20mm |
| 2 | PN2.5 | 8 | DN80 | 2.5 Bar | 3,75 Bar | 10 Bar | 1000 | + 10mm-20mm |

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|---|---|---|---|---|---|---|---|---|
| 3 | PN2.5 | 8 | DN100 | 2.5 Bar | 3,75 Bar | 10 Bar | 1000 | + 10mm-20mm |
| 4 | PN2.5 | 6 | DN100 | 2.5 Bar | 3,75 Bar | 10 Bar | 1000 | + 10mm-20mm |
| 5 | PN2.5 | 6 | DN150 | 2.5 Bar | 3,75 Bar | 10 Bar | 1000 | + 10mm-20mm |
| 6 | PN2.5 | 6 | DN200 | 2.5 Bar | 3,75 Bar | 10 Bar | 1000 | + 10mm-20mm |
| 7 | PN2.5 | 4 | DN250 | 2.5 Bar | 3,75 Bar | 10 Bar | 1000 | + 10mm-20mm |
| 8 | PN2.5 | 4 | DN300 | 2.5 Bar | 3,75 Bar | 10 Bar | 1000 | + 10mm-20mm |
| 9 | PN2.5 | 4 | DN350 | 2.5 Bar | 3,75 Bar | 10 Bar | 1000 | + 10mm-20mm |
| 10 | PN2.5 | 3 | DN400 | 2.5 Bar | 3,75 Bar | 10 Bar | 1000 | + 10mm-20mm |
| 11 | PN2.5 | 3 | DN450 | 2.5 Bar | 3,75 Bar | 10 Bar | 1000 | + 10mm-20mm |
| 12 | PN2.5 | 3 | DN500 | 2.5 Bar | 3,75 Bar | 10 Bar | 1000 | + 10mm-20mm |
| 13 | PN2.5 | 3 | DN600 | 2.5 Bar | 3,75 Bar | 10 Bar | 1000 | + 10mm-20mm |
| 14 | PN2.5 | 3 | DN700 | 2.5 Bar | 3,75 Bar | 10 Bar | 1000 | + 10mm-20mm |
| 15 | PN2.5 | 3 | DN800 | 2.5 Bar | 3,75 Bar | 10 Bar | 1000 | + 10mm-20mm |
| 16 | PN2.5 | 3 | DN900 | 2.5 Bar | 3,75 Bar | 10 Bar | 1000 | + 10mm-20mm |
| 17 | PN2.5 | 3 | DN1000 | 2.5 Bar | 3,75 Bar | 10 Bar | 1000 | + 10mm-20mm |
| 18 | PN2.5 | 2 | DN1200 | 2.5 Bar | 3,75 Bar | 10 Bar | 1000 | + 10mm-20mm |
| 19 | PN6 | 10 | DN100 | 6 Bar | 9 Bar | 24 Bar | 1000 | + 10mm-20mm |

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|---|---|---|---|---|---|---|---|---|
| 20 | PN6 | 8 | DN200 | 6 Bar | 9 Bar | 24 Bar | 1000 | + 10mm-20mm |
| 21 | PN6 | 6 | DN250 | 6 Bar | 9 Bar | 24 Bar | 1000 | + 10mm-20mm |
| 22 | PN6 | 5 | DN300 | 6 Bar | 9 Bar | 24 Bar | 1000 | + 10mm-20mm |
| 23 | PN6 | 5 | DN350 | 6 Bar | 9 Bar | 24 Bar | 1000 | + 10mm-20mm |
| 24 | PN6 | 5 | DN400 | 6 Bar | 9 Bar | 24 Bar | 1000 | + 10mm-20mm |
| 25 | PN6 | 5 | DN450 | 6 Bar | 9 Bar | 24 Bar | 1000 | + 10mm-20mm |
| 26 | PN6 | 4 | DN500 | 6 Bar | 9 Bar | 24 Bar | 1000 | + 10mm-20mm |
| 27 | PN6 | 4 | DN600 | 6 Bar | 9 Bar | 24 Bar | 1000 | + 10mm-20mm |
| 28 | PN6 | 4 | DN700 | 6 Bar | 9 Bar | 24 Bar | 1000 | + 10mm-20mm |
| 29 | PN6 | 4 | DN800 | 6 Bar | 9 Bar | 24 Bar | 1000 | + 10mm-20mm |
| 30 | PN10 | 10 | DN100 | 10 Bar | 15 Bar | 40 Bar | 1000 | + 10mm- |
| 31 | PN10 | 10 | DN125 | 10 Bar | 15 Bar | 40 Bar | 1000 | + 10mm- |
| 32 | PN10 | 7 | DN150 | 10 Bar | 15 Bar | 40 Bar | 1000 | + 10mm- |
| 33 | PN10 | 8 | DN200 | 10 Bar | 15 Bar | 40 Bar | 1000 | + 10mm- |
| 34 | PN10 | 5 | DN250 | 10 Bar | 15 Bar | 40 Bar | 1000 | + 10mm- |
| 35 | PN10 | 5 | DN300 | 10 Bar | 15 Bar | 40 Bar | 1000 | + 10mm- |
| 36 | PN10 | 5 | DN350 | 10 Bar | 15 Bar | 40 Bar | 1000 | + 10mm- |
| 37 | PN10 | 5 | DN400 | 10 Bar | 15 Bar | 40 Bar | 1000 | + 10mm- |
| 38 | PN10 | 4 | DN450 | 10 Bar | 15 Bar | 40 Bar | 1000 | + 10mm- |
| 39 | PN10 | 4 | DN500 | 10 Bar | 15 Bar | 40 Bar | 1000 | + 10mm- |
| 40 | PN10 | 4 | DN600 | 10 Bar | 15 Bar | 40 Bar | 1000 | + 10mm- |

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|---|---|---|---|---|---|---|---|---|
| 41 | PN10 | 4 | DN700 | 10 Bar | 15 Bar | 40 Bar | 1000 | + 10mm- |
| 42 | PN10 | 4 | DN800 | 10 Bar | 15 Bar | 40 Bar | 1000 | + 10mm- |
| 43 | PN16 | 8 | DN80 | 16 Bar | 24 Bar | 64 Bar | 1000 | + 10mm- |
| 44 | PN16 | 12 | DN100 | 16 Bar | 24 Bar | 64 Bar | 1000 | + 10mm- |
| 45 | PN16 | 12 | DN125 | 16 Bar | 24 Bar | 64 Bar | 1000 | + 10mm- |
| 46 | PN16 | 9 | DN150 | 16 Bar | 24 Bar | 64 Bar | 1000 | + 10mm- |
| 47 | PN16 | 10 | DN200 | 16 Bar | 24 Bar | 64 Bar | 1000 | + 10mm- |
| 48 | PN16 | 6 | DN250 | 16 Bar | 24 Bar | 64 Bar | 1000 | + 10mm- |
| 49 | PN16 | 6 | DN300 | 16 Bar | 24 Bar | 64 Bar | 1000 | + 10mm- |
| 50 | PN16 | 5 | DN350 | 16 Bar | 24 Bar | 64 Bar | 1000 | + 10mm- |
| 51 | PN2.5 | 20 | DN65 | 2.5 Bar | 3.75 Bar | 10 Bar | 1000 | +20mm-40mm |
| 52 | PN2.5 | 17 | DN80 | 2.5 Bar | 3.75 Bar | 10 Bar | 1000 | +20mm-40mm |
| 53 | PN2.5 | 19 | DN100 | 2.5 Bar | 3.75 Bar | 10 Bar | 1000 | +20mm-40mm |
| 54 | PN2.5 | 20 | DN125 | 2.5 Bar | 3.75 Bar | 10 Bar | 1000 | +20mm-40mm |
| 55 | PN2.5 | 13 | DN150 | 2.5 Bar | 3.75 Bar | 10 Bar | 1000 | +20mm-40mm |
| 56 | PN2.5 | 13 | DN200 | 2.5 Bar | 3.75 Bar | 10 Bar | 1000 | +20mm-40mm |
| 57 | PN2.5 | 7 | DN250 | 2.5 Bar | 3.75 Bar | 10 Bar | 1000 | +20mm-40mm |
| 58 | PN2.5 | 7 | DN300 | 2.5 Bar | 3.75 Bar | 10 Bar | 1000 | +20mm-40mm |
| 59 | PN2.5 | 7 | DN350 | 2.5 Bar | 3.75 Bar | 10 Bar | 1000 | +20mm-40mm |
| 60 | PN2.5 | 6 | DN400 | 2.5 Bar | 3.75 Bar | 10 Bar | 1000 | +20mm-40mm |

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|---|---|---|---|---|---|---|---|---|
| 61 | PN2.5 | 6 | DN450 | 2.5 Bar | 3.75 Bar | 10 Bar | 1000 | +20mm-40mm |
| 62 | PN2.5 | 6 | DN500 | 2.5 Bar | 3.75 Bar | 10 Bar | 1000 | +20mm-40mm |
| 63 | PN2.5 | 5 | DN600 | 2.5 Bar | 3.75 Bar | 10 Bar | 1000 | +20mm-40mm |
| 64 | PN2.5 | 5 | DN700 | 2.5 Bar | 3.75 Bar | 10 Bar | 1000 | +20mm-40mm |
| 65 | PN2.5 | 5 | DN800 | 2.5 Bar | 3.75 Bar | 10 Bar | 1000 | +20mm-40mm |
| 66 | PN2.5 | 5 | DN900 | 2.5 Bar | 3.75 Bar | 10 Bar | 1000 | +20mm-40mm |
| 67 | PN2.5 | 5 | DN1000 | 2.5 Bar | 3.75 Bar | 10 Bar | 1000 | +20mm-40mm |
| 68 | PN2.5 | 4 | DN1200 | 2.5 Bar | 3.75 Bar | 10 Bar | 1000 | +20mm-40mm |
| 69 | PN6 | 18 | DN100 | 6 Bar | 9 Bar | 24 Bar | 1000 | +20mm-40mm |
| 70 | PN6 | 19 | DN125 | 6 Bar | 9 Bar | 24 Bar | 1000 | +20mm-40mm |
| 71 | PN6 | 13 | DN150 | 6 Bar | 9 Bar | 24 Bar | 1000 | +20mm-40mm |
| 72 | PN6 | 13 | DN200 | 6 Bar | 9 Bar | 24 Bar | 1000 | +20mm-40mm |
| 73 | PN6 | 11 | DN250 | 6 Bar | 9 Bar | 24 Bar | 1000 | +20mm-40mm |
| 74 | PN6 | 9 | DN300 | 6 Bar | 9 Bar | 24 Bar | 1000 | +20mm-40mm |
| 75 | PN6 | 9 | DN350 | 6 Bar | 9 Bar | 24 Bar | 1000 | +20mm-40mm |
| 76 | PN6 | 9 | DN400 | 6 Bar | 9 Bar | 24 Bar | 1000 | +20mm-40mm |
| 77 | PN6 | 9 | DN450 | 6 Bar | 9 Bar | 24 Bar | 1000 | +20mm-40mm |

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|---|---|---|---|---|---|---|---|---|
| 78 | PN6 | 8 | DN500 | 6 Bar | 9 Bar | 24 Bar | 1000 | +20mm-40mm |
| 79 | PN6 | 8 | DN600 | 6 Bar | 9 Bar | 24 Bar | 1000 | +20mm-40mm |
| 80 | PN6 | 8 | DN700 | 6 Bar | 9 Bar | 24 Bar | 1000 | +20mm-40mm |
| 81 | PN6 | 8 | DN800 | 6 Bar | 9 Bar | 24 Bar | 1000 | +20mm-40mm |
| 82 | PN10 | 13 | DN150 | 10 Bar | 15 Bar | 40 Bar | 1000 | +20mm-40mm |
| 83 | PN10 | 14 | DN200 | 10 Bar | 15 Bar | 40 Bar | 1000 | +20mm-40mm |
| 84 | PN10 | 10 | DN250 | 10 Bar | 15 Bar | 40 Bar | 1000 | +20mm-40mm |
| 85 | PN10 | 10 | DN300 | 10 Bar | 15 Bar | 40 Bar | 1000 | +20mm-40mm |
| 86 | PN10 | 9 | DN350 | 10 Bar | 15 Bar | 40 Bar | 1000 | +20mm-40mm |
| 87 | PN10 | 9 | DN400 | 10 Bar | 15 Bar | 40 Bar | 1000 | +20mm-40mm |
| 88 | PN10 | 8 | DN450 | 10 Bar | 15 Bar | 40 Bar | 1000 | +20mm-40mm |
| 89 | PN10 | 8 | DN500 | 10 Bar | 15 Bar | 40 Bar | 1000 | +20mm-40mm |
| 90 | PN10 | 8 | DN600 | 10 Bar | 15 Bar | 40 Bar | 1000 | +20mm-40mm |
| 91 | PN10 | 8 | DN700 | 10 Bar | 15 Bar | 40 Bar | 1000 | +20mm-40mm |
| 92 | PN10 | 8 | DN800 | 10 Bar | 15 Bar | 40 Bar | 1000 | +20mm-40mm |
| 93 | PN16 | 12 | DN250 | 16 Bar | 24 Bar | 64 Bar | 1000 | +20mm-40mm |
| 94 | PN16 | 10 | DN300 | 16 Bar | 24 Bar | 64 Bar | 1000 | +20mm-40mm |

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|---|---|---|---|---|---|---|---|---|
| 95 | PN16 | 10 | DN350 | 16 Bar | 24 Bar | 64 Bar | 1000 | +20mm-40mm |

Approval Conditions **: -**

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