TYPE APPROVAL CERTIFICATE
No. **MAC056616XT/002**

This is to certify, as notified body 0474, that the product identified below is in compliance with the regulations herewith specified

Description	**Metallic expansion joints**
Type	**AYVAZ Axial/Lateral Expansion Joints with Fixed Flanges PN10/PN16 - DN80-DN400**
Applicant	**HACI AYVAZ ENDUSTRIYEL MAMULLER SAN. VE TIC. A.S. - AYVAZ**
Manufacturer	**HACI AYVAZ ENDUSTRIYEL MAMULLER SAN. VE TIC. A.S. - AYVAZ**
Place of manufacture	**ATATURK SANAYI BOLGESI, MUSTAFA INAN CAD., NO.36 34555 HADIMKOY, ISTANBUL TURKEY**
Reference standards	**RINA Rules for the Type Approval of Flexible Hoses and Expansion Joints**

Issued in **ISTANBUL** on **October 10, 2016**. *This Certificate is valid until* **October 9, 2021**

RINA Services S.p.A.
Volkan Celik

This certificate consists of this sheet plus an attachement

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1. TECHNICAL CHARACTERISTICS

AYVAZ Axial/Lateral Expansion Joints with fixed flanges PN10/ PN16 - DN 80 to DN 400

1.1 Design Specifications

Nominalsize/PN	**DN80/PN10/16**	**DN100/PN10/16**	**DN125/PN10/16**	**DN150/PN10/16**	**DN200/PN10/16**
Length (mm)	Min. 260	Min. 260	Min. 280	Min. 275	Min. 300
Max. working pressure (MPa)	0.1	0.1	0.1	0.1	0.1
Max. working temperature (°C)	+ 350	+ 350	+ 350	+ 350	+ 350
Tie rods	No	No	No	No	No
Movements (mm)	Axial +5/-25 Lateral +50/-0	Axial +5/-25 Lateral +50/-0	Axial +5/-25 Lateral +50/-0	Axial +5/-25 Lateral +50/-0	Axial +5/-25 Lateral +50/-0
Flanged type	Fixed	Fixed	Fixed	Fixed	Fixed
Number of plies	3	3	3	3	3
Intermediate Pipe	Optional	Optional	Optional	Optional	Optional
Number of convolutions	20	20	20	16	16

Nominalsize/PN	**DN250/ PN 10/16**	**DN300/PN10/16**	**DN350/PN10/16**	**DN400/PN10/16**
Length (mm)	Min. 300	Min. 300	Min. 350	Min. 350
Max. working pressure (MPa)	0.1	0.1	0.1	0.1
Max. working temperature (°C)	+ 350	+ 350	+ 350	+ 350
Tie rods	No	No	No	No
Movements (mm)	Axial +10/-50 Lateral +50/-0	Axial +15/-45 Lateral +50/-0	Axial +15/-45 Lateral +50/-0	Axial +15/-45 Lateral +50/-0
Flanged type	Fixed	Fixed	Fixed	Fixed
Number of plies	3	3	3	3
Intermediate Pipe	Optional	Optional	Optional	Optional
Number of convolutions	14	13	13	13

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1.2 Materials

Part Name	Material
Bellow	AISI 300 series stainless steel and duplex
Band	AISI 300 series stainless steel and duplex
Flange	St 37,2/1.0038

When other choices of materials are used per manufacturer's recommendations, the RINA agreement is to be obtained.

2. REFERENCE DOCUMENTS

- Manufacturer's catalogue 1999 March Edition dated 20/06/2015
- Product list for fixed flanged metallic expansion joints dated 05/01/2016
- Installation manual for metal expansion joints
- Drawing expansion joint with fixed flanges DN 80 N° 702.046.100.80 Edition 01 dated 08/01/2016
- Drawing expansion joint with fixed flanges DN 100 N° 702.046.100.100 Edition 01 dated 08/01/2016
- Drawing expansion joint with fixed flanges DN 125 N° 702.046.100.125 Edition 01 dated 08/01/2016
- Drawing expansion joint with fixed flanges DN 150 N° 702.046.100.150 Edition 01 dated 08/01/2016
- Drawing expansion joint with fixed flanges DN 200 N° 702.046.100.200 Edition 01 dated 08/01/2016
- Drawing expansion joint with fixed flanges DN 250 N° 702.046.100.250 Edition 01 dated 08/01/2015
- Drawing expansion joint with fixed flanges DN 300 N° 702.046.100.300 Edition 01 dated 08/01/2015
- Drawing expansion joint with fixed flanges DN 350 N° 702.046.100.350 Edition 01 dated 08/01/2016
- Drawing expansion joint with fixed flanges DN 400 N° 702.046.100.400 Edition 01 dated 08/01/2015

No departure from the above documents shall be made without the prior consent of the Society. The manufacturer must inform the Society of any modification or changes to these documents and drawings.

3. TEST REPORTS

3.1 Type tests according to Testing Programme performed in-house
- Pressure impulse test report N° TTAL.4.005 Rev.0 dated 25/10/2003 and test report N° 20151003 Rev.0 dated 02/10/2015
- Hydraulic pressure test at twice the max working pressure dated 2003, DN 300 N° 20151001 Rev.0 dated 02/10/2015, DN80 N° TTAL.4.011 dated 25/10/2014
- Burst pressure test at 4 times the max working pressure report N° TTAL.4.007 Rev.0 dated 25/10/2003, test report for DN 300 N° 20151002 Rev.0 dated 29/09/2015
- Cyclic expansion test report N° TTAL.4.006 Rev.0 dated 25/10/2003 and test report for DN 300 N° 20151003 Rev.0 dated 02/10/2015
- Dimension test report for DN 300 N° 20151010 dated 29/09/2015

3.2 Cyclic expansion tests (1000 cycles)

3.3 Instructions:
-Hydrostatic test (Document N°TTAL.4.011 Rev.0 dated on 25/10/2014)

-Burst test (Document N°TTAL.4.012 Rev.0 dated on 25/10/2014)

-Fatigue cyclic test (Document N°TTAL.4.006 Rev.0 dated on 25/09/2015)

-Impulse test (Document N°TTAL.4.006 Rev.0 dated on 25/09/2015)

-EJMA 9 design calculation (Document N°AYVAZ/2016/399 Rev.0 dated on 13/01/2016)

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3.4 Tests reports:

Nominal size/PN	Hydrostatic test	Burst test	Fatigue cyclic test	Impulse test
DN80/PN10/PN16	201601001	201601002	201601003	201601004
DN100/PN10/PN16	201601009	201601010	201601011	2016010012
DN125/PN10/PN16	201601013	201601014	201601015	2016010016
DN150/PN10/PN16	201601017	201601018	201601019	2016010020
DN200/PN10/PN16	201601033	201601034	201601035	2016010036
DN250/PN10/PN16	201601021	201601022	201601023	2016010024
DN300/PN10/PN16	201601025	201601026	201601027	2016010028
DN350/PN10/PN16	201601037	201601038	201601039	2016010040
DN400/PN10/PN16	201601029	2016010130	201601031	2016010032

4. FIELDS OF APPLICATION

4.1 The expansion joints may be used for exhaust gas lines.

4.2 The use of stainless steel is restricted as per RINA rules.

4.3 Reduction factors are to be taken in consideration for maximum working pressure and tolerable movement caused by temperature influence according to manufacturer's recommendations.

4.4 The calculated maximum values of axial and/or lateral movements at 1000 full cycles are not to be exceeded. 4.5 The expansion joints are to be installed according to manufacturer's instructions and RINA Rules.

4.6 In case of high level of vibrations in the piping systems where fitted to engines, pumps, compressors and other sources of high vibrations, care shall be taken in order to avoid that the natural frequency of compensator doesn't coincide with the system frequency.

4.7 The expansion joints must only be fitted in areas where they are always accessible.

5.ACCEPTANCE CONDITIONS

5.1 The products are to be supplied by HACI AYVAZ END. MAMULLER SAN. VE TIC. A.S. in compliance with the type and the requirements described in this certificate.

5.2 Each expansion joint is to be hydraulic pressure tested to twice the maximum working pressure under witnessing of a Society's Surveyor when required by the Rules.

5.3 RINAProduct Certificate is required.

6. MARKING OF PRODUCT

The product shall be marked with at least:
- Manufacturer's name or logo
- Type designation and size
- Maximum working temperature and pressure
- Date of manufacture
- Society's brand as relevant

This approval is given on the understanding that the manufacturer will accept full responsibility for informing shipbuilders or their sub-contractors of the proper methods of fitting and general maintenance of the products and of the conditions of this approval.

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