

TYPE APPROVAL CERTIFICATE

This is to certify:**That the Plastic Piping System, Thermoplastic**with type designation(s)
Wavin Tigris K5, Tigris M5

Issued to

Wavin GmbH
Twist, Germany

is found to comply with

DNV GL rules for classification – Ships Pt.4 Ch.6 Piping systems**DNV GL class programme DNVGL-CP-0072 – Type approval – Thermoplastic piping systems****ISO 21003-2:2008 "Multilayer piping systems for hot and cold water installations inside buildings – Part 2: Pipes"****ISO 21003-3:2008 "Multilayer piping systems for hot and cold water installations inside buildings – Part 3: Fittings"****ISO 21003-5:2008 "Multilayer piping systems for hot and cold water installations inside buildings – Part 5: Fitness for purpose of the system"**

Application :**Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV.**Issued at **Hamburg** on **2021-07-22**This Certificate is valid until **2026-07-21**.for **DNV**DNV local station: **Hamburg – CMC North/East**Approval Engineer: **Hagen Markus**

Olaf Drews
Head of Section

This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid. The validity date relates to the Type Approval Certificate and not to the approval of equipment/systems installed.

LEGAL DISCLAIMER: Unless otherwise stated in the applicable contract with the holder of this document, or following from mandatory law, the liability of DNV AS, its parent companies and their subsidiaries as well as their officers, directors and employees ("DNV") arising from or in connection with the services rendered for the purpose of the issuance of this document or reliance thereon, whether in contract or in tort (including negligence), shall be limited to direct losses and under any circumstance be limited to 300,000 USD.



Product description

The Wavin TIGRIS K5, M5 composite plastic piping system consists of Polyethylene multilayer pipes made of PE-Xc / Al / HDPE (white) and PE-RT/Al/PE-RT (white) joined by radial press fittings made of Polyphenyl sulfone (PPSU) or Brass (CW617N).

Pipes

Dimensions	Outer diameter x Wall thickness (mm)				
Straight lengths	16x2	20x2.25	25x2.5	32x3	40x4.0
Ring bound	16x2	20x2.25	25x2.5	32x3	n.a.

Nominal internal pressure bar	PN10
Temperature range according to ISO 21003	0°C up to 80°C
Nominal external pressure rating	Up to 7.6bar

Press fittings

Materials	Tigris M5	Tigris K5
Body	Brass, CW625N/CW724R	Polyphenyl sulfone (PPSU) Thread inserts, Ecobrass (CW724R)
Press sleeve	Stainless steel, 1.4301	Stainless steel, 1.4301
Sealing ring (O-ring) and flat seal	EPDM	EPDM
Types ¹	Couplings, T-pieces, Bends, Adapters/-bends and connecting fittings (press fitting – screwed connection), Socket plugs, Caps.	
Pressing jaws	Press profile “B”, “H”, “TH”, “U”, “UP”	

Notes

¹ Refer to the Wavin “Technisches Handbuch Wavin Tigris”

Permissible service pressure and temperature limits

According to standard ISO 21003 series – Multilayer piping systems for hot and cold-water installations inside buildings.

Classes	Class 1	Class 2	Class 4	Class 5
Service pressure	10bar	10bar	10bar	6bar
Max. service temperature	60°C	70°C	60°C	80°C
Applications				
Class 1, 2	Hot water supply			
Class 4	Underfloor heating and low temperature radiators			
Class 5	High temperature radiators			

Production places

Pipes
Multilayer Pipe Company Sp. Z.o.o Pecz 59, PL-57-100 Strzelin, Poland
Fittings
Tigris K5 - PPSU
Wavin GmbH Kunststoff Rohrsysteme, Industriestrasse 20, D- 49767 Twist, Germany
Tigris M5 - Brass press fittings – Type M-MV
Ningbo Friendship Bronze Ware Co. Ltd., 315321 Zhejiang, PR China

Responsibility

Wavin GmbH, Twist takes the responsibility that the design and production are in compliance with Rules, Standards and Regulations listed on page 1 of this Certificate.

Application/Limitation

The TIGRIS K5, M5 piping system is type approved for application in piping systems as listed in the table below. Reference DNV GL Rules Pt.4 Ch.6, Section 2 – 1.7 Plastic pipes “Table 1- Fire endurance requirements matrix”. Approved installation locations where “0” is specified, appropriate footnotes are to be observed.

Not approved for installation locations where “NA” or “X” is indicated and not approved for installation in gas hazardous area.

Reference heading to Table 1	Item	Piping system
Freshwater	22	Non-essential systems: - Potable water generating and treatment systems - Potable hot and cold water, wash water systems (internal) - Cooling and heating system of air condition systems
Sanitary and drains and scuppers	24	Sanitary drains (internal): - Condensate from air conditioning systems
Miscellaneous	29	Service air (non-essential)

Extent of Type Tests applicable to piping system dependent on application

Fire endurance Level

The TIGRIS K5, M5 piping system is not tested with respect to Fire Endurance characteristics.

Flame spread

Surface flame spread characteristics is confirmed by UL 94 HB (compliant to ASTM D 635 - HB).

Smoke and toxicity

The TIGRIS K5, M5 piping system is not tested with respect to smoke and toxicity characteristics.

Electrical conductivity

Not applicable.

Passenger vessels

For application on passenger vessels additional requirements specified in the Rules and Regulations of the appropriate flag state authority may have to be observed.

Assembling and Installation

For assembling of press fittings, released pressing tools and installation of the piping system the instructions specified in the “Wavin “Technisches Handbuch Wavin Tigris” are to be observed.

In addition, the installation requirements specific to the ship as specified by the ship yard as well as DNV GL Rules Pt.4 Ch.6, Section 10 – 4 Joining of plastic pipes.

Bulkhead and Deck Penetration

Pipe penetration through watertight bulkheads or decks as well as through fire divisions shall be type approved unless the penetration pipe is welded into the bulkhead/deck.

When plastic pipes pass through watertight bulkheads or decks which are also a fire division and a fire may cause flooding of watertight compartments, the watertight integrity of the bulkhead or deck is to be maintained by a metallic shut-off valve fitted at the bulkhead or deck. The operation of this valve shall be provided from above the freeboard deck. Refer to DNV GL Rules Pt.4, Ch.6 Section 3 – 1.4 Fittings on watertight bulkheads.

On passenger vessels, where the watertight bulkhead is also a fire division, the requirements of the SOLAS Chapter II - 1, Regulation 13.2.3. are to be observed.



Job Id: 262.1-035023-1
Certificate No: TAK0000224

Type Approval documentation

Tests carried out

Marking of product

Pipes

Scope	Example
- Manufacturer name and or trademark - Nominal outside diameter and wall thickness - Composition - Design standard and application class / service pressure - Manufacturer information	- wavin - 16x2,0mm - PE-Xc/Al/PE-HD (white colour) - EN ISO 21003, cl 1, 2, 4 /10bar, cl 5 / 6bar - Made in EU

Fittings

Material	Part	Example
PPSU coupling Dimension 16	- Body - Sleeve - Fix ring	- ppsu - wavin 16 - wavin 16
Brass coupling Dimension 40	- Body - Sleeve - Retaining ring	- 40x40 - wavin 40-U-TH-H - wavin 40

Periodical assessment

For retention of the Type Approval, a DNV GL Surveyor shall perform periodical assessment after two years (+/- 90 days) and after 3.5 years (+/- 90 days) to verify that the conditions for the Type Approval are complied with. Refer to the Class Programme DNVGL-CP-0338, Sec.4.

End of certificate