

TYPE APPROVAL CERTIFICATE

This is to certify:**That the Plastic Pipes, Thermoplastic**

with type designation(s)

**PPH & PPR SDR17,6 S8.3 and PPH & PPR SDR11 S5 Pipes,
PPR SDR17 S8 and PPR SDR11 S5 Fittings**

Issued to

**AGRU Kunststofftechnik GmbH
BAD HALL, Austria**

is found to comply with

Det Norske Veritas' Rules for Classification of Ships**Det Norske Veritas' Offshore Standards****Det Norske Veritas' Type Approval Programme 1-501.2, 2011, Thermoplastic Pipes****IMO Resolution A.753(18). Guidelines for the Application of Plastic Pipes on Ships****Application :****For use in systems for water and sea water up to 12.5 (16) bar. Service temperature 0°C to 95°C. For installation in accordance with DNV Rules and Manufacturer's Specification. The piping systems are not tested w.r.t. Fire Endurance and Flame Spread characteristics.****Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.**This Certificate is valid until **2019-10-15**.Issued at **Høvik** on **2015-10-16**DNV GL local station: **Essen**Approval Engineer: **Gisle Hersvik**for **DNV GL**

**Martin Strande
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.

Product description

PPH & PPR SDR17,6 S8.3 and PPH & PPR SDR11 S5 Pipes PPR SDR17 S8 and PPR SDR11 S5 Fittings

- Polypropylene (PP)
 - **PPH** (Polypropylene Homopolymer) **Pipes** (extruded)
 - *Nominal Internal Pressure rating (IMO*): 8 and 12.5 bar.*
 - **PPR Pipes** (Polypropylene Random Copolymer) (extruded) **and Fittings** (molded)
 - *Nominal Internal Pressure rating (IMO*): 8 and 12.5 bar.*
- * IMO=IMO Resolution A.753(18).

Pipes – PPH:

Nominal diameter, DN [mm]	Wall thickness, min. [mm]	
	<i>Standard Size Ratio, SDR</i>	
	SDR17.6	SDR11
	<i>Pipe Series, S</i>	
	8.3	5
	<i>Nominal Pressure, PN [bar]</i>	
	PN10	PN16
16	--	1.8
20	--	1.9
25	--	2.3
32	2.0	2.9
40	2.3	3.7
50	2.9	4.6
63	3.6	5.8
75	4.3	6.8
90	5.1	8.2
110	6.3	10.0
125	7.1	11.4
140	8.0	12.7
160	9.1	14.6
180	10.2	16.4
200	11.4	18.2
225	12.8	20.5
250	14.2	22.7
280	15.9	25.4
315	17.9	28.6
355	20.1	32.2
400	22.7	36.3
450	25.5	40.9
500	28.3	45.4

Fittings:

Elbows, bends, tees, reducers, sockets, caps, flanges, threaded adaptors, unions, stub ends and backing rings.

Joining techniques:

Butt fusion, socket fusion and electrofusion

Pipes – PPR:

Nominal diameter, DN [mm]	Wall thickness, min. [mm]	
	<i>Standard Size Ratio, SDR</i>	
	SDR17	SDR11
	<i>Pipe Series, S</i>	
	8	5
	<i>Nominal Pressure, PN [bar]</i>	
	PN10	PN16
16	--	1.8
20	--	1.9
25	--	2.3
32	1.9	2.9
40	2.4	3.7
50	3.0	4.6
63	3.8	5.8
75	4.5	6.8
90	5.4	8.2
110	6.6	10.0
125	7.4	11.4
140	8.3	12.7
160	9.5	14.6
180	10.7	16.4
200	11.9	18.2
225	13.4	20.5
250	14.8	22.7
280	16.6	25.4
315	18.7	28.6
355	21.1	32.2
400	23.7	36.3
450	26.7	40.9
500	29.7	45.4

Fittings:

Elbows, bends, tees, reducers, sockets, caps, flanges, threaded adaptors, unions, stub ends and backing rings.

Joining techniques:

Butt fusion, socket fusion and electrofusion

Application/Limitation

The approval covers application such as essential and non-essential system, hot and cold water systems chilled and brine water systems, cooling systems (air condition), black and grey water systems, water treatment fresh and waste water, osmosis systems and evaporation, fresh water bunker lines, etc.

For installation in accordance with legacy DNV GL Rules and Manufacturer's Specification.

Maximum service pressure; 8 (10) and 12.5 (16 bar). Ref. above table w.r.t. dimensions.

Service temperature range; 0°C to 95°C.

The piping system is not tested with respect to Low Flame Spread characteristics.

Job Id: **262.1-014120-1**
Certificate No: **TAK000002U**

The piping system is not tested with respect to Fire Endurance characteristics.

The piping system is non-conductive, not for installation in gas hazardous area.

Type Approval documentation Tests carried out

Type Testing carried out in accordance with **Type Approval documentation**.

Marking of product

The product is to be marked with the *manufacturer's name*: **AGRU**, *dimensions*, *SDR rating*, *batch no.* and *material designation*.

The marking is to be carried out in such a way that it is visible, legible and indelible. The marking of product is to enable traceability to the DNV GL Type Approval Certificate.

Periodical assessment

The scope of the Periodical Assessment is to verify that the conditions stipulated for the Type Approval is complied with and that no alterations are made to the product design or choice of materials. Periodical Assessment to be performed after two (2) years (Certificate Retention) and at renewal after four (4) years (Certificate Renewal).

The main elements of the Periodical Assessment are to:

- Ensure that **Type Approval documentation** is available.
- Review design, materials, production process, and performance with respect to possible changes, in order to ensure compliance with **Type Approval documentation** and/or referenced material specifications.
- Ensure traceability between manufacturer's product marking and the DNV GL Type Approval Certificate.

END OF CERTIFICATE