

TYPE APPROVAL CERTIFICATE

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

with type designation(s)

PE100/PE100 RC SDR17 S8 (PN10) and PE100/PE100 RC SDR11 S5 (PN16) Pipes and Fittings

Issued to

**AGRU Kunststofftechnik GmbH
Bad Hall, Austria**

is found to comply with

DNV GL class programme DNVGL-CP-0072 – Type approval – Thermoplastic piping systems**DNV GL rules for classification – Ships****DNV GL offshore standards****IMO Resolution A.753(18). Guidelines for the Application of Plastic Pipes on Ships****Application :****For use in systems for water and seawater up to 12.5 (16) bar. Service temperature -40°C to 60°C. For installation in accordance with DNV GL 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 **2018-12-31**.Issued at **Høvik** on **2016-07-04**DNV GL local station: **Essen**Approval Engineer: **Gisle Hersvik**for **DNV GL**

**Arnstein Gloppen
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

PE100/PE100 RC Pipes and Fittings.

- Polyethylene (PE100)
- Nominal Internal Pressure rating (AGRU): 10 and 16 bar at 20°C for a life time of 50 years.
- Nominal Internal Pressure rating (IMO*): 8 and 12.5 bar.
* IMO=IMO Resolution A.753(18); Downrated due to internal burst pressure testing.

Pipes:

Nominal diameter, DN [mm]	Wall thickness, min. [mm]	
	Standard Size Ratio, SDR	
	SDR17	SDR11
	Pipe Series, S	
	8	5
	Nominal Pressure, PN [bar]	
	PN10	PN16
20	--	2.0
25	--	2.3
32	2.0	3.0
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	--	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, watertreatment fresh and waste water, osmosis systems and evaporation, fresh water bunker lines, etc.

For installation in accordance with 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; -40°C to 60°C.

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

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

- 1.
- 2.
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- 3.
- 4.
- 5.
- 6.
- 7.

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