



Global Pipe

PRODUCT APPRAISAL REPORT PA 1014 Issue 3

HOBAS Centrifugally Cast (CC) Glass Reinforced Plastics (GRP) Jacking Pipes for Sewer Applications
DN 250 – DN 3600

ISO 25780 – Plastics piping systems for pressure and non-pressure water supply, irrigation, drainage or sewerage – Glass-reinforced thermosetting plastics (GRP) systems based on unsaturated polyester (UP) resin - Pipes with flexible joints intended to be installed using jacking techniques

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Overview of WSAA

The Water Services Association of Australia (WSAA) is the peak industry body representing the urban water industry. Our members provide water and sewerage services to over 20 million customers in Australia and New Zealand and many of Australia's largest industrial and commercial enterprises.

Based around our vision of 'customer driven, enriching life', WSAA facilitates collaboration, knowledge sharing, networking and cooperation within the urban water industry. We are proud of the collegiate attitude of our members which has led to industry-wide approaches to national water issues.

WSAA can demonstrate success in the standardisation of industry performance monitoring and benchmarking, as well as many research outcomes of national significance. The WSAA Executive retains strong links with policy makers and legislative bodies and their influencers, to monitor emerging issues of importance to the urban water industry.

WSAA was formed in 1995 as a non-profit organisation to foster the exchange of information between industry, government and the community, and to promote sustainable water resource management.

The urban water industry is committed to anchoring its services to customers' values, and to enrich communities where water services have broad economic, environmental and social values. In line with this our main activities focus on four areas:

1. influencing national and state policies on the provision of urban water services and sustainable water resource management
2. promoting debate on environmentally sustainable development and management of water resources and the community health requirements of public water supplies
3. improving industry performance and establishing benchmarks and industry leading practices for water service processes; and
4. fostering the exchange of information on education, training, research, water and wastewater management and treatment and other matters of common interest.

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CONTENTS

1 EXECUTIVE SUMMARY	6
1.1 Recommendations	6
2 THE APPLICANT	7
2.1 The Supplier	7
2.2 The Manufacturer	7
3 THE PRODUCT	7
3.1 General	7
3.2 Manufacture of CC-GRP Jacking Pipes	8
3.2.1 Process	8
3.2.2 Reinforcement	8
3.2.3 Resin	8
3.2.4 Aggregate and fillers	9
3.3 External diameter	9
3.4 Jointing	9
3.4.1 Stainless steel coupling for jacking pipes	9
3.4.2 GRP coupling for jacking pipes	9
3.5 Jacking Load and Nominal Stiffness	9
3.6 Nominal Pressure	10
3.7 Nominal Pipe Lengths	10
3.8 Allowable Angular Deflection	10
3.9 Pipe Fittings	10
4 SCOPE OF THE APPRAISAL	10
5 APPRAISAL CRITERIA	10
5.1 Quality Assurance Requirements	10
5.2 Performance Requirements	11
6 COMPLIANCE WITH APPRAISAL CRITERIA	11
6.1 Compliance with Quality Assurance Requirements	11
6.2 Compliance with Performance Requirements	11
6.2.1 Type tests	11
6.2.2 Temperature and pressure re-rating	11
6.2.3 Resistance to ultraviolet degradation	12
6.2.4 Coupling Materials	12
7 FITTING INSTRUCTIONS, TRAINING AND INSTALLATION	12
8 PRODUCT MARKING	12
9 PACKAGING AND TRANSPORTATION	12
10 PRODUCT WARRANTY	12
11 WATER AGENCY EXPERIENCE WITH THE PRODUCT OR FIELD-TESTING REPORT	13
12 OUTCOMES OF EXPERT PANEL PRODUCT REVIEW	13
13 FUTURE WORKS	13
14 DISCLAIMER	13
14.1 Issue of Report	14
14.2 Limits on Reliance on Information and Recommendations	14

14.2.1 Disclaimer of liability	14
14.2.2 Intellectual Property and other rights	14
14.2.3 Need for independent assessment	15
14.3 No Updating	15
14.4 No Warranty	15
APPENDIX A – PRODUCT LITERATURE	16
APPENDIX B - QUALITY CERTIFICATIONS.....	27
APPENDIX C - SUPPLIER CONTACTS	30

1 EXECUTIVE SUMMARY

The Trustee for Global Pipe Unit Trust trading as Global Pipe, a 100% Australian owned company, was established in 2007 and is a major supplier of pipe and tunneling products for infrastructure projects throughout Australasia. Global Pipe is the exclusive agent and distributor for Amiblu Hobas CC GRP jacking pipes and fittings within Australia.

HOBAS® is part of the Amiblu Group headquartered in Austria and is a specialist manufacturer of glass reinforced pipeline systems. The pipes are manufactured in the Hobas facility in Trolenhagen Germany.

This appraisal applies to Hobas Centrifugally Cast (CC) Glass Reinforced Plastic (GRP) jacking pipes for pressure and non-pressure sewer applications manufactured to comply with ISO 25780:2011 – *Plastics piping systems for pressure and non-pressure, water supply, irrigation, drainage or sewerage - Glass-reinforced thermosetting plastics (GRP) systems based on unsaturated polyester (UP) resin – Pipes with flexible joints intended to be installed using jacking techniques.*

This Issue 3 is to replace the original Appraisal that had reached its expiry date.

The jacking pipes considered in this Appraisal include nominal pipe diameters ranging from DN 250 (272 OD) to DN 3600 (3600 OD) with a nominal pressure classification of PN1 and stiffness ratings ranging from SN32,000 to SN1,000,000. Nominal jacking loads range from 20 tonnes to 2000 tonnes. Pipes with alternative pressure classifications up to PN16 can also be supplied.

The outside diameter range of the pipes is provided in Appendix A.

The pipes are normally supplied in lengths of 1m, 2m, 3m or 6m but may be manufactured to order for alternative intermediate lengths.

Hobas offers stainless steel or GRP sleeve type flush couplings with incorporated EPDM seals for jointing the jacking pipes. Pipes are supplied with the coupling mounted onto one end of the pipe.

GRP fittings used with HOBAS® CC-GRP jacking pipes are fabricated from sections of straight pipe, cut to length, joint wrapped externally and internally with additional fibre reinforcement in accordance with ISO 10467 for sewerage systems. GRP fittings are supplied with spigot ends suitable for connection to Hobas CC-GRP jacking pipe couplings.

Amiblu Germany holds an ISO 9001:2015 Quality Management System Licence.

The Hobas centrifugally cast GRP jacking pipes are covered by a TUV SUD Certificate of Conformity for ISO 25780:2011.

This Appraisal has determined that the Hobas CC-GRP jacking pipes included in this appraisal report meets the requirements of WSA PS – 205J *Centrifugally Cast Glass Reinforced Plastics (CC-GRP) Pipes for Pressure and Non-Pressure Applications – Drinking Water, Non-Drinking Water Supply and Sewerage – Installed Using Trenchless Installation Methods* and are therefore considered as 'fit-for-purpose'.

1.1 Recommendations

It is recommended that WSAA members, subject to any specific requirements of the member, accept or authorise the Hobas CC GRP jacking pipe as detailed in this report for use in pressure and non-pressure sewerage applications for installation using trenchless techniques, provided they are installed in accordance with WSAA Codes and the manufacturer's requirements, where specified.

2 THE APPLICANT

The Applicant is The Trustee for Global Pipe Unit Trust trading as Global Pipe.

2.1 The Supplier

The Trustee for Global Pipe Unit Trust trading as Global Pipe, a 100% Australian owned company, was established in 2007 and is a major supplier of pipe and tunneling products for infrastructure projects throughout Australasia. The company sources products from world renowned manufacturers of glass reinforced plastics pipe systems and offers comprehensive technical support, engineering and design services through an in-house team of engineers.

Global Pipe is the exclusive agent and distributor for Amiblu Hobas CC GRP jacking pipes and fittings within Australia.

2.2 The Manufacturer

Hobas is part of the Amiblu Group headquartered in Austria. Amiblu was formed in 2017 as a joint venture company incorporating Hobas Europe and Amiantit Europe, both market leaders in the manufacturer of GRP pipes. The company employs approximately 1500 people and has manufacturing facilities in Germany, Spain, Poland and Romania with an R & D centre in Norway.

Hobas is a major manufacturer and exporter of pressure and non-pressure GRP pipes and associated accessories. Their modern factories are equipped with the latest process control equipment which allows them to produce pipes to a range of standards and makes them one of the major players in the pipe production industry in the world.

Hobas GRP products have been manufactured continuously for more than 60 years.

3 THE PRODUCT

This appraisal applies to Hobas Centrifugally Cast (CC) Glass Reinforced Plastic (GRP) jacking pipes for pressure and non-pressure sewer applications manufactured to comply with ISO 25780:2011 – *Plastics piping systems for pressure and non-pressure, water supply, irrigation, drainage or sewerage - Glass-reinforced thermosetting plastics (GRP) systems based on unsaturated polyester (UP) resin – Pipes with flexible joints intended to be installed using jacking techniques.*

The jacking pipes considered in this Appraisal include nominal pipe diameters ranging from DN 250 (272 OD) to DN 3600 (3600 OD) with a nominal pressure classification of PN1 and stiffness ratings ranging from SN32,000 to SN1,000,000. Nominal jacking loads range from 20 tonnes to 2000 tonnes. Pipes with alternative pressure classifications up to PN16 can also be supplied.

The pipes are normally supplied in lengths of 1m, 2m, 3m or 6m but may be manufactured to order for alternative intermediate lengths.

Hobas offers stainless steel or GRP sleeve type flush couplings with incorporated EPDM seals for jointing the jacking pipes. Pipes are supplied with the coupling mounted onto one end of the pipe.

3.1 General

HOBAS® CC-GRP pipe is a flexible, structurally strong, centrifugally cast composite pipe that is designed to be used in buried and above ground applications for the transport of drinking water, non-drinking water, sewage, sea water, storm water and aggressive chemicals under both pressure and gravity flow conditions. The pipes and fittings are manufactured under strict quality standards and are distinguished by their high strength, chemical and corrosion resistance and relatively low weight.

3.2 Manufacture of CC-GRP Jacking Pipes

Hobas can design CC-GRP Jacking pipes to meet the different needs of specific applications by varying the resin, sand and glass proportions, orientation and configuration.

3.2.1 Process

Hobas technology produces centrifugally cast pipes in a 100 % computer-controlled process. The manufacturing machine's arm feeds all raw materials, chopped glass fibres, thermosetting plastics (unsaturated polyester or vinylester resins) and reinforcing agents, into a fast-rotating mould.

Layer by layer, in a predefined process, the pipe wall is built up from the outside inwards. The material quantities inserted by the machine are monitored and compared to the desired design values in order to assure that each product is fully traceable with respect to its raw material types and quantities. Once all raw materials have been inserted into the mould, the speed of rotation is increased. High centrifugal forces of up to 75 g press the materials against the mould wall and condense them to a maximum, creating a high quality, very solid and void-free pipe wall. Cold water is used to cool the mould and after the pipe is removed, the pipe ends are trimmed and bevelled. Finally, a coupling is mounted onto one end of each pipe.

The centrifugal casting process ensures that the pipes are circular, the wall thickness is uniform over the entire length at exact outer diameter, and the material displays a high longitudinal compressive strength that is particularly important for jacking. Thanks to the three-dimensional chemical bonding of the thermosetting resin, the pipe retains its stability even in very warm environments. The sandwich construction of the wall also ensures that the pipes can withstand high loading without any trouble and enables the pipe's strength to be customized to suit the specific load directions required.

3.2.2 Reinforcement

Hobas use any combination of glass material (Full ECR, full E or mixture of E & ECR glass) in production in accordance with the customer request and application area. Global Pipe provides the necessary information to Hobas so that they are able to determine if their standard glass mix is satisfactory or if it needs to be modified to meet the application. HOBAS are able to meet any request for pipes to be manufactured with either ECR, E or mixed.

The glass used in the manufacture of pipes for water and sewer industry is type E or ECR glass. The glass is supplied by approved suppliers of HOBAS® and must conform to international standards for the manufacture of fibreglass. Depending on the application, fluid handled, the appropriate glass can be used.

Standard roving tests are performed on every batch delivered to check the quality and uniformity of an approved glass fibre.

3.2.3 Resin

The Hobas pipes are manufactured using orthophthalic polyester resin supplied by approved suppliers. All resin orders are required to meet detailed specific quality requirements specified by Hobas and samples of all batches are checked in the QC laboratory on delivery. Different resins are purchased as required for specialized applications.

3.2.4 Aggregate and fillers

Silica sand is used as filler in the Hobas CC-GRP pipes. The sand is required to meet specified grading and quality requirements. All the sand samples are checked in the quality lab before unloading in the silos.

3.3 External diameter

The external diameters of the Hobas jacking pipes are based on ISO 10467 Series B1 and B2. The diameters are provided in Appendix A.

3.4 Jointing

There are two types of flush sleeve type couplings available for jointing Hobas CC-GRP jacking pipes as described below. Each pipe is provided with a coupling mounted onto one end of the pipe.

3.4.1 Stainless steel coupling for jacking pipes

The Hobas Grade 316 stainless steel couplings consist of a sleeve with an integrated EPDM seal and are used in trenchless installations for sizes up to DN 2500 and pressures up to PN16. Refer to Figure 1.



FIGURE 1: STAINLESS STEEL COUPLING

3.4.2 GRP coupling for jacking pipes

These couplings consist of a GRP sleeve with an EPDM seal and are used in trenchless installations for sizes up to DN 3600 and pressures up to PN6. See Figure 2.



FIGURE 2: GRP COUPLING

3.5 Jacking Load and Nominal Stiffness

Hobas CC GRP jacking pipes can be supplied with the following jacking loads and stiffness classes.

TABLE 2 JACKING LOAD AND NOMINAL STIFFNESS

Jacking Load (tonnes)	Nominal Stiffness (N/m ²)
From 20 to 2,000	SN32,000 – SN1,000,000

ISO 25780 nominates a minimum stiffness of SN 20,000 for jacking pipe, however based on many years of experience Hobas recommends a minimum stiffness of SN32,000 for jacking pipes.

3.6 Nominal Pressure

The Hobas CC GRP jacking pipes are normally supplied with a pressure rating of PN1; however, pipe can be supplied with alternative pressure ratings up to PN16.

3.7 Nominal Pipe Lengths

Hobas CC-GRP jacking pipe can be supplied in 1m, 2m, 3m or 6m lengths. Intermediate pipe lengths are available upon request.

The tolerance on each pipe length is ± 25 mm.

3.8 Allowable Angular Deflection

Table 3 below specifies the maximum allowable angular deflection between adjacent pipes in the installed condition at which the joint is designed to operate when subjected to either internal or external pressure, including during pipe jacking operations.

TABLE 3 MAXIMUM ALLOWABLE INSTALLED JOINT DEFLECTIONS

External Diameter mm	Maximum Allowable Joint Deflection	
	a mm/m	δ degrees
200 ≤ 500	15	0.8594
< 500 ≤ 999	10	0.5729
1000	9	0.5156
1200	8	0.4583
1400	7	0.4010

3.9 Pipe Fittings

GRP fittings used with Hobas CC-GRP jacking pipes are fabricated from sections of straight pipe, cut to length and joint wrapped externally and internally with additional fibre reinforcement in accordance with ISO 10467. GRP fittings are supplied with spigot ends suitable for connection to the jacking pipe using stainless steel or GRP couplings.

4 SCOPE OF THE APPRAISAL

The scope of this Product Appraisal applies to Hobas CC GRP jacking pipes, as specified in Section 3, for pressure and non-pressure sewer applications using various trenchless installation methods such as slip lining, micro tunnelling and pipe jacking.

5 APPRAISAL CRITERIA

5.1 Quality Assurance Requirements

The WSAA Product Appraisal Technical Advisory Group accepts GRP Centrifugally Cast Jacking Pipes manufactured in compliance with ISO 25780:2011 - *Plastics piping systems for pressure and non-pressure, water supply, irrigation, drainage or sewerage - Glass-reinforced thermosetting plastics (GRP) systems based on unsaturated polyester (UP) resin – Pipes with flexible joints intended to be installed using jacking techniques* and duly certified by means of an ISO Type 5 product certification scheme undertaken by a JAS-ANZ accredited Conformity Assessment Body (CAB) or by an international accreditation system recognised by JAS-ANZ.

The manufacturer is generally expected to have a production management and control system that has been duly accredited in accordance with AS/NZS ISO 9001 as a prerequisite to undergoing a product certification audit.

The ISO Type 5 Product Certification Scheme shall meet the criteria described in WSA TN-08.

5.2 Performance Requirements

Hobas CC GRP jacking pipe has been appraised for compliance with the requirements of ISO 25780:2011 – *Plastics piping systems for pressure and non-pressure, water supply, irrigation, drainage or sewerage - Glass-reinforced thermosetting plastics (GRP) systems based on unsaturated polyester (UP) resin – Pipes with flexible joints intended to be installed using jacking techniques*

The following Product Specification is relevant to this application:

WSA PS – 205J-*Centrifugally Cast Glass Reinforced Plastics (CC-GRP) Pipes for Pressure and Non-Pressure Applications – Drinking Water, Non-Drinking Water Supply and Sewerage – Installed Using Trenchless Installation Methods.*

A copy of the Product Specification is available at the following link:

<https://www.wsaa.asn.au/shop/product/35716>

6 COMPLIANCE WITH APPRAISAL CRITERIA

6.1 Compliance with Quality Assurance Requirements

Global Pipe has submitted the following quality certificates:

- ISO 9001:2015 Certificate of Registration No. 12 100 49982/02 issued to Amiblu Germany GmbH by TUV SUD.
- ISO 25780:2011 Certificate of Conformity No. 19 01 90258 001-1 issued to Amiblu Germany GmbH by TUV SUD

Copies of the Quality Assurance and Product Certification licences have been included in Appendix B and are also available from WSAA.

6.2 Compliance with Performance Requirements

6.2.1 Type tests

Type test reports were provided for Issue 1 of this Appraisal to demonstrate compliance with the performance requirements of ISO 25780:2011 and are not required to be repeated unless there is a design change to the product. The tests completed included long-term specific creep stiffness, resistance to strain corrosion, resistance to internal pressure, joint performance, longitudinal compressive strength, permissible jacking forces, ultimate longitudinal load, specific initial longitudinal compressive modulus and abrasion resistance. Where required, specific test results are available from Global Pipe.

6.2.2 Temperature and pressure re-rating

Temperature and pressure re-rating requirements vary according to the pipeline application and Hobas can provide recommendations on resin use and re-rating for abnormal applications. In general, pipelines carrying liquids up to 35°C requires no pressure re-rating. For temperatures greater the 35°C Global Pipe should be consulted for a recommendation on resins and re-rating.

6.2.3 Resistance to ultraviolet degradation

Hobas advises that CC GRP pipes can be stored outside for long periods without detrimental effects to the structure of the pipe or coupling, however the inner pipe layer should not be exposed to UV radiation for more than 8 weeks. Where pipe is required to be stored outdoors for more than 8 weeks the ends should be covered with pipe caps to protect the inner layer from the effects of UV.

6.2.4 Coupling Materials

A material test report by MPA NRW (DAkKS Accreditation No D-PL-11142) has been submitted to demonstrate compliance of the EPDM-60 seals to EN 681-1. An analytical report by Aperam has been provided to demonstrate that the stainless-steel material complies with Grade 316L.

7 FITTING INSTRUCTIONS, TRAINING AND INSTALLATION

The Australasian Society Trenchless Technology has developed Trenchless Guidelines, Standards and Specifications to assist industry users in Australia and New Zealand in utilising these technologies. These documents are not intended not replace any existing relevant manuals or standards. It remains the user's responsibility to ensure that all relevant laws, standards and specifications are adhered to during the course of a Works with use of these trenchless technologies.

These Guidelines, Standards and Technical specifications are available from the Australasian Society Trenchless Technology (ASTT) website. (<http://astt.com.au>). Comprehensive technical specifications are available from the ASTT (Australian Society for Trenchless Technology) website. (<http://astt.com.au>) and www.globalpipe.com.au

8 PRODUCT MARKING

Marking is digitally printed on the pipe in accordance with ISO 25780: 2011 as follows:

- (a) The number of the Standard: ISO 25780
- (b) External diameter:
- (c) Stiffness rating, SN:
- (d) Pressure rating, PN:
- (e) Permissible jacking load:
- (f) Code letter "C" to denote sewerage.
- (g) Manufacturers name or identification:
- (h) Date of manufacture:
- (i) Individual pipe number:

9 PACKAGING AND TRANSPORTATION

Global Pipe will arrange for ocean freight to the nearest sea port and onforwarding to the project site or storage yard using road transport or rail for local transportation.

An extract from the Hobas Installation Manual relating to transportation, unloading and storage is included in Appendix A.

10 PRODUCT WARRANTY

The products are covered by the normal commercial and legal requirements of the *Competition and Consumer Act 2010 (Cth)*, which covers manufacture to the relevant

standard and details of Global Pipe's warranty is included in their terms and conditions of sale.

11 WATER AGENCY EXPERIENCE WITH THE PRODUCT OR FIELD-TESTING REPORT

Hobas CC-GRP pipes have been successfully used by Australian Water Agencies for more than 25 years. Global Pipe has supplied Hobas CC-GRP jacking pipes to many water agencies including Melbourne Water, Yarra Valley Water, South East Water, City West Water, Power and Water (NT), Sydney Water, Water Corporation of WA and Queensland Urban Utilities.

12 OUTCOMES OF EXPERT PANEL PRODUCT REVIEW

The following queries are transposed from Issue 1.

Q.1 What fittings and accessories are available to be used with jacking pipes?

Ans. It is common to have transition fittings which are used to connect to the start and end of the pipe to be jacked. Transition fittings may have a filament wound coupling and a stainless-steel coupling where one end joins to the jacking pipe and the other to an open trench pipe. Hobas Transition pipes can be supplied such that there is no step between the jacking pipe ID and the open trench pipe ID and there is a smooth transition.

Rocker pipes/manhole connectors have spigot/spigot connections and a puddle flange fabricated onto the pipe. The puddle flange position can be fabricated in accordance with the pipeline design requirements.

All fittings can be supplied with either the stainless-steel couplings or GRP couplings.

Q.2 What safety factors are used for calculating the allowable jacking loads on the Hobas CC-GRP Jacking pipes? Why are the safety factors important?

Ans: Safety factors are intended to account for any eccentric or point loading that may occur during Jacking. HOBAS uses a safety factor of 1.75 for Relining/slip lining applications due to the fact that these trenchless applications do not require the pipe to take a major compressive load. Based on over 30 years of experience as the developer of CC-GRP jacking pipe, Hobas has determined that a safety factor of 3.5 is needed. This high safety factor is very useful to accommodate 'unanticipated' deviations in the jacking alignment which result in eccentric loads and point loads on the jacking pipe. Experience dictates that not all bores will be perfectly straight. This may be due to changes in geology (hard ground to softer ground), inconsistencies in ground conditions (eg boulders in soft ground), steering or oversteering of the TBM or planned curves. Hobas determined very early in their development of CC-GRP jacking pipe that a safety of 1.75 was not adequate.

13 FUTURE WORKS

There are no future works identified.

14 DISCLAIMER

This Product Appraisal Report (Report) is issued by the Water Services Association of Australia Limited on the understanding that:

This Report applies to the product(s) as submitted. Any changes to the product(s) either minor or major shall void this Report.

To maintain the recommendations of this Report any such changes shall be detailed and notified to the Product Appraisal Manager for consideration and review of the Report and

appropriate action. Appraisals and their recommendations will be the subject of continuous review dependent upon the satisfactory performance of products.

WSAA reserves the right to undertake random audits of product manufacture and installation. Where products fail to maintain appraised performance requirements the appraisal and its recommendations may be modified and reissued. Appraisal reports will be reviewed and reissued at regular intervals not exceeding five (5) years.

The following information explains a number of very important limits on your ability to rely on the information in this Report. Please read it carefully and take it into account when considering the contents of this Report.

Any enquiries regarding this report should be directed to the Program Manager, Carl Radford, Phone: 03 8605 7601 email carl.radford@wsaa.asn.au.

14.1 Issue of Report

This Report has been published and/or prepared by the Water Services Association of Australia Limited and nominated Project Manager and peer group of technical specialists (the Publishers).

The Report has been prepared for use within Australia only by technical specialists that have expertise in the function of products such as those appraised in the Report (the Recipients).

By accepting this Report, the Recipient acknowledges and represents to the Publisher(s) and each person involved in the preparation of the Report that the Recipient has understood and accepted the terms of this Disclaimer.

14.2 Limits on Reliance on Information and Recommendations

14.2.1 Disclaimer of liability

Neither the Publisher(s) nor any person involved in the preparation of the Report accept(s) any liability for any loss or damage suffered by any person however caused (including negligence or the omission by any person to do anything) relating in any way to the Report or the product appraisal criteria underlying it. This includes (without limitation) any liability for any recommendation or information in the Report or any errors or omissions.

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Australia Limited may have information in its possession about intellectual property rights infringement allegations or other infringement allegations in relation to the Product which are not referred to or disclosed in this Report and which are not otherwise communicated to Recipients.

14.2.3 Need for independent assessment

The information and any recommendation contained (expressly or by implication) in this Report are provided in good faith (and subject to the limitations noted in this Report). However, you should treat the information as indicative only. You should not rely on that information or any such recommendation except to the extent that you reach an agreement to the contrary with the Publisher(s).

This Report does not contain all information that a person might require for the purposes of assessing any product discussed or appraised within it (Product). The product appraisal criteria used in preparing this Report may not address all relevant aspects of the Product.

Recipients should seek independent evidence of any matter which is material to their decisions in connection with an assessment of the Product and consult their own advisers for any technical information required. Any decision to use the Product should take into account the reliability of that independent evidence obtained by the Recipient regarding the Product.

Recipients should also independently verify and assess the appropriateness of any recommendation in the Report, especially given that any recommendation will not take into account a Recipient's particular needs or circumstances.

WSAA has not evaluated the extent of the product liability and professional indemnity insurance that the provider of the product maintains. Recipients should ensure that they evaluate the allocation of liability for product defects and any professional advice obtained in relation to the product or its specification including the requirements for product liability and professional indemnity insurance.

14.3 No Updating

Neither the Publisher(s) nor any person involved in the preparation of this Report [has] [have] any obligation to notify you of any change in the information contained in this Report or of any new information concerning the Publisher(s) or the Product or any other matter.

14.4 No Warranty

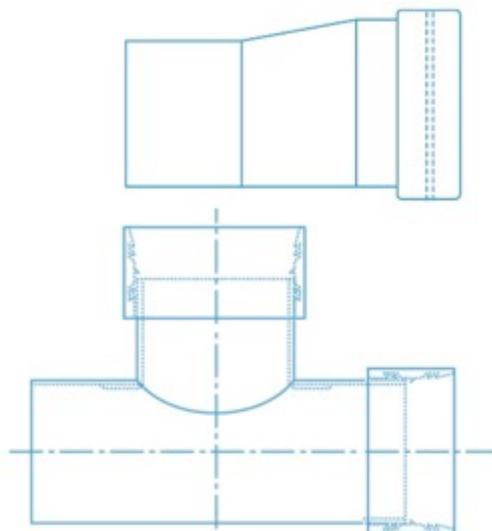
The Publisher(s) do[es] not, in any way, warrant that steps have been taken to verify or audit the accuracy or completeness of the information in this Report, or the accuracy, completeness or reasonableness of any recommendation in this Report.

APPENDIX A – PRODUCT LITERATURE



Hobas GRP pipe systems PN 1

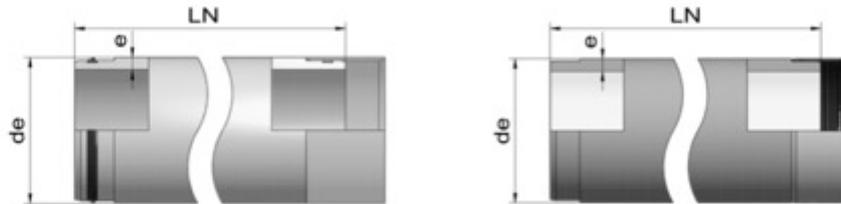
Technical product data



Amiblu Pipe Systems
Engineered for the next 150 years



Jacking Pipe PN 1



Portfolio as sold by Amiblu. For the full range of the Hobas technology, visit www.hobas.com.

de [mm]		SN	SN	SN	SN	SN	SN	SN	SN	SN	SN	SN	SN
Coupling Type		32000	40000	50000	64000	80000	100000	128000	160000	200000	320000	640000	1000000
272 Stainless Steel	e [mm]										19	24	
	m [kg/m]										32	40	
	F [kN]*										204	297	
324 Stainless Steel	e [mm]									20	23	28	
	m [kg/m]									41	46	55	
	F [kN]*									273	341	452	
376 Stainless Steel	e [mm]							19	20	23	27	32	
	m [kg/m]							46	48	54	63	74	
	F [kN]*							297	324	405	424	638	
427 Stainless Steel	e [mm]						19	20	21	24	28	34	39
	m [kg/m]						52	54	57	65	75	89	101
	F [kN]*						342	373	405	497	618	795	938
478 Stainless Steel	e [mm]					21	23	25	27	29	33	41	46
	m [kg/m]					64	70	76	81	87	98	119	132
	F [kN]*					449	519	588	657	725	859	1120	1278
530 Stainless Steel	e [mm]				20	23	24	26	28	31	36	44	51
	m [kg/m]				68	78	81	88	94	103	119	143	163
	F [kN]*				459	577	616	694	770	885	1071	1362	1608

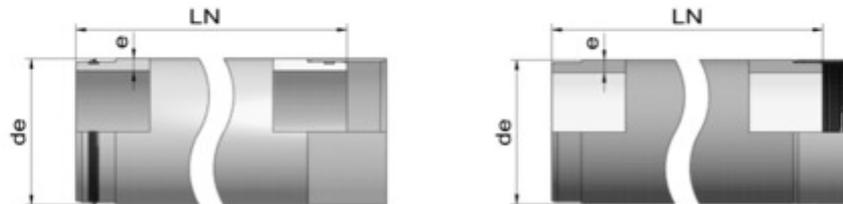
Standard pipe lengths LN are 1 | 2 | 3 | 6 m. - Other lengths and stiffness classes are available on request.

Tolerances according to Amiblu standard.

* The specified jacking force [kN] corresponds to the ultimate jacking force with a 3.5-times safety factor according to ISO 25780.



Jacking Pipe PN 1



Portfolio as sold by Amiblu. For the full range of the Hobas technology, visit www.hobas.com.

de [mm]		SN	SN	SN	SN	SN	SN	SN	SN	SN	SN	SN	SN
Coupling Type		32000	40000	50000	64000	80000	100000	128000	160000	200000	320000	640000	1000000
550 Stainless Steel	e [mm]		20	21	22	24	26	28	30	33	38	47	53
	m [kg/m]		71	74	78	84	91	98	104	114	130	158	176
	F [kN]*		484	525	566	648	728	808	888	1006	1199	1537	1755
616 Stainless Steel	e [mm]		21	23	25	27	29	32	34	37	43	50	58
	m [kg/m]		84	92	99	107	114	125	132	143	165	189	216
	F [kN]*		583	675	767	858	949	1083	1172	1304	1564	1860	2188
650 Stainless Steel	e [mm]	21	24	25	26	28	30	33	35	38	44	54	62
	m [kg/m]	89	101	105	109	117	125	136	144	156	178	215	243
	F [kN]*	613	760	809	857	953	1049	1191	1285	1425	1700	2146	2491
718 Stainless Steel	e [mm]	23	25	27	28	30	32	35	40	43	48	59	68
	m [kg/m]	108	117	125	130	139	147	160	182	194	215	260	295
	F [kN]*	733	842	949	1003	1109	1215	1373	1633	1787	2040	2583	3012
752 Stainless Steel	e [mm]	24	26	28	30	33	36	39	42	45	51	62	72
	m [kg/m]	118	127	136	145	159	173	186	200	213	239	286	327
	F [kN]*	800	913	1026	1138	1305	1470	1634	1797	1958	2276	2843	3342
820 Stainless Steel	e [mm]	25	27	29	33	35	38	42	45	49	54	67	78
	m [kg/m]	134	144	154	175	185	199	219	234	253	277	337	386
	F [kN]*	964	1088	1211	1456	1578	1758	1998	2175	2410	2699	3433	4033

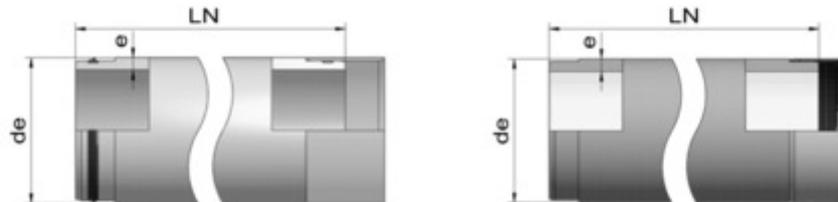
Standard pipe lengths LN are 1 | 2 | 3 | 6 m. - Other lengths and stiffness classes are available on request.

Tolerances according to Amiblu standard.

* The specified jacking force [kN] corresponds to the ultimate jacking force with a 3.5-times safety factor according to ISO 25780.



Jacking Pipe PN 1



Portfolio as sold by Amiblu. For the full range of the Hobas technology, visit www.hobas.com.

de [mm]		SN	SN	SN	SN	SN	SN	SN	SN	SN	SN	SN	SN
Coupling Type		32000	40000	50000	64000	80000	100000	128000	160000	200000	320000	640000	1000000
860	e [mm]	27	29	31	35	37	40	43	47	51	58	72	80
	m [kg/m]	152	162	173	194	205	220	236	256	276	311	379	417
	F [kN]*	1140	1270	1399	1655	1783	1972	2160	2409	2655	3080	3905	4362
924	e [mm]	29	32	34	37	40	42	46	50	54	62	77	
	m [kg/m]	175	192	204	221	238	249	271	293	315	358	436	
	F [kN]*	1302	1511	1649	1856	2061	2197	2466	2734	2998	3520	4470	
960	e [mm]	31	34	36	39	42	44	48	52	56	64	80	
	m [kg/m]	194	212	224	242	259	271	294	317	339	384	471	
	F [kN]*	1497	1714	1857	2072	2284	2425	2706	2983	3258	3801	4854	
1026	e [mm]	34	36	38	41	44	48	52	56	61	68		
	m [kg/m]	227	240	252	271	290	315	340	364	394	436		
	F [kN]*	1830	1984	2138	2367	2595	2897	3196	3492	3859	4366		
1099	e [mm]	35	38	41	44	48	51	56	59	64	73		
	m [kg/m]	251	272	292	312	339	359	392	411	444	501		
	F [kN]*	2040	2288	2535	2781	3106	3348	3748	3987	4380	5079		
1229	e [mm]	40	43	46	49	53	56	61	66	71	81		
	m [kg/m]	321	344	366	389	419	441	478	515	551	623		
	F [kN]*	2748	3026	3302	3576	3940	4212	4660	5105	5546	6415		

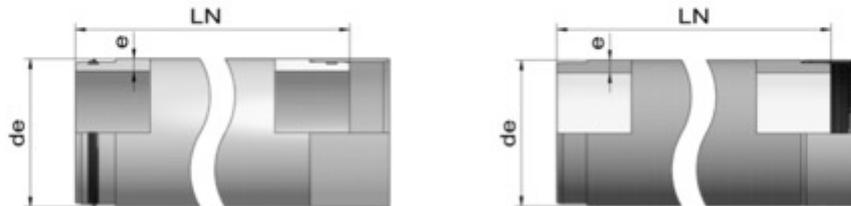
Standard pipe lengths LN are 1 | 2 | 3 | 6 m. - Other lengths and stiffness classes are available on request.

Tolerances according to Amiblu standard.

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Jacking Pipe PN 1



Portfolio as sold by Amiblu. For the full range of the Hobas technology, visit www.hobas.com.

de [mm]		SN	SN	SN	SN	SN	SN	SN	SN	SN	SN	SN	
Coupling Type		32000	40000	50000	64000	80000	100000	128000	160000	200000	320000	640000	1000000
1280	e [mm]	41	45	47	52	55	59	64	68				
	m [kg/m]	343	375	391	430	453	484	522	553				
	F [kN]*	2968	3353	3545	4022	4306	4682	5149	5520				
1434	e [mm]	46	49	52	57	61	65	71	76				
	m [kg/m]	431	458	485	529	564	598	650	693				
	F [kN]*	3890	4215	4537	5072	5497	5919	6548	7067				
1499	e [mm]	48	52	56	60	64	68	74	79				
	m [kg/m]	471	508	545	582	618	655	709	753				
	F [kN]*	4236	4688	5137	5583	6027	6469	7126	7669				
1535	e [mm]	48	52	56	60	64	69	75					
	m [kg/m]	485	524	562	600	638	684	740					
	F [kN]*	3687	4151	4613	5072	5529	6096	6771					
1638	e [mm]	52	56	60	65	70	75	81					
	m [kg/m]	561	602	643	693	743	793	853					
	F [kN]*	4456	4949	5440	6051	6657	7259	7976					
1720	e [mm]	55	59	64	68	73	78						
	m [kg/m]	623	666	719	762	815	867						
	F [kN]*	5065	5583	6227	6739	7376	8009						

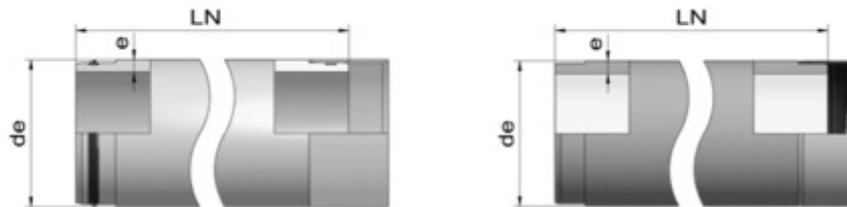
Standard pipe lengths LN are 1 | 2 | 3 | 6 m. - Other lengths and stiffness classes are available on request.

Tolerances according to Amiblu standard.

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Jacking Pipe PN 1



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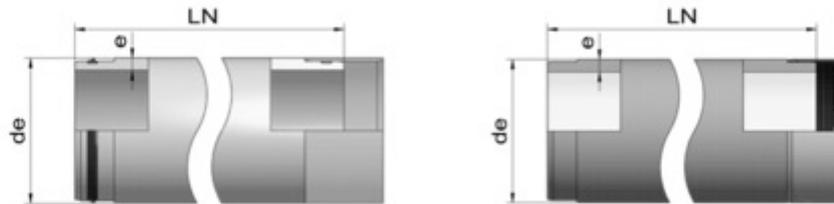
de [mm]		SN	SN	SN	SN	SN	SN	SN	SN	SN	SN	SN	SN
Coupling Type		32000	40000	50000	64000	80000	100000	128000	160000	200000	320000	640000	1000000
1842 Stainless Steel	e [mm]	59	63	68	73	78	83						
	m [kg/m]	716	762	819	876	933	989						
	F [kN]*	6001	6557	7247	7934	8616	9295						
1937 Stainless Steel	e [mm]	62	67	72	77	81							
	m [kg/m]	792	852	912	972	1019							
	F [kN]*	6747	7478	8204	8926	9501							
2047 Stainless Steel	e [mm]	65	70	75	81	85							
	m [kg/m]	878	942	1005	1081	1131							
	F [kN]*	7601	8372	9139	10055	10662							
2160 Stainless Steel	e [mm]	69	74	79	85	90							
	m [kg/m]	983	1051	1118	1198	1264							
	F [kN]*	8828	9641	10450	11416	12216							
2250 Stainless Steel	e [mm]	71	76	82	87	94							
	m [kg/m]	1055	1125	1209	1279	1375							
	F [kN]*	9422	10271	11283	12123	13292							
2400 GRP	e [mm]	76	81	86	93	100							
	m [kg/m]	1204	1279	1353	1457	1560							
	F [kN]*	9251	10154	11053	12304	13548							

Standard pipe lengths LN are 1 | 2 | 3 | 6 m. - Other lengths and stiffness classes are available on request.
Tolerances according to Amiblu standard.

* The specified jacking force [kN] corresponds to the ultimate jacking force with a 3.5-times safety factor according to ISO 25780.



Jacking Pipe PN 1



Portfolio as sold by Amiblu. For the full range of the Hobas technology, visit www.hobas.com.

de [mm]		SN	SN	SN	SN	SN	SN	SN	SN	SN	SN	SN	SN
Coupling Type		32000	40000	50000	64000	80000	100000	128000	160000	200000	320000	640000	1000000
2453	e [mm]	80	82	88	95	102							
	m [kg/m]	1293	1324	1415	1521	1627							
	GRP F [kN]*	10127	10497	11602	12884	14157							
2555	e [mm]	82	85	92	99	106							
	m [kg/m]	1382	1430	1541	1652	1762							
	GRP F [kN]*	10846	11423	12765	14099	15425							
2999	e [mm]	94	100	108	117	127							
	m [kg/m]	1864	1976	2126	2292	2476							
	GRP F [kN]*	13548	14907	16709	18724	20947							
3270	e [mm]	101	108	116	126								
	m [kg/m]	2187	2330	2492	2695								
	GRP F [kN]*	15535	17265	19232	21676								
3600	e [mm]	111	119	128	138								
	m [kg/m]	2647	2827	3029	3251								
	GRP F [kN]*	19774	21951	24388	27080								

Standard pipe lengths LN are 1 | 2 | 3 | 6 m. - Other lengths and stiffness classes are available on request.

Tolerances according to Amiblu standard.

* The specified jacking force [kN] corresponds to the ultimate jacking force with a 3.5-times safety factor according to ISO 25780.



2

2 Transportation & Unloading of Pipes, Manholes, and Fittings

In general, the legal provisions of the respective country's road traffic regulations apply to transportation. The pipeline components shall be delivered using suitable vehicles and have to be appropriately loaded and unloaded. Impact stresses shall be avoided. The packaging provided at the factory is adapted for the intended means of shipping, e.g. road, rail, or sea.

HOBAS Pipes and Fittings are loaded at the factories by trained personnel. Nevertheless, each delivery shall be checked for deficiencies upon arrival. Particular attention must be paid with regard to damaged pipe ends, strong abrasion and pressure marks. Any defects found shall immediately be noted in the corresponding freight and shipping documents in the presence of the freight forwarder so that they can be taken into consideration in the case of complaints. The damaged components must be labelled and stored separately. Pipe materials that have been processed due to in-house sampling or other reasons may look slightly different from unprocessed materials. This will however not be considered as grounds for complaint. In case of doubt, please contact HOBAS.

Please understand that subsequent complaints that could have been identified by proper inspection at the time of delivery can no longer be accepted. Interim transportation on the construction sites shall preferably be in the original packaging.

2.1 Pipe Transportation

The pipes are usually delivered in lengths of 6 m and with a pre-mounted coupling. To transport pipes with different diameters economically, smaller diameter pipes can be nested inside larger ones. The inserted pipes must rest on the surface below and must not be hung on steel belts. When unloading, the packaging units (Figure 1) must be lifted individually by means of slings.

To guarantee safe transport, single pipes shall be loaded and unloaded according to Figure 2. In certain cases it may be necessary to transport the pipes with the help of a cross beam inside the pipe. The beam shall be protected with mats (cushioning) accordingly to prevent mechanical damage to the pipes and couplings.

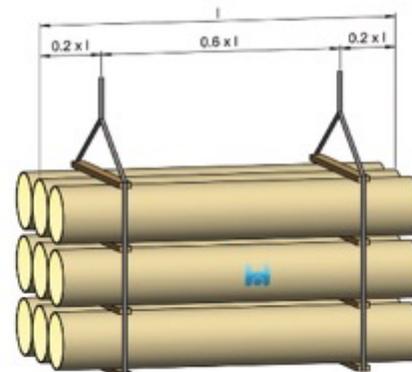


Fig. 1: Packaging units

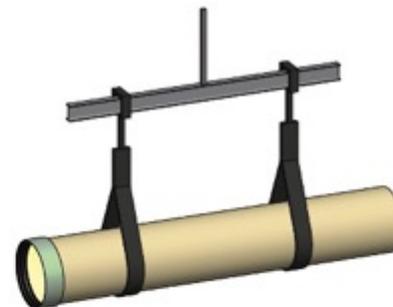


Fig. 2: Loading and unloading of pipes

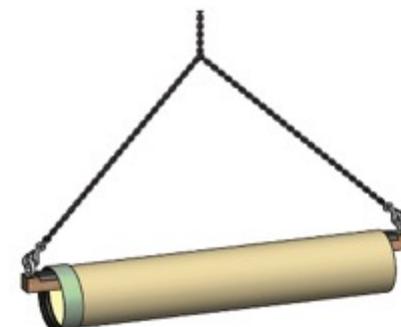


Fig. 3: Transportation with cross beam inside the pipe

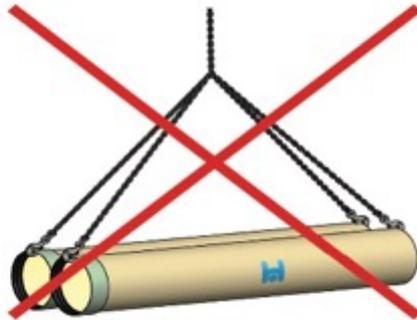


Fig. 4: Hooks and wire ropes must not be used for transportation

Avoid using hooks wire rope, chains, and hoisting gear with sharp edges. Do not subject the pipes to point loads (Figure 4). The pipes shall be denested with suitable devices which prevent the pipes from being damaged (Figure 5). Metal tools (forklift forks etc.) must be protected in such a way that pipe damage can be ruled out. The lifting slings for nested pipes must be removed immediately after the pipes have been unloaded (by cutting, not by ripping). Pulling the pipes across the ground or rolling them over longer distances (Figure 8) is prohibited.

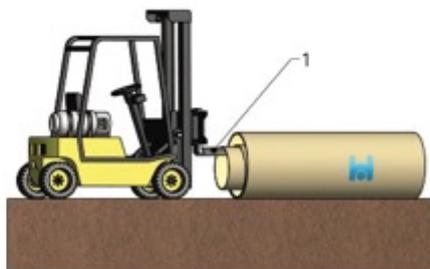


Fig. 5: One option for denesting the pipes

1 Rubber lining

2.2 Transportation of Manholes and Fittings

The same basic rules apply to the transportation of manholes and fittings. Manholes should be transported vertically or horizontally, depending on their design height. Loose accessories (e.g. cover plates) are mounted on site. Unloading shall take place with the help of lifting devices, e.g. anchors that are integrated in the wall of the manhole and to which ropes can be attached (Figure 6).

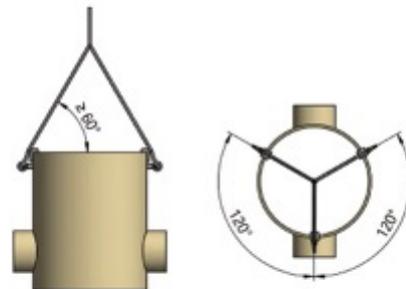


Fig. 6: Lifting aids for manhole transportation

Safety instructions

- All lifting aids must be used during transportation in order to avoid uneven load distribution
- The lifting devices (e.g. bolts, screws, etc.) must be checked prior to each use
- Damaged lifting aids must not be used
- Subsequent adaptation of lifting aids (e.g. cutting, grinding, bending, etc.) is prohibited

Impact and bending stresses must be avoided in the loading of both pipes and special structures.



4

3 Storage

The original packaging, mostly on pallets, is suitable for both transportation and storage. The pipes shall be stored on an even surface (Figure 7). The materials must not be subject to intense heat, flames, solvents, etc. Pipes must be protected from mechanical damage, contamination of the sealing gaskets, and point loads (Figure 8).

On temporary storage sites, pipes must be protected against vandalism and access by third parties, e.g. playing children. When stored alongside the pipeline route, pipes must be protected against damage and displacement. If pipes are subsequently stacked, the stacking height depends on the soil conditions as well as the loading and safety equipment on site (see Table 1).

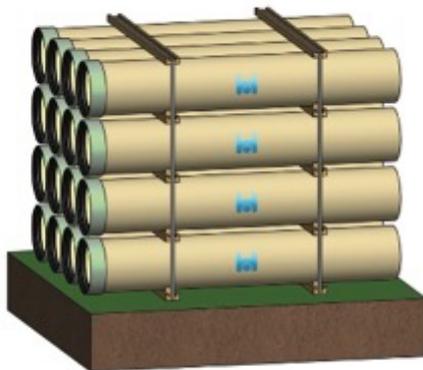


Fig. 7: Packaging unit

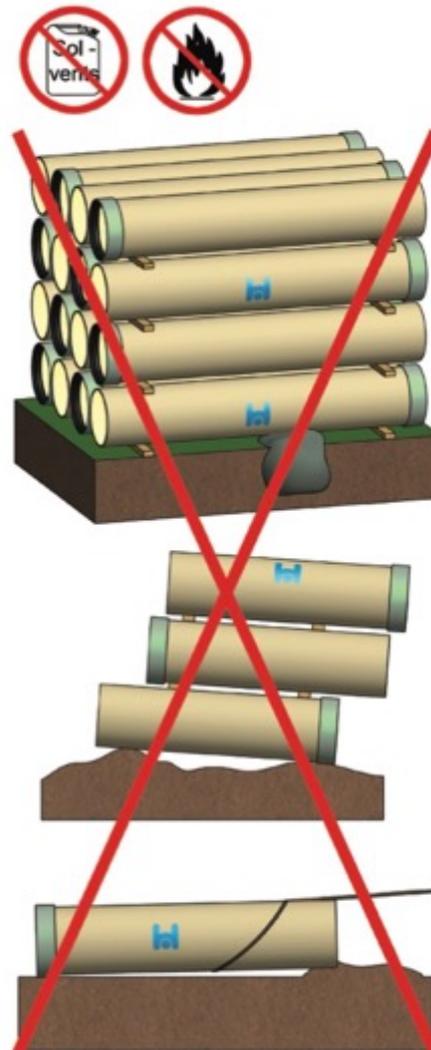


Fig. 8: Improper storage and handling of GRP pipes

Nominal diameter DN	150	200	250	300	400	500	600	700	800	900	1000	1100	1200	≥1400
Quantity	8	8	7	6	5	4	3	3	2	2	2	2	2	1

Table 1: Number of pipe layers relative to DN

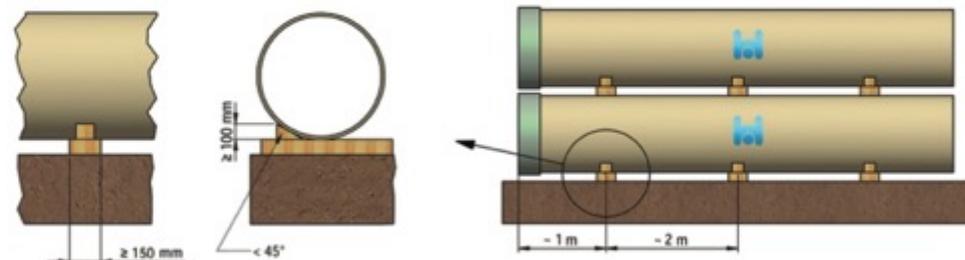


Fig. 9: Storage of pipes on wooden supports

Wooden beams must be placed under the bottom layer of pipes to avoid siltation due to rainwater draining and prevent the pipes from freezing. Stacking heights above 3 m are prohibited on construction sites to prevent accidents. The pipes must be secured in position with the help of wooden beams and wedges. HOBAS Pipes are usually supplied with a coupling mounted on one pipe end.

The inner pipe surface and rubber seals on the couplings must not be subject to UV light for more than 8 weeks. Furthermore, they must be protected from greases, oils, solvents, and other damaging substances. It is therefore advisable to cover the pipe ends if they are stored outdoors over a longer period (8 weeks).

APPENDIX B - QUALITY CERTIFICATIONS

Copies of the following Quality Certification Certificates are available for downloading from the WSAA members website.

**TABLE B1
AMIBLU GERMANY GMBH – MANAGEMENT SYSTEMS**

Gewerbepark 1, 17039 Trolenhagen Germany	
Quality Systems Standard	ISO 9001:2015
Certification Licence No.	12 100 49982/02 TMS
Certifying Agency	TUV SUD
Current Date of Certification	11 December 2019
Expiry Date of Certification	26 October 2022

**TABLE B2
AMIBLU GERMANY GMBH – PRODUCT CERTIFICATION**

Gewerbepark 1, 17039 Trolenhagen Germany	
Product Standard/Spec.	ISO 25780:2011
Certificate No.	19 01 90258 001-1
Issuing Certification Body	TUV SUD
Current Date of Certification	31 January 2019
Expiry Date of Certification	30 January 2022

ZERTIFIKAT ◆ CERTIFICATE ◆ 認證書 ◆ CERTIFICADO ◆ CERTIFICAT



Management Service

CERTIFICATE

The Certification Body
of TÜV SÜD Management Service GmbH
certifies that

Amiblu

Amiblu Germany GmbH
Gewerbepark 1
17039 Trollehagen
Germany

has established and applies
a Quality Management System for

**Development, production, service, consulting and sales of
Glassfiber Reinforced Plastic (GRP) Pipe Systems.**

An audit was performed, Order No. **70000320**.
Proof has been furnished that the requirements
according to

ISO 9001:2015

are fulfilled.

The certificate is valid from **2019-12-11** until **2022-10-26**.

Certificate Registration No.: **12 100 49982/02 TMS**.

Product Compliance Management
Munich, 2019-12-12



MS/01-01/2019

TÜV SÜD Management Service GmbH • Zertifizierungsstelle • Ridlerstrasse 57 • 80339 München • Germany
www.tuev-sued.de/certificate-validity-check

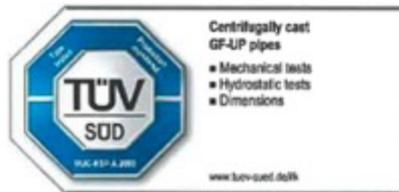
TUV®



Industrie Service

**Amiblu Germany GmbH
Gewerbepark 1
17039 Trollenhagen
Germany**

The above organization is hereby entitled, on the basis of certificate No. 19 01 90258 001-1 and the appendant test report, to affix the certification body's certification mark shown below to the following product (see description below).

**Requirements:**

The product satisfies the requirements pursuant to EN 1796, EN 14364, ISO 10639, ISO 10467, ISO 25780 and DIN 16869-1/2. Furthermore it satisfies the more extensive requirements pursuant to MUC-KSP-A 2000.

Product description:

HOBAS UP-GF piping system, manufactured by centrifugal casting process, consisting of pipes, pipe connectors and formed parts in the following nominal widths, nominal stiffnesses and nominal pressure levels:

nominal widths:	DN 150 to DN 3600 (q. v. initial sample test report (report no. BE006_13, HOBAS Engineering GmbH) plus validation by TÜV SÜD report no. 600009873-1)
nominal stiffnesses:	SN 500 to SN 1 0000 pursuant to EN 1796 and EN 14364 SN 12500 to SN 1 000 000 pursuant to ISO 25780 and HOBAS Standard
nominal pressure levels:	PN 01 to PN 32

The HOBAS centrifugal piping system can be used in water supply, waste water disposal and general technical applications.

This certificate is valid until January 2022.
Annual monitoring of production.

Munich, 2019-01-31

TÜV SÜD Industrie Service GmbH
Institute for Plastics


i. A. Schweizer



TUV®

APPENDIX C - SUPPLIER CONTACTS

Global Pipe

25 Beaumaris Parade
Highett Vic 3190

Phone: 03 9305 0600

Email: info@globalpipe.com.au

Web: www.globalpipe.com.au



Melbourne Office

Level 8, Suite 8.02
401 Docklands Drive
Docklands VIC 3008

Sydney Office

Level 9 420 George Street
Sydney NSW 2000
GPO Box 915
Sydney NSW 2001

P +61 (0) 3 8605 7666
email: info@wsaa.asn.au

www.wsaa.asn.au