

E.Hawle Armaturenwerke GmbH

PRODUCT APPRAISAL REPORT 1206 Issue 4

HAKU Tapping Bands and Flanged Off-take Clamps for
PE Pipe

**AS/NZS 4129:2008 - Fittings for polyethylene (PE) pipes for
pressure applications**

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Name/Title	Organisation	Date
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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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1 EXECUTIVE SUMMARY

HAKU Tapping Bands and Flanged Off-take Clamps for PE pipe are manufactured by E. Hawle Armaturenwerke GmbH in compliance with AS/NZS 4129:2008.

Hawle, based in Vöcklabruck Austria, was founded by Engelbert Hawle in 1948 and has a long-recognised history of innovation. Hawle is a leading manufacturer of valves and pipeline fittings for the water and gas industries with products exported to more than 60 countries worldwide.

This appraisal covers PN16 threaded tapping bands in sizes from DN 40 to DN 315 with 1" or 2" BSP tappings (depending on the nominal size) and flanged off-take clamps in sizes from DN 110 to DN 355 with DN 80 to DN 150 flanged outlets. The fittings are suitable for use with PE100 pipes with pressure classifications of PN 12.5 and PN 16. Refer to Section 3 for complete details.

This Issue 4 is a replacement for the previous version that had reached its 5-year expiry.

Issue 3 updated the report with current quality certifications.

Issue 2 included DN 125 x 80 and DN 125 x 100 flanged off-take clamps in the Appraisal. Type tests have been completed for the DN 125 x 100 clamp. Quality assurance documents have also been updated.

The HAKU tapping bands consist of two ductile iron polymeric coated components bolted together, clamp style, with stainless steel fasteners. A full contact rubber lining is bonded to the inside of the components with several concentric O-ring seals surrounding the threaded outlet.

The HAKU flanged off-take clamps consist of two ductile iron polymeric coated components bolted together, clamp style, with stainless steel fasteners. The bottom component has a full contact rubber lining glued to the inside diameter, whilst the flanged component is fitted with an O-ring around the outlet.

An alternative design tapping band is included in the Hawle literature for sizes DN 250 to DN 630 where the bottom half of the saddle is a Grade 316 stainless steel strap. WSAA does not consider this design type to be suitable for use on flexible pipes such as PE as the design does not incorporate a positive stop to avoid over-tightening.

Hawle holds an ISO 9001:2015 quality management system licence.

The Hawle HAKU tapping band and flanged off-take clamp range is product certified with a StandardsMark ISO Type 5 licence for compliance with AS/NZS 4129:2008 *Fittings for polyethylene (PE) pipes for pressure applications*.

This Appraisal has determined that Hawle HAKU tapping bands and flanged off-take clamps, as detailed in Section 4, comply with the requirements of WSA PS 327 *Tapping bands and off-take clamps, mechanical, for use with polyethylene (PE) mains for pressure applications – Water supply* and are considered as 'fit-for-purpose'.

1.1 Report Recommendation

It is recommended that WSAA members, subject to any specific requirements of the member, accept or authorise the Hawle HAKU tapping bands and flanged off-take clamps, as listed in Section 3 of this report, for use with PN12.5 and PN16 PE100 water supply and sewerage pressure pipelines, provided they are installed in accordance with applicable WSAA Codes and the manufacturer's requirements, where specified.

It is also recommended that for the overall design, installation, pipeline testing and installer training requirements agencies and installers refer to the WSAA Polyethylene Pipeline Code - WSA 01 available from the bookshop at the WSAA web site www.wsaa.asn.au.

2 THE APPLICANT

2.1 The Supplier

Hygrade Water Australia was established in 2007 to supply a range of specialist products for the Australian plumbing and civil market segments. Hygrade Water is a registered Australian business, wholly owned by the Hynds Group.

Hynds Group, a privately owned and operated New Zealand company established in 1973, has become a leading supplier of pipeline systems and related products to civil contractors within Australasia.

Hygrade Water Australia is the Australian agent for Hawle products in Australasia.

2.2 The Manufacturer

E. Hawle Armaturenwerke GmbH (Limited Liability Company) is based in Vöcklabruck, Austria. The Hawle Company was founded by Engelbert Hawle in 1948. Hawle has a history of innovation and was the manufacturer of the first resilient seated gate valve in the world. Today Hawle is a leading manufacturer of valves and pipeline fittings for the water and gas industries, with plants and subsidiary operations throughout Europe. Hawle products are exported to more than 60 countries world-wide. Additional information is available at <https://www.hawle.com>

3 THE PRODUCT

This appraisal considers a range of Hawle HAKU tapping bands with BSP threaded outlets and flanged off-take clamps. These products are designed for use with AS/NZS 4130 PE100 polyethylene pipes with pressure classifications of PN 12.5 and PN 16.



FIGURE 1 HAKU TAPPING BANDS AND FLANGED OFF-TAKE CLAMPS

HAKU tapping bands feature the following:

- Saddle bonnet and bottom – Ductile Iron
- Polymeric coating on DI components.
- Bolts, nuts and washers – stainless steel Grade 316 (A4). Nuts are Molybdenum coated.
- EPDM rubber linings bonded to the both components of the saddle.
- 1” or 2” threaded outlet surrounded by multiple concentric EPDM ‘O’ rings.

HAKU flanged off-takes clamps feature the following:

- Flanged outlet top and bottom component – Ductile Iron
- Polymeric coating on DI components
- Bolts, nuts and washers – stainless steel Grade 316 (A4). Nuts are Molybdenum coated.
- EPDM rubber linings bonded to the bottom component
- EPDM O-Ring fitted around the flanged outlet of the top component
- DN 80 to DN 150 AS/NZS 4087 PN16 Fig B5 flange

The range of product certified HAKU tapping bands positively appraised are detailed in Table 1.

The HAKU tapping bands have BSP parallel (RP) threaded outlets in compliance with AS ISO 7.1. The scope of this Appraisal includes tapping bands with 1" tapping only for DN 40 and DN 50 and 2" tapping for DN 63 up to and including DN 315. Hawle advise that for alternative tapping outlet sizes an approved DR brass bush should be utilised.

The products marked with an asterisk indicate that AS/NZS 4129 Type Tests have been completed for those sizes with a 2" BSP outlet.

TABLE 1. HAKU TAPPING BANDS WITH BSP THREADED OUTLET

Nominal Size DN	Threaded outlet size	
	25mm (1" BSP)	50mm (2" BSP)
40	✓	
50	✓	
63		✓
75		✓
110*		✓
125*		✓
140		✓
160		✓
180*		✓
200		✓
225		✓
250*		✓
280		✓
315*		✓

See the HAKU Pipe Saddle with Threaded BSP Outlet brochure in Appendix A.

The HAKU tapping bands are supplied with both ductile iron components lined with a full contact EPDM elastomer. In addition, several concentric seals surround the outlet to relieve the pressure on the drill hole and protect it from deformation. The EPDM lining is bonded to both components and moulded to fit the pipe diameter. The components are bolted together with Grade 316 (A4) stainless steel bolts, nuts and washers. The two halves of the component are designed to meet thus providing a positive stop to avoid over-tightening.

Note: HAKU brochures nominate Grade 304 SS bolts, nuts and washers however Hawle has confirmed that Grade 316 SS bolts, nuts & washers are supplied for the Australian market.

Tapping bands with an alternative design are listed in the Hawle literature for sizes DN250 to DN630, where the bottom component is a 1.5mm thick Grade 316 stainless steel strap bolted to the ductile iron top component. WSAA does not consider this design type to be suitable for use on flexible pipes such as PE, as the design does not incorporate a positive stop to avoid over-tightening

The available range of HAKU flanged off-take clamps is detailed in Table 2. The products marked with an asterisk indicate that AS/NZS 4129 Type Tests have been completed for those sizes with a DN 80 or DN 100 branch.

TABLE 2 HAKU FLANGED OFF-TAKES

Pipe Size DN	Flanged outlet size		
	80mm	100mm	150mm
110*	✓		
125*	✓	✓	
140	✓	✓	
160	✓	✓	
180*	✓	✓	
200	✓	✓	
225	✓	✓	
250*	✓		
280			✓
315*	✓		✓
355			✓

See the HAKU Pipe Saddle with Flanged Outlet Brochure in Appendix A.

The HAKU flanged off-take clamps consist of two ductile iron polymeric coated components bolted together, clamp style, with Grade 316 stainless steel fasteners. The bottom component has a full contact EPDM rubber lining bonded to the inside diameter, whilst the flanged outlet component is fitted with an O-ring around the outlet. The two halves of the component are designed to meet thus providing a positive stop to avoid over-tightening.

Hawle advises that should the tapping bands and flanged off-take clamps be fitted to pipe where the outside diameter is above tolerance, a maximum torque should be applied in accordance with the Installation Instructions. (See Appendix A).

The sizes included above are listed on the product certification schedule and independent Type Test reports have been submitted for the common sizes.

4 SCOPE OF THE APPRAISAL

The Scope of this appraisal is as described in Section 3 above. These products are included in the Product Certification Product Schedule attached to the StandardsMark certificate in Appendix B.

Please note that the brochures included in Appendix A contain additional products that have not been appraised in this report.

5 APPRAISAL CRITERIA

5.1 Quality Assurance Requirements

The WSAA Product Appraisal Technical Advisory Group accepts tapping bands and flanged off-take clamps manufactured in compliance with AS/NZS 4129:2008 *Fittings for polypropylene (PE) pipes for pressure applications* and duly certified by means of an ISO Type 5 product certification scheme undertaken by a JAS/ANZ accredited Certification 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 accredited in accordance with 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

The HAKU tapping bands and flanged off-take clamps have been appraised for compliance with AS/NZS 4129:2008 – *Fittings for polypropylene (PE) pipes for pressure applications*.

Appraisal criteria are also determined by the WSAA Product Appraisal Technical Advisory Group and regularly reviewed to ensure that the criteria reflect the requirements of WSAA members.

The following Product Specification is also relevant to this application:

WSA PS 327 *Tapping bands and off-take clamps, mechanical, for use with polyethylene (PE) mains for pressure applications – Water supply*.

A copy of the above Product Specification can be found in Appendix C or downloaded from the WSAA website.

6 COMPLIANCE WITH APPRAISAL CRITERIA

6.1 Compliance with Quality Assurance Requirements

HAWLE has submitted the following quality certificates:

- ISO 9001:2015 Certificate of Registration No. AT-00545/0 issued to E. Hawle Armaturenwerke GmbH by Quality Austria/IQNet.
- ISO 9001:2015 Certificate of Registration No. CH-36880 issued to Compounds AG by SQS/IQNet. (Supplier of elastomeric components)
- AS /NZS 4129:2008 ISO Type 5 StandardsMark product certification licence No SMK25792 issued to E. Hawle Armaturenwerke GmbH by SAI Global.

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

Copies of ISO 9001 certification has also been provided for suppliers of components.

6.2 Compliance with Performance Requirements

6.2.1 Material Requirements

6.2.1.1 Ductile Iron Components

The ductile iron is nominated as Grade 400-18 and a typical test certificate has been submitted to demonstrate conformance to this requirement.

6.2.1.2 Elastomeric seals

Elastomeric components are manufactured by Compounds AG in Switzerland. The seals and O-rings are specified as T8517 EPDM and a test certificate has been submitted to demonstrate conformance to EN681.1.

6.2.1.3 Stainless Steel Fasteners

Stainless Steel fasteners are Grade 316 (A4) bolts, nuts and washers. HAKU brochures nominate Grade 304 SS bolts, nuts and washers however Hawle have confirmed that Grade 316 is supplied for the Australian market. The nuts are molybdenum coated.

6.2.1.4 Polymeric Coatings

The ductile iron components are coated with Akzo Nobel, Resicoat R4 epoxy powder coating, applied by the fluidised bed process in accordance with AS/NZS 4158:2003. The Resicoat R4 powder has a product certification StandardsMark licence issued by SAI Global. SAI Global

also undertakes audits of the coating application system in accordance with the terms of the various StandardsMark licences held by Hawle.

Hawle "Repair Instructions" for epoxy powder coating is attached in Appendix A.

6.2.2 Compliance with AS/NZS 4020

A copy of a Type Test report dated 21 September 2018 has been submitted to demonstrate that the products conform to AS/NZS 4020:2005. Testing was carried out on a DN 40 tapping band by Eurofins/ams in Silverwater NSW.

6.2.3 Type Tests

Hawle has submitted Type Test reports from Queensland Testing Laboratories Pty Ltd (QTL) to demonstrate compliance with AS/NZS 4129 Section 4 *Mechanical Tapping Saddles* as summarized in Table 4.

TABLE 4 PRODUCT TYPE TESTING

CLAUSE	TYPE TEST	PRODUCTS TESTED
4.4.2	Leak resistance under pressure	DN 110 with 50mm (2") BSP outlet.
4.4.3	Liquid infiltration. when subject to bending	DN 125 with 50mm (2") BSP outlet.
4.4.4	Hydrostatic pressure test for assembled saddle.	DN 180 with 50mm (2") BSP outlet.
4.4.5	Resistance to pressure during application of a bending moment to the branch outlet.	DN 110 with DN 80 flange DN 125 with DN100 flange
4.4.6	Resistance to sliding of saddle on the pipe – rotational & axial	DN180 with DN 80 flange. DN 250 with DN 80 flange. DN 315 with DN 80 flange.

Note: AS/NZS 4129 does not nominate specific sizes to be tested for qualification purposes

7 FITTING INSTRUCTIONS, TRAINING AND INSTALLATION

Tapping bands are a mature and simple product and experienced pipeline installers are well versed in the requirements for installation. A copy of the installation instructions is provided with the product and a copy is included in Appendix A.

WSAA recommends for overall design, installation, pipeline testing and installer training requirements for polyethylene pipeline systems, agencies and installers refer to the WSAA Polyethylene Pipeline Code - WSA 01 available from the WSAA web site www.wsaa.asn.au.

8 PRODUCT MARKING

AS/NZS 4129 specifies that the manufacturers name or registered trademark shall be legibly and permanently marked on the body of the fitting. Other marking requirements may be provided using a label, preferably attached to the fitting body. Hawle has provided examples of marking that demonstrates compliance with the Standard.

Examples are attached in Appendix D.

9 PACKAGING AND TRANSPORTATION

Individual bands are packed in transparent protective bags and contained in carton boxes. Each carton or protective package indicates its contents. All fittings are packaged to allow use on site without additional cleaning.

Where only one type of product is packaged in a bag or carton box, a label showing the manufacturer identification, the description of the product, a drawing of the product, the relevant size and the quantity is indicated on each package.

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 Hawle's warranty is included in their terms and conditions of sale.

Hawle additionally provide a 10-year quality warranty on their products (see Appendix A).

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

City West Water conducted a field trial on 19th March 2014. Two DN 280x150 Haku flanged off-takes were installed in conjunction with a main replacement. The trial was reported as successful.

A copy of the Field Trial Report is available from WSAA.

12 DISCUSSION

Whilst the Product Certification product schedule lists the complete HAKU product range some sizes may not be stocked in Australia and will need to be ordered. In addition, there are some products listed on the product schedule and in the Hawle brochures that have not been included in the scope of this Appraisal.

The scope of this Appraisal is detailed in Section 3 and includes tapping bands with 1" tapping only for DN40 and DN50 and 2" tapping for DN 63 up to and including DN 315. Hawle advise that for alternative tapping outlet sizes an approved DR Brass bush should be utilised.

The Hawle web site provides a list of European product approvals including the following:

- Dutch KIWA Approval
- Belgium – Belgaqua Approval
- Poland – ITB Approval
- Germany DVGW Approval
- Belarus Approval
- England WRAS Approval

13 OUTCOMES OF EXPERT PANEL PRODUCT REVIEW

Some queries were raised during the original peer review process and the answers are provided below:

Q1. Can these fittings be used for under-pressure applications?

A1. Yes, they can be used for under-pressure tapping utilising established procedures.

Q2. Are the lengths of the flanged off-take clamps adequate? For example, a DN110 x 80 clamp is 180mm wide, which leaves around 50mm either side of a dn 80 drilled hole.

A2. The design team has successfully conducted extensive testing of the HAKU range against caving of PE pipe and the fittings have been used extensively in Europe without problems.

Q3. The terminology used in the brochures is different to those used in the Appraisal Report.

A3. The brochures have been produced using European terminology, whereas to avoid confusion WSAA has adopted Australian terminology in the Appraisal Report. 'Pipe saddle

with threaded outlet' is commonly known in Australia as 'tapping band with threaded outlet' and 'pipe saddle with flanged outlet' is known as 'flanged off-take clamp'.

14 FUTURE WORKS

No future works have been identified for this appraisal.

15 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 9605 7601 email carl.radford@wsaa.asn.au.

15.1 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.

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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.

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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



HAKU PIPE SADDLE WITH FLANGED OUTLET

- ▶ FOR PE PIPES
UP TO PN16
- ▶ DN100–600



AWM14 HAWLE HAKU PIPE SADDLE WITH FLANGED OUTLET

AWM14 HAWLE HAKU PIPE SADDLE WITH FLANGED OUTLET



For PE pipes of all pressure ratings up to PN 16 for cold water. Other applications on request.

FEATURES

- ▶ Solid construction of ductile iron epoxy powder coated
- ▶ Bolts, nuts and washers of stainless steel
- ▶ The drilled hole is sealed by an O ring inserted in the upper part of saddle (D 630, 2 O rings)
- ▶ The rubber linings are bonded to the lower part of saddle – this ensures positive positioning of saddle (only D 110-315)

MATERIAL

- ▶ **Saddle body:**
Ductile iron EN-GJS-400 according to EN 1563 (GGG 400 – DIN 1693) epoxy powder coated
- ▶ **Rubber-in the lower part:**
Elastomer
- ▶ **O ring seal-in the bonnet:**
Elastomer, (suitable for potable water)
- ▶ **Bolts, Nuts and Washers:**
Stainless steel – A4
- ▶ **Nuts:**
Molybdenum coated

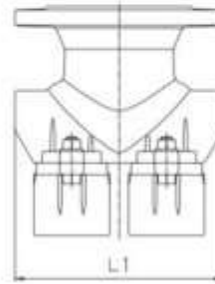
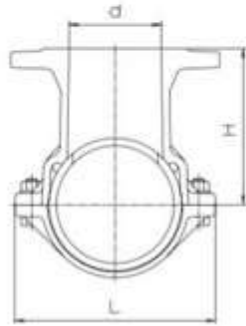
Special Hawle Drilling Machine available for drilling D 630 PE pipes.



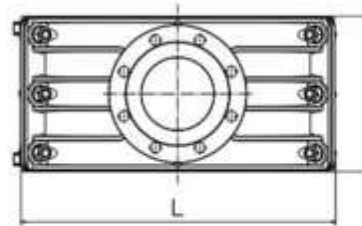
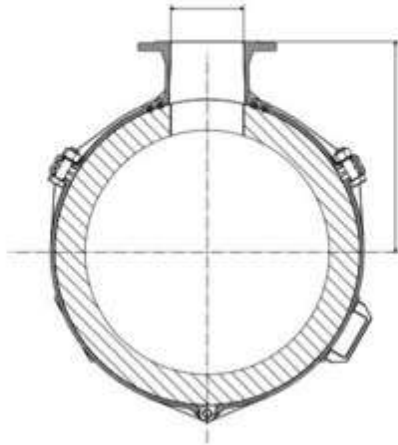
ORDER NO.	APPLICATION	CLASS	DIMENSIONS															
			110	140	160	180	200	225	250	280	315	355	450	500	630			
5230	Cold water, other applications on request!	80	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
		100		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
		150									*	*	*	*	*	*	*	*

Available soon: 355/100

D 110-355



D 450
D 500
D 630



PIPE Ø mm	FLANGE DN	DB	H	L	L 1	WEIGHT kg
110	80	80	150	182	180	8.30
140	80	80	166	212	220	10.2
	100	100	166	212	220	10.9
160	80	80	176	234	220	10.1
	100	100	176	234	220	11.0
180	80	80	186	254	220	9.0
	100	100	186	254	220	12.2
200	80	80	191	270	220	11.8
	100	100	191	270	220	13.8
225	80	80	206	301	220	14.0
	100	100	206	301	220	16.0
250	80	80	221	347	220	14.7
280	150	150	239	374	285	21.0
315	80	80	255	410	285	20.0
315	150	150	257	409	285	24.5
630	150	150	435	649	320	55.0



HAKU PIPE SADDLE WITH THREADED BSP OUTLET

- ▶ FOR PE PIPES
UP TO PN 16
- ▶ DN 40–500





For PE pipes of all pressure ratings up to PN 16 AS/NZS 4129 for cold water. Other applications on request.

- ▶ The HAKU sealing system is the best method for sealing outlets in plastic pipes.
- ▶ The HAKU seal is in full contact with the entire diameter of the PE (series 1) and is glued into the saddle for ease of assembly.
- ▶ In addition several concentric seals with increasing diameter surround the outlet thus relieving the pressure upon the drill hole and protecting it from deformation.

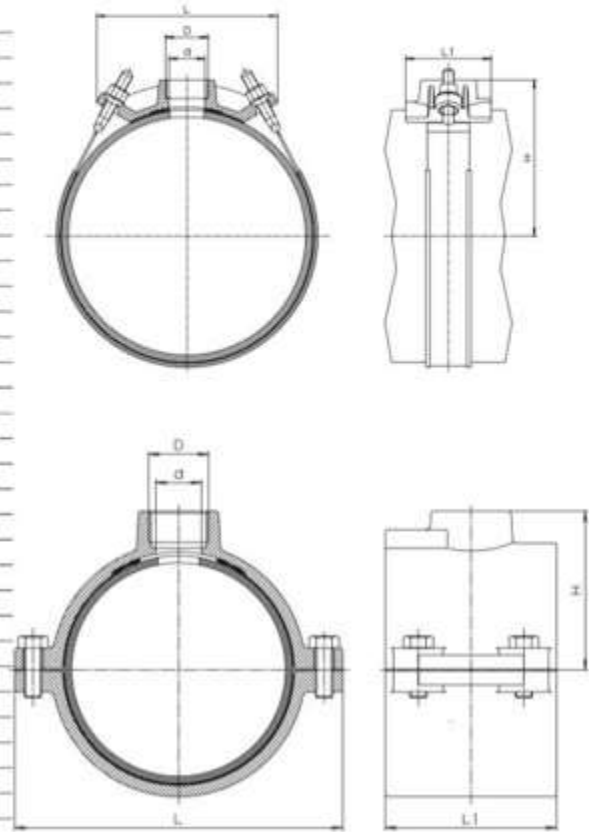
MATERIAL

- ▶ **D40:** EN-GJL-250 (GG 250) to EN 1561, epoxy powder coated
- ▶ **D50:** 500 EN-GJS-400-18 (GGG 400) to EN 1563 epoxy powder coated
- ▶ **Rubber seals:** Elastomer, suitable for potable water
- ▶ **Bolts and washers:** Stainless steel – A2, A4

"PIPE Ø mm"	INTERNAL THREADED OUTLET			
	1"	1 1/4"	1 1/2"	2"
40	*			
50	*			
63	*	*	*	*
75	*	*	*	*
90	*	*	*	*
110	*	*	*	*
125	*	*	*	*
140	*	*	*	*
160	*	*	*	*
180	*	*	*	*
200	*	*	*	*
225	*	*	*	*
250	*	*	*	*
280				*
280*	*	*	*	*
315				*
315*		*	*	*
355*				*
400*			*	*
450*			*	*
500*			*	*



PIPE Ø mm	*D ISO 228*	D Ø	H	L	L1	WEIGHT kg
40	1"	27	42	98	70	0.95
50	1"	27	56	110	80	1.20
63	1"	27	57	124	100	1.80
	1¼"	33	62			2.00
	1½"	40	62			1.90
	2"	40+	68			2.10
75	1"	27	63	135	110	2.15
	1¼"	33	68			2.25
	1½"	40	68			2.20
	2"	50	73			2.30
90	1"	27	71	150	110	2.60
	1¼"	33	75			2.70
	1½"	40	75			2.60
	2"	50	80			2.70
110	1"	27	81	170	120	3.60
	1¼"	33	85			3.60
	1½"	40	85			3.80
	2"	50	90			3.60
125	1"	27	87	192	120	3.70
	1¼"	33	93			3.70
	1½"	40	93			4.15
	2"	50	98			4.10
140	1"	27	96	208	120	4.40
	1¼"	33	100			4.30
	1½"	40	100			4.60
	2"	50	106			4.50
160	1"	27	106	230	120	5.90
	1¼"	33	111			6.10
	1½"	40	111			6.30
	2"	50	118			6.20
180	1"	27	125	262	120	8.00
	1¼"	33	125			8.00
	1½"	40	127			8.10
	2"	50	127			8.10
200	1"	30	132	282	120	8.10
	1¼"	33	132			7.80
	1½"	40	137			8.30
	2"	50	137			8.10
225	1"	27	143	310	120	9.10
	1¼"	33	145			9.40
	1½"	40	145			9.70
	2"	50	150			9.60
250	1"	27	156	347	180	11.00
	1¼"	33	156			11.30
	1½"	40	163			11.50
	2"	50	163			12.00
280	1*"	27	176	204	120	3.80
	1¼*"	38	176			3.60
	1½*"	44	176			3.60
	2*"	50	176			3.30
315	2"	51	178	377	180	14.20
	1¼*"	38	196	-	-	3.80
	1½*"	44	196	-	-	3.75
	2*"	50	196	-	-	3.55
355	2"	51	196	408	180	16.70
	2"	50	230	255	120	4.25
400	1½*"	40	243	270	120	4.90
	2*"	50	243			4.90
450	1½*"	40	268	235	120	4.60
	2*"	50	268			4.60
500	1½*"	40	292	255	120	4.90
	2*"	50	292			4.90



HAWLE 10 YEAR QUALITY WARRANTY**Hawle-quality-warranty****10 years quality warranty**

(water for human consumption and for natural gas)

HAWLE guarantees perfect functionality for a period of 10 (ten) years of delivery from the works for all original HAWLE valves marked with the "HAWLE" label. This guarantee applies for all valves used for their specified purpose in water for human consumption projects in compliance with the Directive 98/83/EC, or for natural gas in compliance with ÖVGW G 31.

Should a fitting lose its functionality during the guarantee period, HAWLE shall at its own choice either repair the valve or supply a replacement of an equal value.

Exceptions to this guarantee are expendable parts and any damage caused by incorrect storage, transport, assembly, failure to follow instructions for use, failure to carry out pressure testing, inadequate

service and maintenance, subsequent product manipulation or the use of unsuitable fluids or gases. This guarantee does not apply in the case of unusual environmental conditions, vibrations or where there are remnant quantities of a medium left or similar external effects, nor in the case of actions carried out by third parties, accidents or other events over which HAWLE has no influence.

Please observe the exceptions and special rules applicable for specific products as given in the catalogue on our homepage www.hawle.at.

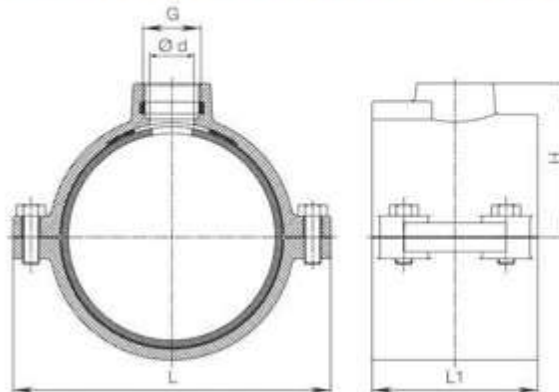
Any warranty claims derived from the sales contract will not be restricted through this guarantee certificate.

Austrian law applies to this guarantee.

Installation instructions **HAKU Pipe Saddles**



Sample picture



1. Intended use / product description

Medium:	potable water
Max. operating pressure:	16 bar
Material:	body: ductile iron, epoxy powder-coated
	gaskets: elastomer
	screws: stainless steel - coated
	washers: stainless steel

HAKU pipe saddles are used for installation in the field of potable water supply and for other potable water applications. They can be used for pipes of PE acc. to EN 12201-2, DIN 8074, and PVC pipes acc. to EN 1452-2, DIN 8062. For installation, assembly and maintenance, the applicable standards and regulations as well as the trade associations' provisions for the prevention of accidents shall be complied with. The saddles shall be installed and maintained by skilled personnel only.

2. Installation



**Open-ended wrench,
ring wrench, torque wrench**

The following installation instructions apply to HAKU pipe saddles consisting of two half shells.

1. The surface of the pipe must be free from dirt, soil or grease, and the pipe has to be cleaned accordingly. When the saddle is to be used on a pipe with outside protection layer, the layer has to be removed to the base pipe as specified by the pipe manufacturer.
2. Place the HAKU pipe saddle at the intended position.
3. Fix the HAKU top and bottom halves by means of the four screws included in the scope of supply. Please tighten them at the following torques:

M 10: min. torque 50 Nm - max. torque 60 Nm
 M 12: min. torque 60 Nm - max. torque 70 Nm
 M 14: min. torque 70 Nm - max. torque 80 Nm
 M 16: min. torque 80 Nm - max. torque 90 Nm
 M 20: min. torque 110 Nm - max. torque 120 Nm

hawle. **made for generations.**

**Standard installation:**

Tighten the hexagon head screws evenly and crosswise until the two parts get in contact and the maximum torque is reached.

➔ Do not use any extensions!

Installation on aged pipes:

When installing the saddles on existing PE pipelines (aged pipes) the outside diameter may exceed the standard pipe tolerance. Pretighten HAKU with two longer screws, if required. After final assembly of the saddle, check the maximum torque twice after 15 minutes, each!

4. Now drill the pipe by means of the Hawle drilling machine.
➔ Please follow the applicable manual.

3. Servicing and maintenance

Hawle HAKUs do not require any maintenance.

4. Commissioning and pressure testing:

After completion of the installation work, perform a pressure test according to EN 805. (see „Hawle Water Catalogue" page 6)

Sooner or later, even the best product will reach the end of its useful life and should be recycled as sustainably as possible. Please observe our disposal recommendations

**If you have any other questions or if you need more information,
please contact your local Hawle branch.**

E. Hawle Armaturenwerke GmbH

Wagrainer Straße 13 | A-4840 Vöcklabruck | hawle.com

Ausgabe | Edition 01.2019 | 5019590

APPENDIX B - QUALITY CERTIFICATIONS

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

**TABLE B1
E. HAWLE ARMATURENWERKE GMBH - MANAGEMENT SYSTEMS**

A-4840 Vocklabruck Wagrain Strasse 13	
Quality Systems Standard	ISO 9001:2015
Certification licence no.	AT-00545/0
Certifying agency	Quality Austria/IQNet
First date of certification	21 August 1995
Current date of certification	10 April 2018
Expiry date of certification	30 March 2021

**TABLE B2
COMPOUNDS AG- MANAGEMENT SYSTEMS**

Barzloostrasse 1 8330 Pfaffikon ZH Switzerland	
Quality Systems Standard	ISO 9001:2015
Certification licence no.	36880
Certifying agency	SQS/IQNet
Current date of certification	29 October 2019
Expiry date of certification	28 October 2022

**TABLE B3
E. HAWLE ARMATURENWERKE GMBH - PRODUCT CERTIFICATION**

A-4840 Vocklabruck Wagrain Strasse 13	
Product Standard/Spec.	AS/NZS 4129:2008
Certificate No.	SMK25792
Issuing certification body	SAI Global
First date of certification	4 September 2013
Current date of certification	24 September 2018
Expiry date of certification	3 September 2023



THE INTERNATIONAL CERTIFICATION NETWORK

CERTIFICATE

Quality Austria
has issued an IQNet recognized certificate that the organization:

E. Hawle Armaturenwerke GmbH
A-4840 Vöcklabruck, Wagrain Straße 13

incl. site: A-4890 Frankenmarkt, Hawle Straße 1

for the following scope:

Development, production and sales of valves and fittings

EAC: 14; 17.2; 18

has implemented and maintains a

QUALITY MANAGEMENT SYSTEM

which fulfils the requirements of the following standard

ISO 9001:2015

Issued on:	2018-04-10
Validity date:	2021-03-30
Quality Austria certified since:	1995-08-21

This attestation is directly linked to the IQNet Partner's original certificate and shall not be used as a stand-alone document.

Registration Number: AT-00545/0

Signatures removed for security reasons



Michael Drechsel
President of IQNet

Mag. Friedrich Khuen-Belasi
Authorised Representative
of Quality Austria



IQNet Partners*:

AENOR Spain AFNOR Certification France APCER Portugal CCC Cyprus CIBQ Italy
CQC China CQM China CQS Czech Republic Cso Cert Croatia DQS Holding GmbH Germany FCAV Brazil
FONDORORMA Venezuela KONTEC Colombia Inspecta-Sertifiointi Oy Finland INTECO Costa Rica
IRAM Argentina JQA Japan KPQ Korea MERTEC Greece MSZT Hungary Nemko AS Norway NSAI Ireland
NYCE-SIGE Mexico PCBC Poland Quality Austria Austria IIR Russia SII Israel SJO Slovenia
SIRIM QAS International Malaysia SQS Switzerland SRAC Romania TEST St Petersburg Russia TSE Turkey YUQS Serbia
IQNet is represented in the USA by: AFNOR Certification, CIBQ, DQS Holding GmbH and NSAI Inc.

* The list of IQNet partners is valid at the time of issue of this certificate. Updated information is available under www.iqnet-certification.com



Certificate

The SQS herewith attests that the organisation named below has a management system that meets the requirements of the normative base mentioned.



Compounds AG
Barzloostrasse 1
8330 Pfäffikon ZH
Switzerland

Scope

Development and manufacturing of rubber compounds, rubber foils and rubber profiles

Normative base

ISO 9001:2015

Quality Management System

Reg. no. 36880

Validity 29. 10. 2019–28. 10. 2022
Issue 29. 10. 2019

A. Grisard
A. Grisard, President SQS

F. Müller
F. Müller, CEO SQS

4100_27 June 2019/Version 2.0



Swiss Association for Quality and Management Systems (SQS)
Bernstrasse 103, 3052 Zollikofen, Switzerland





STANDARDSMARK LICENCE

SAI Global hereby grants:

E. Hawle Armaturenwerke GmbH

Wagrainer Strabe 13, A-4840 Voecklabruck, Austria

StandardsMark Licence

Manufactured to:

AS/NZS 4129:2008 - Fittings for polyethylene (PE) pipes for pressure applications

"the StandardsMark Licensee" the right to use the STANDARDSMARK as shown below only in respect of the goods described and detailed in the Schedule which are produced by the Licensee or on behalf of the Licensee* and which comply with the appropriate Standard referred to above as from time to time amended. The Licence is granted subject to the rules governing the use of the STANDARDSMARK and the Terms and Conditions for certification and licence. The Licensee covenants to comply with all the Rules and Terms and Conditions.

Licence No: SMK25792

Issued : 25 September 2018

Expires : 3 September 2023

Originally Certified : 4 September 2013

Current Certification : 24 September 2018

Kevin Goodwin
General Manager Technical Services
SAI Global Assurance



* For details of manufacture, refer to the licensee

The STANDARDSMARK is a registered certification trademark of SAI Global Pty Limited (A.C.N. 050 644 642) and is issued under licence by SAI Global Certification Services Pty Limited (ACN 108 716 669) ("SAI Global") 680 George Street, Sydney NSW 2000, GPO Box 5420 Sydney NSW 2001. This certificate remains the property of SAI Global and must be returned to SAI Global upon its request. Refer to www.saiglobal.com, for the list of product models.



SCHEDULE TO STANDARDSMARK LICENCE

SAI Global hereby grants:

E. Hawle Armaturenwerke GmbH

Wagrainer Strabe 13, A-4840 Voecklabruck, Austria

StandardsMark Licence

Manufactured to:

AS/NZS 4129:2008 - Fittings for polyethylene (PE) pipes for pressure applications

Model identification of the goods on which the STANDARDSMARK may be used:

Model Identification	Model Name	Brand Name	Product Description	Product Type	Product Application	Size Classification (DN)	Pressure Classification	Joint Type	Colour	Material Designation	Date Endorsed
5003447	5250	E.Hawle	Haku PE Pipe Saddle 1" BSP	PE Pipe Tapping Saddle	Water	40	PN16	Mechanical	Blue	Ductile Cast Iron	17 Jul 2017
5003452	5250	E.Hawle	Haku PE Pipe Saddle 1" BSP	PE Pipe Tapping Saddle	Water	50	PN16	Mechanical	Blue	Ductile Cast Iron	17 Jul 2017
5003484	5250	E.Hawle	Haku PE Pipe Saddle 2" BSP	PE Pipe Tapping Saddle	Water	110	PN16	Mechanical	Blue	Ductile Cast Iron	17 Jul 2017
5003496	5250	E.Hawle	Haku PE Pipe Saddle 2" BSP	PE Pipe Tapping Saddle	Water	125	PN16	Mechanical	Blue	Ductile Cast Iron	17 Jul 2017
5003519	5250	E.Hawle	Haku PE Pipe Saddle 2" BSP	PE Pipe Tapping Saddle	Water	250	PN16	Mechanical	Blue	Ductile Cast Iron	17 Jul 2017
5003522	5250	E.Hawle	Haku PE Pipe Saddle 2" BSP	PE Pipe Tapping Saddle	Water	250	PN16	Mechanical	Blue	SS316 Strap / Ductile	17 Jul 2017
5003533	5250	E.Hawle	Haku PE Pipe Saddle 2" BSP	PE Pipe Tapping Saddle	Water	280	PN16	Mechanical	Blue	Ductile Cast Iron	17 Jul 2017
5003536	5250	E.Hawle	Haku PE Pipe Saddle 2" BSP	PE Pipe Tapping Saddle	Water	280	PN16	Mechanical	Blue	SS316 Strap / Ductile	17 Jul 2017
5003547	5250	E.Hawle	Haku PE Pipe Saddle 2" BSP	PE Pipe Tapping Saddle	Water	315	PN16	Mechanical	Blue	Ductile Cast Iron	17 Jul 2017
5003550	5250	E.Hawle	Haku PE Pipe Saddle 2" BSP	PE Pipe Tapping Saddle	Water	315	PN16	Mechanical	Blue	SS316 Strap / Ductile	17 Jul 2017
5003553	5250	E.Hawle	Haku PE Pipe Saddle 2" BSP	PE Pipe Tapping Saddle	Water	355	PN16	Mechanical	Blue	SS316 Strap / Ductile	17 Jul 2017
5003558	5250	E.Hawle	Haku PE Pipe Saddle 2" BSP	PE Pipe Tapping Saddle	Water	400	PN16	Mechanical	Blue	SS316 Strap / Ductile	17 Jul 2017
5003563	5250	E.Hawle	Haku PE Pipe Saddle 2" BSP	PE Pipe Tapping Saddle	Water	450	PN16	Mechanical	Blue	SS316 Strap / Ductile	17 Jul 2017
5003568	5250	E.Hawle	Haku PE Pipe Saddle 2" BSP	PE Pipe Tapping Saddle	Water	500	PN16	Mechanical	Blue	SS316 Strap / Ductile	17 Jul 2017
5003571	5250	E.Hawle	Haku PE Pipe Saddle 2" BSP	PE Pipe Tapping Saddle	Water	600	PN16	Mechanical	Blue	SS316 Strap / Ductile	17 Jul 2017

Licence No: SMK25792

Issued Date: 25 September 2018

This schedule supersedes all previously issued schedules



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SCHEDULE TO STANDARDSMARK LICENCE

Model Identification	Model Name	Brand Name	Product Description	Product Type	Product Application	Size Classification (DN)	Pressure Classification	Joint Type	Colour	Material Designation	Date Endorsed
5003576	5250	E.Hawke	Haku PE Pipe Saddle 2" BSP	PE Pipe Tapping Saddle	Water	63	PN16	Mechanical	Blue	Ductile Cast Iron	17 Jul 2017
5003595	5250	E.Hawke	Haku PE Pipe Saddle 2" BSP	PE Pipe Tapping Saddle	Water	75	PN16	Mechanical	Blue	Ductile Cast Iron	17 Jul 2017
5003716	5250	E.Hawke	Haku PE Pipe Saddle 2" BSP	PE Pipe Tapping Saddle	Water	140	PN16	Mechanical	Blue	Ductile Cast Iron	17 Jul 2017
5003732	5250	E.Hawke	Haku PE Pipe Saddle 2" BSP	PE Pipe Tapping Saddle	Water	160	PN16	Mechanical	Blue	Ductile Cast Iron	17 Jul 2017
5003742	5250	E.Hawke	Haku PE Pipe Saddle 2" BSP	PE Pipe Tapping Saddle	Water	180	PN16	Mechanical	Blue	Ductile Cast Iron	17 Jul 2017
5003755	5250	E.Hawke	Haku PE Pipe Saddle 2" BSP	PE Pipe Tapping Saddle	Water	200	PN16	Mechanical	Blue	Ductile Cast Iron	17 Jul 2017
5003768	5250	E.Hawke	Haku PE Pipe Saddle 2" BSP	PE Pipe Tapping Saddle	Water	225	PN16	Mechanical	Blue	Ductile Cast Iron	17 Jul 2017
5004310	5230	E.Hawke	Haku PE Pipe Saddle Flanged Outlet 80	PE Pipe Tapping Saddle	Water	110	PN16	Mechanical	Blue	Ductile Cast Iron	17 Jul 2017
5004312	5230	E.Hawke	Haku PE Pipe Saddle Flanged Outlet 100	PE Pipe Tapping Saddle	Water	125	PN16	Mechanical	Blue	Ductile Cast Iron	17 Jul 2017
5004314	5230	E.Hawke	Haku PE Pipe Saddle Flanged Outlet 80	PE Pipe Tapping Saddle	Water	125	PN16	Mechanical	Blue	Ductile Cast Iron	17 Jul 2017
5004316	5230	E.Hawke	Haku PE Pipe Saddle Flanged Outlet 80	PE Pipe Tapping Saddle	Water	140	PN16	Mechanical	Blue	Ductile Cast Iron	17 Jul 2017
5004318	5230	E.Hawke	Haku PE Pipe Saddle Flanged Outlet 100	PE Pipe Tapping Saddle	Water	140	PN16	Mechanical	Blue	Ductile Cast Iron	17 Jul 2017
5004320	5230	E.Hawke	Haku PE Pipe Saddle Flanged Outlet 80	PE Pipe Tapping Saddle	Water	160	PN16	Mechanical	Blue	Ductile Cast Iron	17 Jul 2017
5004322	5230	E.Hawke	Haku PE Pipe Saddle Flanged Outlet 100	PE Pipe Tapping Saddle	Water	160	PN16	Mechanical	Blue	Ductile Cast Iron	17 Jul 2017
5004324	5230	E.Hawke	Haku PE Pipe Saddle Flanged Outlet 80	PE Pipe Tapping Saddle	Water	180	PN16	Mechanical	Blue	Ductile Cast Iron	17 Jul 2017
5004326	5230	E.Hawke	Haku PE Pipe Saddle Flanged Outlet 100	PE Pipe Tapping Saddle	Water	180	PN16	Mechanical	Blue	Ductile Cast Iron	17 Jul 2017
5004328	5230	E.Hawke	Haku PE Pipe Saddle Flanged Outlet 80	PE Pipe Tapping Saddle	Water	200	PN16	Mechanical	Blue	Ductile Cast Iron	17 Jul 2017
5004330	5230	E.Hawke	Haku PE Pipe Saddle Flanged Outlet 100	PE Pipe Tapping Saddle	Water	200	PN16	Mechanical	Blue	Ductile Cast Iron	17 Jul 2017
5004332	5230	E.Hawke	Haku PE Pipe Saddle Flanged Outlet 80	PE Pipe Tapping Saddle	Water	225	PN16	Mechanical	Blue	Ductile Cast Iron	17 Jul 2017

Licence No: SMK25792

Issued Date: 25 September 2018

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SCHEDULE TO STANDARDSMARK LICENCE

Model Identification	Model Name	Brand Name	Product Description	Product Type	Product Application	Size Classification (DN)	Pressure Classification	Joint Type	Colour	Material Designation	Date Endorsed
5004334	5230	E.Hawke	Haku PE Pipe Saddle Flanged Outlet 100	PE Pipe Tapping Saddle	Water	225	PN16	Mechanical	Blue	Ductile Cast Iron	17 Jul 2017
5004336	5230	E.Hawke	Haku PE Pipe Saddle Flanged Outlet 80	PE Pipe Tapping Saddle	Water	250	PN16	Mechanical	Blue	Ductile Cast Iron	17 Jul 2017
5004338	5230	E.Hawke	Haku PE Pipe Saddle Flanged Outlet 150	PE Pipe Tapping Saddle	Water	280	PN16	Mechanical	Blue	Ductile Cast Iron	17 Jul 2017
5004340	5230	E.Hawke	Haku PE Pipe Saddle Flanged Outlet 80	PE Pipe Tapping Saddle	Water	315	PN16	Mechanical	Blue	Ductile Cast Iron	17 Jul 2017
5004342	5230	E.Hawke	Haku PE Pipe Saddle Flanged Outlet 150	PE Pipe Tapping Saddle	Water	315	PN16	Mechanical	Blue	Ductile Cast Iron	17 Jul 2017
5004344	5230	E.Hawke	Haku PE Pipe Saddle Flanged Outlet 150	PE Pipe Tapping Saddle	Water	355	PN16	Mechanical	Blue	Ductile Cast Iron	17 Jul 2017
5005143	0400	E.Hawke	MMA-Flange, System 2000	Fitting	Water	100/125	PN16	Mechanical	Blue	Ductile Cast Iron	17 Jul 2017
5005147	0400	E.Hawke	MMA-Flange, System 2000	Fitting	Water	150/180	PN16	Mechanical	Blue	Ductile Cast Iron	17 Jul 2017
5005148	0400	E.Hawke	MMA-Flange, System 2000	Fitting	Water	200/225	PN16	Mechanical	Blue	Ductile Cast Iron	17 Jul 2017
5005149	0400	E.Hawke	MMA-Flange, System 2000	Fitting	Water	200/200	PN16	Mechanical	Blue	Ductile Cast Iron	17 Jul 2017
5005151	0400	E.Hawke	MMA-Flange, System 2000	Fitting	Water	200/250	PN16	Mechanical	Blue	Ductile Cast Iron	17 Jul 2017
5005153	0400	E.Hawke	MMA-Flange, System 2000	Fitting	Water	250/250	PN16	Mechanical	Blue	Ductile Cast Iron	17 Jul 2017
5005155	0400	E.Hawke	MMA-Flange, System 2000	Fitting	Water	300/315	PN16	Mechanical	Blue	Ductile Cast Iron	17 Jul 2017
5005157	0400	E.Hawke	MMA-Flange, System 2000	Fitting	Water	300/355	PN16	Mechanical	Blue	Ductile Cast Iron	17 Jul 2017

End of Record

Licence No: SMK25792

Issued Date: 25 September 2018

This schedule supersedes all previously issued schedules



* For details of manufacture, refer to the licensee

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APPENDIX C - WSA PRODUCT SPECIFICATION

WATER SERVICES ASSOCIATION of Australia

PRODUCT SPECIFICATION

WSA PS - 327 TAPPING BANDS, MECHANICAL, FOR USE WITH POLYETHYLENE (PE) MAINS FOR PRESSURE APPLICATIONS – WATER SUPPLY

327.1 SCOPE

This specification covers mechanical tapping bands for pressure applications in connecting property services to PE water reticulation mains¹.

327.2 REQUIREMENTS

- (a) Tapping bands shall comply with AS/NZS 4129:2008/Amdt 1:2013.

327.3 QUALITY ASSURANCE

- (a) Tapping bands shall have product certification (ISO Type 5) to AS/NZS 4129:2008/Amdt 1:2013.
- (b) All products shall be marked in accordance with the conformity assessment body's requirements.

327.4 AGENCY OR PROJECT SPECIFIC REQUIREMENTS

Nominal pipe size, DN, and off-take size, mm	
Pressure Class, PN	
Series RP or Series RC internal outlet thread ²	

NOTES:

- 1 Includes drinking water and recycled water supply. Colour differentiation is not required.
- 2 Where a tapered RC external threaded fitting is to be screwed into a plastic bodied tapping band, a tapered RC internal outlet thread is recommended.

UNCONTROLLED IF PRINTED

File Name: WSA_PS_327_05

Copyright

Issue: 06

October 2018

Doc Name: Product Specifications for Products & Materials

Page 1 of 1

APPENDIX D PRODUCT MARKING.



Hawle – cast on to body of fitting



Markings on adhesive label attached to Tapping Band



Markings on adhesive label attached to Flanged Off-Take



StandardsMark and WaterMark attached by adhesive label



Material designation GJS cast on to body

GJS is the European designation for Ductile Iron

APPENDIX F – SUPPLIER CONTACTS

Hygrade Water Australia

Brisbane Head Office

42-44 Blue Eagle Drive, Meadowbrook, QLD 4132

Telephone: 07 3805 9186

Email: qldsales@hygradewater.com.au

Sydney Office

10 McPherson Road, Smeaton Grange, NSW 2567

Telephone: 02 4646 1747

Email: nswsales@hygradewater.com.au

Website: www.hygradewater.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