

Water Supply and Sewerage Approved Products Manual - February 2006

Gravity Sewerage Products – Vitrified Clay Pipeline System

Section SGPS 02

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SGPS 02-S1 PIPES TO EN 295

STANDARD	EN 295: 1991	Vitrified clay pipes and fittings and pipe joints for drains and sewers		
DESIGN	Hydraulic:	VC pipes to EN 295 have a minimum internal diameter closely approximating the nominal size. The deviation of the minimum internal diameter from the nominal size increases as pipe diameter increases being 96 mm for DN 100 mm up to 585 mm for DN 600.		
	Structural:	The class of pipe is defined by the ring crushing strength which can be directly used in structural design calculations.		
	Joint:	EN 295 specifies seven jointing dimension systems to cover available systems in Europe. Systems A, B, C and D relate to four dimension systems for the socket or socket fairing. Systems E, F and G relate to three dimension systems for the spigot.		
	Compatibilities:	Only pipes of the same class and jointing system are compatible.		
MATERIALS	Pipe:	A blend of clays from different locations and/or strata. Shale, sand and pre-fired material may also be included. Calcine clays included to minimise pipe wall permeability.		
	Joint sleeve:	Polypropylene to SP7 Appendix A.		
	Joint fairings:	Polyester		
	Joint seal:	EPDM, SBR, NBR or other approved elastomer to EN 681-1		
JOINT TEST DEFLECTIONS	DN 100 to DN 200:	4.7° or 80 mm/m pipe length		
	DN 225 to DN 500:	1.7° or 30 mm/m pipe length		
	DN 600 to DN 800:	1.2° or 20 mm/m pipe length		
	> DN 800:	0.6° or 10 mm/m pipe length		
CRUSHING STRENGTH #	DN	Class number	DN	Class number
		120 160 200		95 120 160
	150 *	22 28 34	400	38 48 64
	200	24 32 40	450	43 54 72
	225	28 36 45	500	48 60 80
	250	30 40 50	600	57 72
	300	36 48 60	700	67 84
	350	42 56 70	800	76
			1000	95
	# Crushing strength in kN/m		* Class numbers do not apply for DN 150 pipe	
EFFECTIVE LENGTH	Whole multiples of 250 mm.			
MARKINGS	EN 295-1 CE symbol ID symbol of third party certification body Manufacturer's identification Date of manufacturing Nominal size (DN...) Dimensional jointing system Crushing strength in kN/m Bending moment resistance in kNm if appropriate			
MARKING METHOD	Indented before firing or indelibly stencilled after firing			
USE LIMITS	Do not use in unstable ground, i.e. refilled ground, tidal zones. Do not use above ground or for crossing under water courses.			

SGPS 02-S2 PIPES TO AS 1741

STANDARD	AS 1741: 1991	Vitrified clay pipes and fittings with flexible joints – Sewer quality
DESIGN	Hydraulic:	VC pipes to AS 1741 have a minimum internal diameter closely approximating the nominal size. The deviation of the internal diameter from the nominal size increases as pipe diameter increases being ± 3 mm for DN 100 mm up to ± 12 mm for DN 600.
	Structural:	The class of pipe is defined by the ring crushing strength which can be directly used in structural design calculations.
	Joint:	AS 1741 specifies only one standard jointing dimension system but allows other dimension systems to be specified by the purchaser.
	Compatibilities:	Pipe of different classes are compatible.

MATERIALS	Pipe:	A blend of clays from different locations and/or strata. Shale, sand and pre-fired material may also be included. Calcine clays included to minimise pipe wall permeability.
	Joint sleeve:	Polymer complying with ISO 175 for chemical resistance Polypropylene to SP7 Appendix A Stainless steel Grade AS1449/316
	Joint seal:	EPDM, SBR, NBR or other approved elastomer to AS 1646 & SP15

JOINT TEST DEFLECTIONS	< DN 225:	2.9° or 50 mm/m pipe length
	DN 225 to DN 525:	1.7° or 30 mm/m pipe length
	> DN 525:	1.2° or 20 mm/m pipe length

CRUSHING STRENGTH #	DN	Class		DN	Class	
		3	4		3	4
	150	30	39	450	45	60
	200	31	41	525	52	69
	225	32	42	600	59	78
	250	33	43	700	68	90
	300	34	45	750	72	96
	350	37	49	800	76	101
	375	39	51	900	84	111
	400	41	54	1000	89	121

Crushing strength in kN/m

EFFECTIVE LENGTH	Not specified
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MARKINGS (pipe and sleeve)	Manufacturer's name and registered trademark (indented) Date of manufacture or equivalent identification (indented) Identification of factory location if manufacturer has more than one works (indented) Nominal size, e.g. DN 300 (indented or indelibly stencilled) Crushing strength class, e.g. class 3 (indelibly stencilled) The word 'SEWER' (indelibly stencilled) The word 'TOP' (indelibly stencilled) The letters 'BL', i.e. beam loading strength (indelibly stencilled) Product certification mark, i.e. StandardsMark
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MARKING METHOD	Indented or indelibly stencilled as shown above on the exterior in legible lettering, not less than 10 mm and 15 mm high respectively.
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USE LIMITS	Do not use in unstable ground, i.e. refilled ground, tidal zones. Do not use above ground or for crossing under water courses.
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SGPS 02-S3 FITTINGS TO EN 295

STANDARD	EN 295-1 : 1991	Vitrified clay pipes and fittings and pipe joints for drains and sewers Part 1: Requirements
DESIGN	Hydraulic:	VC fittings to EN 295 have a minimum internal diameter closely approximating the nominal size. The deviation of the minimum internal diameter from the nominal size increases as pipe diameter increases being -4 mm for DN 100 up to -15mm for DN 600.
	Structural:	Fittings may be manufactured by extrusion, injected moulding or fabrication by hand sticking or epoxy adhesion of pipe parts.
	Joint:	EN 295 specifies seven jointing dimension systems to cover available systems in Europe. Systems A, B, C and D relate to four dimension systems for the socket or socket fairing. Systems E, F and G relate to three dimension systems for the spigot.
	Compatibilities:	Only pipes of the same class and jointing system are compatible.
MATERIALS	Fitting:	A blend of clays from different locations and/or strata. Shale, sand and pre-fired material may also be included. Calcine clays included to minimise pipe wall permeability.
	Joint sleeve:	Polypropylene to SP7 Appendix A.
	Joint fairings:	Polyester
	Joint seal:	EPDM, SBR, NBR or other approved elastomer to EN 681-1
JOINT TEST DEFLECTIONS	DN 100 to DN 200:	4.7° or 80 mm/m pipe length
	DN 225 to DN 500:	1.7° or 30 mm/m pipe length
	DN 600 to DN 800:	1.2° or 20 mm/m pipe length
	> DN 800:	0.6° or 10 mm/m pipe length
MARKINGS	EN 295-1	
	CE symbol	
	Identification symbol of the third party certification body	
	Manufacturer's identification	
	Date of manufacturing	
	Nominal size (DN...)	
	Dimensional jointing system	
	Crushing strength in kN/m	
	Bending moment resistance in kNm if appropriate	
	Date of bonding (SP7 requirement)	
	Place of manufacture if more than one site (SP7 requirement)	
	Angle of bend (SP7 requirement)	
MARKING METHOD	Indented before firing or indelibly stencilled after firing	
USE LIMITS	Do not use in unstable ground, i.e. refilled ground, tidal zones. Do not use used above ground or for crossing under water courses.	

SGPS 02-S4 FITTINGS TO AS 1741

STANDARD	AS 1741: 1991	Vitrified clay pipes and fittings with flexible joints – Sewer quality
DESIGN	Hydraulic:	VC fittings to AS 1741 have a minimum internal diameter closely approximating the nominal size. The deviation of the minimum internal diameter from the nominal size increases as pipe diameter increases being ± 3 mm for DN 100 up to ± 12 mm for DN 600.
	Structural:	Fittings may be manufactured by extrusion, injected moulding or fabrication by hand sticking or epoxy adhesion of pipe parts.
	Joint:	AS 1741 specifies only one standard jointing dimension system but allows other dimension systems to be specified by the purchaser.
	Compatibilities:	Pipe of different classes are compatible.
MATERIALS	Fitting:	A blend of clays from different locations and/or strata. Shale, sand and pre-fired material may also be included. Calcine clays included to minimise pipe wall permeability.
	Joint sleeve:	Polymer complying with ISO 175 for chemical resistance Polypropylene to SP7 Appendix A. Stainless steel Grade AS1449/316
	Joint seal:	EPDM, SBR, NBR or other approved elastomer to AS 1646 & SP15
JOINT TEST DEFLECTIONS	< DN 225:	2.9° or 50 mm/m pipe length
	DN 225 - DN 525:	1.7° or 30 mm/m pipe length
	>DN 525:	1.2° or 20 mm/m pipe length
MARKINGS	Manufacturer's name and registered trademark (indented) Date of manufacture or equivalent identification (indented) Identification of factory location if manufacturer has more than one works (indented) Nominal size, e.g. DN 300 (indented or indelibly stencilled) Crushing strength class, e.g. class 3 (indelibly stencilled) The word 'SEWER' (indelibly stencilled) The word 'TOP' (indelibly stencilled) The letters 'BL', i.e. beam loading strength (indelibly stencilled) Product certification mark, i.e. StandardsMark Date of bonding (SP7 requirement) Place of manufacture if more than one site (SP7 requirement) Angle of bend (SP7 requirement)	
MARKING METHOD	Indented or indelibly stencilled as shown above on the exterior in legible lettering, not less than 10 mm and 15 mm high respectively.	
USE LIMITS	Do not use in unstable ground, i.e. refilled ground, tidal zones. Do not use above ground or crossing under water courses.	

SGPS 02-S5 JOINT SEALS FOR AS 1741 PIPES/FITTINGS

STANDARD	AS 1646: 2000 Elastomeric seals for waterworks purposes
DESIGN	Joint seals are to be of elastomeric compounds comprising suitable polymers. Elastomers have performance properties which deteriorate with time and as such the design of the seal's profile and the compounding of the elastomer needs to ensure long term sealing of the joint. The elastomer properties affecting long term sealing performance are hardness, rate of compression stress relaxation, water absorption, resistance to ageing, resistance to chemicals and resistance to microbiological deterioration.
COMPOUND MATERIALS	<p>Polymer: EPDM, SBR, NR or other polymer approved by Power and Water. Minimum volume of polymer of compound as shown in AS 1646.</p> <p>Antidegradant: Based on the combined antioxidant-antiozonant N-(1,3-dimethyl-butyl)-N'-phenyl-p-phenylene diamine with a concentration (m/m) of not less than 1.5 parts per hundred of polymer.</p> <p>Protective wax: Wax with a melting point of not less than 57°C and concentration (m/m) not greater than 3.0 parts per hundred of polymer.</p> <p>Filler: Carbon black</p> <p>Copper & manganese: As applicable to the elastomer, as shown in AS 1646.</p>
MARKINGS	<p>Manufacturer's identification mark</p> <p>Cavity number, if applicable</p> <p>Nominal size or nominal internal and cord diameters as appropriate</p> <p>Year of manufacture, e.g. 01 to represent year 2001</p> <p>Standard designation where the elastomeric compound is certified to AS 1646.</p>
MARKING METHODS	Embossing with lettering 3 ± 1 mm high and 0.3 ± 0.1 mm proud of the surface; or Vulcanised transfer or permanent ink with lettering 3.5 ± 1.5 mm.
ELASTOMER TYPE IDENTIFICATION	<p>Marking colour: Blue</p> <p>Marking method: Continuous durable stripe of width 3.5 ± 1.5 mm; or Durable flash or dot of 6 mm minimum dimension</p>
STORAGE	<ul style="list-style-type: none"> ▪ Do not store seals in a room with any equipment capable of generating ozone (e.g. mercury vapour lamps, electric motors, high voltage equipment) ▪ Store seals in a relaxed condition free from tension, compression or other deformation ▪ Storage temperature not to exceed 35°C and preferably not above 15°C or less than 5°C ▪ Natural rubber seals not to be continuously exposed to direct sunlight ▪ For prolonged storage (in excess of 3 months), enclose or wrap seals in an opaque material so as to prevent free access of air and to prevent UV damage (refer ISO 2230)
USE LIMITS	<p>Do not use elastomeric seals removed from packaging for more than 3 months</p> <p>Do not use elastomeric seals older than 18 months from date of manufacture unless supplier can demonstrate that seals have been stored in a cool, controlled environment</p> <p>Do not use SBR or NR elastomeric more than 3 years from date of manufacture</p> <p>Do not use EPDM elastomeric more than 6 years from date of manufacture</p> <p>Do not use NR/SBR seals that have been stored unprotected from sunlight for more than 7 days</p> <p>Do not use elastomeric seals that have been in contact with chemicals, e.g. solvents (petrol).</p>

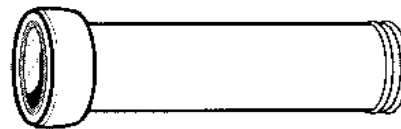
SGPS 02-S6 JOINT SEALS FOR EN 295 PIPES/FITTINGS

STANDARD	EN 681-1:1996	Elastomeric seals. Material requirements for pipe joint seals used in water and drainage applications. (this standard applies also to sewers)
	<p><i>Note: On its release, EN 681-1 replaced ISO 4633 (Rubber seals – Joint rings for water supply, drainage and sewerage pipelines - Specification for materials) as the standard which EN 295 requires rubber sealing elements to comply with. EN 681-1 is in most parts identical to ISO 4633, with the principal differences being that EN 681-1;</i></p> <ul style="list-style-type: none"> ▪ <i>additionally covers rubber seals for hot potable and non-potable water supply;</i> ▪ <i>has mandatory quality requirements including compliance to EN ISO 9000 series or equivalent, third party inspection at least twice a year and product control test requirements; and</i> ▪ <i>does not specify resistance to microbiological deterioration.</i> 	
DESIGN	<p>Joint seals are to be of elastomeric compounds comprising suitable polymers. Elastomers have performance properties which deteriorate with time and as such the design of the seal profile and the compounding of the elastomer need to ensure long term sealing of the joint. The elastomer properties affecting long term sealing performance and of which EN 681-1 specifies conformance requirements are hardness, tensile strength, elongation at break, compression set, stress relaxation in compression, water absorption (volume change in water), resistance to ageing (hardness tensile strength and elongation at break as measures) and resistance to ozone.</p>	
COMPOUND MATERIALS	<p>Polymer: EPDM, SBR, NR or other polymer as approved by Power and Water. Minimum volume of polymer of compound not specified in EN 681-1.</p> <p>Antidegradant: Not specified in EN 681-1</p> <p>Protective wax: Not specified in EN 681-1</p> <p>Filler: Not specified in EN 681-1</p> <p>Copper & manganese: Not specified in EN 681-1</p>	
MARKINGS	<p>Nominal size Manufacturer's identification The number of this standard with the type of application and hardness class as a suffix, e.g. EN 681-1/WB/50 Third party certification mark The quarter and year of manufacture The abbreviation of the rubber, e.g. SBR</p>	
MARKING METHODS	Clearly and durably such that the sealing capability is not impaired	
ELASTOMER TYPE IDENTIFICATION	<p>Marking colour: Not specified in EN 681-1</p> <p>Marking method: Not specified in EN 681-1</p>	
STORAGE (guidance in standard)	<ul style="list-style-type: none"> ▪ Do not store seals in a room with any equipment capable of generating ozone (e.g. mercury vapour lamps, electric motors, high voltage equipment) ▪ Store seals in a relaxed condition free from tension, compression or other deformation ▪ Storage temperature not to exceed 35°C and preferably not above 15°C or less than 5°C ▪ Natural rubber seals not to be continuously exposed to direct sunlight ▪ For prolonged storage (in excess of 3 months), enclose or wrap seals in an opaque material so as to prevent free access of air and to prevent UV damage (refer ISO 2230) 	
USE LIMITS	<p>Do not use elastomeric seals removed from packaging for more than 3 months Do not use elastomeric seals older than 18 months from date of manufacture unless supplier can demonstrate that seals have been stored in a cool, controlled environment Do not use SBR or NR elastomeric more than 3 years from date of manufacture Do not use EDPM elastomeric more than 6 years from date of manufacture Do not use NR/SBR seals that have been stored unprotected from sunlight for more than 7 days Do not use elastomeric seals that have been in contact with chemicals, e.g. solvents (petrol).</p>	

SGPS 02-S7 JOINTING LUBRICANT

STANDARD	None
DESIGN	Jointing lubricant is required to achieve the following: <ul style="list-style-type: none">▪ Provide sufficient lubrication to prevent damage to joint seals or surfaces on jointing.▪ Enable correctly configured jointing when using jointing methods recommended by the pipe or fitting manufacturer.▪ Not affect the elastomer or pipe or fitting materials.▪ Remain an effective lubricant under wet conditions.▪ Not be hazardous to handle and be able to be applied by hand.▪ Be completely soluble in water.▪ Be able to be removed under standard flushing arrangements for commissioning.
MATERIALS	Water based emulsion
CONTAINER MARKINGS	Manufacturer's name or trademark Proprietary name of joint seal with which the lubricant can be used. The words "Jointing Lubricant" or "Joint Lubricant". Date of manufacture. Date of expiry for use. The specification to which it complies. The WaterMark or other mark to certify compliance with the specification. Instructions for use of lubricant.
USE LIMITS	Do not use where past expiry date.

SOCKET-SPIGOT PIPES



Nominal Size DN
100
150
200 ¹
225
250 ¹
300
375
400 ¹
450
500 ¹
600
750

NOTES

1. DN 200, DN 250, DN 400 and DN 500 are non-preferred sizes in AS 1741 and shall not be used without Power and Water's written permission.

SPIGOT-SPIGOT PIPES

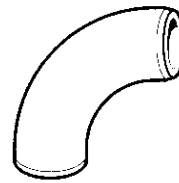


Nominal Size DN	Hepworth (Supersleve) ¹
100	✓ (1.6m)
150	✓ (1.75 m)
200 ²	✓ (2.0 m)
225	✓ (2.0 m)
250 ²	✓ (2.0 m)
300	✓ (2.0 m)
375	
400 ²	
450	
500 ²	
600	
750	

NOTES

1. Supersleve pipe have a jointing system to the dimensions and tolerances for system E given in EN 295-1. Supersleve pipe can only be joined to pipe or fittings not having System E joints using a flexible mechanical coupling.
2. DN 200, DN 250, DN 400 and DN 500 are non-preferred sizes in AS 1741 and shall not be used without Power and Water's written permission.
3. The effective length available for the pipes is shown in brackets.

SPIGOT-SPIGOT BENDS

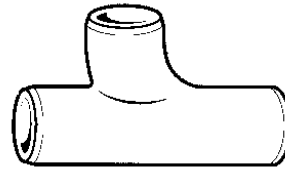


Nominal Size DN x degrees	Hepworth (Supersleve)
100 x 15	✓
100 x 30	✓
100 x 45	✓
100 x 90	✓
150 x 15	✓
150 x 30	✓
150 x 45	✓
150 x 90	✓
200 x 15	✓ ¹
200 x 30	✓ ¹
200 x 45	✓ ¹
200 x 90	✓ ¹
225 x 15	✓
225 x 30	✓
225 x 45	✓
225 x 90	✓
250 x 15	✓ ¹
250 x 30	✓ ¹
250 x 45	✓ ¹
250 x 90	
300 x 15	✓
300 x 30	✓
300 x 45	✓
300 x 90	

NOTES

1. DN 200 and 250 are non-preferred sizes in AS 1741 and shall not be used without Power and Water's written permission.

**SPIGOT-SPIGOT-SPIGOT
CURVED SQUARE JUNCTIONS
(Riley Slope Junctions)**

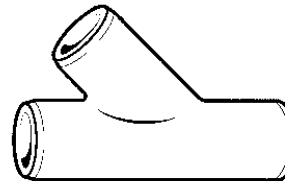


Nominal Size DN x dn	Hepworth (Supersleve)
100 x 100	✓
150 x 150	✓
200 x 150	✓ ¹
200 x 200	✓ ¹
225 x 150	✓
225 x 150	✓
250 x 150	✓ ¹
250 x 200	✓ ¹
250 x 250	✓ ¹
300 x 150	✓
300 x 200	✓
300 x 225	✓
300 x 250	✓
300 x 300	✓

NOTES

1. DN 200 and DN 250 are non-preferred sizes in AS 1741 and shall not be used without Power and Water's written permission.

**SPIGOT-SPIGOT-SPIGOT
OBLIQUE JUNCTIONS
(Slope Junctions)**

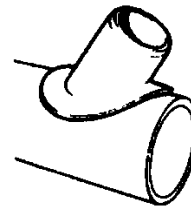


Nominal Size DN x dn	Hepworth (Supersleve)
100 x 100	✓
150 x 150	✓
200 x 150	✓ ¹
200 x 200	✓ ¹
225 x 150	✓
225 x 225	✓
250 x 150	✓ ¹
250 x 200	✓ ¹
250 x 250	✓ ¹
300 x 150	✓
300 x 200	✓
300 x 225	✓
300 x 250	
300 x 300	✓

NOTES

1. DN 200 and DN 250 are non-preferred sizes and shall not be used without Power and Water's written permission.

SPIGOT OBLIQUE SADDLES

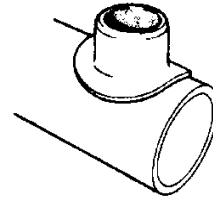


Nominal Size DN x dn	Hepworth (Supersleve)
150 x 100	✓
150 x 150	✓
200 x 100	✓
200 x 150	✓
200 x 200	
225 x 100	✓
225 x 150	✓
225 x 200	
225 x 225	
250 x 100	✓
250 x 150	✓
250 x 200	
250 x 225	
250 x 250	
300 x 100	✓
300 x 150	✓
300 x 200	
300 x 225	✓
300 x 250	
300 x 300	
375 x 100	✓
375 x 150	✓
375 x 200	
375 x 225	✓
375 x 250	
375 x 300	
375 x 375	
400 x 100	✓
400 x 150	✓
400 x 200	
400 x 225	✓
400 x 250	
400 x 300	
400 x 375	
400 x 400	
450 x 100	✓
450 x 150	✓
450 x 200	
450 x 225	✓
450 x 250	
450 x 300	
450 x 375	
450 x 400	
450 x 450	

NOTES

1. DN 200, DN 250 and DN 400 are non-preferred sizes in AS 1741 and shall not be used without Power and Water's written permission.

SPIGOT SQUARE SADDLES

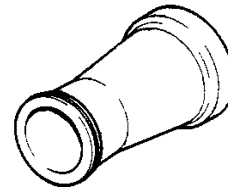


Nominal Size DN x dn	Hepworth (Supersleve)
150 x 100	✓
150 x 150	✓
200 x 100	✓
200 x 150	✓
200 x 200	
225 x 100	✓
225 x 150	✓
225 x 200	
225 x 225	
250 x 100	✓
250 x 150	✓
250 x 200	
250 x 225	
250 x 250	
300 x 100	✓
300 x 150	✓
300 x 200	
300 x 225	✓
300 x 250	
300 x 300	
375 x 100	✓
375 x 150	✓
375 x 200	
375 x 225	✓
375 x 250	
375 x 300	
375 x 375	
400 x 100	✓
400 x 150	✓
400 x 200	
400 x 225	✓
400 x 250	
400 x 300	
400 x 375	
400 x 400	
450 x 100	✓
450 x 150	✓
450 x 200	
450 x 225	✓
450 x 250	
450 x 300	
450 x 375	
450 x 400	
450 x 450	

NOTES

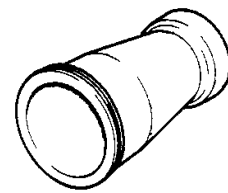
1. DN 200, DN 250 and DN 400 are non-preferred sizes in AS 1741 and shall not be used without Power and Water's written permission.

SOCKET-SPIGOT
REDUCER TAPERS



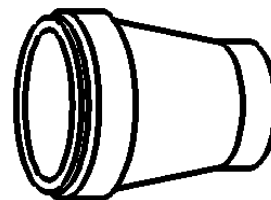
Nominal Size DN x dn
225 x 150
250 x 200
300 x 225
375 x 300
450 x 375

SOCKET-SPIGOT
INCREASER TAPERS



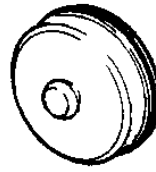
Nominal Size dn x DN
150 x 225
200 x 250
225 x 300
300 x 375
375 x 450

SPIGOT-SPIGOT TAPERS



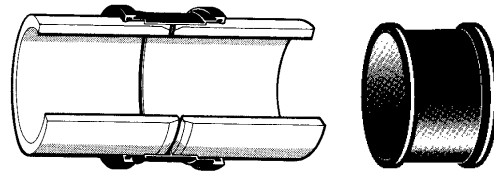
Nominal Size DN x dn	Hepworth (Supersleve)
150 x 100	✓
200 x 150	
225 x 150	
250 x 200	
300 x 250	

STOPPERS



Nominal Size DN
100
150
225
250
300
375
400
450
500

COUPLINGS WITH ELASTOMERIC SEALS



Nominal Size DN	Hepworth (Supersleve)
100	✓
150	✓
200 ¹	✓
225	✓
250 ¹	✓
300	✓

NOTES

1. DN 200 and 250 are non-preferred sizes in AS 1741 and shall not be used without Power and Water's written permission.

JOINTING LUBRICANT



Tin Size	Hepworth
1 kg	✓
2.5 kg	✓