



SINTAKOTE®

STEEL PIPELINE SYSTEMS

NEW ZEALAND MARKET BROCHURE

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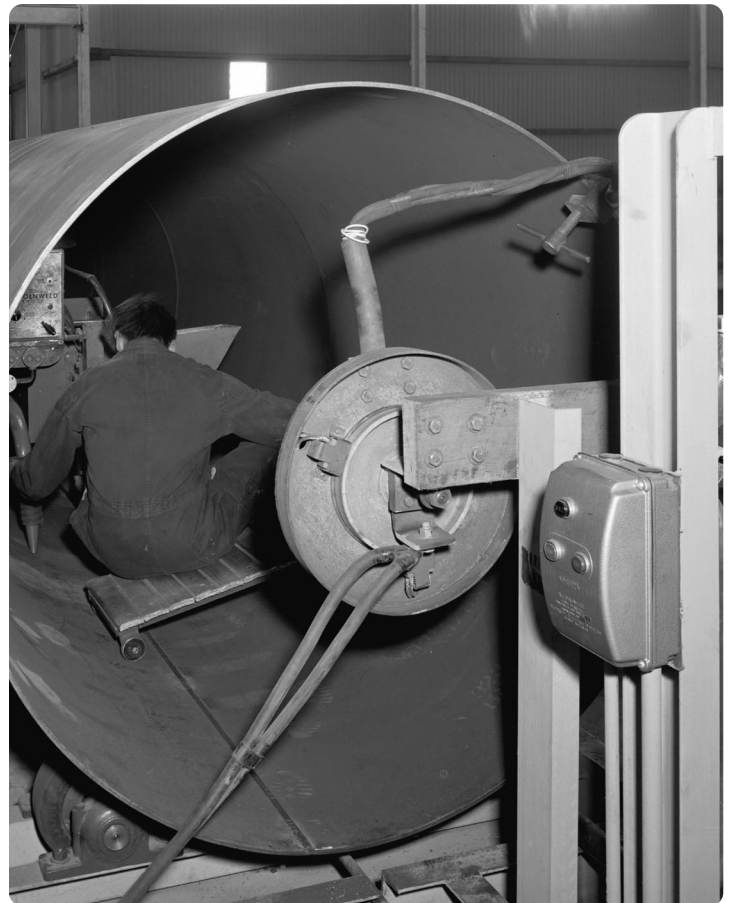
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ABOUT STEEL MAINS

HISTORY

Steel Mains is Australasia's leading manufacturer and supplier of complete steel pipeline systems for the transportation of water and wastewater, offering a total solutions approach to its customers. Steel Mains and its forerunners have traditionally been at the forefront of developments in the water industry for more than 125 years of manufacturing pipelines in Australia. Over that period steel pipeline design, manufacturing processes and technology have evolved into the Sintakote® steel pipeline system further explained in this brochure.

Today, Steel Mains products and services cover a range of industry needs both within Australia and the Pacific, delivering quality, strength, and reliability.



CAPABILITIES

For over 40 years, we've delivered the acclaimed Sintakote pipeline system known for exceptional performance. Our expertise in Mild Steel jointing, coating, and lining technology keeps us at the forefront, strengthened by collaborations with the Water Industry. From basic bends to intricate trifurcates, our range of fittings can be supplied with Sintajoint for easy assembly or welded joints for on-site welding needs.

Steel Mains manufactures steel pipeline systems in a comprehensive range from 100mm to 2100mm nominal diameter including all ISO and Australian Standard diameters. Pipes can be manufactured in a range of effective laying lengths from 6.0 to 11.83 metres with wall thicknesses ranging from 5mm to 20mm.





SINTAKOTE PIPELINE SYSTEM



AS4321 - TABLE 1

Pipe Size OD mm	Coating Minimum Thickness mm	
≤273	1.6	
>273	≤508	1.8
>508	≤762	2.0
>762	2.3	

ADVANTAGES

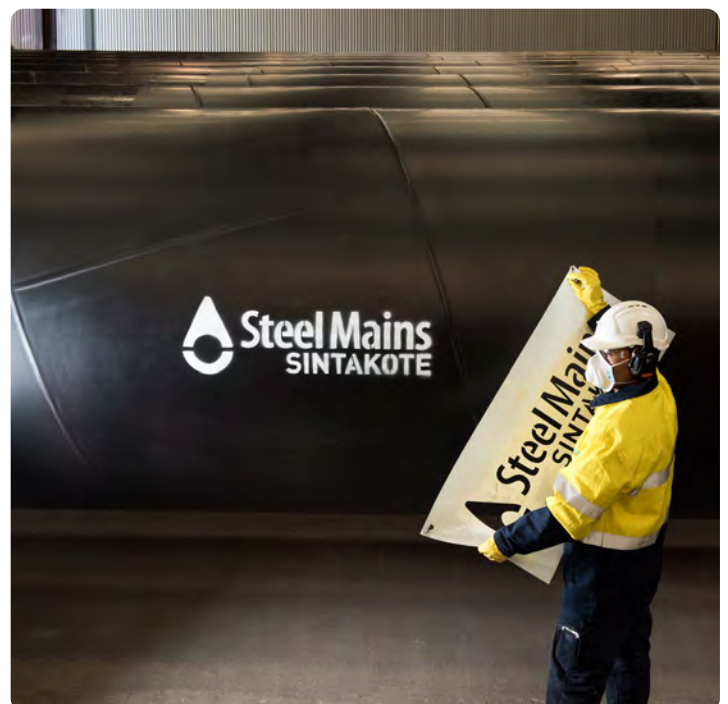
- Excellent adhesion
- High impact and load resistance
- Excellent chemical resistance
- High dielectric strength
- High electrical resistivity
- Low water absorption
- Resistance to soil stresses
- Wide service temperature range with temperatures from - 40°C to +70°C having no detrimental effect on Sintakote
- Ability to accept cold bending of the pipe in accordance with AS 2885 without damage to the coating
- Inbuilt ultra-violet stabiliser

DESCRIPTION

Sintakote is a registered trademark. Sintakote has almost 40 years proven operating experience in providing superior corrosion protection both below ground in a wide variety of soil conditions, from desert sands to aggressive saline soils and above ground, exposed to direct sunlight, without significant deterioration or any requirement for ongoing coating maintenance. Sintakote is a medium density polyethylene which is applied to the pipe by a fusion bonding process. Polyethylene, supplied as a powder, is fusion bonded onto a blasted preheated steel pipe, this process provides a continuous and holiday free coating, with a smooth surface, ideal for above and below ground applications and when exposed to direct UV sunlight.

Sintakote is supplied in accordance with AS4321 – Fusion-bonded medium density polyethylene coating and lining for pipes and fittings. AS4321 specifies the minimum coating thickness of Sintakote, which Steel Mains adherers to.

Quality control is maintained through tests as specified in AS4321 with all pipes being continuity tested by high voltage at a minimum of 12kV.



CEMENT MORTAR LINING

LINING PROCESS

Cement mortars are typically mixed with a cement/aggregate ratio of 2 to 1. They are mixed with water to form a slurry that is delivered to a rotating pipe in closely controlled quantities. Once the slurry is delivered, the pipe's rotation is accelerated to rotational speeds up to 1200rpm and radial accelerations up to 200G.

AS1281 - TABLE 2

Pipe Size OD mm		Lining Minimum Thickness mm	Tolerance
	≤273	9	±3
>273	≤762	12	±4
>762	≤1219	16	±4
>1219	≤1829	19	±4

PERFORMANCE

Cement mortar linings are manufactured to the thicknesses and tolerances specified in AS1281, which can be seen in the above table.

Cement mortar lining provides a twofold protection system, through being a physical barrier between the steel surface and the corrosive elements, and through providing a chemical barrier.

Cement mortar linings create a high pH environment. This environment creates a stable hydroxide film, that prevents corrosion on the steel surface.

AUTOGENOUS HEALING

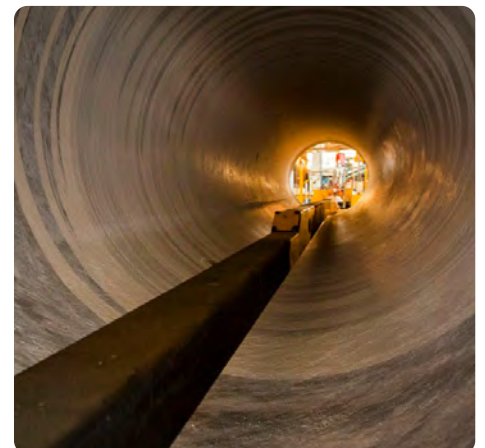
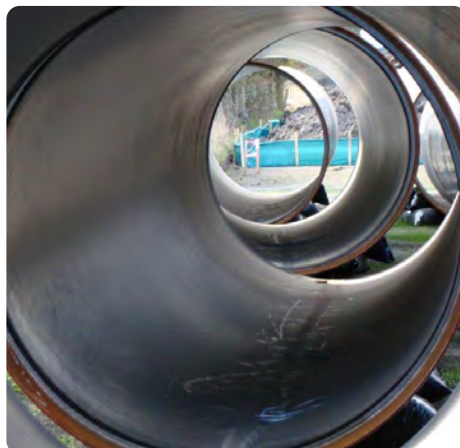
When the pipes leave our plant, the linings may contain superficial, hairline cracks. If the pipes are store for extended periods, especially in hot weather, shrinkage due to drying can lead to the formation of larger cracks.

Cracks that are less than 2mm wide should not be repaired. When the pipes are re-wetted the mortar typically absorbs 8% of the moisture and expands. In service, these cracks will close completely by this hydration and curing, a process known as autogenous healing.

CEMENT TYPE

Cement mortars used for linings are available in various formulations and are specified to comply with AS3972 – General purpose Portland and blended cements. Requirements include both the composition as well the properties and performance of the cement. For potable water, General Purpose (GP) cement is commonly used.

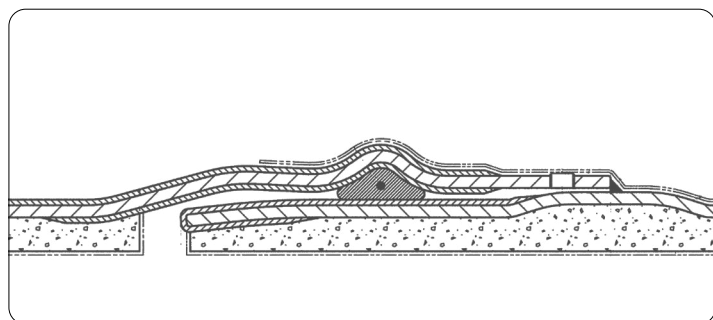
For sewage and industrial wastewater with extreme pH values and/or abrasive solids, Calcium Aluminate Cement (CAC) to EN14647, can be provided.



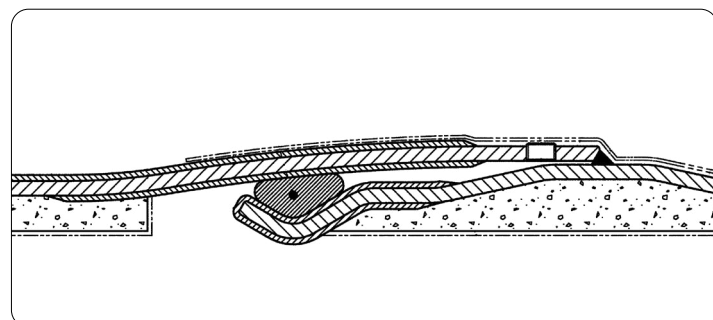


Sintakote steel pipeline systems can be connected via a wide variety of jointing systems. To accommodate project specific needs, various joints are available from Steel Mains to satisfy pipeline and construction requirements.

Sintalock® - Type I Welded Rubber Ring Joint (RRJ) DN300-DN1400



Sintalock® - Type II Welded Rubber Ring Joint (RRJ) DN500-DN1800

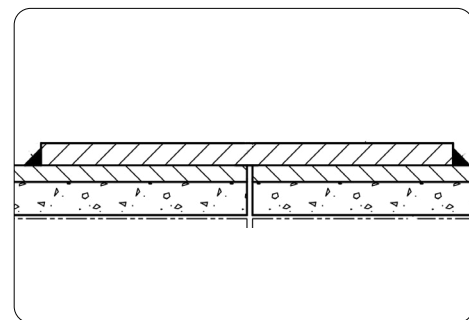
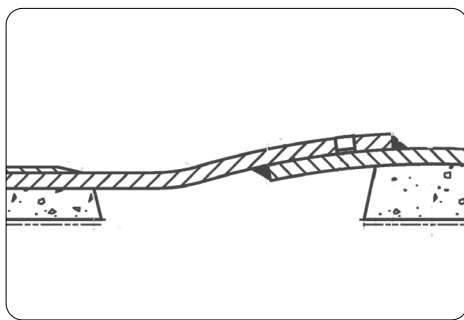
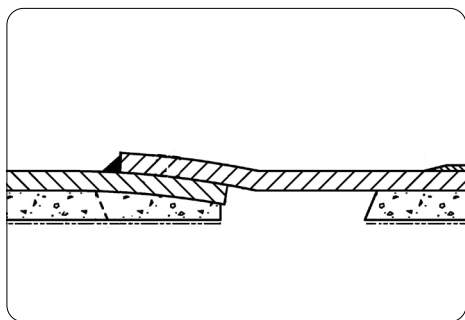


As opposed to many other joints, the Sintalock line enables construction of a fully end restrained pipeline without the need for concrete thrust blocks. This is a significant improvement on welded joints as it eliminates the safety issues associated with entry. SINTALOCK is also much faster to install as only external welding is required.

Spherical Slip in Joint (SSJ)

Ball and Socket Joint (BSJ)

Plain Ended Joint



- Available in outside diameters from 168 to 1422mm.
- Available for wall thicknesses up to 12mm
- Allow angular deflections of up to 3° for all diameters and wall thicknesses for each joint prior to welding.
- Can generally weld internally above 813mm outside diameter.

- Available in outside diameters from 900 to 2159mm.
- Available for wall thicknesses up to 20mm
- Allow angular deflections of up to 3° for all diameters and wall thicknesses for each joint prior to welding.
- Welding comprises internal and external welds.
- Each joint has a pneumatic test hole for checking joint integrity.

- May be satisfactorily welded from one side using a root fill and hot-pass method.
- A full penetration weld is required for this joint.
- This method is particularly useful for small diameter pipes where internal reinstatement of the cement mortar lining cannot be performed by hand.

STEEL

Steel water pipe produced in accordance with AS 1579 is normally manufactured from the following grades of steel:

AS/NZS 1594 – hot-rolled steel coil or
AS/NZS 3678 – Structural steel – hot-rolled plate.

Steel Strength

Wall Thickness OD mm	Min. Yield MPa	Min. Tensile MPa	Product Standard	Grade
t≤8	300	400	AS/NZS 1594	HA300
8<t<12.7	300	400	AS/NZS 1594	HU300

Note: Larger wall thicknesses are available on request. Please consult a Steel Mains representative for more information.

HA300 & HU300 are structural grades of steel which have the mechanical properties guaranteed by the steel maker.

Yield strength performance of the steel to make the pipe is assured by the hydrostatic test of each pipe after manufacture to 90% MYS (minimum yield strength).

The hydrostatic factory test not only proves minimum steel strength, but also tests the welding and ultimate fitness for purpose.



Requirement	AS1579	NZ4442	Contrast
Hydrostatic Test	Pipes shall be strength tested at a pressure equivalent to 90% of the steel yield strength or 8.5 MPa, whichever is less.	Pipes shall be strength tested at a pressure equivalent to 75% of the steel yield strength but not exceeding 7 MPa	AS1579 has a greater requirement for pipe hydrostatic strength test pressure. This leads to a higher propensity to detect weld defects.
Steel	Pipes shall be manufactured from an analysis or structural grade of hot rolled steel complying with AS/NZS 1594 or AS/NZS 3678	Steel standards that meet the requirements are AS1204, AS/NZS 1594, BS4360 and JIS G3101	Both standards have AS/NZS 1594 in common.

PIPE SIZE DATA

Nominal Diameter D_N mm	Outside Diameter D_N mm	Wall Thickness t mm	Internal Diameter I.D. mm	Test Pressure P_T Mpa	Rated Pressure P_R Mpa	Sintakote Thickness T_S mm	Lining Thickness T mm	Joint Type	Max. Pipe Axial Deflection $^\circ$
100	114	4.8	104.4	8.5	6.8	1.6	9	Butt Joint	0
150	168	5	158	8.5	6.8	1.6	9	SSJ	3
200	219	5	209	8.5	6.8	1.6	9	SSJ	3
250	273	5	263	8.5	6.8	1.6	9	SSJ	3
300	324	5	314	8.33	6.67	1.8	12	SSJ	3
350	356	5	346	7.58	6.07	1.8	12	SSJ	3
400	406	6	394	7.98	6.38	1.8	12	SSJ	3
450	457	6	445	7.09	5.67	1.8	12	SSJ	3
500	508	6	496	6.38	5.1	1.8	12	SSJ	3
600	610	6	598	5.31	4.25	2	12	SSJ	3
700	711	6	699	4.56	3.65	2	12	SSJ	3
750	762	8	746	5.67	4.54	2	12	SSJ	3
800	813	8	797	5.31	4.25	2.3	16	SSJ	3
900	914	8	898	4.73	3.78	2.3	16	SSJ	3
1000	1016	10	996	5.31	4.25	2.3	16	SSJ	3
1200	1219	10	1199	4.43	3.54	2.3	16	SSJ	3
1400	1422	10	1402	3.8	3.04	2.3	19	SSJ	3
1600	1626	12.7	1600.6	4.22	3.37	2.3	19	B&S	3
1800	1829	12.7	1803.6	3.75	3	2.3	19	B&S	3

*Based on WaterCare Standard Sizes, please consult your local Steel Mains representative for more information.



Nominal diameter DN mm	Outside diameter OD mm	Wall Thickness t mm	Overall pipe length m	Pipes per container
100	114	4.8	6	132
150	168	5	9	59
200	219	5	9	45
250	273	5	9	36
300	324	5	9	25
350	356	5	9	24
400	406	6	11.83	15
450	457	6	11.83	13
500	508	6	11.83	11
600	610	6	11.83	9
700	711	6	11.83	6
750	762	8	11.83	5
800	813	8	11.83	5
900	914	8	11.83	4
1000	1016	10	11.83	4
1200	1219	10	11.83	2
1400	1422	10	11.83	1
1600	1626	12.7	11.83	1
1800	1829	12.7	11.83	1

CONTAINER PACKS

For our international customers, pipes will arrive onshore in 40ft high cube containers. Steel Mains has been exporting pipe for the last 30 years, delivering for both major and minor projects. Steel Mains has successfully and safely delivered pipes through export for major projects in, the United Arab Emirates, Singapore, Fiji and New Zealand.

Steel Mains has developed, tried, and tested a safe and reliable system of securing pipes inside a container. Pipes are arranged as a pack, on sliding skids, allowing for easy extraction of the pipes from the container. The pipe packs are secured to the container, complying with the International Maritime Organisation's Guidelines for packing of cargo transportation units (CTUs) 2014.

The table to the left, provides information on the number of pipes per container for our standard export pipe range.

Notes:

1. Largest pipe size is for the biggest joint type OD dimensions.
2. This weight is for maximum cement mortar lining thickness.





Steel Mains has a wealth of experience in export projects. Here are some examples of this expertise: (For further details regarding our project experience, please refer to our Export Project History Brochure)

UNITED ARAB EMIRATES

In the last 10 years, Steel Mains has supplied over 168km of pipe in sizes from DN800 to DN1600 to the UAE for various water pipelines.



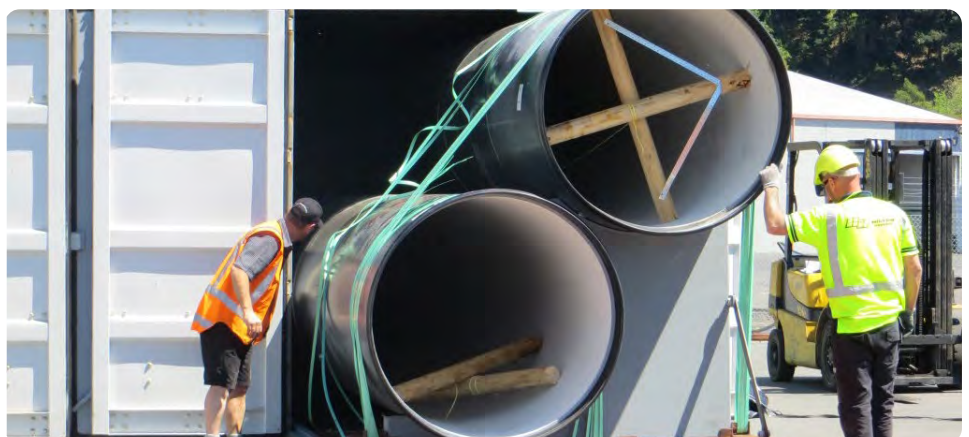
FIJI

Steel Mains has supplied Fiji with the pipelines necessary for a range of projects such as the 1500m 9140D Nagado Pipeline.

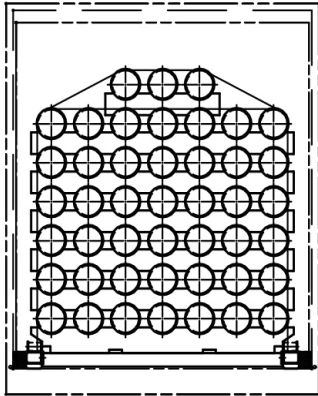


NEW ZEALAND

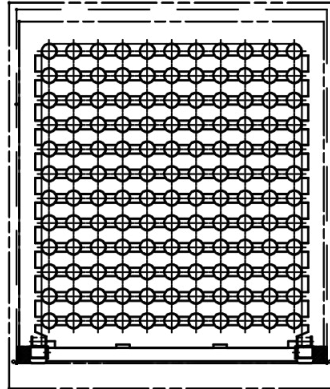
Steel Mains has provided pipes for a range of different pipeline projects in New Zealand, such as the Ashburton Lyndhurst Irrigation Project (ALIS) and the Downlands Otago Irrigation Scheme.



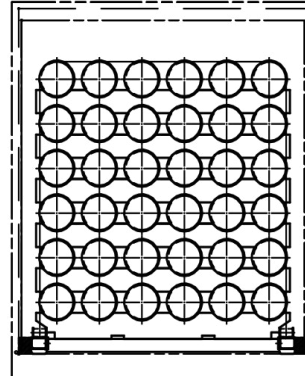
EXPORT PACK EXAMPLES



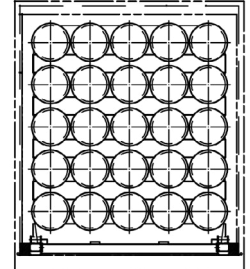
45 PIPES PER
HI-CUBE CONTAINER
PIPE SIZE 219 O.D.



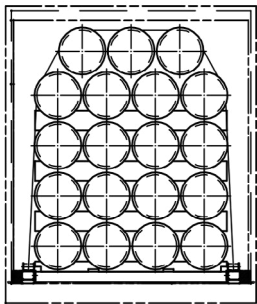
132 PIPES PER
HI-CUBE CONTAINER
PIPE SIZE 114 O.D.



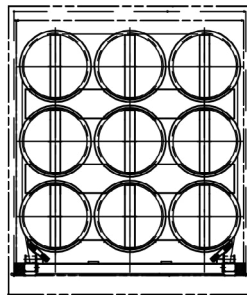
36 PIPES PER
HI-CUBE CONTAINER
PIPE SIZE 273 O.D.



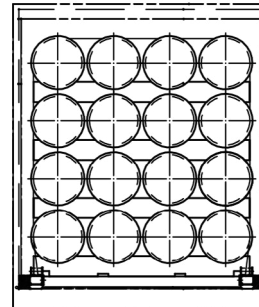
25 PIPES PER
HI-CUBE CONTAINER
LARGEST PIPE SIZE 356 O.D.
(Size Range 324 OD to 356 OD)



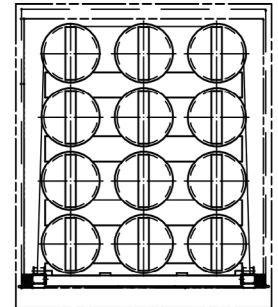
19 PIPES PER
HI-CUBE CONTAINER
LARGEST PIPE SIZE 406 O.D.
(Size Range 368 OD to 406 OD)



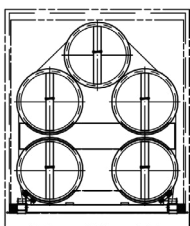
9 PIPES PER
HI-CUBE CONTAINER
LARGEST PIPE SIZE 660 O.D.
(Size Range 559 OD to 660 OD)



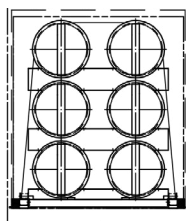
16 PIPES PER
HI-CUBE CONTAINER
LARGEST PIPE SIZE 457 O.D.
(Size Range 419 OD to 457 OD)



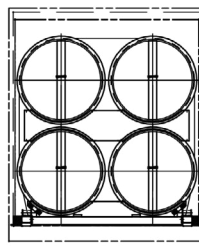
12 PIPES PER
HI-CUBE CONTAINER
LARGEST PIPE SIZE 508 O.D.
(Size Range 502 OD to 508 OD)



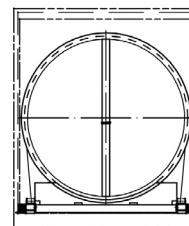
5 PIPES PER
HI-CUBE CONTAINER
LARGEST PIPE SIZE 813 O.D.
(Size Range 762 OD to 813 OD)



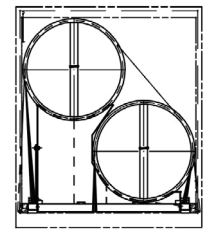
6 PIPES PER
HI-CUBE CONTAINER
LARGEST PIPE SIZE 711 O.D.
(Size Range 700 OD to 711 OD)



4 PIPES PER
HI-CUBE CONTAINER
LARGEST PIPE SIZE 1035 O.D.
(Size Range 914 OD to 1035 OD)



1 PIPE PER
HI-CUBE CONTAINER
LARGEST PIPE SIZE 2159 O.D.
(Size Range 1290 OD to 2159 OD)



2 PIPES PER
HI-CUBE CONTAINER
LARGEST PIPE SIZE 1283 O.D.
(Size Range 1200 OD to 1283 OD)

Note:

Drawing views show the maximum number of pipes able to be packed into a container or is based on the maximum pack weight for the minimum wall thickness.



EXPORT PACK UNLOADING PROCEDURE

The following procedures are for a generic export pack. Specific instructions may be provided by Steel Mains.

Procedure for Unloading Pipe Pack from Container

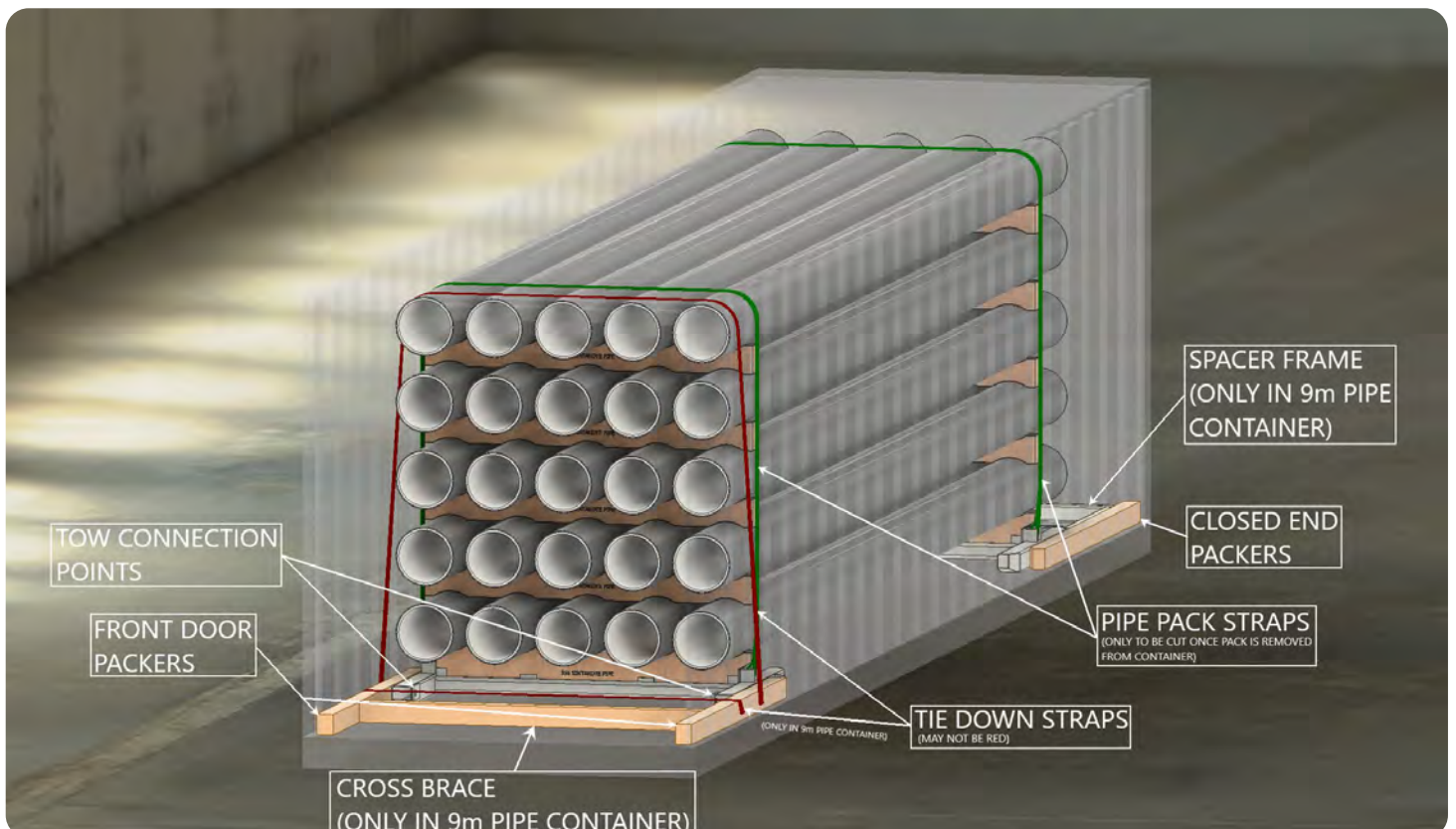
1. Ensure the unloading area has a flat hard surface (concrete or steel plate on the ground). The area required is approximately 5m wide by 45 meters long.
2. Place the container on the surface and fully open the doors.
3. Check the strapping in the container. Proceed if strapping is intact. If they are not intact, contact Steel Mains for advice.
4. Cut the tie down straps, marked with tape. All pipe length containers shall have straps tying the pipe pack to the container. 9m pipe length containers shall also have straps tying the front door timber packers to the container. Do not cut any other straps until the pipe pack is removed from the container. All other straps fasten the pipe pack to the skids and must remain for the removal of the pipe pack from the container.
5. Remove the two timber door packers. For 9m pipe length containers, also remove the timber cross brace.
6. Place an unloading ramp in position at the open end of the container, attach the ramp securing chains through container bottom corner fittings and secure grab hook on chain. To safely remove the pipe pack, the unloading ramp must be at least 2300mm wide and 3000mm long with a loading capacity of 10,000 kg.
7. Connect a 10m long, 20 tonnes rated, two-leg chain to the end of the front skid, in the two holes provided. Connect the other end to an approved towing point on a vehicle with a drawbar pull capacity at least equal to 20 tonnes.
8. Slowly withdraw the pack from the container, keep personnel clear of the chain and pack. Observe both sides of the pipe pack, with the ability to signal any problems to the driver. Ensure the pipes do not touch the side of the container doorway.
9. When the pack is clear of the container, inspect and report any damage to your Steel Mains representative.

EXPORT PACK UNLOADING PROCEDURE



Procedure for Unloading the Pipes from the Pack

1. Ensure the pack is on level ground.
2. First, cut and remove the straps that interweave the most inner pipes of the pack. Continue to remove the interweaving straps by removing the straps that interweave the most inner pipes first, and removing the straps that interweave the most outer pipes last. This procedure ensures pipes do not become dislodged from the bolsters.
3. Cut and remove the straps that pass over the complete pack and dispose of all straps safely.
4. Lift the top two corner pipes, the two outer pipes, one a at a time, using standard lifting procedures and handling methods (Refer to Steel Mains Handling & Installation Manual). By removing the outer pipes first, stability of the bolster and pack is maintained.
5. Remove the remaining pipes from the layer. Once all pipes from the layer have been removed, remove the bolsters. Repeat this procedure until the bottom layer.
6. The bottom layer of pipes can be removed in any order.
7. Cut and remove any remaining straps, and/or timber packers from inside the container. Move the ramp away from the container door opening and close container doors.
8. Return the steel skids, bolsters, and steel packers to Steel Mains in Australia. All other timber and packaging are to be disposed of safely.





HEAT SHRINK SLEEVES

Despite care during transport, handling and laying operations, some damage cannot always be avoided. However repair of damage to polyethylene coated pipes is relatively easy.

Heat Shrink Sleeves are corrosion protection repair systems in the form of a wraparound sleeve.

Steel Mains field-applied Sintakote repairs involves the use heat shrink sleeves to restore corrosion protection. Steel Mains heat shrink sleeves are qualified CanusaWrap® KLON sleeves.

For more information and application procedures, see the Steel Mains Handling and Installation Manual or consult an available Steel Mains representative.



DESCRIPTION

The Canusa KLON wraparound sleeve is designed for corrosion protection of buried and exposed steel pipelines operating up to 60°C (140°F). KLON consists of a crosslinked polyolefin backing, coated with a technologically advanced corrosion protective adhesive, which effectively bonds to steel substrates and common pipeline coatings including polyethylene and fusion bonded epoxy.

FEATURES/BENEFITS

- Rapid and Reliable Installation
- Long Term Corrosion Protection
- Time and Money Saving
- Registered to ISO 9001:2000

FITTINGS

Pipe fittings are components used to connect sections of straight pipes. The functions of pipe fittings are imperative and essential for a complete pipeline system. These functions include connection, change of direction, change in pipe diameter, flow regulation, splitting flow and terminating pipe runs. Steel Mains' fittings licensee in New Zealand is Olsen Welding Ltd.

MILD STEEL FITTINGS

Steel Mains has the capability of manufacturing and supplying a full range of steel fittings, including fittings fabricated from pipe and/or cylinders rolled and welded from plate steel up to a thickness of 40mm.

Steel Mains Sintakote Fittings are manufactured to suit the specific needs of customers and a wide range of steel fabricated fittings can be supplied in addition to the standard range.

Fittings are manufactured from pre-tested steel and are typically coated in Sintakote and cement mortar lined with welded, flanged or Sintakote joints.



TECHNICAL

Size Range 114mm to 2500mm diameter

Operating Pressures Up to 6800kPa (Diameter Dep.)

Maximum Velocities 6m/s for cement lined fittings

Operating Temperatures -40°C to 70°C (FITTINGS FOR ANY APPLICATION)

Certifications AS/NZS ISO 9001 AS/NZS 4020 AS 1579 Standards Mark





TEMPORARY ACCESS CLOSURE

Steel Mains **Temporary Access Closures** provide a pipeline access opening of approximately 580mm in diameter and are specifically manufactured to match the steel pipe diameter nominated. They are suitable for use with potable water and waste water in above and below ground applications (only applies to Steel Mains recommended coating and lining systems - please refer to the Steel Mains Steel Pipeline System Design Manual for further details).

Please consult with Steel Mains regarding design requirements, availability and suitability prior to placing orders.

ATTRIBUTES

- Low cost pipeline access solution during construction
- Maintains the internal corrosion protection integrity when closed
- Generally manufactured in accordance AS 1579 depending on the design requirements
- Generally factory fitted to the pipe at time of purchase to comply with nominated operating requirements
- Can be supplied for on-site fitting to meet specific requirements

TECHNICAL

Size Range 762mm to 2500mm diameter

Operating Pressures Maximum 2500kPa

Operating Temperatures -40°C to 70°C

Certifications AS/NZS ISO 9001 AS/NZS 4020 AS 1579 Standards Mark



COMPACT DISMANTLING JOINT

Steel Mains' **Compact Dismantling Joint** offers a better way to seal your pipeline. The design simplifies dismantling joints and makes them more compact and easier to install without compromising functionality. These can be safely installed in tight and constricted locations or where space is at a premium.

FEATURES

- Reduced mass for easy handling
- 100% restrained - External flange bolts "sandwich" the Compact Dismantling Joint
- Significantly reduced length requirements
- Easy installation and removal for servicing pipeline components
- Angular misalignment tolerance
- Integrated effective sealing system activated by compression
- Suitable for high pressure applications

TECHNICAL

Size Range 100 to 2400mm

Rated Pressures PN16 and PN35

Temperature Range -40° to 70°C

Standards AS1579 – Arc-welded steel pipes and fittings for water and waste water

Certifications Certified to AS/NZS 4020 – Suitable for contact with drinking water

Coating AS/NZS 4158 - Thermal-bonded polymeric coatings on valves and fittings for water industry purposes





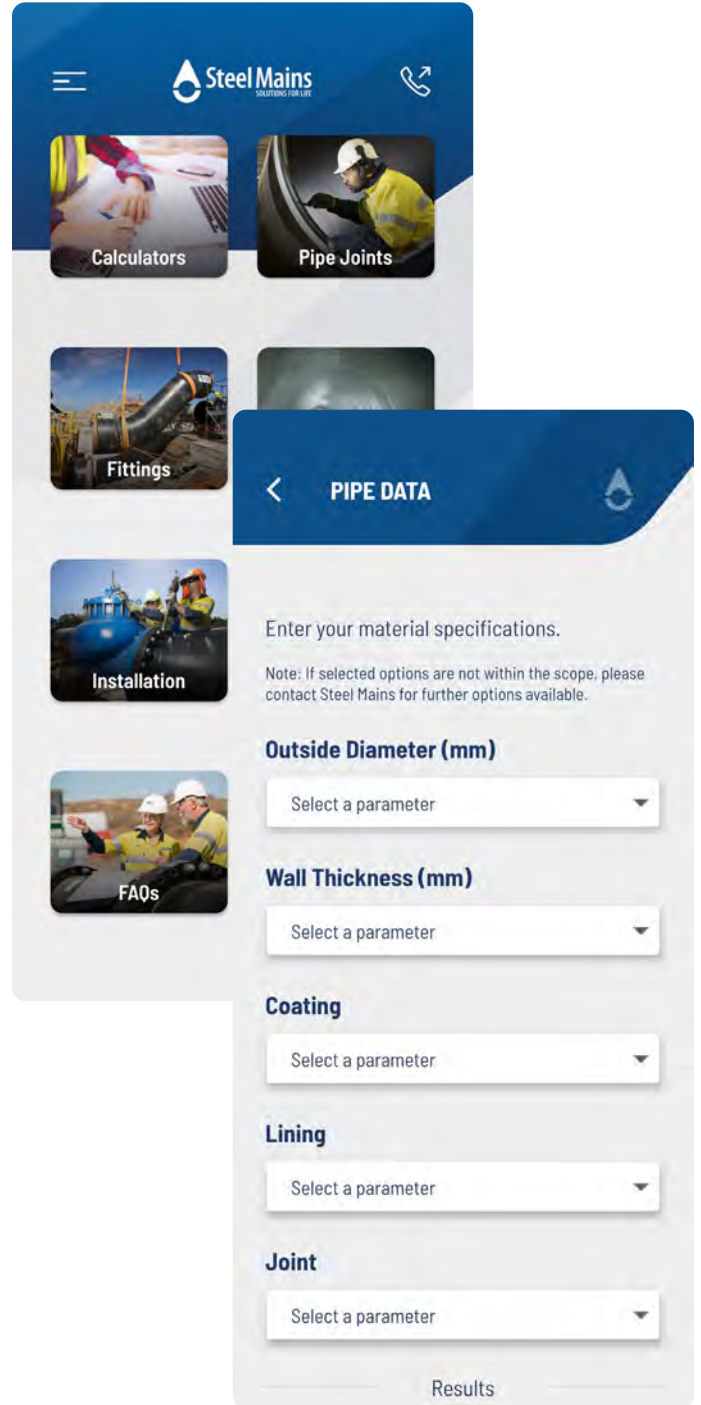
STEEL MAINS MOBILE APP

The official Steel Mains mobile app is available for download on both Android and iOS devices.

Our app provides a convenient way for you to stay up to date with the latest news and updates from Steel Mains. Additionally, a range of helpful tools and calculators are available for instant technical support.

Features include:

- Offline access to a range of handy pipeline tools anytime right there in your pocket!
- Calculators for determining pipe specifications:
 - Pipe Data
 - Pipe Weight
 - Pipes Per truck
 - Hydraulic Loss
 - Buried Pipeline Design
 - Flange Torques
- Installation procedure and pipeline repair information including:
 - Heat Shrink Sleeve application
 - Lining Reinstatement for Welded Joints
 - Holiday Testing (Spark Testing)
 - Seal Coat Reinstatement



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