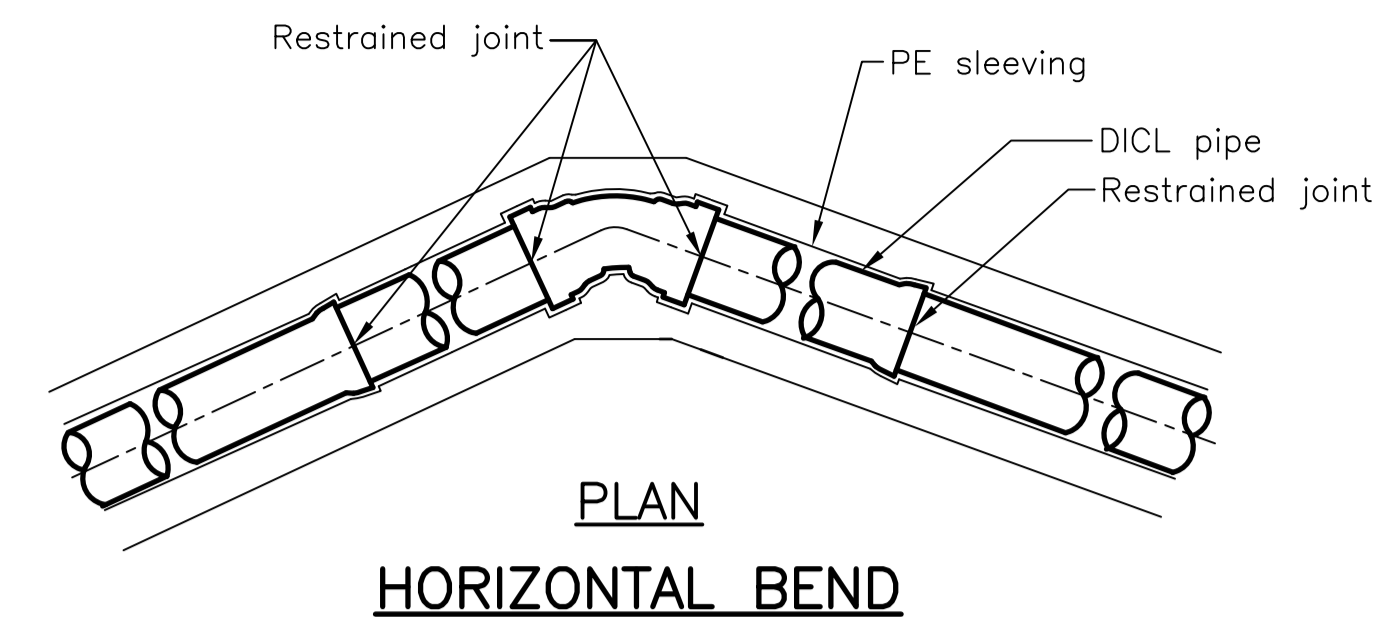
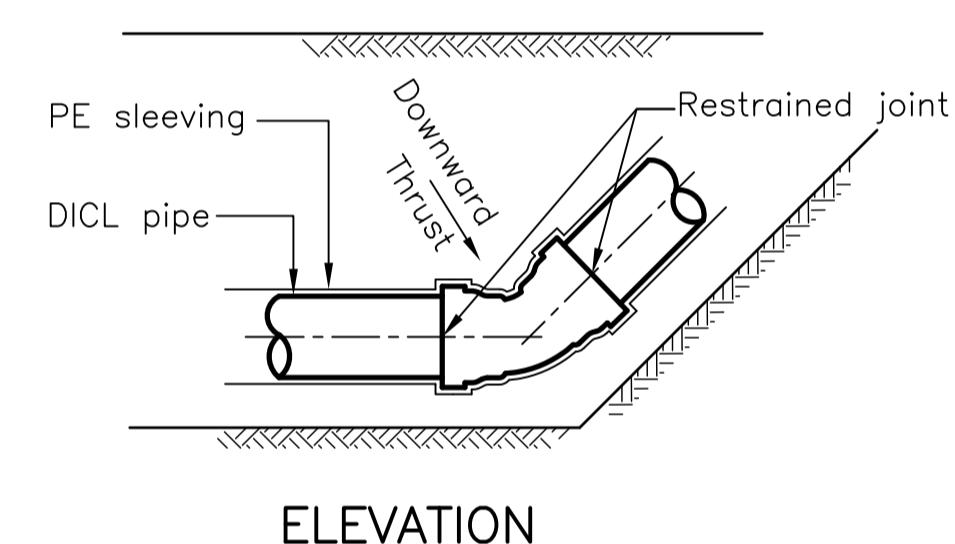
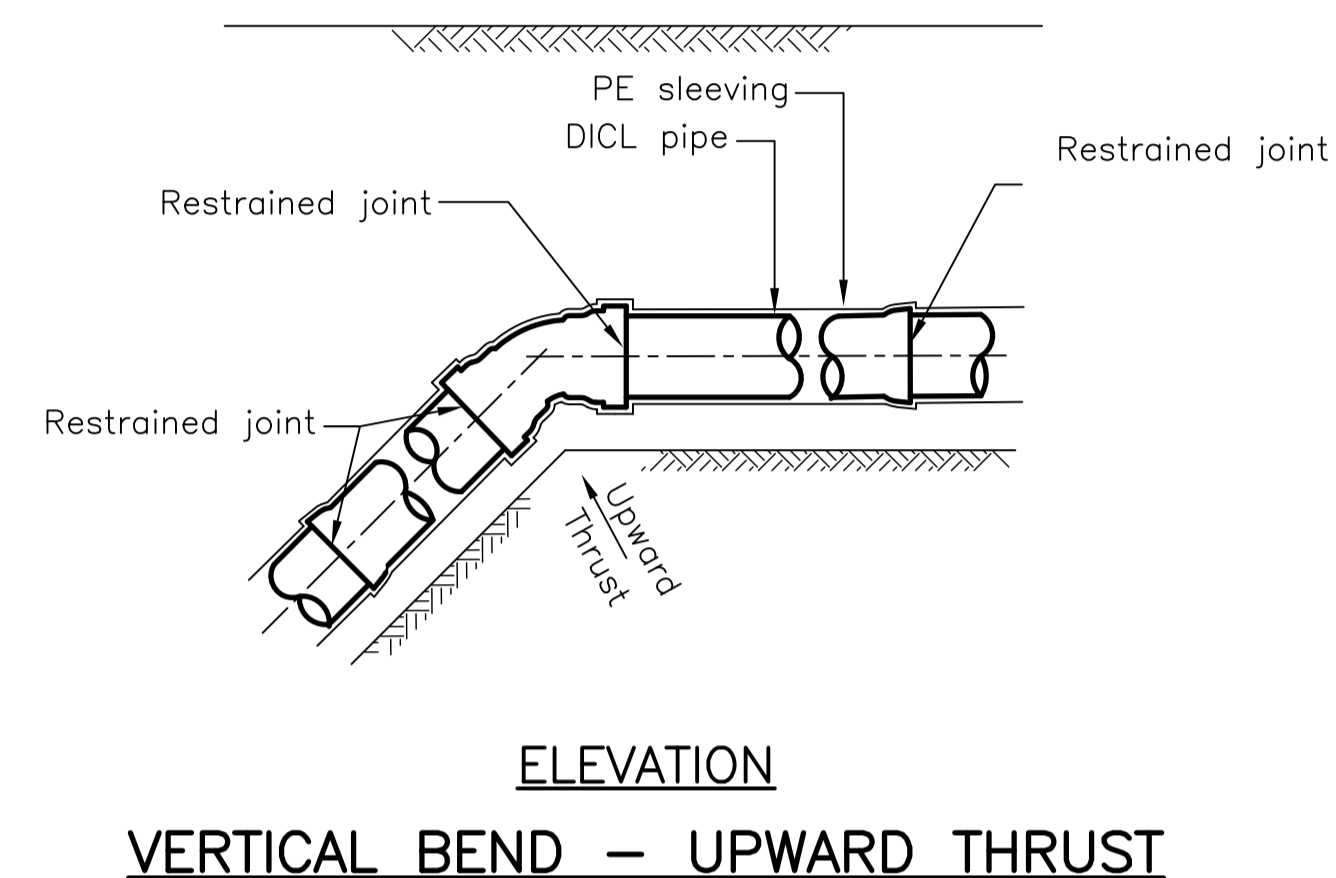


		BENDS (SEE NOTE 3)										DEAD ENDS (m)
		HORIZONTAL				VERTICAL						
						UPWARD THRUST		DOWNWARD THRUST				
DN		11 $\frac{1}{2}^{\circ}$ (m)	22 $\frac{1}{2}^{\circ}$ (m)	45 $^{\circ}$ (m)	90 $^{\circ}$ (m)	11 $\frac{1}{2}^{\circ}$ (m)	22 $\frac{1}{2}^{\circ}$ (m)	45 $^{\circ}$ (m)	11 $\frac{1}{2}^{\circ}$ (m)	22 $\frac{1}{2}^{\circ}$ (m)	45 $^{\circ}$ (m)	
100		0.8	1.6	3.4	8.1	2.4	4.9	10.2	0.8	1.6	3.4	24.7
150		1.1	2.2	4.6	11.2	3.4	6.9	14.4	1.1	2.2	4.6	34.7
200		1.4	2.8	5.9	14.2	4.4	8.8	18.4	1.4	2.8	5.9	44.4
250		1.6	3.1	6.5	15.8	4.9	9.8	20.5	1.6	3.1	6.5	49.4
300		1.8	3.7	7.7	18.5	5.8	11.7	24.4	1.8	3.7	7.7	58.9



		TEES (SEE NOTE 5)		
MAIN PIPE DN	BRANCH PIPE DN	MIN. DISTANCE BETWEEN JOINTS 'A'		
		2 m RESTRAINED LENGTH 'B' (m)	5.5 m RESTRAINED LENGTH 'B' (m)	11 m RESTRAINED LENGTH 'B' (m)
100	100	20.6	13.4	2.2
	150	17.4	7.0	0.2
150	100	30.5	23.2	11.6
	150	14.8	1.1	0.2
	200	28.0	18.4	3.3
200	100	40.2	32.8	21.1
	150	10.6	0.2	0.2
	200	23.1	11.3	0.2
	250	34.5	25.3	10.9
250	100	45.1	37.6	25.8
	150	8.0	0.2	0.2
	200	20.9	6.6	0.2
	250	32.2	21.2	3.8
300	100	42.8	33.7	19.5
	150	54.6	46.9	34.9
	200	REFER TO MANUFACTURER		
	250	REFER TO MANUFACTURER		
375	100	REFER TO MANUFACTURER		
	150	REFER TO MANUFACTURER		
	200	REFER TO MANUFACTURER		
	250	REFER TO MANUFACTURER		

		TAPERS (SEE NOTE 6)	
LARGE PIPE DN	SMALL PIPE DN	MIN. LENGTH OF SMALL PIPE FOR ONE RESTRAINT (m)	MIN. LENGTH OF LARGE PIPE FOR FULL RESTRAINT (m)
150	100	25.8	18.2
200	100	59.1	32.2
200	150	24.0	18.6
250	100	91.0	40.4
250	150	48.2	30.5
250	200	20.6	16.9
300	100	137.6	51.6
300	150	81.3	43.4
300	200	46.7	32.3
300	250	21.8	18.4
375	100	REFER TO MANUFACTURER	
375	150	REFER TO MANUFACTURER	
375	200	REFER TO MANUFACTURER	
375	250	REFER TO MANUFACTURER	
375	300	REFER TO MANUFACTURER	



### NOTES

- All dimensions in millimetres unless otherwise noted.
- All restrained lengths are applicable for buried pipelines only. The minimum of pipeline required to be restrained is calculated from the pipe diameter, fitting type, standard trench conditions and a pipeline pressure of 122m.
- The length of restraint required is the amount of pipeline that must be restrained either side of the fitting, including the fitting joints.
- Special consideration is required if the designated restrained length for a fitting encroaches, or overlaps the designated restrained length for another fitting. Seek manufacturer's or designer's guidance.
- The length of restraint required for tees applies to 'B' (branch) only. The 'minimum distance 'A' between joints is the minimum distance between the nearest unrestrained joint either side of the tee, not including the tee. Restraint is not required in the main line sockets or mechanical couplings, unless encroaching (see note 4). Hydrant tees and other non-thrust bearing fittings do not require restraint.
- For tapers, if the minimum length of the adjacent small pipe size occurs, without encroaching another fitting's restraint, then only one restrained joint is required in the large socket of the taper. If the minimum length of small pipe does not occur then, full restraint is required.
- Treat flushing bends as a dead end.
- Special design required for 90 degree vertical bends.
- Place marking tape for identification of restrained sections of the pipeline along the top of the restrained pipe lengths and fasten to the pipe at not less than 3m centres. Marking tape to be pink coloured polyethylene tape approximately 100 wide, with the inscription: 'Warning – Restrained pipeline – Use restrained fittings only'.
- When maintaining or cutting restrained sections of pipeline it is advisable that effective lengths of fittings be measured on site to confirm their compliance with this drawing.
- Restrained joints may be assumed to act the same as a flanged joint.

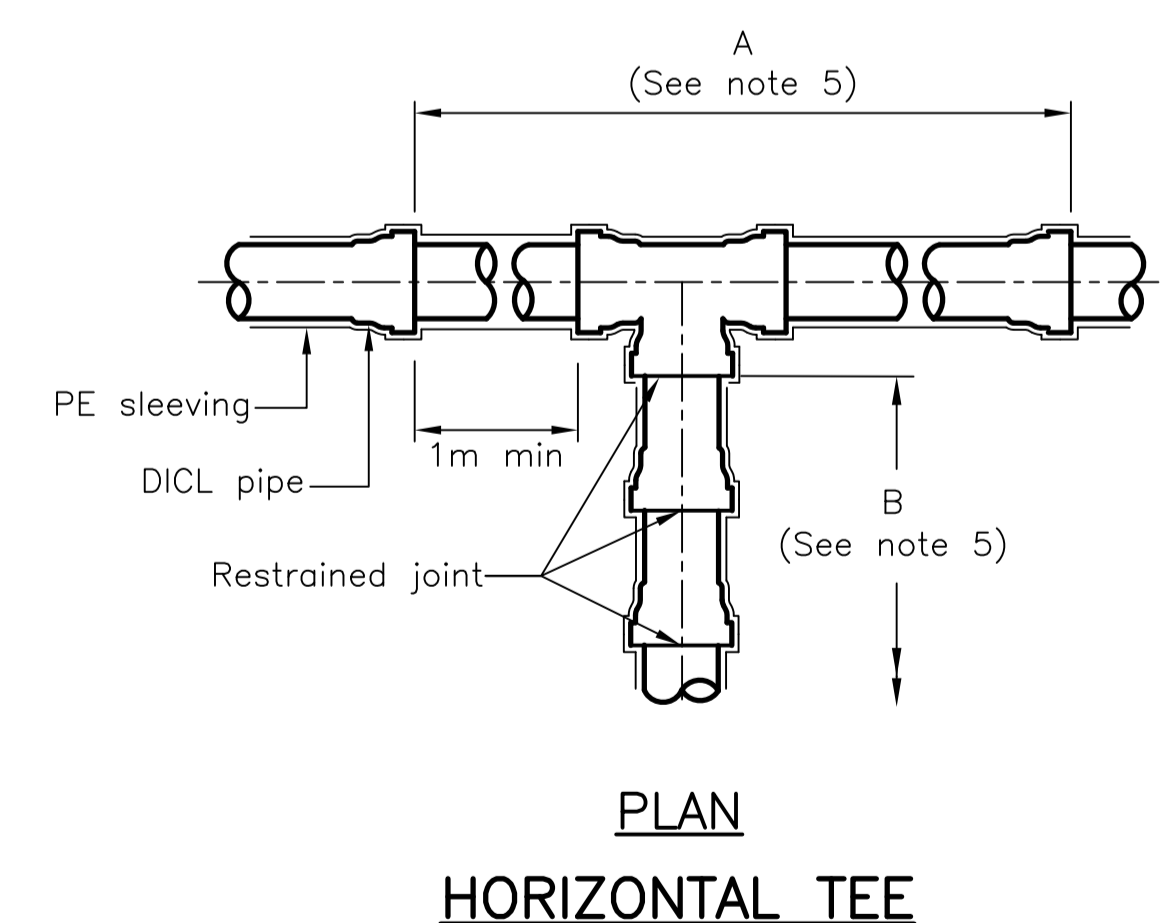
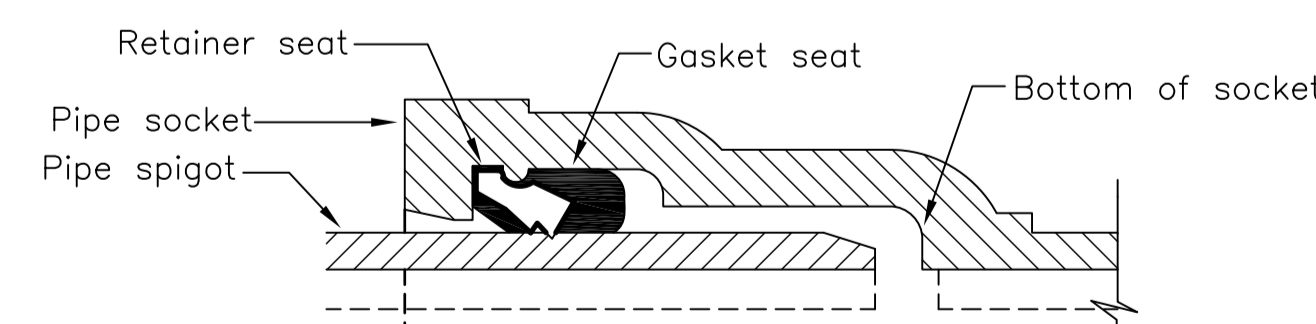
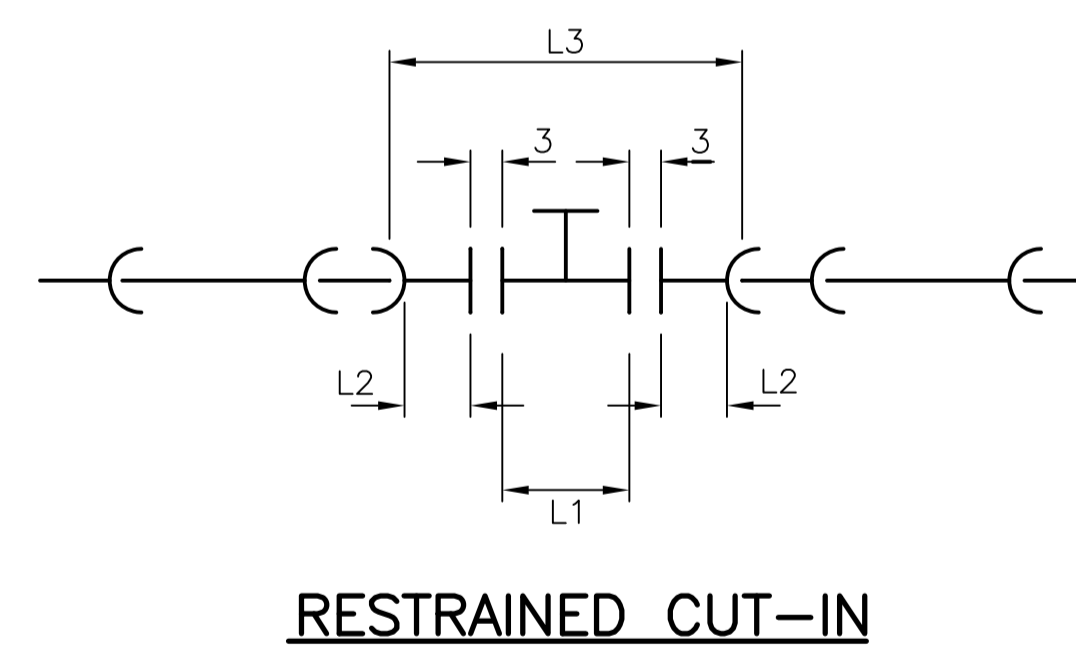
### ASSEMBLY

- Joining to be in accordance with the manufacturer's instructions.
- Restraint via locking gaskets is only to be used with DI pipes and fittings featuring the authorised socket profile. Do not use with other DI socket profiles or other pipe materials.
- If maximum joint deflection is desired, push the spigot to the first witness mark only and then deflect the joint. The joint will not deflect after inserting the spigot all the way home.

### DISASSEMBLY

- Joints to be disassembled in accordance with the manufacturer's recommendations.
- Do not reuse restrained joint gaskets.

DN	RESTRAINED CUT-IN		
	INSERT L1	CONNECTOR L2	OVERALL L3
100	356	110	582
150	406	135	682
200	484	135	760
250	534	155	850
300	610	170	956
375	REFER MANUFACTURER		



NOTES : BASED ON FORMER WSAА DRAWING WAT-1208

Full Size A1

Not to Scale

DRAWN:  
Design Engineer Approved: P Turl  
Date: 24-07-2012  
Manager Approved: M Harvey  
Date: 24-07-2012

CHECKED: D Moseley



Ph: (07) 4727 9000  
www.townsville.qld.gov.au

RESTRAINED JOINT SYSTEM  
DN100 TO DN375 DI MAINS

STANDARD  
DRAWING  
WATER

SD-373 | A

No.	DATE	DESCRIPTION	AP'D
A		ORIGINAL ISSUE	
REVISIONS			