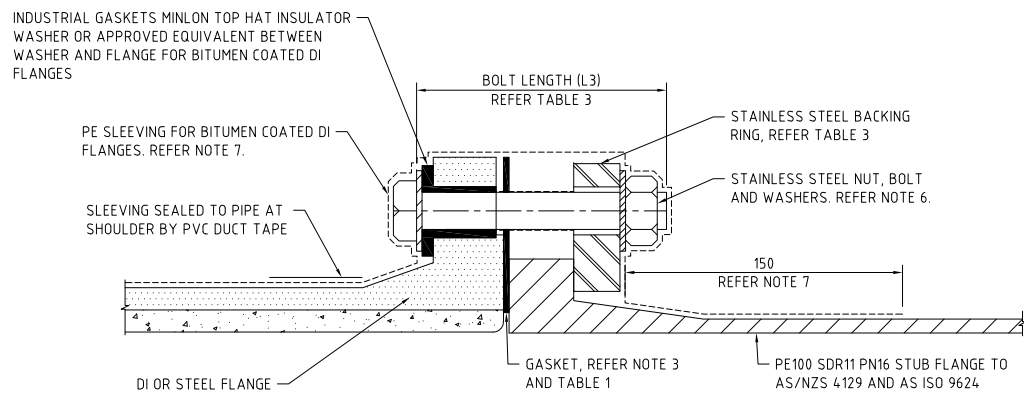
**TYPE 1 - GALVANISED BOLTS, NUTS AND WASHERS**

SCALE 1:2

TYPE 1 - FOR CONNECTION OF THE FOLLOWING FLANGE MATERIALS AND COATINGS
SEE NOTE 8

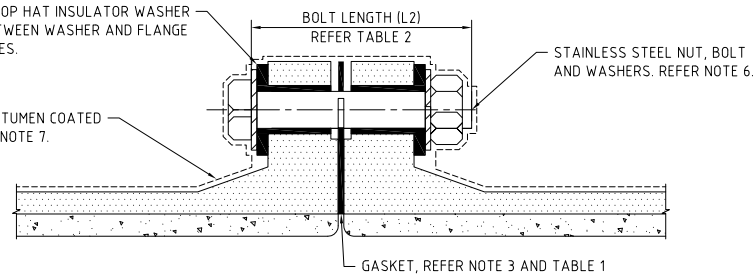
FLANGE MATERIAL	FLANGE COATING
DUCTILE IRON	TBP, BITUMEN
STEEL	BARE, EPOXY- LIQUID APPLIED, FBPE

**TYPE 3 - PE STUB FLANGE CONNECTION
STAINLESS STEEL NUTS, BOLTS, WASHERS AND BACKING RING**

SCALE 1:2

TYPE 3 - FOR CONNECTION OF A PE STUB FLANGE TO THE FOLLOWING FLANGE MATERIALS AND COATINGS
SEE NOTE 8

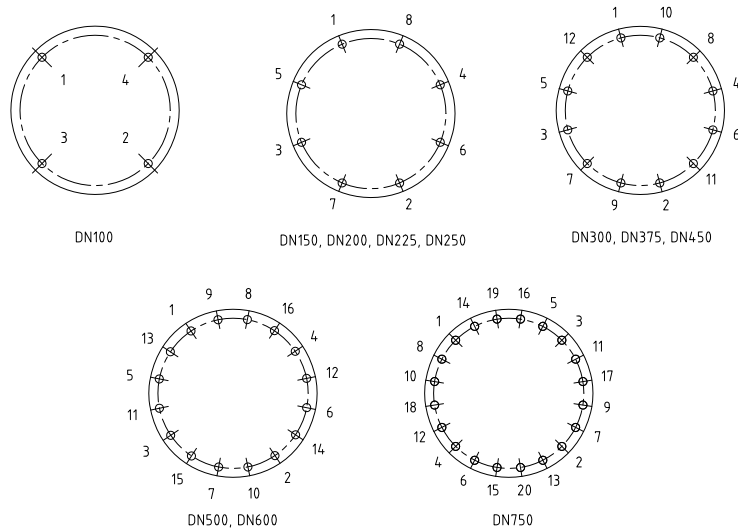
FLANGE MATERIAL	FLANGE COATING
DUCTILE IRON	TBP, BITUMEN
STEEL	FBPE ONLY

INDUSTRIAL GASKETS MINLON TOP HAT INSULATOR WASHER
OR APPROVED EQUIVALENT BETWEEN WASHER AND FLANGE
FOR BITUMEN COATED DI FLANGES.PE SLEEVING FOR BITUMEN COATED
DI FLANGES. REFER NOTE 7.**TYPE 2 - STAINLESS STEEL NUTS, BOLTS AND WASHERS**

SCALE 1:2

TYPE 2 - FOR CONNECTION OF THE FOLLOWING FLANGE MATERIALS AND COATINGS
SEE NOTE 8

FLANGE MATERIAL	FLANGE COATING
DUCTILE IRON	TBP, BITUMEN
STEEL	FBPE ONLY

**TIGHTENING SEQUENCE**

SCALE 1:10

BOLTING PROCEDURE TO BE IN ACCORDANCE WITH WSA 109

NOTES:

- ALL DIMENSIONS IN mm.
- TAKE CARE TO PREVENT DAMAGE TO FLANGE PROTECTIVE COATINGS.
- FLANGE GASKETS TO COMPLY WITH WSA 109.
- PROPRIETARY ITEMS SHALL BE INSTALLED STRICTLY IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
- GALVANISED BOLT SYSTEM.
 - ALL, BOLTS, NUTS AND WASHERS TO BE HOT DIP GALVANISED. AFTER GALVANISING, AND PRIOR TO ASSEMBLY, LIBERALLY COAT ALL NUTS AND BOLT THREADS WITH LOCTITE 771 OR APPROVED EQUIVALENT, THEN APPLY DENSO MULTI PURPOSE PRIMER TO REMAINING AREAS.
 - AFTER ASSEMBLY, COVER ALL BOLT HEADS AND NUTS WITH POLYETHYLENE SEALING CAPS FILLED WITH DENSO MULTI PURPOSE PRIMER OR APPROVED EQUIVALENT. SEALING CAPS ARE TO BE MANUFACTURED SPECIFICALLY FOR COVERING NUTS/BOLTS OF THE SIZE USED IN THE CONNECTION AND ENCAPSULATING THEM IN CORROSION PROTECTIVE MATERIALS.
 - APPLY DENSO PROFILING MASTIC OR APPROVED EQUIVALENT IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS.
 - WRAP THE ASSEMBLY WITH DENSO PETROLATUM TAPE SYSTEM OR APPROVED EQUIVALENT 100mm MINIMUM PAST DENSO PROFILING MASTIC. EXTENT OF TAPE TO BE INCREASED FOR BARE STEEL PIPE AND LIQUID APPLIED EPOXY COATED PIPE. TAKE CARE WHEN BACKFILLING TO ENSURE CAPS ARE NOT DISLODGED.
 - GALVANISING SHALL BE IN ACCORDANCE WITH AS1214.
- STAINLESS STEEL BOLT SYSTEM
ALL STAINLESS STEEL BOLTS, NUTS, WASHERS AND BACKING RINGS TO BE MANUFACTURED FROM 316 GRADE STAINLESS STEEL AND COMPLY WITH AS4087. COAT THE THREADED SECTIONS OF ALL STAINLESS STEEL BOLTS WITH LOCTITE 771 OR APPROVED EQUIVALENT.
- ALL BITUMEN COATED DUCTILE IRON (DI) FLANGES AND PIPES SHALL BE PE SLEEVED TO AS 3680.

PE SLEEVING IS NOT REQUIRED FOR TBP OR FBPE COATED FLANGES, EXCEPT WHERE PETROLATUM TAPE IS USED.

WHEN CONNECTING A BITUMEN COATED DI FLANGE TO A TBP OR FBPE COATED FLANGE, EXTEND PE SLEEVING 150MM BEYOND BITUMEN COATED FLANGE AND TAPE TO PIPE.
- BITUMEN COATING OF DI PIPEWORK SHALL BE TO AS/NZS 3750.4. THERMAL BONDED POLYMERIC (TBP) COATING OF DI FLANGES SHALL BE TO AS/NZS 4158. FUSION BONDED POLYETHYLENE (FBPE) COATING OF STEEL FLANGES SHALL BE TO AS4321.
- ARRANGEMENT NOT SUITABLE FOR AGGRESSIVE SOILS.
- FLANGES AND FASTENERS SHALL BE IN ACCORDANCE WITH AS4087. PN16 FLANGES SHALL BE DRILLED OFF CENTRE. ONLY RAISED FACE FLANGES SHALL BE USED.
- FLANGES SUITABLE FOR DESIGN PRESSURE OF 160m AND TEST PRESSURE OF 190m HEAD ONLY.
- BOLTS ARE TO BE TIGHTENED IN ACCORDANCE WITH TIGHTENING SEQUENCE SHOWN IN FOUR STAGES, TIGHTENING OF BOLTS WILL OCCUR TO 20%, 50% AND 100% OF THE ESTIMATED TORQUE REQUIRED. TIGHTENING TORQUES FOR STEEL AND DUCTILE IRON FLANGES ARE PROVIDED ON DTC/1146. FOR PE FLANGES, THE BOLTS ARE TO BE RE-TIGHTENED 24 HOURS AFTER INITIAL TIGHTENING. RECOMMENDED TIGHTENING TORQUE DETAILED IN TABLES 4 AND 5.
- THIS DRAWING TO BE READ IN CONJUNCTION WITH DTC/1146.

**Sydney
WATER**

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APPROVED

PETER GILLMAN
MANAGER E & ES

ENGINEERING & ENVIRONMENTAL SERVICES

A

ORIGINAL ISSUE

LETTER

DETAILS OF ISSUE / AMENDMENT

PJG

01/03/13

APP'D

DATE

DEEMED TO COMPLY DRAWINGS

**WATER MAINS
PN16 FLANGE CONNECTION DETAILS
DN100 TO DN750 - SHEET 1 OF 2****DTC
1145**

ISSUE

A

DATE

01/03/13