GF Piping Systems

MAB PE4710 mechanical products for HDPE pipes

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MAB PE4710 mechanical products for HDPE pipes / presentation outline

1. Overview of available Products for use on PE4710 (Products = mechanical products)

a) Split in 2 sections per C901-17 (3/4" to 3" CTS and IPS- PE4710 DR9) and C906-15 (4" – 12" DIPS and IPS PE4710 only). Future work will consider 14" and greater sizes.

b) When should your products be used for potable water HDPE systems?

c) Provide sample flow chart / decision tree analysis

d) Identify type(s) of Products: Repairs, connections (to other materials too), tapping, Restraints

e) Pressure Classes of Products

f) All Products fully restrained and fully pressure rated for PE4710?

g) All Products are resistant to axial pullout

h) Available sizes of Products, including CTS, IPS and DIPS.

i) Are Products universal for use on other piping materials?

j) Do you require modification or special installation and special training for use on HDPE?

k) Do you require a max. HDPE DR?

l) Ongoing work to make gaskets compliant with new AWWA requirements re disinfectants

m) Large diameter hot tapping: solutions with 4" to 8"; tapping equipment used? Any special tooling the local water company may not have?

2. Design features that make the Products compatible with properties of HDPE

3. Testing done with HDPE pipe (tensile/restraint, pressure, cyclic, seismic, others, …)

4. Installation recommendations (stiffener, bolt torque, spring washers, special tooling, special support for weight of fitting, lifting lugs, anode connection, how to repair a scratch on coating?, alignment, etc.).

5. Manufacturing Standards (ISO, ASTM, others …) and Model Specs for Products and installation procedures

6. Projected Design life
   - Are repair methods considered temporary or permanent (permanent ≥ 50 years)?
   - Corrosion protection methods

7. History of use with HDPE/ case studies/ operating conditions

8. Other issues and concerns

1. Overview of available products recommended for use on HDPE

1.a. C901-17 (3/4” to 3” CTS and IPS- PE4710 DR9)

Product range of MULTI/JOINT
Starts with 2” (actual 1,811”)

Couplers
Reduced couplings

Flange adaptors
Reduced flange adaptors

End caps
End caps with thread

And many more specific models

1.a. C906-15 (4” – 12” DIPS and IPS PE4710 only). Future work will consider 14” and greater sizes.

Full product range of MULTI/JOINT
Starting from 4” up to 12”

For future work we are prepared!

The product line **goes up to 24”**

All suitable for PE connections.

1.b. When should your products be used for potable water HDPE systems?

Repair and emergency repairs

Planned maintenance work in distribution and transport networks

Renovation works

Transitions old to new pipes / different materials

Pressure tests (end caps)

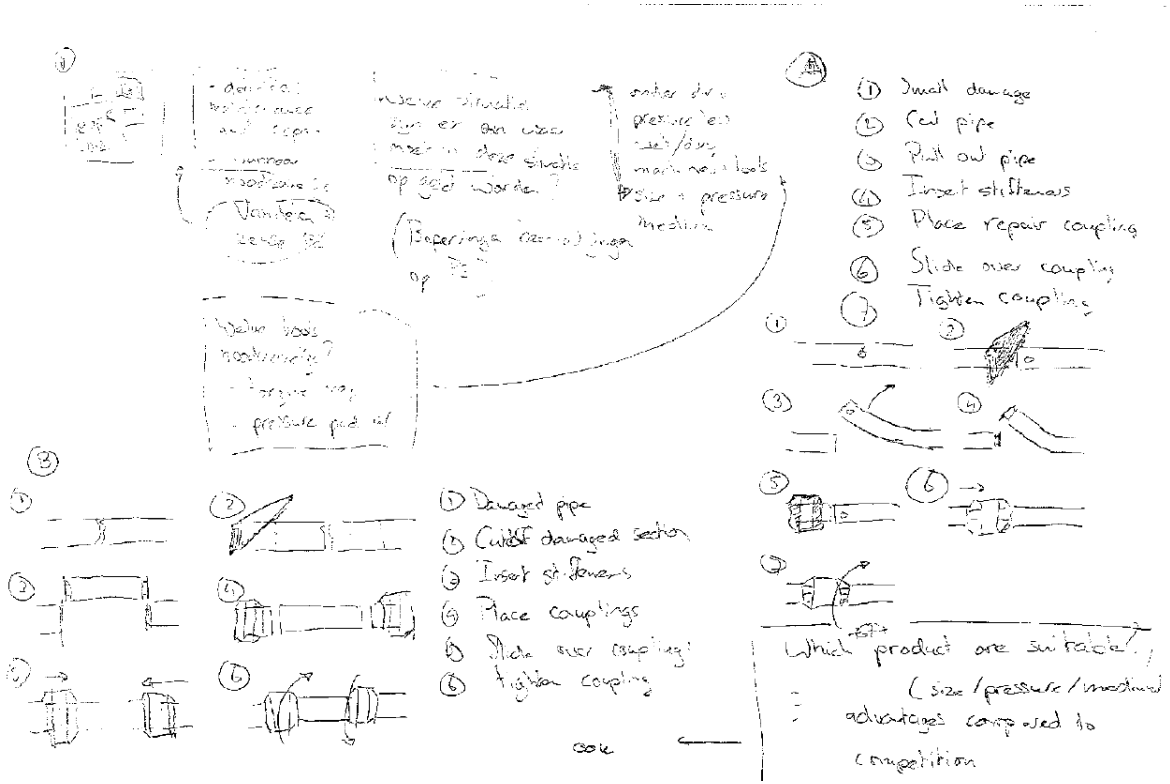
Network extensions

Re lining applications

1.c. flow chart/decision tree

Not available at the moment.
Should be defined in later stage.

→ Many local solutions and methods.
→ If possible -> weld it. If not -> mechanical solutions are preferred



1.d. Identify type(s) of mechanical products for HDPE (Split PP in 4 sections: repairs, couplings, transitions and tapping)

Our core competence: repair and transitions, all types are suitable.

Repair:

Valves:

Old to new:

1.e. Pressure Classes of Products




Wp=working pressure

Water applications
Restraint pressure **232** **PSI Wp. (from 2”-12”)**

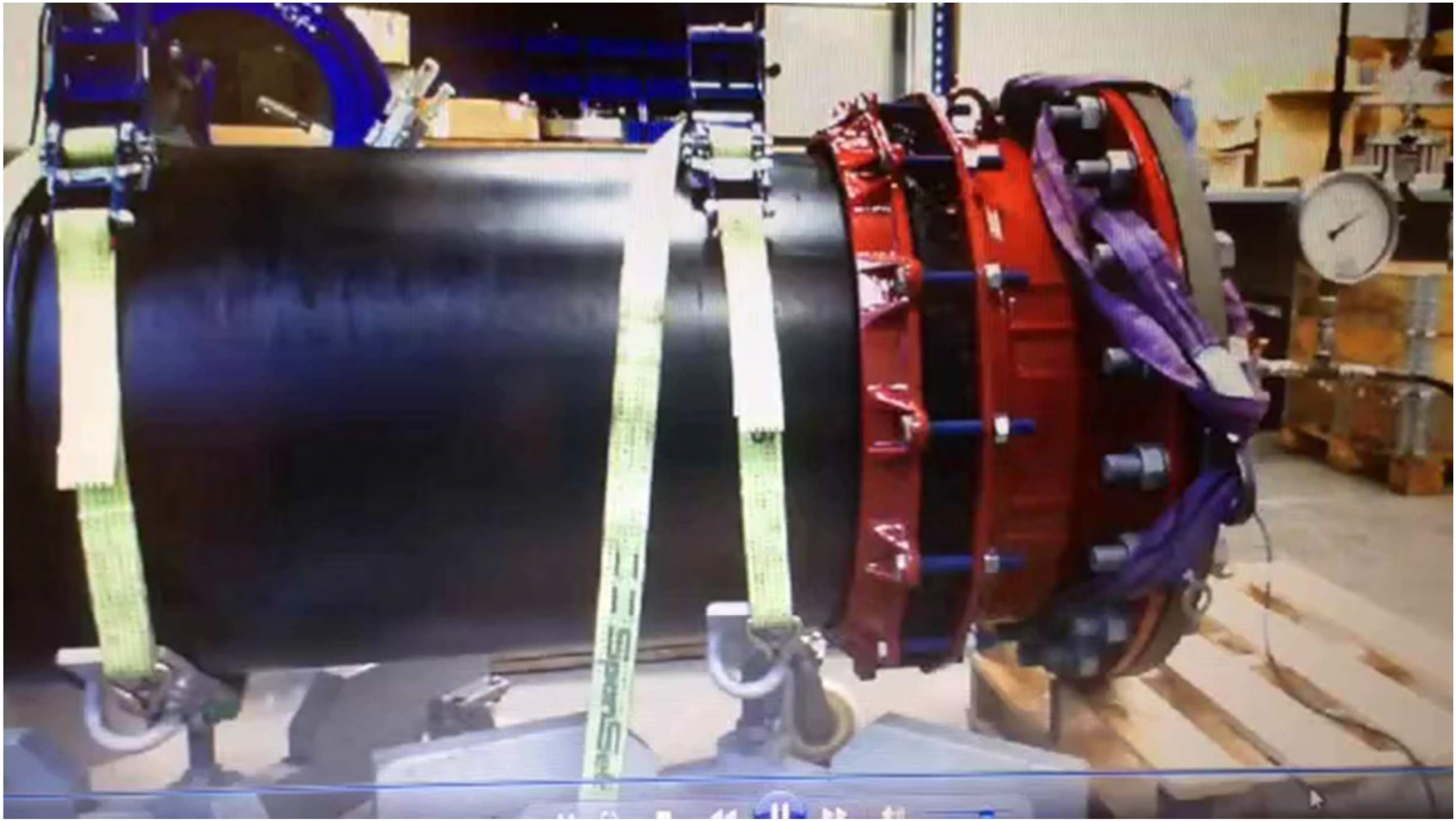
Max. Allowable testing pressures in the trench: PSI Wp. x 1.5 = 350 Psi

In company laboratory testing facilities for certifications PSI Wp x 1.5 + 72.5PSI= **420.5 PSI** tested with internal pressure. (water pressurized)

1.f. fully restrained pressure rated for PE4710 – 12” HDPE

The MULTI/JOINT 3000plus series is fully equipped to withstand the axial pullout force. Fits and Grips all pipe materials.

1.g. Resitant to axial pull out PE – 24”. At 420 Psi.



1.g. All products are resistant to axial pullout. Restraint pressure overview water applications

DN (mm)	Size (inch)	Range (mm)	Range (inch)	Working pressure**
DN50	2"	46 - 71	1.811 - 2.795	232 psi
DN65	2 ½"	63 - 90	2.480 - 3.543	232 psi
DN80	3"	84 - 105	3.307 - 4.133	232 psi
DN100	4"	104 - 132	4.094 - 5.196	232 psi
DN125	5"	132 - 155	5.196 - 6.102	232 psi
DN150	6"	154 - 192	6.062 - 7.559	232 psi
DN200	8"	192 - 232	7.559 - 9.133	232 psi
DN225	9"	230 - 268	9.050 - 10.551	232 psi
DN250	10"	267 - 310	10.500 - 12.204	232 psi
DN300	12"	315 - 356	12.401 - 14.015	232 psi
DN350	14"	352 - 393	13.858 - 15.472	150 psi
DN400	16"	392 - 433	15.433 - 17.047	150 psi
DN425	17"	432 - 464	17.000 - 18.267	150 psi
DN450	18"	450 - 482	17.716 - 18.976	150 psi
DN475	19"	481 - 513	18.937 - 20.196	150 psi
DN500	20"	500 - 532	19.685 - 20.944	150 psi
DN550	22"	548 - 580	21.574 - 22.834	150 psi
DN600	24"	605 - 637	23.818 - 25.078	150 psi

** restraint

1.h. Available IPS, DIPS and CTS sizes up to 24”

Nominal size		MULTI/JOINT®	
Inch	mm	Range (inch)	Range (mm)
2	50	1.811-2.795	46-71
2 ½	65	2.480-3.543	63-90
3	80	3.307-4.133	84-105
4	100	4.094-5.196	104-132
5	125	5.196-6.102	132-155
6	150	6.062-7.559	154-192
8	200	7.559-9.133	192-232
9	225	9.050-10.500	230-268
10	250	10.511-12.204	267-310
12	300	12.401-14.015	315-356
14	350	13.858-15.472	352-393
16	400	15.433-17.047	392-433
17	425	17.000-18.267	432-464
18	450	17.716-18.976	450-482
19	475	18.937-20.196	481-513
20	500	19.685-20.944	500-532
22	550	21.574-22.834	548-580
24	600	23.818-25.078	605-637

MULTI/JOINT® coupling overview *

Article	Description	Inch	Range	Restraint	Max. WP psi
709305610	MJ3007+ 50M x 50M A2 EPDM	2"	1.811 - 2.795	restraint	232
709305612	MJ3007+ 65M x 65M A2 EPDM	2 ½"	2.480 - 3.543	restraint	232
709305614	MJ3007+ 80M x 80M A2 EPDM	3"	3.307 - 4.133	restraint	232
709305616	MJ3007+ 100M x 100M A2 EPDM	4"	4.094 - 5.196	restraint	232
709305618	MJ3007+ 125M x 125M A2 EPDM	5"	5.196 - 6.102	restraint	232
709305620	MJ3007+ 150M x 150M A2 EPDM	6"	6.062 - 7.559	restraint	232
709305624	MJ3007+ 200M x 200M A2 EPDM	8"	7.559 - 9.133	restraint	232
709305626	MJ3007+ 225M x 225M A2 EPDM	9"	9.050 - 10.500	restraint	232
709305628	MJ3007+ 250M x 250M A2 EPDM	10"	10.500 - 12.204	restraint	232
709305632	MJ3007+ 300M x 300M A2 EPDM	12"	12.401 - 14.015	restraint	232
709305636	MJ3007+ 350M x 350M A2 EPDM	14"	13.858 - 15.472	restraint	150
709305640	MJ3007+ 400M x 400M A2 EPDM	16"	15.433 - 17.047	restraint	150
709305642	MJ3007+ 425M x 425M A2 EPDM	17"	17.000 - 18.267	restraint	150
709305672	MJ3007+ 450M x 450M A2 EPDM	18"	17.716 - 18.976	restraint	150
709305673	MJ3007+ 475M x 475M A2 EPDM	19"	18.937 - 20.196	restraint	150
709305674	MJ3007+ 500M x 500M A2 EPDM	20"	19.685 - 20.944	restraint	150
709305676	MJ3007+ 550M x 550M A2 EPDM	22"	21.574 - 22.834	restraint	150
709305678	MJ3007+ 600M x 600M A2 EPDM	24"	23.818 - 25.078	restraint	150

1.i. Are products universal for use on other pipe materials? YES !

1.j. Do you require modification or special installation and special training for use on HDPE?

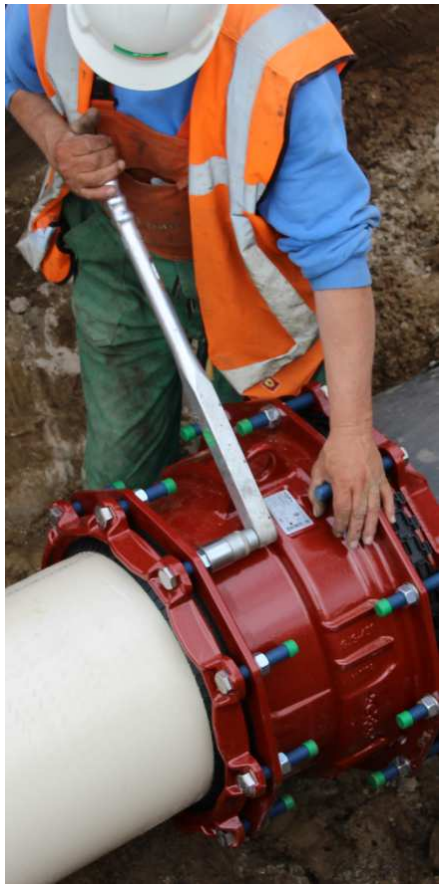
No modification is needed for the MULTI/JOINT, **one piece stab fit.**

Always take care of PE pipe surface conditions! especially scratches etc. In gas applications we advice the use of grease on our rubber seal system and peeling (Always: do create a scratch free sealing zone).
Always use insert stiffeners when working with PE pipes.

1.j. Do you require modification or special installation and special training for use on HDPE?

Standard tools are needed on site. Such as pipe preparations tools.

Ratchets
Torque keys.



Gas application example. Cast iron to PE branch off with welded PE T-section

Water application

1.k. Do you require a max. HDPE DR?

We do not require a max. or min. DR → as long as the pipe outside diameter will be covered by the fitting range.

We have gained experience with mechanical jointing with PE piping starting in the 1960's.
Density experience materials PE 63 PE 80, PE 100. (3 Generations)

Pressure Rating:

DR 32.5 (65psi)
DR 26 (80psi)
DR 21 (100psi)
DR 17 (130psi)
DR 13.5 (160psi)
DR 11 (200psi)
DR 9 (250psi) take in consideration pressure class of fitting.
DR 7 (335 psi) take in consideration pressure class of fitting.

1.1. Ongoing work to make gaskets compliant with new AWWA requirements re disinfectants

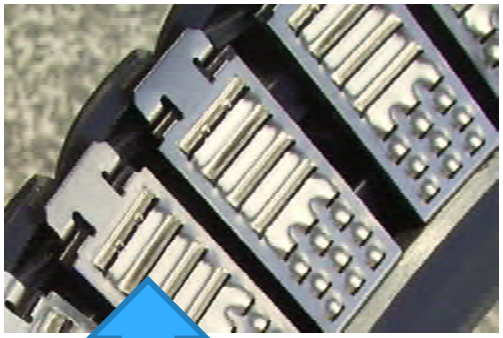
- Typically, the disinfectant is 3ppm chlorine - and chlorimines (and in some few cases, chlorine dioxide).
- Chloramines in concentrations up to 5 ppm will have no aging effect on pipe gasket performance, use EPDM seals
- Our product is fully NSF61 certified by NSF

l.m. Large diameter hot tapping: solutions with 4” to 8”; tapping equipment used? Any special tooling the local water company may not have?

Max. cupdrill size is 3.3 “

2. Design features that makes products compatible with properties of HDPE

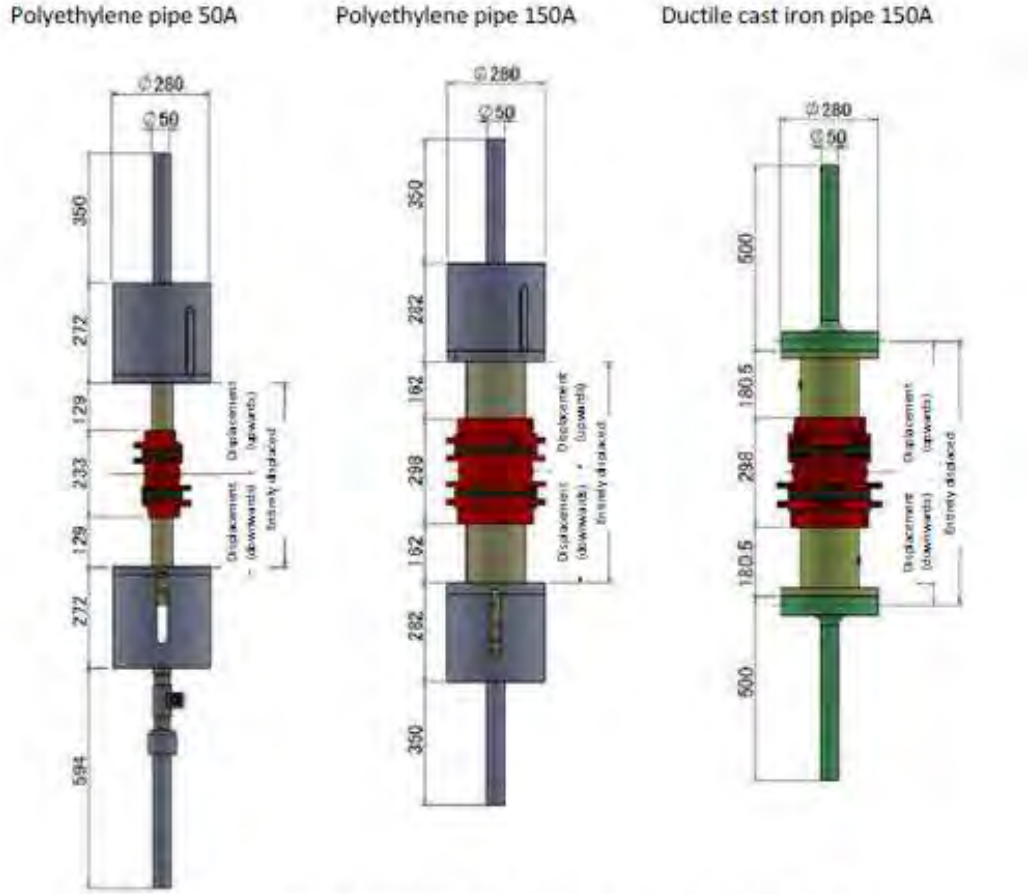
The uniqueness of the system lies in the sealing which consists of a flexible ring which consists of plastic segments and a rubber sealing ring (EPDM or NBR). The Restraint version is supplied with stainless steel metal grippers which makes the MULTI/JOINT® 3000 Plus restraint on all types of pipe materials.



Horizontal design
For PE piping
gripping elements

3. Testing done with HDPE pipe (tensile/restraint, pressure, cyclic, others, …)

- The MULTI/JOINT undergoes all described tests acc. to EN14525
- Tensile
- Restraint
- Pressure
- Cyclic testing



Testing conditions and measuring position (tensile test)

3. Tests in acc. with the EN 14525

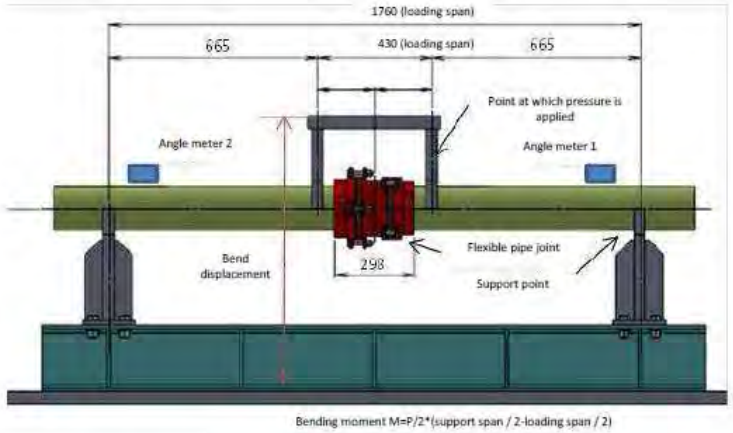
Table 4 – Performance testing of the joints: requirements and test conditions

Test	Tests requirements	Pipe section	Test conditions
Positive internal pressure	- test pressure (bar): 1.5PFA + 5 - test duration: 2 h - no leakage	Stiff pipe of maximum OD	Joint deflected
			Joint aligned and withdrawn, with shear load
		Stiff pipe of minimum OD	Joint of maximum annulus, deflected
			Joint of maximum annulus, aligned and withdrawn, with shear load
Positive internal pressure (if applicable)	- test pressure (bar): 1.5PFA + 5 - test duration: 2 h - no leakage	PFA 6 bar PVC pipe [a]	Joint of maximum annulus, aligned and withdrawn, with shear load
		PFA 16 bar PVC pipe [a]	Joint of maximum annulus, aligned and withdrawn, with shear load
Positive internal pressure (if applicable)	- test pressure (bar): 1.5PFA + 5 - test duration: 2 h - no leakage	PFA 6 bar PE pipe [a]	Joint of maximum annulus, aligned and withdrawn.
		PFA 16 bar PE pipe [a]	Joint of maximum annulus, aligned and withdrawn
Negative internal pressure	- test pressure: - 0,8 bar - test duration: 2 h - max pressure change: 0,08 bar	Stiff pipe of minimum OD	Joint of maximum annulus, aligned and withdrawn, with shear load
Negative internal pressure (if applicable)	- test pressure: - 0,8 bar - test duration: 2 h - max pressure change: 0,08 bar	PFA 6 bar PVC pipe [a]	Joint of maximum annulus, aligned and withdrawn, with shear load
Negative internal pressure (if applicable)	- test pressure: - 0,8 bar - test duration: 2 h - max pressure change: 0,08 bar	PFA 6 bar PE pipe [a]	Joint of maximum annulus, aligned and withdrawn.
Dynamic internal pressure	- test pressure: 24 000 cycles between (0,5 PMA or PMA – 5 bar)[b] and PMA - no leakage	Stiff pipe of minimum OD	Joint of maximum annulus, aligned and withdrawn, with shear load
Dynamic internal pressure (if applicable)	- test pressure: 24 000 cycles between (0,5 PMA or PMA – 5 bar)[b] and PMA - no leakage	PFA 6 bar PVC pipe [a]	Joint of maximum annulus, aligned and withdrawn, with shear load
Dynamic internal pressure (if applicable)	- test pressure: 24 000 cycles between (0,5 PMA or PMA – 5 bar)[b] and PMA - no leakage	PFA 6 bar PE pipe [a]	Joint of maximum annulus, aligned and withdrawn.

[a] The PFA 6 and PFA 16 PVC and / or PE pipes may be replaced by the lowest and the highest PVC and / or PE pipe series declared by the coupling/flange adaptor manufacturer

[b] Whichever pressure range is the greater

3. PE Testing in Japan, seismic



Testing conditions and measuring position (bend test)

3. PE testing

3. Internal pressure test.

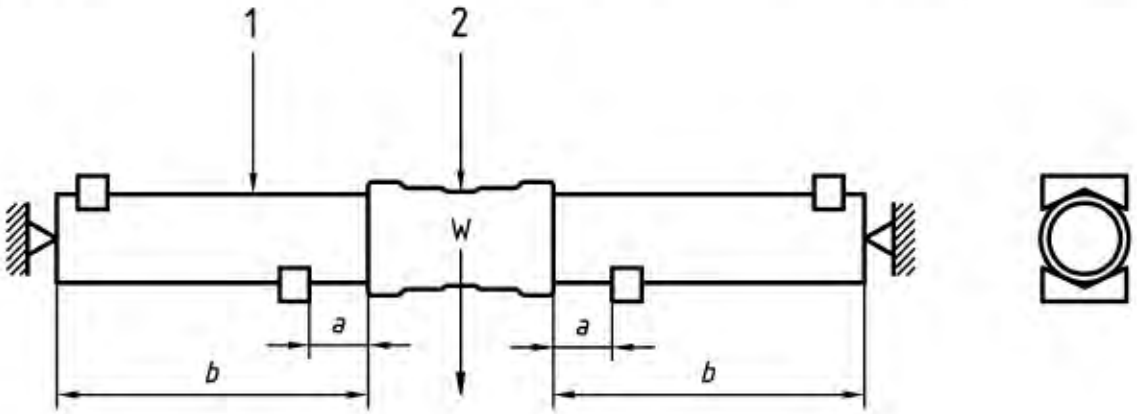
7 Performance tests

7.1 Leak tightness of joints to positive internal pressure

7.1.1 Coupling

The test shall be carried out on an assembled joint comprising a ductile iron coupling and two pipe sections (see figure 3).

The test apparatus shall be capable of providing suitable end and lateral restraints whether the joint is in the aligned position, deflected or subjected to a shear load. It shall be equipped with a pressure gauge with an error limit of ± 3 %.



Key

1 Pipe section
2 Ductile iron coupling

3. Negative internal pressure test.

7.2 Leak tightness of joints to negative internal pressure

The test assembly shall be as given in 7.1.1 or 7.1.2 with the pipe section(s) axially restrained to prevent them from moving towards each other.

The test assembly shall be empty of water and shall be evacuated to a negative internal pressure of 0,8 bar (see Table 4) and then isolated from the vacuum pump. The test assembly shall be left under vacuum for at least 2 h during which the pressure shall not have changed by more than 0,08 bar. The test shall be at a temperature between 10 °C and 25 °C. The temperature of the test assembly shall not vary by more than 10 °C for the duration of the test.

3. Dynamic internal testing 24 000 cycle test.

7.3 Leak tightness of joints to dynamic internal pressure

The test assembly shall be as given in 7.1.1 or 7.1.2. The test assembly shall be filled with water and suitably vented of air.

The pressure shall be steadily increased up to PMA, the allowable maximum operating pressure of the joint, then automatically monitored according to the following pressure cycle:

a) steady pressure reduction to 0,5 PMA or PMA -5 (as applicable) ;

b) maintain 0,5 PMA or PMA -5 (as applicable) for at least 5 s ;

c) steady pressure increase to PMA ;

d) maintain PMA for at least 5 s.

The number of cycles shall be recorded and the test stopped automatically in the occurrence of a failure of the joint.

For a restrained joint, the test assembly, the test apparatus and the test procedure shall be identical, except that there shall be no end restraint, so that the axial thrust is taken by the restrained joint under test. In addition, possible axial movement of the spigot shall be measured every 15 min.

All necessary safety precautions should be taken for the duration of the pressure test.

4. Installation recommendations (stiffener, bolt torque, spring washers, special tooling, etc.).

- Every product is supplied with a full installation manual
- Torque figures are listed in the manual
- Before installing the product pay attention to the manual

- http://www.gfps.com/com/en/about-GF-PipingSystems/locations/production-sites/waga/documentation.html

5. Manufacturing Standards

Specifications

Body	Ductile iron GGG45 in accordance with EN-GJS-450-10.
Clamp ring	Ductile iron GGG45 in accordance with EN-GJS-450-10.
Coating	Resicoat® epoxy powder coating, type RT 9000 R4, meets the requirements of NSF Standard 61. Colour red (RAL 3003). Minimum layer thickness 250 micron, in accordance with the GSK-register.
Varioseal rubber gasket	Potable water: EPDM, NSF 61 approved. Non potable water and gas: NBR.
Uni/Fiks and Uni/Fleks ring	POM (polyoxymethylene) and/or glass fibre filled Polyamide.
Uni/Fiksers	Stainless steel AISI 316.
Bolts and nuts	Stainless steel AISI 304 or stainless steel AISI 316. Bolts are PTFE coated, nuts are galvanised and passivated to prevent galling.
Washers	Stainless steel AISI 304 or stainless steel AISI 316.
Flanges	Drilling pattern in accordance with AWWA C-110 or patterns PN16/PN10 in accordance with EN1092-2.
Working temperature	-5°C to +50°C / 23°F to 122°F
Working pressure (PFA)*	Non restraint: up to 362 psi water and up to 116 psi gas. Restraint: up to 232 psi water and up to 116 psi gas. * For details see user manual or contact your supplier.
Certificates	NSF, ACS (France), Belgaqua (Belgium), WRc (United Kingdom), ÖVGW (Austria), SVGW Switzerland), DVGW (Germany) and KIWA (The Netherlands). EN 14525: ÖVGW, SVGW and KIWA.
Standards	AWWA C219-11, AWWA C111/A21.11-12, AWWA C153/A21.53-11, RMDCS 02511, ASTM F1476-07(2013), AWWA C227-11

5. Model Specs

Available upon request

Word files with all detailed information

Tender Specification for large tolerance fittings for use in fluids like potable water and sewage & waste water; Georg Fischer WAGA MULTI/JOINT© 3000 Plus or equal.

Scope:
This tender specification specifies the requirements for large tolerance couplings, flange adaptors and other fittings (hereinafter called mechanical joints), restraint or non restraint, sized DN50 up to and including DN600, for conveying fluids like potable water, waste water and cooling water, suitable for fluid temperatures between -5°C and 50°C, suitable to be installed under and above ground, and inside and outside buildings.

The mechanical joints shall be constructed in conformity with **ISO 2531**.

Ranges:
The mechanical joints shall be suitable **for all pipe materials**, both metal and non-metal, like PE, PVC, GRP, PB, asbestos cement, copper, steel, galvanized steel, stainless steel AISI 304 and AISI 316, grey cast iron, ductile cast iron and concrete.

Mechanical joints shall be designed to cover following pipe outside diameters per nominal diameter:

DN-size	Minimum range (mm)	Maximum range (mm)	Minimum length coupling (mm)	Minimum length flange adaptor (mm)
DN50	46	71	209	179
DN65	63	90	220	187
DN80	84	105	234	183
DN100	104	132	230	181
DN125	132	155	246	196
DN150	154	192	242	194
DN200	192	232	297	224
DN225	230	268	342	n.a.
DN250	267	310	354	260
DN300	315	356	356	283
DN350	352	393	504	326
DN400	392	433	562	356
DN425	432	464	530	365
DN450	450	482	530	365
DN475	481	513	530	365
DN500	500	532	530	365
DN550	548	580	530	365
DN600	605	637	530	365

Separated bolt sets:
Couplings shall have **separate bolt sets (misaligned DN50-DN200)** for each socket end, enabling connecting 1 pipe end at a time and ensuring optimal bolt torque at each pipe end.

Possibility of changing configuration on the spot
The mechanical joint shall offer **the possibility of changing the configuration** from restraint to non restraint or vice versa at the time of installation, by either inserting or removing gripping elements on the spot.

Tender Specifications for large tolerance fittings for use in water *page 1 of 3*

Material specifications:

Body & clamp(ing) rings: All metal parts, except the gripping elements, shall be made of ductile cast iron in conformity with **EN-GJS-450-10-HB200.**

Coating: Coating shall be a **Resicoat® RT9000R4 epoxy powder coating** or equal, with a **minimum layer thickness of 250 micron** and chemical resistance of pH 2 up to pH 13. **Coating shall be approved by an internationally accepted institute for potable water or other fluids (e.g. WRc, KIWA, DVGW) and shall fulfill the requirements of GSK (Association for Excellent Corrosion Protection with Epoxy resin powder coating) in accordance with DIN 3476 (P), DIN 30677-2 and EN 14901.**

Bolts, Nuts and washers:
- Bolts, nuts and washers shall be made of stainless steel A2-70 (AISI 304) or A4-80 (AISI 316).
- Bolts shall have a **dry anti friction coating to prevent cold-welding due to fretting.**
- Nuts are galvanized and passivated to prevent galling

Rubber gasket:
- EPDM according to **EN 681-1**, for the **type WA** for cold potable water supply up to 50°C.
- NBR according to **EN 682** for cold non potable water supply, drainage, sewerage and rainwater pipes (continuous flow up to 45°C) with oil resistance.

Gripping elements: - Gripping elements shall be made of stainless steel A4 (AISI 316).

Flanges:
- Flanges shall be constructed in such a way that they can be attached to flanges from which the dimensions and tolerances comply to **EN 1092-2.**
- Flange face shall have concentric grooves.

Pressures:
- Non restraint: Max. working pressure: 25 bar / 16 bar
- Restraint: Max. working pressure: 16 bar / 10 bar
  Depending on DN-size and/or pipe material.

Angular deflection: 8° per side, based on middle of range

Ambient temperature at installation:
The mechanical joints with EPDM gasket shall be suitable for installation at ambient temperatures between -20°C and +50°C.

Marking requirements:
All mechanical joints shall be legibly and durably marked. **Marks shall be cast on the body** and shall bear at least the following information:
- The manufacturer's name or mark
- Identification of the year of manufacture
- Identification of ductile cast iron
- Identification of DN size
- Identification of the range of external diameters that the mechanical can connect.

Tender Specifications for large tolerance fittings for use in water *page 2 of 3*

Marking requirements on rubber gasket:
All rubber gaskets shall be legibly and durably marked. The rubber gasket shall bear at least the following information:
- The manufacturer's name or mark
- Identification of the year of manufacture
- Identification of the range of external diameters over which the mechanical joint works.
- The type of gasket (EPDM or NBR)
- The EN-standard

Additional information to be supplied with the mechanical joint:
The following information shall be supplied **on or with** each mechanical joint:
installation instructions
maximum joint gap
maximum allowable angular deflection (8° per side, based on middle of range)
pipe materials for which the mechanical joint is intended to be used with
non restrained and restrained joints.
need for supporting sleeves (inserts)
bolt torque
Information about reusability of the mechanical joint
Code for traceability

Quality assurance:
The manufacturer's quality system shall conform to **ISO 9001.**
The manufacturer's environmental system shall conform to **ISO 14001.**
The manufacturer's international occupational health and safety management system specification shall conform to **OHSAS 18001.**

Technical support:
Product training and technical information

The manufacturer or the sales representative shall provide a specialized theoretical and active practical product training given by qualified instructors to enable installers of the above mentioned products to be able to understand and use the products and associated tooling correctly and efficiently under site conditions.

In addition to the main subject matter all training courses shall additionally cover other associated distribution pipeline products as well as routine repair and maintenance procedures.

Additional training courses for inspectors, group leaders and teaching staff are to be provided upon request.

The manufacturer has to provide accurate and easy-to-understand operating instructions in at least one internationally recognized language, which can be used at any subsequent time for reference purposes.

The manufacturer must have in-house test facilities to execute basic tests.

Hygienic packaging / protection from production to point of use:
The manufacturer shall supply the product with a hygienic packaging / protection. The hygienic packaging / protection will be applied during the production / assembly process. The hygienic packaging / protection shall protect the product from dirt, dust and other contaminants during transport and storage till point of use where the hygienic packaging / protection will be removed.

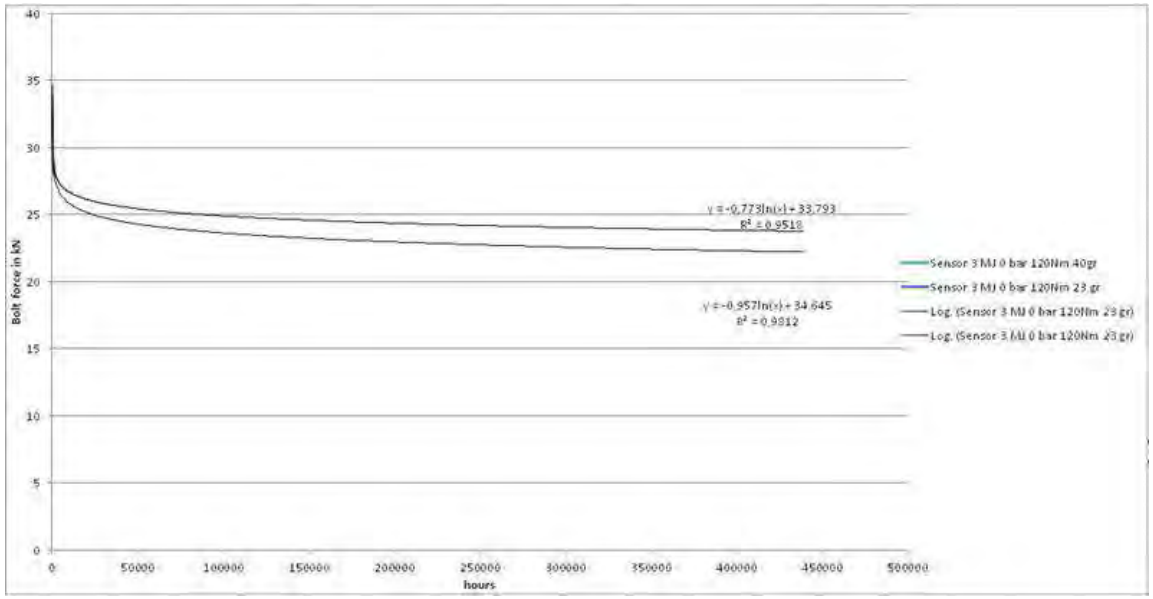
Certification:
Products shall bear the EN 14525 certificate of KIWA (BRL-775), ÖVGW (QS-W503) and SVGW.
Products shall bear the NSF 61 certificate of NSF.

Tender Specifications for large tolerance fittings for use in water *page 3 of 3*

6. Projected Design life

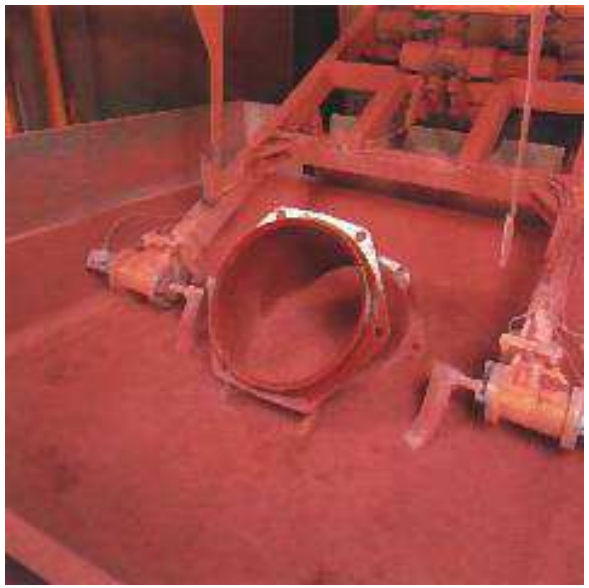
50 years technical lifetime design.
We consider the repairs as permanent.

Tested and proofed by internal testing methods (sensor tests).



6. Corrosion protection methods

- Epoxy powder coating
- Minimum layer thickness of 250 micron
- Impact resistant, thanks to the elasticity of the coating
- Perfect adhesion to the body (ISO 4624)
- No toxic substances
- No pores (3kV direct Volt test GSK)
- Chemical resistance of pH 2 - pH 13
- No bacteriological growth
- NSF approved



- Coating : RESICOAT http://www.resicoat.com/

Resicoat is NSF approved

NSF International

OFFICIAL LISTING

NSF International Certifies that the products appearing on this Listing conform to the requirements of NSF/ANSI Standard 61 - Drinking Water System Components - Health Effects

This is the Official Listing recorded on April 26, 2017.

Akzo Nobel Powder Coatings GmbH
Markwiesenstr. 50
D-72770 Reutlingen
Germany
49 712 151 9190

Facility: Reutlingen, Germany

Joining and Sealing Materials

Trade Designation	Size	Water Contact Temp	Water Contact Material
Sealants			
Resicoat Glue Mastic	(1)	C(d) 23	EPOXY

(1) Certified for use in 45 mm pipe and greater.

Protective (Barrier) Materials

Trade Designation	Water Contact Size Restriction	Water Contact Temp	Water Contact Material
Coatings - Fittings			
Resicoat R4-HS HAF118 White (1)	>= 1"	D. HOT	PRC
Resicoat R4-HS HEF218 Red-Brown (2)	>= 1"	D. HOT	PRC
Resicoat R4-HS HEF108 Red (2)	>= 1"	D. HOT	PRC
Resicoat R4-HS HJF018 Blue (1)	>= 1"	D. HOT	PRC
Resicoat R4-HS HJF108 Blue (1)	>= 1"	D. HOT	PRC
Resicoat R4-HS HJF148 Blue (2)	>= 1"	D. HOT	PRC
Resicoat R4-HS HJF218 Blue (2)	>= 1"	D. HOT	PRC
Resicoat R4-HS HJF228 Blue (1)	>= 1"	D. HOT	PRC
Resicoat R4-HS HJF238 Saphir-Blue (2)	>= 1"	D. HOT	PRC
Resicoat R4-HS HJF178 Blue (4)	>= 1"	D. HOT	PRC
Resicoat R4-PA HEC278 Red-Brown (2)	>= 1"	D. HOT	PRC
Resicoat R4-PA HJC048 Blue (1)	>= 1"	D. HOT	PRC
Resicoat R4-PA HJC068 Blue (1)	>= 1"	D. HOT	PRC
Resicoat R4-PA HJC148 Blue (1)	>= 1"	D. HOT	PRC
Resicoat R4-PA HJC168 Blue (1)	>= 1"	D. HOT	PRC
Resicoat R4-PA HJC138 Blue (1)	>= 1"	D. HOT	PRC
Resicoat R4-PA HJC248 Saphir-Blue (2)	>= 1"	D. HOT	PRC
Resicoat R4-PA HJC178 Blue (5)	>= 1 in	D. HOT	PRC
Coatings - Valve			
Resicoat R4-HS HAF218 White (1)	>= 1"	D. HOT	PRC

Note: Additions shall not be made to this document without prior evaluation and acceptance by NSF International

1 of 3

7. History of use with HDPE/ case studies/ operating conditions

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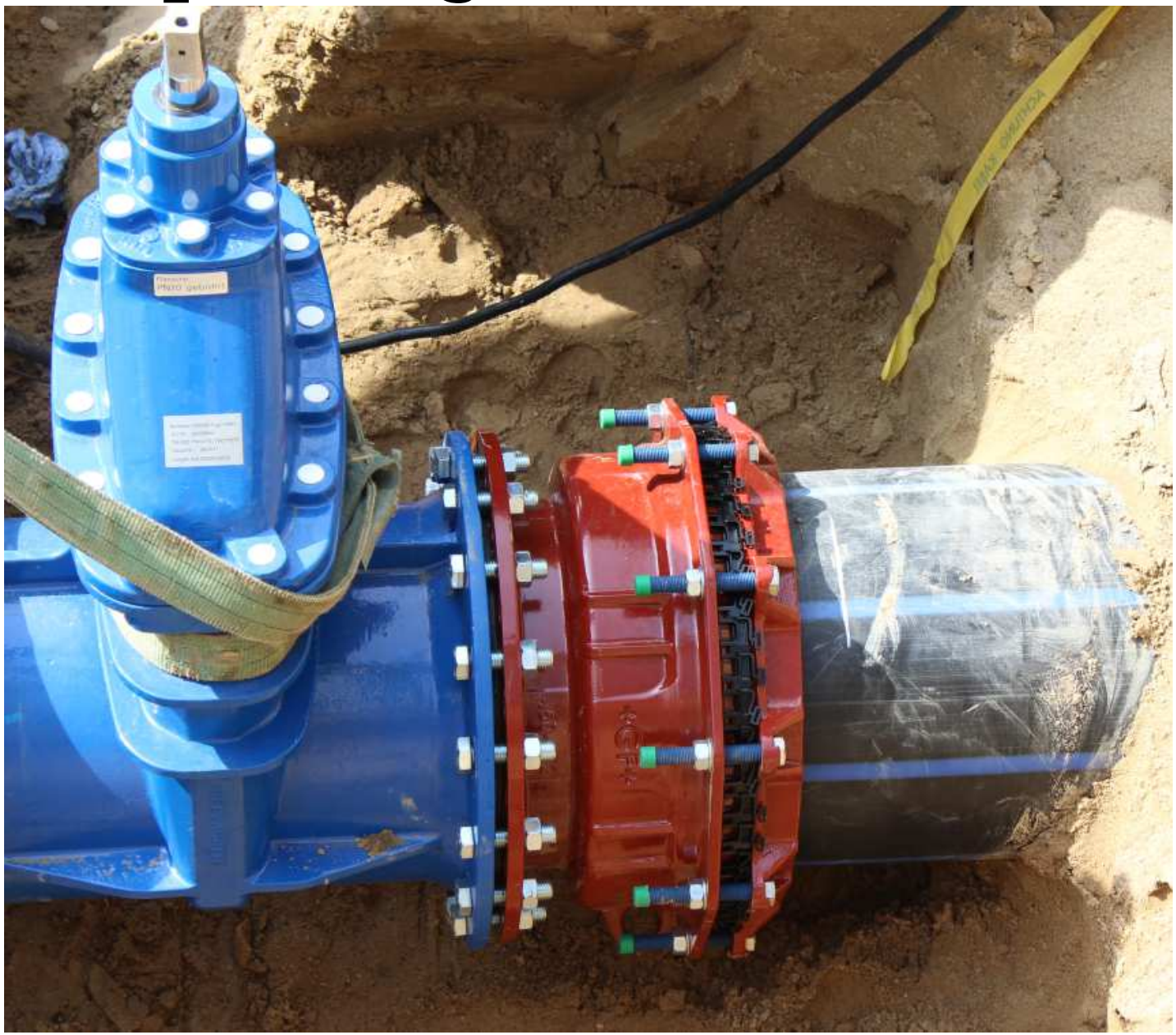

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7. History of use with HDPE/ case studies/ operating conditions

7. Canada reference

7. Canada valve chamber

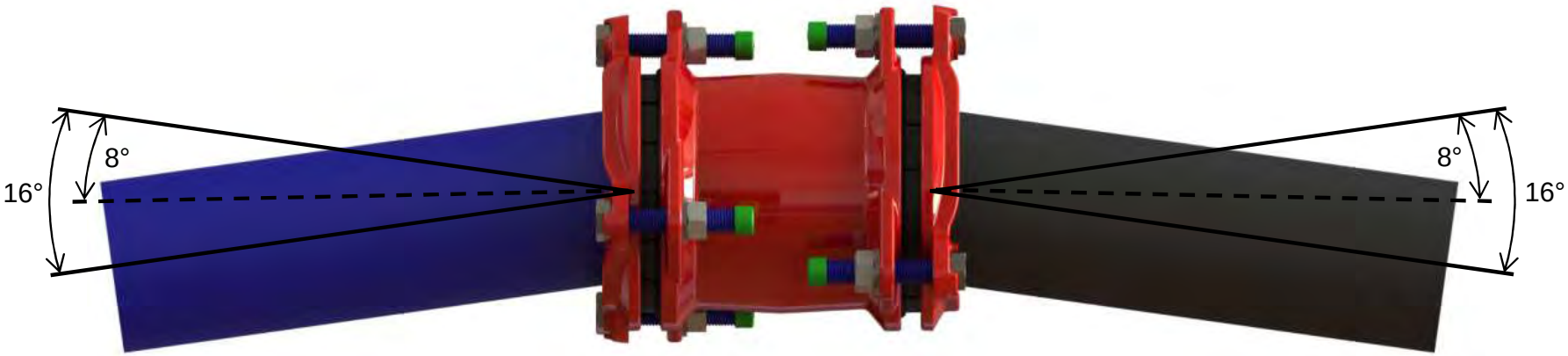
7. Canada

7. Canada bridge crossing isolated PE pipes

8. Other issues and concerns

Nominal* angularity

- Restraint connection:
  8° per coupling side
- Non-restraint connection:
  8° per coupling side



** Based on the middle of the coupling range*

8. Other issues and concerns

- One stab one piece fitting
- No need for adjusting the product on site
- High grade materials used. Stainless steel and ductile iron
- No steel parts in the system. Preventing corrosion risks.
- 25 Years of track record with PE - up to 24 inch.
- PE Restraint / pull out resistance

Thank you for your attention !
Q&A