Centre Scientifique et Technique du Bâtiment
84 avenue Jean Jaurès
CHAMPS-SUR-MARNE
F-77447 Marne-la-Vallée Cedex 2
Tel.: +33 (0)1 64 68 82 82
Fax: +33 (0)1 60 05 70 37

Designated according to Article 29 of Regulation (EU) No 305/2011

Member of www.eota.eu

European Technical Assessment

ETA-09/0248
dated 18/05/2021

(original version in French)

GENERAL

Technical Assessment Body issuing the European Technical Assessment:	Centre Scientifique et Technique du Bâtiment (CSTB)
Trade name of the construction product:	**- FLEX-SEAL Plus**
Family of products to which the construction product belongs:	Flexible elastomer couplings, potentially equipped with stainless-steel reinforcement bands, intended for assembling sanitation pipes with or without pressure
Manufacturer:	**NORHAM** **ZA Les Druisieux** **F-26260 Saint-Donat-sur-l'Herbasse** www.norham.fr
Manufacturing plant(s):	**- NORHAM, ZA Les Druisieux, F-26260 Saint-Donat-sur-l'Herbasse, France**
This European Technical Assessment contains:	10 pages, including 5 appendices that are integral parts of the document.
This European Technical Assessment has been issued in accordance with Regulation (EU) No. 305/2011, based on:	European Assessment Document EAD 17-18-0018-07.04
This version replaces:	ETA 09/0248-2018-01-23

SPECIFIC PART

1. Technical description of the product

FLEX-SEAL Plus flexible couplings for sanitation pipes are elastomer (EPDM or nitrile) couplings that may or may not be equipped with a metal (stainless steel) reinforcement band. Their purpose is to connect different types of pipes, which may be made from different materials.

The elastomer components adhere to standard EN 681-1 and the stainless-steel grades are 1.4307, 1.4301, 1.4303, 1.4404, 1.4401, or 1.4571 according to standard EN 10088-2. The elastomer seal is compressed on the piping using a stainless-steel band clamp, with the recommended tightening torque written on the coupling. The different components of the band clamps are made from steel with the same specifications and with a minimum hardness corresponding to class +C850, according to standard EN 10088-2.

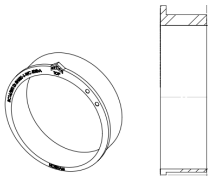
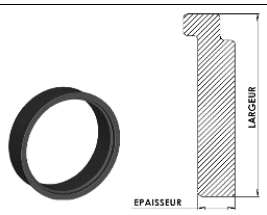
The constituent materials of the pipes to be connected and their diameters may differ.

The FLEX-SEAL Plus product lines of couplings are the following:

- SC (FLEX-SEAL Plus) couplings: with a metal reinforcement band, for small differences in outside diameter between the pipes to be connected,
- AC (FLEX-SEAL Plus) couplings: without a metal reinforcement band, for significant differences in outside diameter between the pipes to be connected,
- DC (FLEX-SEAL Plus) couplings: without a metal reinforcement band, for small differences in outside diameter between the pipes to be connected.

For SC couplings, when the difference between the outside diameters of the pipes to be connected is too significant (see table below), the connection can be made by combining the appropriate compensation ring (BC) with the coupling. In case of different internal diameters, “offset” compensation rings (BC Ex) shall be used in order to adjust the inverts of the joined pipes (according to EN 476).

Outside diameters	Difference between outside diameters
OD ≤ 120 mm	10 mm
300 ≥ OD > 120 mm	12 mm
600 > OD ≥ 300 mm	15 mm

<table>
<tr><td>  </td><td>  </td><td>  </td></tr>
<tr><td>SC flexible coupling</td><td>AC flexible coupling</td><td>BC EX compensation ring</td></tr>
<tr><td>  </td><td> 
</td><td></td></tr>
<tr><td>DC flexible coupling</td><td>BC compensation ring</td><td></td></tr>
</table>

2. Specifications for the intended use according to the applicable European Assessment Document (hereinafter referred to as EAD)

The FLEX-SEAL Plus flexible couplings make it possible to connect different types of sanitation pipes that use gravity or low pressure, either buried or not, intended for the transport of wastewater or rain water, inside or outside of buildings.

The following limiting conditions for usage apply:

Coupling type	Maximum pressure in the pipe (bar)	Outside diameters and materials of pipes connected	Shear strength R (N)*
SC	1.0	Different	R (N) > 25xDN (mm)
AC	0.6	Different	Weak
DC	0.6	Identical	Weak
* According to standard EN 476. The DN value to be taken into account is the maximum outside diameter that can be connected with the flexible coupling, in mm.			

The provisions of this ETA are based on an assumed life span of at least 50 years, provided that the conditions for implementation set forth in Appendix 5 are adhered to. Indications related to life span shall not be interpreted as a guarantee provided by the Manufacturer. They are only to be considered as a means for choosing the appropriate products for the economically feasible life span expected from work performed.

3. Product performance and references to the methods used for the assessment of their performance

In the table below, “BRCW” means “Basic Requirement for Construction Work”.

Essential characteristic	Performance
BRCW 1: Mechanical resistance and stability	
Dimensions according to EAD 17-18-0018-07.04 §2.2.1.1 - Sleeves - Reinforcements and band clamps	See Appendices 1, 2, and 3 The dimensional tolerances of cast components meet class M3 requirements under the ISO 3302-1 standard. The dimensional tolerances of extruded and vulcanised components meet class E3 requirements under ISO 3302-1.
Strength of band clamps according to EAD 17-18-0018-07.04 §2.2.1.2	The band clamp stands up to a tightening torque of: ≥ 10 N.m when a screwdriver is recommended ≥ 17 N.m when a lever tool is recommended
Tensile strength of welded or clinched assembled parts according to EAD 17-18-0018-07.04 §2.2.1.3	The assembled parts stand up to a tensile force of 6000 N
Heat resistance (for usage inside of a building) according to EAD 17-18-0018-07.04 §2.2.1.4	No leakage
Watertightness at the recommended tightening torque according to EAD 17-18-0018-07.04 §2.2.1.5	No leakage
BRCW 2: Safety in case of fire	
Reaction to fire (for usage inside of a building) according to EAD 17-18-0018-07.04 §2.2.2	Class E
BRCW 4: Safety and accessibility in use	
Watertightness according to EAD 17-18-0018-07.04 §2.2.3: - Shear force and negative pressure - Negative pressure and angular deviation - Positive pressure and shear force - Positive pressure and angular deviation - Negative pressure and diametric deformation - Positive pressure and diametric deformation	No leakage
Long-term shear strength according to EAD 17-18-0018-07.04 §2.2.3.2	No leakage at the recommended tightening torque

4. System for assessment and verification of the constancy of performance (hereinafter referred to as AVCP) applied, with references to its legal basis

In accordance with European Commission Delegated Decision (EU) 2015/1959 of 1 July 2015, the AVCP systems (see Appendix V of the Regulation (EU) No. 305/2011) given in the following table apply:

Product	Intended usage	System
Flexible coupling	For usage outside of a building (BRCW 1 & 4)	4
	For usage subject to fire-related regulations (BRCW 2)	3

5. Technical details required for implementation of the AVCP system, as set forth by the applicable EAD

The technical details required for implementation of the AVCP system are specified in the inspection plan submitted to the CSTB.

Appendices

Appendix 1: “AC” flexible couplings (type 1)

Outside diameter (mm)	Thickness under the band clamp (mm)	Width of the band clamp (mm)	Thickness of the band clamp (mm)
< 200	4,5	12	0,6
201 - 385	5,5		

Minimum dimensions of the “AC” flexible couplings (Side A = side with smaller diameter; Side B = side with larger diameter)

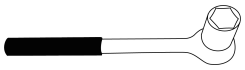
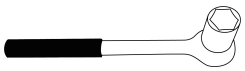
Previous old Ref	New Ref	Side A		Side B		Width	Tightening torque
		Mini	Maxi	Mini	Maxi		
AC0401	AC032-040	24	32	32	40	64	6 N .m Tool: screwdriver 
AC110	AC032-050	24	32	40	50	64	
AC0502	AC040-050	32	40	40	50	64	
AC5622125	AC042-063	35	42	53	63	64	
AC5632	AC064-090	50	64	75	90	100	
AC5642	AC064-115	50	64	100	115	100	
AC5643	AC090-115	75	90	100	115	100	
AC0243	AC090-137	75	90	122	137	120	
AC1221	AC095-125	80	95	110	125	120	
AC5144	AC115-125	100	115	110	125	120	
AC1362	AC115-136	100	115	121	136	120	
AC5654	AC115-145	100	115	130	145	100	
AC0644	AC115-152	100	115	137	152	100	
AC5664	AC115-170	100	115	155	170	120	
AC4000	AC125-136	110	125	121	136	120	
AC1452	AC125-145	110	125	130	145	120	
AC1602	AC125-160	110	125	144	160	120	
AC1702	AC125-170	110	125	155	170	120	
AC1922	AC125-193	110	125	170	193	120	
AC2102	AC125-210	110	125	185	210	150	
AC1603	AC136-160	121	136	144	160	120	
AC1923	AC136-193	121	136	170	193	120	
AC1703	AC145-170	130	145	155	170	120	
AC1924	AC160-193	144	160	170	193	120	
AC2105	AC160-210	144	160	185	210	150	
AC2354	AC160-235	144	160	210	235	150	
AC2654	AC160-265	144	160	240	265	150	
AC5686	AC170-222	150	170	197	222	150	
AC2001	AC170-200	155	170	180	200	120	
AC0286	AC168-257	153	168	232	257	150	
AC56106	AC175-280	155	175	255	280	150	
AC6000	AC180-200	160	180	180	200	120	
AC2355	AC193-235	170	193	210	235	150	
AC2356	AC215-235	190	215	210	235	150	
AC2656	AC215-265	190	215	240	265	150	
AC2906	AC215-290	190	215	265	290	150	
AC0288	AC222-257	197	222	232	257	150	
AC56108	AC222-275	197	222	250	275	150	
AC2657	AC235-265	210	235	240	265	150	
AC2908	AC265-290	240	265	265	290	150	
AC3208	AC265-320	240	265	295	320	150	
AC5612	AC275-325	250	275	300	325	150	
AC3209	AC290-320	265	290	295	320	150	
AC3600	AC320-360	295	320	335	360	150	
AC0212	AC325-375	300	325	350	375	150	
AC3850	AC325-385	300	325	360	385	150	
AC0312	AC335-375	310	335	350	375	150	

Range of “AC” flexible couplings (note: NBR couplings are marked with an N in the reference)

Appendix 2: “SC” flexible couplings (type 2B)

Outside diameter (mm)	Sleeve width (mm)	Thickness under the band clamp (mm)	Width of the shear band (mm)	Thickness of reinforcement against shearing (mm)	Width of the band clamp (mm)	Thickness of the band clamp (mm)
<100	100	7.0	54	0.35	12	0.6
101 - 200	120	7,0	54	0,35	12	0,6
201 – 300	150	7,5	78	0,35	12	0,6
301 – 645	185	9,0	97	0,75	12	0,6

Minimum dimensions of “SC” flexible couplings

Reference (SC)	Min. diameter (mm)	Max. diameter (mm)	Width (mm)	Tightening torque
SC65	50	65	100	6 N.m Tool: screwdriver 
SC75	65	75	100	
SC90	75	90	100	
SC100	85	100	100	
115	100	115	120	
120	110	121	120	
140	120	140	120	
150	130	150	120	
162	137	162	120	
175	150	175	120	
190	165	190	120	
200	175	200	150	10 N.m Tool: lever tool 
210	185	210	150	
225	200	225	150	
250	225	250	150	
275	250	275	150	
290	265	290	150	
310	285	310	190	
320	290	320	190	
335	310	335	190	
350	325	350	190	
360	335	360	190	
365	340	365	190	
385	355	385	190	
410	385	410	190	15 N.m Tool: lever tool 
430	400	430	190	
445	415	445	190	
465	435	465	190	
490	460	490	190	
510	480	510	190	
525	495	525	190	
545	515	545	190	
550	525	550	190	
560	530	560	190	
570	545	570	190	
585	550	585	190	
600	570	600	190	
SC635	605	635	190	
SC645	615	645	190	

Range of “SC” flexible couplings (note: NBR couplings are marked with an N in the reference)

Appendix 3: “DC” flexible couplings (type 1)

Outside diameter (mm)	Sleeve width (mm)	Thickness under the band clamp (mm)	Width of the band clamp (mm)	Thickness of the band clamp (mm)
<50	64	4.0	12	0.6
51 - 100	100	7.0	12	0.6
101 - 200	120	7,0	12	0,6
201 – 290	150	7,5	12	0,6

Minimum values for dimensions of “DC” flexible couplings

Reference (DC)	Min. diameter (mm)	Max. diameter (mm)	Width (mm)	Tightening torque
DC32	24	32	64	6 N.m Tool: screwdriver 
DC40	32	40	64	
DC50	42	50	64	
DC65	50	65	100	
DC75	65	75	100	
DC90	75	90	100	
DC100	85	100	100	
DC115	100	115	120	
DC120	110	120	120	
DC140	120	140	120	
DC150	125	150	120	
DC162	137	162	120	
DC175	150	175	120	
DC190	165	190	150	
DC200	175	200	150	
DC210	185	210	150	
DC225	200	225	150	
DC250	225	250	150	
DC275	250	275	150	
DC290	265	290	150	

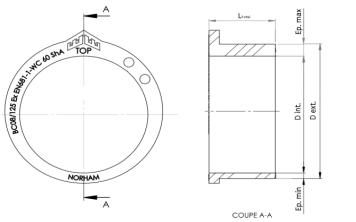
Range of “DC” flexible couplings (note: NBR couplings are marked with an N in the reference)

Appendix 4a: dimensions of “BC” elastomer rings

BC reference	08-80	16-80	08-100	16-100	24-100	32-100	40-100	48-100
Thickness (mm)	8	16	8	16	24	32	40	48
Width (mm)	80	80	100	100	100	100	100	100
Intended usage	SC width < 190 mm		SC width ≥ 190 mm					

Note: NBR rings are marked with an N in the reference

Appendix 4b : dimensions of “BC EX” elastomer rings

Reference	Internal diameter	External diameter	Width. min	Width. max	L	
BC08-125EX	125.7	144.7	6.0	13.0	65.0	
BC08-200EX	201.0	222.0	5.0	16+.0	80.0	
BC16-250EX	251.2	275.2	5.5	18.5	80.0	
BC16-400EX	402.0	431.0	5.0	25.0	100.0	

Appendix 5: Implementation

1. “SC”-“DC” flexible couplings

In all cases, the coupling must cover 4 cm of the pipe on each side. If there is risk of shearing, the distance between the two pipes must not exceed 2 cm.

① On the pipe with the larger outside diameter, make a mark corresponding to half of the width of the coupling
② Loosen the fasteners and slide the coupling onto the pipe with the larger outside diameter

③ Align the two pipes and bring their ends as close together as possible

④ Slide the coupling up to the mark drawn on the pipe and tighten all of the fasteners as much as possible (the recommended tightening torque is indicated on the label of the coupling)

2. “SC” flexible couplings with “BC” or “BC EX”

In all cases, the coupling must cover 4 cm of the pipe on each side. If there is risk of shearing, the distance between the two pipes must not exceed 2 cm.

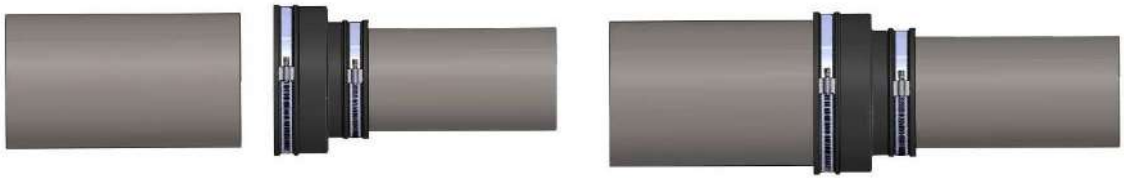
① Loosen the fasteners and slide the coupling onto the pipe with the larger outside diameter
② Slide the ring onto the pipe with the smaller outside diameter. The ring is level with the edge of the pipe.
For BC EX rings make sure the thickest part is on top of the pipe (TOP mark).

③ Align the two pipes and bring their ends as close together as possible

④ Slide the coupling onto the ring until the coupling is flush with the flange of the ring. Tighten all of the fasteners as much as possible (the recommended tightening torque is indicated on the label of the coupling)

3. “AC” flexible couplings

In all cases, the coupling must cover 4 cm of the pipe on each side.



① Loosen the fasteners
② Slide the coupling onto the pipe with the smaller outside diameter

③ Bring the pipe with the smaller outside diameter towards the pipe with the larger outside diameter, bringing the latter as close as possible to the inside flange of the coupling.
④ Tighten all of the fasteners as much as possible (the recommended tightening torque is indicated on the label of the coupling)

Additional comments on assembly:

-1: In the case of a “coupling + ring” assembly, depending on the direction of flow, it may be useful to seal the compensation ring to limit the risk of dislocation.
-2: For any connection on a concrete pipe, first check the state of the surface of the pipe. If necessary, make the surface smooth and clean.
-3: For any connection to products made of an annulated thermoplastic material, place the sleeve clamp against a convex point of the annulated surface.