



TECHNICAL REPORT

## **Bending Test for swivel Joints made of PVC-U**

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# Bending test for swivel joints manufactured by heat moulding of PVC-U pipes

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## **Foreword**

*EOTA Technical Reports are developed as supporting reference documents to European Technical Approval Guidelines and can also be applicable to a Common Understanding of Assessment Procedures, an EOTA Comprehension Document or an European Technical Approval, as far as reference is made therein.*

*EOTA Technical Reports go into detail in some aspects and express the common understanding of existing knowledge and experience of the EOTA bodies at a particular point in time.*

*Where knowledge and experience is developing, especially through approval work, such reports can be amended and supplemented.*

*When this happens, the effect of the changes upon the European Technical Approval Guidelines will be laid down in the relevant comprehension documents, unless the European Technical Approval Guideline is revised.*

*This EOTA Technical Report has been prepared by the approval body KIWA in order to assess EOTA nr. 07.04/16 "Swivel joints manufactured by heat moulding (thermo moulding) from an extruded unplasticized poly(vinyl chloride) (PVC-U) pipe, with a free angle of deflection to a maximum of 30 ° to increase the flexibility of fittings, such as branches, couplers and saddles, in buried non-pressure drainage and sewage applications".*

## **1 Scope**

This EOTA Technical Report specifies a method for determination of the mechanical strength and flexibility of swivel joints made of PVC-U for non pressure drainage and sewerage systems buried in the ground. This EOTA Technical Report is an addition/modification to EN 12256 which does not address the swivel joints.

## **2 Principle**

An assembly of a swivel joint, an adjacent pipe and anchorages (see Figure 1) is subjected to a moment.

## **3 Failure criteria**

The swivel joints shall not crack, break or show leakage during the testing according to Chapter 6. Also the end caps and the joint to the test rig may not come loose during testing.

## **4 Apparatus**

**Anchorage(s)**, capable of holding the body of the swivel joint rigid during the test. The anchorages shall not deform the swivel joint.

**Equipment, capable of applying a force** that will result in a moment (see Chapter 6). The direction of the force can be clockwise or anti-clockwise.

**Equipment, capable of determining the length,  $L$** , of the arm to the rotation point (see Figure 1).

When the total angular deflection,  $\gamma$ , is the determining factor, the arm,  $L$ , as shown in Figure 1, shall be  $(1200 \pm 10)$  mm.

**Force and/or displacement measurement instruments**, capable of determining the force applied and/or the displacement of the end of the arm to which the force is applied, as applicable (see Table 1).

## **5 Test specimen**

### **5.1 Number**

For the test procedure one swivel joint of each swivel joint type is needed.

### 5.2 Preparation

The swivel joint shall be rigidly secured to the test rig (e.g. by clamping rings or belts). The fixation shall be such that only one socket is tested. This can implicate that an extra fixation to the side of the swivel joint may be necessary. An example of the test rig is given in Figure 1.

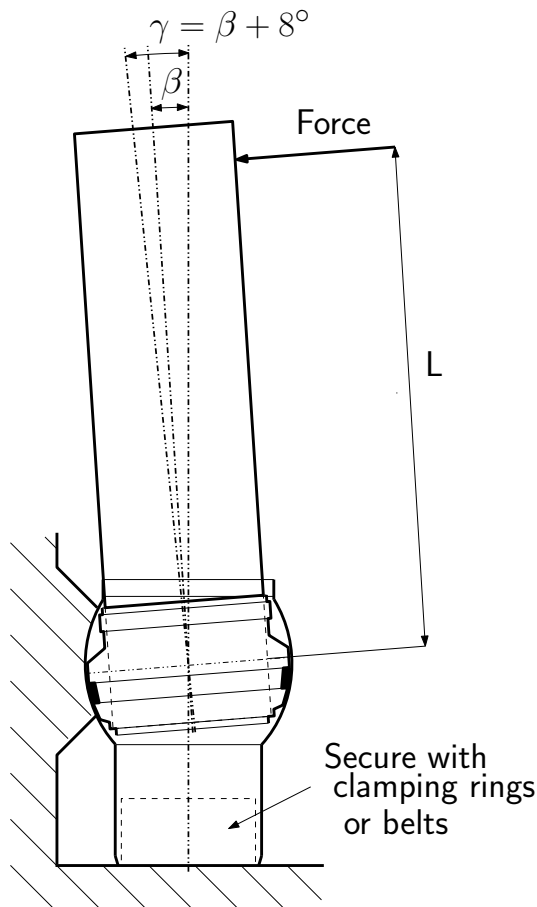


Figure 1 Example of a test rig

In some cases the swivel joint may be mounted on a plastics pipe or socket. A rigid mounting in all cases shall be obtained. This rigid mounting can be achieved by use of a gap filling adhesive. The use of clamping rings or belts is also permitted.

The pipes or sockets to be used for the test shall be of an equal or preferable higher stiffness rating than the tested swivel joint.

### 5.3 Curing and conditioning

The test specimen must be produced at least 15 hours before testing.

Before the test procedure is started the test specimen shall be conditioned in air for at

least 16 hours at a temperature of  $(23 \pm 5)$  °C.

### 6 Procedure

The test is performed at a temperature of  $(23 \pm 5)$  °C.

Secure the test specimen according to 5.2.

Fill the assembly with water until the level in pipe is  $(250 \pm 50)$  mm above the swivel joint.

Gradually apply a force perpendicular to the pipe at a distance to the socket of  $(1200 \pm 10)$  mm until a bending moment of at least M according to Table 1 is reached or until an total angular deflection  $\gamma$  (measured at the end of the pipe) is reached (see Figure 1).

Nominal diameter (d) mm	Minimum bending moment (M) Nm
110	200
125	290
160	610
200	1.200
250	2.300
315	3.100
355	3.500
400	4.000
450	4.500
500	5.000
630	6.300

Table 1 Prescribed bending moment on test specimen

The free angular deflection  $\beta$  shall be declared by the manufacturer of the swivel joint. This declared free angular deflection  $\beta$  is the maximum possible deflection without the use of force.

The total angular deflection  $\gamma$  (as used in testing) shall be the declared free angular deflection  $\beta$  plus  $8^\circ$  ( $\gamma = \beta + 8^\circ$ ).

The required bending moment or angular deflection on the test specimen shall be maintained for 7 x 24 hours.

NOTE: The duration of this bending is equal to the NEN 7146 and significantly longer than the duration in the EN 12256 because the soil conditions in the Netherlands demand a more stringent requirement.

## **7 Expression of results**

Report after the test procedure according to Chapter 6 if the swivel joints display any signs of splitting, cracking, separation and/or leakage. Also report if the end caps or joints to the test rig came loose during testing.

## **8 Test report**

The test report shall include the following information:

- a. Reference to this EOTA Technical Report;
- b. the name of the testing laboratory;
- c. date of the test;
- d. duration of the test;
- e. description of the test specimen (nominal diameter, stiffness, type of swivel joint, production date/code);
- f. declared free angular deflection  $\beta$ ;
- g. the applied bending moment or angular deflection;
- h. information on possible splitting, cracking, separation and/or leakage;
- i. any factors which may have affected the results, such as any incidents or any operating details not specified in this standard.

## **9 Normative reference**

**NEN 7146: 2001** Plastics piping systems - Bending test for thermoplastics fittings - Test method and specifications

**EN 12256: 1998** Plastics piping systems - Thermoplastics fittings - Test method for mechanical strength or flexibility of fabricated fittings