

# PT/282/0409: Kijlstra standard MS and trapezium Precast Concrete Manhole Bases and Access chambers Assessment Schedule -



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## 1. Scope

1.1 This schedule covers the manufacture and installation of Kijlstra standard MS and trapezium manhole bases that incorporate factory cast benching.

The system consists of two components the base and the riser. The base is bespoke design for a site and includes factory cast benching, cast in pipe connectors. The riser section is made to the height from the top of the base to slab level. The joint between the base and riser is a tongue and groove and the seal is achieved by a rubber o ring

The standard MS manholes are available for nominal internal dimensions of 1250mm x 1250mm, 1500mm x 1500mm and 2000mm x 2000mm. The trapezium manholes are available for pipe sizes 900mm, 1050mm, 1200mm, 1350mm and 1500mm. Access chambers are available for nominal internal dimensions of 600mm x 600mm, 800mm x 800mm, 1000mm x 1000mm, In a range of adjoining pipe configurations

1.2 Details of these products, including the available range of connecting pipe sizes, are provided in the Kijlstra Sewer System: Manholes brochure <sup>(1)</sup>.

They provide a fast and economical method of constructing manhole bases on site compared with traditional methods.

The bases:

- remove the need for casting the benching insitu;
- ensure the benching has a consistent quality factory finish;
- eliminate “cure time” relating to the cast insitu method;
- reduces the number of joints in the stack.

1.3 The manhole bases and risers are manufactured from concrete. They are used to construct manholes in drainage and sewer systems and meet the general requirements of the UK water industry as detailed in Sewers for Adoption 6<sup>th</sup> Edition<sup>(2)</sup> and Sewers for Scotland 2<sup>nd</sup> Edition<sup>(3)</sup>.

1.4 The base units are placed on a formation comprising granular material. The base is position and connected to the previously installed pipe. All other pipe connections are made and side fill is placed around the base. The riser section is than place onto the stack connect on the top of the base section.

The pre-cast components may or may not be surrounded in concrete depending on the particular specification requirements.

1.5 Manhole loading limitations are the same as those that apply to conventional manhole bases.

1.6 This schedule covers the following assessment areas in order to prove the “fitness for purpose” of this product:

- general requirements;
- product type testing;

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- audit of the production quality control systems;
- review of documentation and guidance for designers, installers and operatives;
- operational practices.

## 2. General Requirements

2.1 The National Annex to European standard EN 752<sup>(4)</sup> provides information on the design of manholes. Further information is provided in the documents Sewers for Adoption 6th Edition<sup>(2)</sup> and Sewers for Scotland<sup>(3)</sup>. In Sewers for Adoption the manhole design guidance is covered by Clause 2.9 Design of Manholes and typical manhole detail drawings A, B, E and F and a Specification is covered by Part 5. Manhole requirements for drainage systems are in The Building Regulations Part H<sup>(5)</sup> Clause 2.48.

2.2 This product shall meet the requirements of EN 752<sup>(4)</sup> with respect to the following:

- the flows should combine in preformed swept channels;
- the first pipe joints should be within 150mm of the manhole;
- in-situ concrete surround is not normally required;

2.3 This product may depart from one of the requirements of EN 752<sup>(4)</sup> with the following alternative requirement for the benching design (conforms with Sewers for Adoption 6th Edition<sup>(2)</sup>):

- the benching width in manholes greater than 1.5m deep may not be less than 225mm on one side.

The product shall be demonstrated to meet general fitness for purpose

requirements for operations staff working in the manholes.

2.4 Significant requirements of Sewers for Adoption<sup>(2)</sup> are summarised below. Clause 2.9 Design of Manholes:

- largest pipe shall be 700 mm diameter in 1500 mm diameter manhole or equivalent;
- largest pipe shall be 900 mm diameter in 1800 mm diameter manhole or equivalent;
- rocker pipes should be provided at entry to and exits from manholes.

Materials specification Clause 5.2.29:

- manholes and chambers shall comply with the relevant provisions of EN 1917<sup>(6)</sup> and BS 5911-3<sup>(7)</sup>.

## 3. Type testing

3.1 The test requirements for base units in EN 1917<sup>(6)</sup> and BS 5911<sup>(7)</sup> are summarised in Table 1.

3.2 The bedding beneath a base shall be proof loaded and any settlement shall not exceed 10mm. The following bedding materials meeting the requirements of BS EN 13242<sup>(8)</sup> shall be used: 1. 14mm to 5mm graded aggregate, 2. 10mm nominal single size aggregate. A manhole base placed on the bedding shall be loaded to 50 tonnes vertically. A DN 1200 base can be considered to be representative of the size range.

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Test	EN 1917 Clause	BS 5911
Drilled core strength	4.2.2.1	-
Water absorption	4.2.7.1	-
Surface finish	4.3.2	4.3.1
Geometrical characteristics	4.3.3	5.4
Installed steps	4.3.7	-

**Table 1 Type test requirements applicable to DN 1500 and DN 1800**

3.3 The degree of friction provided by the surface grip, when wet, shall be tested by a sewerage operative standing on the benching in typical work boots. The degree of friction provided by the precast concrete shall not be less than that provided by concrete with a steel trowel finish.

3.4 Watertightness tests on the joints between the lining and pipes shall be carried out in accordance with the requirements of DIN 4060<sup>(9)</sup>. The sizes of joints that are tested shall include the smallest and largest diameters that are available in the bases.

#### **4. Production quality audit**

4.1 An audit or proof of the production quality control systems procedures of the manufacturer shall be undertaken and a visit to the manufacturing premises made to witness the production process.

4.2 Quality control certification for the materials suppliers shall be available.

4.3 Certification of any third party Quality Control audits shall be available

#### **5. Documentation**

5.1 The information provided to designers and installers shall be reviewed to check for completeness, accuracy and agreement with UK water industry requirements and general "fitness for purpose" requirements.

5.2 Documentation shall include:

- product details for designers;
- installation details for contractors.

#### **6. Installation**

6.1 WRC shall witness the installation of two base units on site including the first manhole ring in order to check the installation instructions contain the necessary information for site staff.

6.2 WRC shall witness the connecting sewers being installed into the bases to create leaktight joints. This does not have to be undertaken on site.

6.3 The installed products shall be inspected to check the general quality and "fitness for purpose" of the system.

6.4 The potential for settlement of the manhole base shall be assessed by inspecting manholes that have been in service for a minimum of three months. A minimum of three manholes located in trafficked roads shall be inspected. CCTV shall be used to identify if there has been any significant settlement of the manhole relative to the incoming sewers. A visual inspection of the

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manhole cover and surround shall be made to identify if significant settlement has occurred at ground level. Note: this check may be carried out within six months of a WRc Approved certificate being issued. If settlement is shown to be significant, then the certificate shall be withdrawn.

## 7. Operational practices

7.1 The access into the sewers for sewer operations activities shall be checked. A CCTV tractor unit shall be shown to be able to successfully enter a sewer where the rotation at the sewer/manhole joint is the maximum that may be required in practice. The sewer diameter shall be the minimum that can be connected to the manhole.

7.2 The configuration of the chambers' channels and width of benching with respect to operational requirements shall be checked.

## 8. References

1. Kijlstra Sewer System: Manholes brochure.
2. Sewers for Adoption 6<sup>th</sup> Edition, WRc March 2006.
3. Sewers for Scotland 2<sup>nd</sup> Edition, WRc July 2007.
4. BS EN 752:2008 Drain and sewer systems outside buildings.
5. The Building Regulations 2000 Part H Drainage and waste disposal.
6. BS EN 1917:2002 Concrete manholes and inspection chambers, un-reinforced, steel fibre and reinforced.
7. BS 5911-3:2002 Concrete pipes and ancillary concrete products. Specification for un-reinforced and reinforced concrete manholes and soakaways (complementary to BS EN 1917:2002).
8. BS EN 13242:2002+A1:2007 Aggregates for unbound and hydraulically bound materials for use in civil engineering work and road construction.
9. DIN 4060 Pipe joint assemblies with elastomeric seals for use in drains and sewers, Deutsche Norm 1998.