

TESTING, EXAMINATION AND ASSESSMENT OF DUCTILE IRON PIPES SUBMITTED AS LIMITED TYPE TEST SAMPLES

INTRODUCTION

For the purposes of Product Certification the test & evaluation items detailed below were submitted on behalf of Electrosteel Castings Limited (ECL), Khardah Works, Kolkata, India, for testing and assessment against the requirements of BS EN 545:2010 Clause 5.3*(BS EN 598:2007+A1:2009 Clause 5.5.4 and BS ISO 2531:2009 Clause 4.1.3.4) as indicated on the following pages of this Report.

The tests and assessments contained in this Report were undertaken by BSI at the manufacturer's premises in Kolkata, India on 9 to 13 December 2011.

*Compliance with Clause 5.3 requires performance testing to clause 7.2 of BS EN 545:2010.

The test methods & requirements of this clause are identical (or considered more onerous) than those in BS EN 598 & BS ISO 2531, hence only testing to BS EN 545 has been referenced in this report.

The pipe produced is in essence the same for all specifications BS EN 545; BS EN 598 and BS ISO 2351 and only differs in its compliance with the requirements for its coating (colour); lining and marking as applicable in those Standards, its jointing capabilities are not affected by these factors.

TEST AND EVALUATION ITEMS – DUCTILE IRON PIPES

Sample Table No	Nominal Size (mm)	Component Description
1	DN 200 C64	ELECTROLOCK Restrained Flexible Joint
2	DN 400 C40	ELECTROLOCK Restrained Flexible Joint

NOTES

1. The client requested the scope of their Kitemark Licence be extended to cover a restrained flexible joint known as ELECTROLOCK. Therefore this limited type test report is in addition to the audit test reports which bear the same but individual report numbers.
2. Previous type test reports and subsequent audit test reports provide evidence that the basic pipe and the finishing processes have been evaluated. The following type test reports refer:
 - a. 285/000275 & 285/4025051 for KM 52142 - BS EN 598;
 - b. 285/000276 for KM 39560 - BS EN 545
 - c. 285/000273 for KM 34577 - ISO 2531
3. Other reference documentation:
 - a. Annexure: WT-02-32-01 and WT-02-32-01/01;
 - b. Date wise pressure monitoring WT-02-32-01/02; and
 - c. Details of stoppage WT-02-32-01/03.

SUMMARY OF RESULTS

The test items as detailed above met the requirements of those clauses, or parts thereof, of the Specification against which assessments were made and the Manufacturer's specification.

CLAUSE	PERFORMANCE REQUIREMENTS FOR JOINTS	ASSESSMENT
5.	PERFORMANCE REQUIREMENTS FOR JOINTS	
5.1	<p>General</p> <p>Pipes of preferred sizes as per Table 10 were selected to qualify the product size range of DN 100 to DN 700 inclusive. DN 700 being considered as part of the adjacent group DN 300 to DN 600 by design and manufacturing processes.</p>	
5.3	<p>Restrained flexible joints</p> <p>The following joint assemblies were tested against the requirements of this clause: DN 200 ELECTROLOCK restrained joint socket (Sample 1) DN 400 ELECTROLOCK restrained joint socket (Sample 2)</p> <p>The joints were performance tested in accordance with Clause 7.2.2 & 7.2.5 following the requirements of 5.2.2 & 5.2.3 as appropriate.</p> <p>Note: The withdrawal condition of 5.2.2a does not apply to the testing of restrained joints, and test methods 7.2.3 & 7.2.4 have not assessed as an unrestrained version of the joint type has been previously tested.</p>	
	<p>5.2.2 : Test conditions</p> <p>a. A joint of maximum annulus aligned and withdrawn, was subjected to the specified shear load.</p> <p>b. A joint of maximum annulus was deflected by the amount declared by the manufacturer.</p>	
7.2.2	<p>When tested in accordance with Clause 7.2.2 the specified positive internal hydrostatic pressure was applied for a period of 2 hours. The joint exhibited no visible evidence of leakage during the test.</p> <p>DN 200 and DN 400 assemblies</p>	Pass
7.2.3	<p>When tested in accordance with Clause 7.2.3 a negative internal pressure of 0.9 bar below atmospheric pressure was applied for a period of 2 hours.</p> <p>DN 200 and DN 400 assemblies</p>	N/A
7.2.4	<p>When tested in accordance with Clause 7.2.4 a positive external hydrostatic pressure of 2.0 bar was applied for a period of 2 hours. The joint exhibited no visible evidence of leakage during the test.</p> <p>DN 200 and DN 400 assemblies</p>	N/A
7.2.5	<p>When tested in accordance with Clause 7.2.5 the specified cyclic positive internal hydrostatic pressures were cycled for a period of 24000 cycles. The joint exhibited no visible evidence of leakage during the test.</p> <p>DN 200 and DN 400 assemblies</p>	Pass

CLAUSE

BS EN 545:2010 TEST AND EVALUATION

7.2.2 Leak tightness of flexible joints to positive internal pressure

*Commentary for **Sample 1:***

The test assembly and test apparatus was as given in 7.2.2. The test assembly was filled with water and suitably vented of air.

The pressure was steadily increased up to 71 bar. This being the test pressure as stated below based on the manufacturers declared PFA of 44.0 Bar. The joint was thoroughly inspected every 15 minutes.

Test requirements: 2 h duration
Test pressure: 1.5 x PFA +5 bar
Shear load: >50DN in N
Deflection: 4°

Required Result: No visible leakage

Test Location: Electrosteel Castings Limited, 49 B. T. Road, Kolkata

Date: 09-12-11

*Commentary for **Sample 2:***

The test assembly and test apparatus was as given in 7.2.2. The test assembly was filled with water and suitably vented of air.

The pressure was steadily increased up to 50 bar. This being the test pressure as stated below based on the manufacturers declared PFA of 30.0 Bar. The joint was thoroughly inspected every 15 minutes.

Test requirements: 2 h duration
Test pressure: 1.5 x PFA +5 bar
Shear load: >50DN in N
Deflection: 3°

Required Result: No visible leakage

Test Location: Electrosteel Castings Limited, 49 B. T. Road, Kolkata

Date: 09-12-11

CLAUSE BS EN 545:2010 TEST AND EVALUATION

7.2.5 Leak tightness of flexible joints to dynamic internal pressure

*Commentary for **Sample 1:***

The test assembly and test apparatus was as given in 7.2.2. The test assembly was filled with water and suitably vented of air.

The pressure was steadily increased up to PMA (52.8 bar as per manufacturer's declaration), the allowable maximum operating pressure of the joint, then automatically monitored according to the specified pressure cycle.

Test requirements: 24,000 cycles

Test pressure: Between PMA and (PMA-5) bar

Required Result: No visible leakage

Test Location: Electrosteel Castings Limited, 49 B. T. Road, Kolkata

Start Date: 13-12-11

End Date: 20-12-11

Pressure monitoring with respect to time and number of cycles have been recorded in real time and the same is available for future reference.

The end of the Cyclic Pressure test was observed on 20-12-11

*Commentary for **Sample 2***

The test assembly and test apparatus was as given in 7.2.2. The test assembly was be filled with water and suitably vented of air.

The pressure was be steadily increased up to PMA (36 bar as per manufacturer's declaration), the allowable maximum operating pressure of the joint, then automatically monitored according to the specified pressure cycle.

Test requirements: 24,000 cycles

Test pressure: Between PMA and (PMA-5) bar

Required Result: No visible leakage

Test Location: Electrosteel Castings Limited, 49 B. T. Road, Kolkata

Start Date: 20th December 2011

End Date: 28th December 2011

Pressure monitoring with respect to time and number of cycles have been recorded in real time and the same is available for future reference.

The end of the Cyclic Pressure test was observed on 28-12-11

Records seen at the manufacturing location, confirming that 100% of castings were hydrostatically tested in accordance with clause 6.5.

Any castings that visibly leak during this test are rejected by E.C.L.