



**Ranhill  
SAJ**

# **SPECIFICATIONS FOR DUCTILE IRON PIPES & FITTINGS**

**SPECIFICATION SAJ PS / DI / 001**


**(Rev. 4.0 / 02.2019)**

QUALITY ASSURANCE DEPARTMENT  
RANHILL SAJ SDN. BHD.

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Approved by :   
Head of Quality Assurance

## SPECIFICATION FOR DUCTILE IRON PIPE & FITTINGS

<b>CONTENT</b>	<b>Page</b>
1.0 GENERAL	3
2.0 PIPES	3
3.0 PROCESS OF MANUFACTURE	3
4.0 LENGTH AND DIMENSIONS	4
5.0 COATING AND LINING FOR PIPES	4
6.0 INTERNAL LINING OF CEMENT MORTAR	5
7.0 FITTINGS	6
8.0 COATINGS FOR PIPES AND ACCESSORIES	6
9.0 RUBBER RING/ GASKET	6
10.0 TEST METHOD	7
11.0 PACKING	10
12.0 MARKING OF PIPES	10
13.0 PRE-DELIVERY AND EVALUATION	10
14.0 CERTIFICATION	11
SCHEDULE OF STORES	12-43

**Ranhill**  
**SAJ**

## SPECIFICATION FOR DUCTILE IRON PIPE & FITTINGS

### 1. General

- a. The specification is applicable to Ductile Iron Pipes for water supply systems and shall conform to MS 1919:2013.
- b. These specifications will provide necessary information on the product dimension and requirements for the supply of pipes and fittings only.

### 2. Pipes

- a. The pipe shall manufactured with socket and spigot, plain-ends and flanged-ends of Class 40, Class 50, Class 64 and Class 100.
- b. For all special/fittings, the product shall be in Series A.
- c. All Ductile Iron Pipes and accessories shall be designed to withstand hydraulic working pressure of PN 16.
- d. All Ductile Iron or stainless steel and accessories shall be complying with PN 16 BS 4504 or equivalent standards.

### 3. Process of Manufacturer

- a. Pipes and the accessories of Ductile Iron may subjected to suitable heat treatment in order to give them the required mechanical characteristics or tensile properties as shown in Table 1 below.

Table 1: Tensile properties

Type of casting	Tensile strength, MPa	Elongation, %		Hardness
	DN 40 to DN 2000	DN 40 to DN 1000	DN 1100 to DN 2000	
Centrifugally Cast Pipe	420	10	7	230 HBW
Fittings	420	5	5	250HBW

#### 4. Length and Dimensions of Pipes

- 4.1 The effective length of all straight pipes shall be 6.0 meters.  
 4.2 The diameter and shell thickness of standard pipes shall be shown in Table 2 below.

Table 2: Dimensions of pipes

DN	External Diameter (DE), mm		Minimum wall thickness, mm			
	Nominal	Limit deviations	Class 40	Class 50	Class 64	Class 100
80	98	+1/-2.7	3.0	3.5	4.0	4.7
100	118	+1/-2.8	3.0	3.5	4.0	4.7
125	144	+1/-2.8	3.0	3.5	4.0	5.0
150	170	+1/-2.9	3.0	3.5	4.0	5.9
200	222	+1/-3.0	3.1	3.9	5.0	7.7
250	274	+1/-3.1	3.9	4.8	6.1	9.5
300	326	+1/-3.3	4.6	5.7	7.3	11.2
350	378	+1/-3.4	5.3	6.6	8.5	13.0
400	429	+1/-3.5	6.0	7.5	9.6	14.8
450	480	+1/-3.6	6.8	8.4	10.7	16.6
500	532	+1/-3.8	7.5	9.3	11.9	18.3
600	635	+1/-4.0	8.9	11.1	14.2	21.9
700	738	+1/-4.3	10.4	13.0	16.5	
800	842	+1/-4.5	11.9	14.8	18.8	

#### 5. External coating of zinc with finishing layer for Pipes

- 5.1 The external coating of centrifugally cast ductile iron pipes shall comprise a layer of metallic zinc, covered by a finishing layer of a bituminous product or synthetic resin compatible with zinc. Both layers shall be works applied.
- 5.2 The metallic zinc coating shall cover the external surface of the pipe and provide dense, continuous, uniform layer. It shall be free from defects as vare patches or lack of adhesion. The uniformity of the coating shall be checked by visual inspection. The mean mass of zinc per unit area shall be not less than 200g/m<sup>2</sup>. The purity of the zinc used shall be at least 99.99%.
- 5.3 The finishing layer shall uniformly cover the whole surface of the metallic zinc layer and be free from such defects as bare patches or lack of adhesion. The uniformity of the finishing layer shall be checked by visual inspection. The mean thickness of the finishing layer shall not be less than 70µm and the local minimum thickness not less than 50µm.
- 5.4 Damage to coating where the area of total removal of metallic zinc has a width exceeding 5mm and areas left uncoated shall be repaired. Repairs shall be carried out either by:

- a. metallic zinc spray complying with Clause 5.2.
  - b. application of zinc – rich paint containing at least 90% zinc by mass of dry film and with a mean mass of applied paint shall not less than 220g/m<sup>2</sup>.
  - c. application of a finishing layer complying with Clause 5.3.
- 5.5 Unless otherwise specified, the finishing layer of bituminous product shall be coated externally with either one of the following:
- Coal – tar epoxy (epoxy content approximately 12%)
  - Standard coating materials as specified in BS 4147:1980 Type I (bitumen based, hot applied) or
  - Standard coating materials as specified in BS 3416:1976 Type II (bitumen based, cold applied)

## 6. Internal Lining of Cement Mortar for Pipes

- 6.1 All D.I. Pipes and specials/fittings shall be mortar-lined.
- 6.2 The cement mortar lining of ductile iron pipes shall constitute a dense, homogeneous layer covering the total internal surface of the pipe barrel.
- 6.3 Prior to application of the lining, the metal surface shall be free from loose material and oil or grease.
- 6.4 The cement mortar mix shall comprise cement, sand and water. If admixtures are used, they shall comply with Clause 4.1.4 in MS 1919 and they shall be declared.
- 6.5 The ratio by mass of sand to cement shall not exceed 3.5. At the mixing stage, the ratio by mass of total water to cement depends on the manufacturing process and shall be determined such that the lining is in accordance with 4.5.3.2 and 4.5.3.3 in MS 1919.
- 6.6 The compressive strength of the cement mortar after 28 days of curing shall not less than 50 MPa.
- 6.7 The required thickness of the cement mortar lining and its tolerance shall be given in Table 3 below:-

Table 3: Thickness of cement mortar lining

DN	Dimension in mm		
	Thickness		Maximum crack width and radial displacement
	Nominal value	Limit deviation <sup>a</sup>	
40 to 300	4	-1.5	0.4
350 to 600	5	-2.0	0.5
700 to 1200	6	-2.5	0.6
1400 to 2000	9	-3.0	0.8

<sup>a</sup> The lower limit only is given

## 7. Fittings and accessories

- 7.1 The fittings and accessories of ductile iron shall be PN 16 Series A.
- 7.2 The dimensions of fittings and accessories as accordance with Clause 8.3 in MS 1919:2013.

## 8. Coatings for fittings and accessories

- 8.1 All fittings and accessories not centrifugally cast shall be delivered externally and internally coated either by a paint coating in conformity with 4.6.2 or by an epoxy coating in conformity with EN 14901. Fittings may also receive an internal lining of cement mortar conforming to 4.5.3 in MS 1919:2013, machine or hand applied, as a supplement to or as a replacement of the above paint coating.
- 8.2 Parts of accessories made from metal other than ductile iron shall have an appropriate corrosion resistance. The corrosion resistance may be attained from the material itself or a suitable coating protection system.
- 8.3 For components the coating material shall be bitumen or synthetic resin base. Appropriate additives (such as solvent, inorganic fillers, etc.) to allow easy application and drying are permitted. Prior to application of the coating, the casting surface shall be dry, free from rust or non-adhering particles or foreign matter such as oil or grease. The coating shall be works-applied.
- 8.4 The coating shall uniformly cover the whole surface of the casting and have a smooth regular appearance. Drying shall be sufficient to ensure that it will not stick to adjacent coated pieces. The mean thickness of the coating shall be not less than 70µm and the local minimum thickness shall be not less than 50µm.

## 9. Rubber Ring/Gaskets

- 9.1 Rubber rings/gaskets for ductile iron pipes and accessories shall be such size and shape of manufacturers design as to provide a pressure tight seal for the life expectancy of the pipeline under specified working, transient and test pressure conditions.
- 9.2 Rubber gasket materials shall be of EPDM complying with the requirements of MS 672:1999, AS 1646:1992 or BS EN 681 with of 55-85 IHRD with minimum volume 40% of polymer in rubber compound.

## 10. Test Method

### 10.1 Pipe dimensions

#### 10.1.1 Wall thickness

Pipe wall thickness compliance shall be demonstrated by the manufacturer. He may use a combination of various means, e.g. direct wall thickness measurement, mechanical or ultrasonic measurement. The iron wall thickness shall be measured by suitable equipment having an error limit  $\pm 0.1$ mm.

#### 10.1.2 External diameter

Socket and spigot pipes shall be measured at their spigot end by means of a circumferential tape or controlled by pass/fail gauges. In addition, they shall be visually inspected for compliance with the spigot allowable ovality and, in case of doubt; the maximum and minimum spigot axes shall be measured by suitable equipment or controlled by pass/fail gauges.

#### 10.1.3 Internal diameter

The internal diameter of the lined pipes shall be measured by means of suitable equipment either:

- a) Two measurements shall be taken at right angles, at a cross section 200mm or more from the end face or;
- b) A system of pass/fail gauges shall be passed along the bore of the pipe.

#### 10.1.4 Length

The length of socket and spigot pipes shall be measured by suitable equipment:

- On one pipe from the first batch of pipes cast from a new mould, for as-cast pipes;
- On the first pipe, for pipes which are systematically cut to a pre-set length.

### 10.2 Straightness of pipes

The pipe shall be rolled on two gentries or rotated around its axis on rollers, which in case are separated by not less than two thirds of the standardized pipe length.

The point of maximum deviation from the straight axis shall be determined and the deviation measured at that point.

### 10.3 Tensile testing of ductile iron components

#### 10.3.1 Samples

The thickness of the sample and the diameter of the test bar shall be as given in Table X.

##### 10.3.1.1 Centrifugally cast pipes

A sample shall be cut from the spigot of the pipe. This sample may be cut parallel with or perpendicular to the pipe axis, but in case of disputes the parallel with axis sample shall be used.

##### 10.3.1.2 Pipes not centrifugally cast, fittings and accessories

At the manufacturer's option, samples shall be either cast integrally with the castings or cast separately. In the latter case, they shall be cast from the same metal as that used for the castings. If the castings are subjected to heat treatment, the samples shall be subjected to the same heat treatment cycle.

#### 10.3.2 Preparation of test bar

A test bar shall be machined from each sample to be representative of the metal at the mid thickness of the sample, with a cylindrical part having the diameter as given in Table 4. The test bar shall have a gauge length equal to at least five times the nominal test bar diameter. The ends of the test bar shall be such that they will fit the testing machine.

The surface roughness profile of the cylindrical part of the test bar shall be such that  $Rz \leq 6.3$ .

If the specified diameter of the test bar is greater than 60% of the measured minimum thickness of the sample, it is allowed to machined a test bar with a smaller diameter, or to cut another sample in a thicker part of the pipe.

Table 4: Dimensions of test bar

Type of casting	Nominal diameter of the test bar, mm	Limit deviations on diameter, mm	Tolerances on shape <sup>a</sup> , mm
Centrifugally cast pipes, with a wall thickness (mm) of; a) Less than 6 b) 6 up to but not including 8 c) 8 up to but not including 12 d) 12 and over	2.5 3.5 5.0 6.0	±0.06	0.03
Pipes not centrifugally cast, fittings and accessories; a) Integrally cast samples b) Separately cast samples; 1) Sample thickness 12.5mm for casting thickness less than 12mm	5.0 6.0	±0.06 ±0.06	0.03 0.03



Table 4: Dimensions of test bar (continued)

Type of casting	Nominal diameter of the test bar, mm	Limit deviations on diameter, mm	Tolerances on shape <sup>a</sup> , mm
2) Sample thickness 25mm for casting thickness 12mm and over	12.0 Or 14.0	±0.09	0.04
<sup>a</sup> Maximum difference between the smallest and the largest diameter of the test bar.			

Tensile strength shall be calculated either from the nominal diameter of the test bar when it has been machined to fulfil all the tolerances given in Table 6, or, if it is not the case, from the actual diameter of the test bar measured before the test, the actual diameter shall be measured using a measuring device having an error limit  $\leq 0.5\%$  and shall be within  $\pm 10\%$  of the nominal diameter. The tensile test shall be carried out in accordance to EN ISO 6892-1.

#### 10.4 Works leak tightness test for pipes and fittings

##### 10.4.1 General

Pipes and fittings shall be tested in accordance with 9.4.2 and 9.4.3 respectively. The test shall be carried out on all pipes and fittings before the application of their external and internal coatings, except for the metallic zinc coating of pipes which may be applied before the test.

The test apparatus shall be suitable for applying the specified test pressures to the pipes and/or fittings. It shall be equipped with an industrial pressure gauge with an error limit  $\pm 3\%$ .

##### 10.4.2 Centrifugally cast pipes

The internal hydrostatic pressure shall be raised steadily until it reaches the works hydrostatic test pressure equal to the pressure class up to Class 50 and limited to bar 50 bar for classes above above Class 50, which is maintained for a sufficient time to allow visual inspection of the pipe barrel. The total duration of the pressure cycle shall be not less than 15s, including 10s test pressure.

##### 10.4.3 Pipes not centrifugally cast pipes, fittings and accessories

At the manufacturer's option, they shall be submitted to a hydrostatic pressure test or to an air test.

When the hydrostatic pressure test is carried out, it shall be in the same way as for centrifugally cast pipes (see 9.4.2), except for the test pressure which shall be given in Table 5.

Table 5: Works test pressure for pipes not centrifugally cast pipes, fittings and accessories

DN	Pipes not centrifugally cast pipes, fittings and accessories <sup>a</sup> bar
40 to 300	25 <sup>b</sup>
350 to 600	16
700 to 2000	10

<sup>a</sup> The works hydrostatic test pressure is less than for pipes because of the difficulty providing sufficient restraint to high internal pressures during test.

<sup>b</sup> 16 bar for pipes and fittings with PN10 flanges.

When the air test is carried out, it shall be with an internal pressure of at least 1 bar and a visual inspection time not less than 10s, for leak detection, the castings shall be either uniformly coated on their external surface by a suitable foaming agent or submerged in water.

### 11. Packing

All ductile iron pipe shall be packed accordingly with proper methods and protected from damage during transit.

### 12. Marking

All ductile iron pipes and fittings shall have the following body markings:-

- a. The manufacturer name or mark.
- b. The identification of the year manufacture.
- c. The identification as ductile iron.
- d. The nominal size (i.e. DN ...).
- e. The rating of flanges when applicable (i.e. PN ...).
- f. Standard reference – MS 1919:2013.
- g. The initial 'SAJ' in capital letters.
- h. Pipe Class.

### 13. Pre-Delivery Inspection and Evaluation

- a. It is the responsibility of the tenderer to inform SAJ for inspection purposes during manufacturing and before delivery.
- b. SAJ reserve the right to inspect and witness the testing of product offered.
- c. At any time, when requested, the supplier is to provide SAJ sample of the product offered for evaluation purposes. All costs shall be borne by the supplier.
- d. If at any time the supplier fails to deliver the required sample, the product is deemed fail to meet the specifications.

## 14 Certification

- a. Manufacturer or supplier are required to provide a copy of the certificate and testing report from SIRIM, IKRAM or other recognized certification body.
- b. Manufacturer or supplier are required to provide a copy of SPAN's approval certificate to SAJ.
- c. Tests report required shall be those tests conducted within a year period.
- d. SAJ have the right to refuse offer or reject supply if the document required are not enclosed.

A graphic element consisting of a light green square at the top, a light red trapezoidal shape below it, and a light red triangle pointing downwards to the right, all overlapping to form a stylized logo.

**Ranhill  
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# **SCHEDULE OF STORES**

**Ranhill  
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Ranhill SAJ Sdn. Bhd. (A)  
**Schedule of Stores for Supply and Delivery of Ductile Iron Pipes Spigot & Socket**  
**Class 40**  
**To SAJ Specification PS/DI/001 for The Period of ..... Year(s)**

No.	Nominal Diameter (mm)	Outside Diameter (mm)	Provisional Quantity	Rate (RM)	Amount (RM)
1	80	98			
2	100	118			
3	125	144			
4	150	170			
5	200	222			
6	250	274			
7	300	326			
8	350	378			
9	400	429			
10	450	480			
11	500	532			
12	600	635			
13	700	738			
14	800	842			
	<b>TOTAL</b>	<b>TENDERED</b>			

**(Ringgit:.....)**

Signature of Tenderer:..... Signature of witness:.....

Name:..... Name:.....

In the capacity of:..... Address:.....

Tenderer's Seal or chop:.....

Date:..... Date:.....



Ranhill SAJ Sdn. Bhd. (A)  
**Schedule of Stores for Supply and Delivery of Ductile Iron Pipes Spigot & Socket**  
**Class 50**  
**To SAJ Specification PS/DI/001 for The Period of ..... Year(s)**

No.	Nominal Diameter (mm)	Outside Diameter (mm)	Provisional Quantity	Rate (RM)	Amount (RM)
1	80	98			
2	100	118			
3	125	144			
4	150	170			
5	200	222			
6	250	274			
7	300	326			
8	350	378			
9	400	429			
10	450	480			
11	500	532			
12	600	635			
13	700	738			
14	800	842			
	<b>TOTAL</b>	<b>TENDERED</b>			

**(Ringgit:.....)**

Signature of Tenderer:..... Signature of witness:.....

Name:..... Name:.....

In the capacity of:..... Address:.....

Tenderer's Seal or chop:.....

Date:..... Date:.....



Ranhill SAJ Sdn. Bhd. (A)  
**Schedule of Stores for Supply and Delivery of Ductile Iron Pipes Spigot & Socket**  
**Class 64**  
**To SAJ Specification PS/DI/001 for The Period of ..... Year(s)**

No.	Nominal Diameter (mm)	Outside Diameter (mm)	Provisional Quantity	Rate (RM)	Amount (RM)
1	80	98			
2	100	118			
3	125	144			
4	150	170			
5	200	222			
6	250	274			
7	300	326			
8	350	378			
9	400	429			
10	450	480			
11	500	532			
12	600	635			
13	700	738			
14	800	842			
	<b>TOTAL</b>	<b>TENDERED</b>			

**(Ringgit:.....)**

Signature of Tenderer:..... Signature of witness:.....

Name:..... Name:.....

In the capacity of:..... Address:.....

Tenderer's Seal or chop:.....

Date:..... Date:.....



Ranhill SAJ Sdn. Bhd. (A)  
**Schedule of Stores for Supply and Delivery of Ductile Iron Pipes Spigot & Socket**  
**Class100**  
**To SAJ Specification PS/DI/001 for The Period of ..... Year(s)**

No.	Nominal Diameter (mm)	Outside Diameter (mm)	Provisional Quantity	Rate (RM)	Amount (RM)
1	80	98			
2	100	118			
3	125	144			
4	150	170			
5	200	222			
6	250	274			
7	300	326			
8	350	378			
9	400	429			
10	450	480			
11	500	532			
12	600	635			
	<b>TOTAL</b>	<b>TENDERED</b>			

**(Ringgit:.....)**

Signature of Tenderer:..... Signature of witness:.....

Name:..... Name:.....

In the capacity of:..... Address:.....

Tenderer's Seal or chop:.....

Date:..... Date:.....





Ranhill SAJ Sdn. Bhd. (B)  
**Supply And Delivery Of Ductile Iron Specials**  
**To SAJ Specification PS/DI/001 For The Period Of ..... Year(s)** (Thickness of specials for the main barrel shall follow the minimum nominal thickness of Ductile Iron Pipes as in MS 1919:2013)

No	Description	Prov. Qty	Rate (RM)	Amount (RM)
<b>1</b>	<b>Double Flanged Bend</b>			
<b>A</b>	<b>90 Deg</b>			
1	80mm			
2	100mm			
3	125mm			
4	150mm			
5	200mm			
6	250mm			
7	300mm			
8	350mm			
9	400mm			
10	450mm			
11	500mm			
12	600mm			
13	700mm			
14	800mm			

**(Ringgit:.....)**

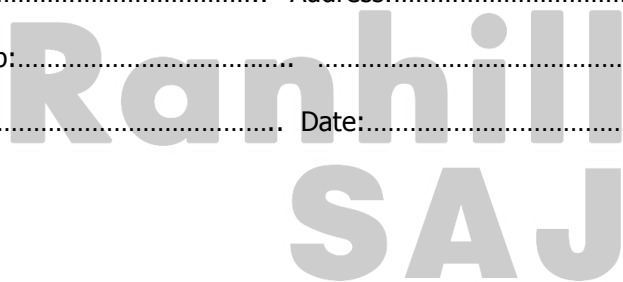
Signature of Tenderer:..... Signature of witness:.....

Name:..... Name:.....

In the capacity of:..... Address:.....

Tenderer's Seal or chop:.....

Date:..... Date:.....



Ranhill SAJ Sdn. Bhd. (B)  
**Supply And Delivery Of Ductile Iron Specials**  
**To SAJ Specification PS/DI/001 For The Period Of ..... Year(s)** (Thickness of specials for the main barrel shall follow the minimum nominal thickness of Ductile Iron Pipes as in MS 1919:2013)

No	Description	Prov. Qty	Rate (RM)	Amount (RM)
..1	<b>Double Flanged Bend</b>			
<b>B</b>	<b>45 Deg</b>			
1	80mm			
2	100mm			
3	125mm			
4	150mm			
5	200mm			
6	250mm			
7	300mm			
8	350mm			
9	400mm			
10	450mm			
11	500mm			
12	600mm			
13	700mm			
14	800mm			

**(Ringgit:.....)**

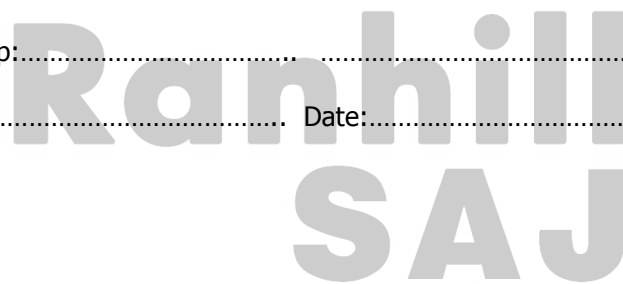
Signature of Tenderer:..... Signature of witness:.....

Name:..... Name:.....

In the capacity of:..... Address:.....

Tenderer's Seal or chop:.....

Date:..... Date:.....



Ranhill SAJ Sdn. Bhd. (B)  
**Supply And Delivery Of Ductile Iron Specials**  
**To SAJ Specification PS/DI/001 For The Period Of ..... Year(s)** (Thickness of specials for the main barrel shall follow the minimum nominal thickness of Ductile Iron Pipes as in MS 1919:2013)

No	Description	Prov. Qty	Rate (RM)	Amount (RM)
..1	<b>Double Flanged Bend ..... con't</b>			
<b>C</b>	<b>22 ½ Deg</b>			
1	80mm			
2	100mm			
3	125mm			
4	150mm			
5	200mm			
6	250mm			
7	300mm			
8	350mm			
9	400mm			
10	450mm			
11	500mm			
12	600mm			
13	700mm			
14	800mm			

**(Ringgit:.....)**

Signature of Tenderer:..... Signature of witness:.....

Name:..... Name:.....

In the capacity of:..... Address:.....

Tenderer's Seal or chop:.....

Date:..... Date:.....



Ranhill SAJ Sdn. Bhd. (B)  
**Supply And Delivery Of Ductile Iron Specials**  
**To SAJ Specification PS/DI/001 For The Period Of ..... Year(s)** (Thickness of specials for the main barrel shall follow the minimum nominal thickness of Ductile Iron Pipes as in MS 1919:2013)

..1	<b>Double Flanged Bend ..... con't</b>			
<b>D</b>	<b>11 ¼ Deg</b>			
1	80mm			
2	100mm			
3	125mm			
4	150mm			
5	200mm			
6	250mm			
7	300mm			
8	350mm			
9	400mm			
10	450mm			
11	500mm			
12	600mm			
13	700mm			
14	800mm			

**(Ringgit:.....)**

Signature of Tenderer:..... Signature of witness:.....

Name:..... Name:.....

In the capacity of:..... Address:.....

Tenderer's Seal or chop:.....

Date:..... Date:.....



Ranhill SAJ Sdn. Bhd. (B)  
**Supply And Delivery Of Ductile Iron Specials**  
**To SAJ Specification PS/DI/001 For The Period Of ..... Year(s)** (Thickness of  
 specials for the main barrel shall follow the minimum nominal thickness of Ductile Iron  
 Pipes as in MS 1919: 2013)

No	Description	Prov. Qty	Rate (RM)	Amount (RM)
<b>2</b>	<b>Double Socket Bend</b>			
<b>A</b>	<b>90 Deg</b>			
1	80mm			
2	100mm			
3	125mm			
4	150mm			
5	200mm			
6	250mm			
7	300mm			
8	350mm			
9	400mm			
10	450mm			
11	500mm			
12	600mm			
13	700mm			
14	800mm			

**(Ringgit:.....)**

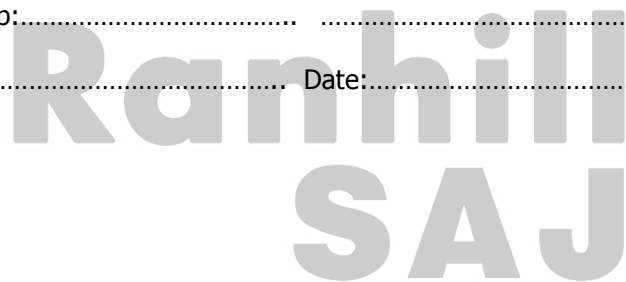
Signature of Tenderer:..... Signature of witness:.....

Name:..... Name:.....

In the capacity of:..... Address:.....

Tenderer's Seal or chop:.....

Date:..... Date:.....



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**To SAJ Specification PS/DI/001 For The Period Of ..... Year(s)** (Thickness of  
 specials for the main barrel shall follow the minimum nominal thickness of Ductile Iron  
 Pipes as in MS 1919:2013)

No	Descriptio	Prov. Qty	Rate (RM)	Amount (RM)
..2	<b>Double Socket Bend</b>			
<b>B</b>	<b>45 Deg</b>			
1	80mm			
2	100mm			
3	125mm			
4	150mm			
5	200mm			
6	250mm			
7	300mm			
8	350mm			
9	400mm			
10	450mm			
11	500mm			
12	600mm			
13	700mm			
14	800mm			

**(Ringgit:.....)**

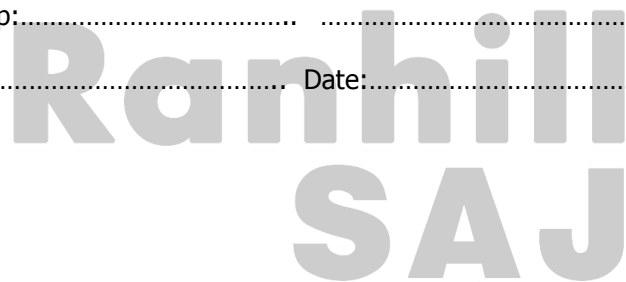
Signature of Tenderer:..... Signature of witness:.....

Name:..... Name:.....

In the capacity of:..... Address:.....

Tenderer's Seal or chop:.....

Date:..... Date:.....



Ranhill SAJ Sdn. Bhd. (B)  
**Supply And Delivery Of Ductile Iron Specials**  
**To SAJ Specification PS/DI/001 For The Period Of ..... Year(s)** (Thickness of specials for the main barrel shall follow the minimum nominal thickness of Ductile Iron Pipes as in MS 1919: 2013)

No	Description	Prov. Qty	Rate (RM)	Amount (RM)
..2	<b>Double Socket Bend ..... con't</b>			
<b>C</b>	<b>22 ½ Deg</b>			
1	80mm			
2	100mm			
3	125mm			
4	150mm			
5	200mm			
6	250mm			
7	300mm			
8	350mm			
9	400mm			
10	450mm			
11	500mm			
12	600mm			
13	700mm			
14	800mm			

**(Ringgit:.....)**

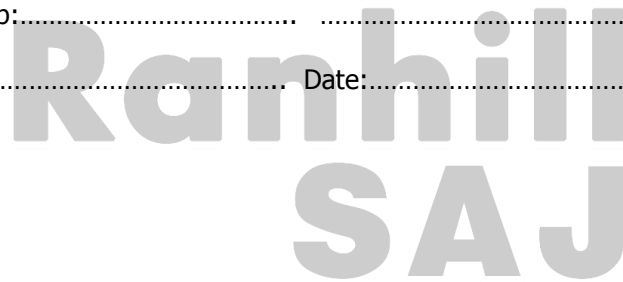
Signature of Tenderer:..... Signature of witness:.....

Name:..... Name:.....

In the capacity of:..... Address:.....

Tenderer's Seal or chop:.....

Date:..... Date:.....



Ranhill SAJ Sdn. Bhd. (B)  
**Supply And Delivery Of Ductile Iron Specials**  
**To SAJ Specification PS/DI/001 For The Period Of ..... Year(s)** (Thickness of  
 specials for the main barrel shall follow the minimum nominal thickness of Ductile Iron  
 Pipes as in MS 1919 : 2013)

No	Description	Prov. Qty	Rate (RM)	Amount (RM)
..2	<b>Double Socket Bend ..... con't</b>			
<b>D</b>	<b>11 ¼ Deg</b>			
1	80mm			
2	100mm			
3	125mm			
4	150mm			
5	200mm			
6	250mm			
7	300mm			
8	350mm			
9	400mm			
10	450mm			
11	500mm			
12	600mm			
13	700mm			
14	800mm			

**(Ringgit:.....)**

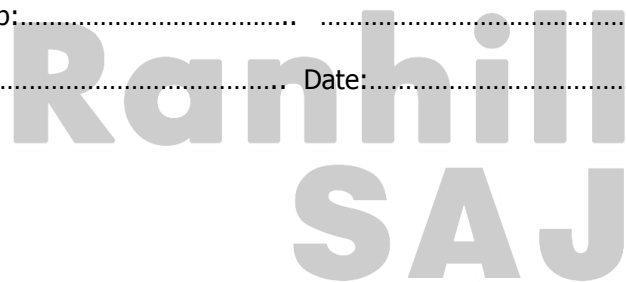
Signature of Tenderer:..... Signature of witness:.....

Name:..... Name:.....

In the capacity of:..... Address:.....

Tenderer's Seal or chop:.....

Date:..... Date:.....





Ranhill SAJ Sdn. Bhd. (B)  
**Supply And Delivery Of Ductile Iron Specials**  
**To SAJ Specification PS/DI/001 For The Period Of ..... Year(s)** (Thickness of specials for the main barrel shall follow the minimum nominal thickness of Ductile Iron Pipes as in MS 1919:2013)

No	Description	Prov. Qty	Rate (RM)	Amount (RM)
<b>3</b>	<b>Double Flanged 90 Deg Duckfoot Bend</b>			
<b>A</b>	<b>90 Deg</b>			
1	80mm			
2	100mm			
3	125mm			
4	150mm			
5	200mm			
6	250mm			
7	300mm			
8	350mm			
9	400mm			
10	450mm			
11	500mm			
12	600mm			
13	700mm			
14	800mm			

**(Ringgit:.....)**

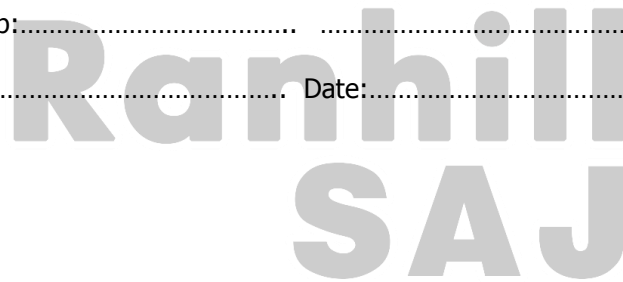
Signature of Tenderer:..... Signature of witness:.....

Name:..... Name:.....

In the capacity of:..... Address:.....

Tenderer's Seal or chop:.....

Date:..... Date:.....



Ranhill SAJ Sdn. Bhd. (B)  
**Supply And Delivery Of Ductile Iron Specials**  
**To SAJ Specification PS/DI/001 For The Period Of ..... Year(s)** (Thickness of  
 specials for the main barrel shall follow the minimum nominal thickness of Ductile Iron  
 Pipes as in MS 1919:2013)

No	Description	Prov. Qty	Rate (RM)	Amount (RM)
<b>4</b>	<b>Double Flanged 90 Deg Long Bend</b>			
1	80mm			
2	100mm			
3	125mm			
4	150mm			
5	200mm			
6	250mm			
7	300mm			
8	350mm			
9	400mm			
10	450mm			
11	500mm			
12	600mm			
13	700mm			
14	800mm			

**(Ringgit:.....)**

Signature of Tenderer:..... Signature of witness:.....

Name:..... Name:.....

In the capacity of:..... Address:.....

Tenderer's Seal or chop:.....

Date:..... Date:.....



Ranhill SAJ Sdn. Bhd. (B)  
**Supply And Delivery Of Ductile Iron Specials**  
**To SAJ Specification PS/DI/001 For The Period Of ..... Year(s)** (Thickness of specials for the main barrel shall follow the minimum nominal thickness of Ductile Iron Pipes as in MS 1919: 2013)

No	Description	Prov. Qty	Rate (RM)	Amount (RM)
<b>5</b>	<b>All Flanged Tee</b>			
1	80mm x 40mm			
2	80mm x 60mm			
3	80mm x 80mm			
4	100mm x 40mm			
5	100mm x 60mm			
6	100mm x 80mm			
7	100mm x 100mm			
8	125mm x 40mm			
9	125mm x 60mm			
10	125mm x 80mm			
11	125mm x 100mm			
12	125mm x 125mm			
13	150mm x 40mm			
14	150mm x 60mm			
15	150mm x 80mm			
16	150mm x 100mm			
17	150mm x 125mm			
18	150mm x 150mm			
19	200mm x 40mm			
20	200mm x 60mm			
21	200mm x 80mm			
22	200mm x 100mm			
23	200mm x 125mm			
24	200mm x 150mm			
25	200mm x 200mm			

**(Ringgit:.....)**

Signature of Tenderer:..... Signature of witness:.....

Name:..... Name:.....

In the capacity of:..... Address:.....

Tenderer's Seal or chop:.....

Date:..... Date:.....

Ranhill SAJ Sdn. Bhd. (B)  
**Supply And Delivery Of Ductile Iron Specials**  
**To SAJ Specification PS/DI/001 For The Period Of ..... Year(s)** (Thickness of specials for the main barrel shall follow the minimum nominal thickness of Ductile Iron Pipes as in MS 1919:2013)

No	Description	Prov. Qty	Rate (RM)	Amount (RM)
<b>..5</b>	<b>All Flanged Tee..... Con't</b>			
26	250mm x 60mm			
27	250mm x 80mm			
28	250mm x 100mm			
29	250mm x 150mm			
30	250mm x 200mm			
31	250mm x 250mm			
32	300mm x 60mm			
33	300mm x 80mm			
34	300mm x 100mm			
35	300mm x 150mm			
36	300mm x 200mm			
37	300mm x 250mm			
38	300mm x 300mm			
39	350mm x 60mm			
40	350mm x 80mm			
41	350mm x 100mm			
42	350mm x 150mm			
43	350mm x 200mm			
44	350mm x 250mm			
45	350mm x 350mm			
46	400mm x 80mm			
47	400mm x 100mm			
48	400mm x 150mm			
49	400mm x 200mm			
50	400mm x 250mm			

**(Ringgit:.....)**

Signature of Tenderer:..... Signature of witness:.....

Name:..... Name:.....

In the capacity of:..... Address:.....

Tenderer's Seal or chop:.....

Date:..... Date:.....

Ranhill SAJ Sdn. Bhd. (B)  
**Supply And Delivery Of Ductile Iron Specials**  
**To SAJ Specification PS/DI/001 For The Period Of ..... Year(s)** (Thickness of specials for the main barrel shall follow the minimum nominal thickness of Ductile Iron Pipes as in MS 1919:2013)

No	Description	Prov. Qty	Rate (RM)	Amount (RM)
<b>..5</b>	<b>All Flanged Tee..... Con't</b>			
51	400mm x 300mm			
52	400mm x 400mm			
53	450mm x 100mm			
54	450mm x 150mm			
55	450mm x 200mm			
56	450mm x 250mm			
57	450mm x 300mm			
58	450mm x 400mm			
59	450mm x 450mm			
60	500mm x 100mm			
61	500mm x 200mm			
62	500mm x 400mm			
63	500mm x 500mm			
64	600mm x 200mm			
65	600mm x 400mm			
66	600mm x 600mm			
67	700mm x 200mm			
68	700mm x 400mm			
69	700mm x 700mm			
70	800mm x 200mm			
71	800mm x 400mm			
72	800mm x 600mm			
73	800mm x 800mm			

**(Ringgit:.....)**

Signature of Tenderer:..... Signature of witness:.....

Name:..... Name:.....

In the capacity of:..... Address:.....

Tenderer's Seal or chop:.....

Date:..... Date:.....

Ranhill SAJ Sdn. Bhd. (B)  
**Supply And Delivery Of Ductile Iron Specials**  
**To SAJ Specification PS/DI/001 For The Period Of ..... Year(s)** (Thickness of specials for the main barrel shall follow the minimum nominal thickness of Ductile Iron Pipes as in MS 1919:2013)

No	Description	Prov. Qty	Rate (RM)	Amount (RM)
<b>6</b>	<b>All Socket Tee</b>			
1	80mm x 40mm			
2	80mm x 80mm			
3	100mm x 40mm			
4	100mm x 60mm			
5	100mm x 80mm			
6	100mm x 100mm			
7	125mm x 40mm			
8	125mm x 80mm			
9	125mm x 100mm			
10	125mm x 125mm			
11	150mm x 40mm			
12	150mm x 80mm			
13	150mm x 100mm			
14	150mm x 150mm			
15	200mm x 40mm			
16	200mm x 80mm			
17	200mm x 100mm			
18	200mm x 150mm			
19	200mm x 200mm			
20	250mm x 80mm			
21	250mm x 100mm			
22	250mm x 150mm			
23	250mm x 200mm			
24	250mm x 250mm			
25	300mm x 100mm			
26	300mm x 150mm			
27	300mm x 200mm			
28	300mm x 250mm			
29	300mm x 300mm			

**(Ringgit:.....)**

Signature of Tenderer:..... Signature of witness:.....

Name:..... Name:.....

In the capacity of:..... Address:.....

Tenderer's Seal or chop:.....

Date:..... Date:.....

Ranhill SAJ Sdn. Bhd. (B)  
**Supply And Delivery Of Ductile Iron Specials**  
**To SAJ Specification PS/DI/001 For The Period Of ..... Year(s)** (Thickness of specials for the main barrel shall follow the minimum nominal thickness of Ductile Iron Pipes as in MS 1919:2013)

No	Description	Prov. Qty	Rate (RM)	Amount (RM)
<b>7</b>	<b>Double Socket Tee With Flanged Branch</b>			
1	80mm x 40mm			
2	80mm x 60mm			
3	80mm x 80mm			
4	100mm x 40mm			
5	100mm x 60mm			
6	100mm x 80mm			
7	100mm x 100mm			
8	125mm x 40mm			
9	125mm x 60mm			
10	125mm x 80mm			
11	125mm x 100mm			
12	125mm x 125mm			
13	150mm x 40mm			
14	150mm x 60mm			
15	150mm x 80mm			
16	150mm x 100mm			
17	150mm x 125mm			
18	150mm x 150mm			
19	200mm x 40mm			
20	200mm x 60mm			
21	200mm x 80mm			
22	200mm x 100mm			

**(Ringgit:.....)**

Signature of Tenderer:..... Signature of witness:.....

Name:..... Name:.....

In the capacity of:..... Address:.....

Tenderer's Seal or chop:.....

Date:..... Date:.....

Ranhill SAJ Sdn. Bhd. (B)  
**Supply And Delivery Of Ductile Iron Specials**  
**To SAJ Specification PS/DI/001 For The Period Of ..... Year(s)** (Thickness of specials for the main barrel shall follow the minimum nominal thickness of Ductile Iron Pipes as in MS 1919:2013)

No	Description	Prov. Qty	Rate (RM)	Amount (RM)
..7	<b>Double Socket Tee With Flanged Branch .... Con't</b>			
23	200mm x 125mm			
24	200mm x 150mm			
25	200mm x 200mm			
26	250mm x 60mm			
27	250mm x 80mm			
28	250mm x 100mm			
29	250mm x 150mm			
30	250mm x 200mm			
31	250mm x 250mm			
32	300mm x 60mm			
33	300mm x 80mm			
34	300mm x 100mm			
35	300mm x 150mm			
36	300mm x 200mm			
37	300mm x 250mm			
38	300mm x 300mm			
39	350mm x 60mm			
40	350mm x 80mm			
41	350mm x 100mm			
42	350mm x 150mm			
43	350mm x 200mm			
44	350mm x 250mm			
45	350mm x 350mm			
46	400mm x 80mm			
47	400mm x 100mm			

**(Ringgit:.....)**

Signature of Tenderer:..... Signature of witness:.....

Name:..... Name:.....

In the capacity of:..... Address:.....

Tenderer's Seal or chop:.....

Date:..... Date:.....



Ranhill SAJ Sdn. Bhd. (B)  
**Supply And Delivery Of Ductile Iron Specials**  
**To SAJ Specification PS/DI/001 For The Period Of ..... Year(s)** (Thickness of specials for the main barrel shall follow the minimum nominal thickness of Ductile Iron Pipes as in MS 1919:2013)

No	Description	Prov. Qty	Rate (RM)	Amount (RM)
..7	<b>Double Socket Tee With Flanged Branch.... Con't</b>			
48	400mm x 150mm			
49	400mm x 200mm			
50	400mm x 250mm			
51	400mm x 300mm			
52	400mm x 400mm			
53	450mm x 100mm			
54	450mm x 150mm			
55	450mm x 200mm			
56	450mm x 250mm			
57	450mm x 300mm			
58	450mm x 400mm			
59	450mm x 450mm			
60	500mm x 100mm			
61	500mm x 200mm			
62	500mm x 400mm			
63	500mm x 500mm			
64	600mm x 200mm			
65	600mm x 400mm			
66	600mm x 600mm			
67	700mm x 200mm			
68	700mm x 400mm			
69	700mm x 700mm			
70	800mm x 200mm			
71	800mm x 400mm			
72	800mm x 600mm			
73	800mm x 800mm			

**(Ringgit:.....)**

Signature of Tenderer:..... Signature of witness:.....

Name:..... Name:.....

In the capacity of:..... Address:.....

Tenderer's Seal or chop:.....

Date:..... Date:.....

Ranhill SAJ Sdn. Bhd. (B)  
**Supply And Delivery Of Ductile Iron Specials**  
**To SAJ Specification PS/DI/001 For The Period Of ..... Year(s)** (Thickness of specials for the main barrel shall follow the minimum nominal thickness of Ductile Iron Pipes as in MS 1919:2013)

No	Description	Prov. Qty	Rate (RM)	Amount (RM)
<b>8</b>	<b>All Flanged Level Invert Tee</b>			
1	100mm x 80mm			
2	150mm x 80mm			
3	150mm x 100mm			
4	200mm x 80mm			
5	200mm x 100mm			
6	250mm x 80mm			
7	250mm x 100mm			
8	300mm x 80mm			
9	300mm x 100mm			
10	300mm x 150mm			
11	350mm x 80mm			
12	350mm x 100mm			
13	350mm x 150mm			
14	400mm x 80mm			
15	400mm x 100mm			
16	400mm x 150mm			
17	400mm x 200mm			
18	450mm x 80mm			
19	450mm x 100mm			

**(Ringgit:.....)**

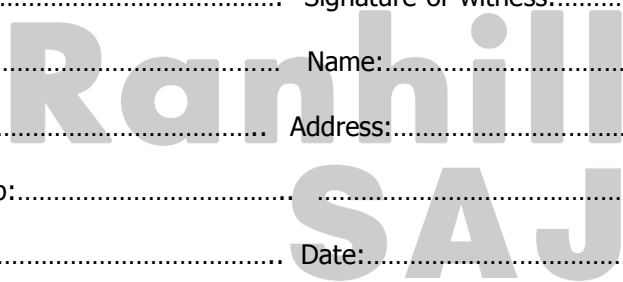
Signature of Tenderer:..... Signature of witness:.....

Name:..... Name:.....

In the capacity of:..... Address:.....

Tenderer's Seal or chop:.....

Date:..... Date:.....



Ranhill SAJ Sdn. Bhd. (B)  
**Supply And Delivery Of Ductile Iron Specials**  
**To SAJ Specification PS/DI/001 For The Period Of ..... Year(s)** (Thickness of specials for the main barrel shall follow the minimum nominal thickness of Ductile Iron Pipes as in MS 1919:2013)

No	Description	Prov. Qty	Rate (RM)	Amount (RM)
<b>..8</b>	<b>All Flanged Level Invert Tee .... Con't</b>			
20	450mm x 150mm			
21	450mm x 200mm			
22	450mm x 250mm			
23	500mm x 80mm			
24	500mm x 100mm			
25	500mm x 150mm			
26	500mm x 200mm			
27	600mm x 80mm			
28	600mm x 100mm			
29	600mm x 150mm			
30	600mm x 200mm			
31	700mm x 150mm			
32	700mm x 200mm			
<b>9</b>	<b>Double Socket Level Invert Tee With Flanged Branch</b>			
1	150mm x 80mm			
2	150mm x 100mm			
3	200mm x 80mm			
4	200mm x 100mm			
5	200mm x 150mm			
6	250mm x 80mm			
7	250mm x 100mm			
8	250mm x 150mm			
9	300mm x 80mm			
10	300mm x 100mm			
11	300mm x 150mm			

**(Ringgit:.....)**

Signature of Tenderer:..... Signature of witness:.....

Name:..... Name:.....

In the capacity of:..... Address:.....

Tenderer's Seal or chop:.....

Date:..... Date:.....

Ranhill SAJ Sdn. Bhd. (B)  
**Supply And Delivery Of Ductile Iron Specials**  
**To SAJ Specification PS/DI/001 For The Period Of ..... Year(s)** (Thickness of specials for the main barrel shall follow the minimum nominal thickness of Ductile Iron Pipes as in MS 1919:2013)

No	Description	Prov. Qty	Rate (RM)	Amount (RM)
<b>..9</b>	<b>Double Socket Level Invert Tee With Flanged Branch.... Con't</b>			
12	350mm x 100mm			
13	400mm x 100mm			
14	450mm x 100mm			
15	500mm x 100mm			
16	600mm x 100mm			
17	700mm x 100mm			
<b>10</b>				
1	80mm			
2	100mm			
3	125mm			
4	150mm			
5	200mm			
6	250mm			
7	300mm			
8	350mm			
9	400mm			
10	450mm			
11	500mm			
12	600mm			
13	700mm			
14	800mm			
<b>11</b>	<b>Double Socket Taper</b>			
1	80mm x 40mm			
2	80mm x 60mm			
3	80mm x 65mm			
4	100mm x 60mm			
5	100mm x 80mm			
6	125mm x 60mm			
7	125mm x 80mm			
8	125mm x 100mm			

**(Ringgit:.....)**

Signature of Tenderer:..... Signature of witness:.....

Name:..... Name:.....

In the capacity of:..... Address:.....

Tenderer's Seal or chop:.....

Date:..... Date:.....

Ranhill SAJ Sdn. Bhd. (B)  
**Supply And Delivery Of Ductile Iron Specials**  
**To SAJ Specification PS/DI/001 For The Period Of ..... Year(s)** (Thickness of specials for the main barrel shall follow the minimum nominal thickness of Ductile Iron Pipes as in MS 1919: 2013)

No	Description	Prov. Qty	Rate (RM)	Amount (RM)
..11	Double Socket Taper.... Con't			
9	150mm x 80mm			
10	150mm x 100mm			
11	150mm x 125mm			
12	200mm x 100mm			
13	200mm x 125mm			
14	200mm x 150mm			
15	250mm x 125mm			
16	250mm x 150mm			
17	250mm x 200mm			
18	300mm x 150mm			
19	300mm x 200mm			
20	300mm x 250mm			
21	350mm x 200mm			
22	350mm x 250mm			
23	350mm x 300mm			
24	400mm x 250mm			
25	400mm x 300mm			
26	400mm x 350mm			
27	450mm x 350mm			
28	450mm x 400mm			
29	500mm x 350mm			
30	500mm x 400mm			
31	600mm x 400mm			
32	600mm x 500mm			
33	700mm x 500mm			
34	700mm x 600mm			
35	800mm x 600mm			
36	800mm x 700mm			

**(Ringgit:.....)**

Signature of Tenderer:..... Signature of witness:.....

Name:..... Name:.....

In the capacity of:..... Address:.....

Tenderer's Seal or chop:.....

Date:..... Date:.....

Ranhill SAJ Sdn. Bhd. (B)  
**Supply And Delivery Of Ductile Iron Specials**  
**To SAJ Specification PS/DI/001 For The Period Of ..... Year(s)** (Thickness of specials for the main barrel shall follow the minimum nominal thickness of Ductile Iron Pipes as in MS 1919:2013)

No	Description	Prov. Qty	Rate (RM)	Amount (RM)
<b>12</b>	<b>Double Flanged Taper</b>			
1	80mm x 60mm			
2	80mm x 65mm			
3	100mm x 80mm			
4	125mm x 100mm			
5	150mm x 125mm			
6	200mm x 150mm			
7	250mm x 200mm			
8	300mm x 250mm			
9	350mm x 300mm			
10	400mm x 300mm			
11	400mm x 350mm			
12	450mm x 400mm			
13	500mm x 400mm			
14	600mm x 500mm			
15	700mm x 600mm			
16	800mm x 700mm			

**(Ringgit:.....)**

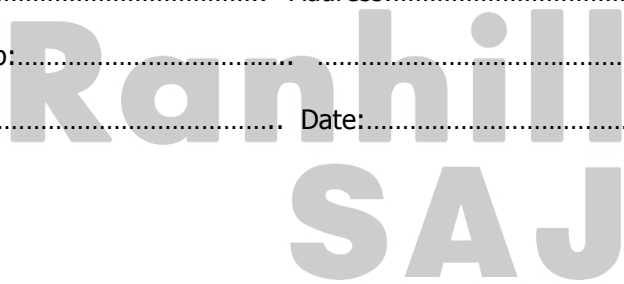
Signature of Tenderer:..... Signature of witness:.....

Name:..... Name:.....

In the capacity of:..... Address:.....

Tenderer's Seal or chop:.....

Date:..... Date:.....



Ranhill SAJ Sdn. Bhd. (B)  
**Supply And Delivery Of Ductile Iron Specials**  
**To SAJ Specification PS/DI/001 For The Period Of ..... Year(s)** (Thickness of specials for the main barrel shall follow the minimum nominal thickness of Ductile Iron Pipes as in MS 1919:2013)

No	Description	Prov. Qty	Rate (RM)	Amount (RM)
<b>13</b>	<b>Flanged Socket</b>			
1	80mm			
2	100mm			
3	125mm			
4	150mm			
5	200mm			
6	250mm			
7	300mm			
8	350mm			
9	400mm			
10	450mm			
11	500mm			
12	600mm			
13	700mm			
14	800mm			
<b>14</b>	<b>Flanged Bell Mouth</b>			
1	80mm			
2	100mm			
3	125mm			
4	150mm			
5	200mm			
6	250mm			
7	300mm			
8	350mm			
9	400mm			
10	450mm			
11	500mm			
12	600mm			
13	700mm			
14	800mm			

**(Ringgit:.....)**

Signature of Tenderer:..... Signature of witness:.....

Name:..... Name:.....

In the capacity of:..... Address:.....

Tenderer's Seal or chop:.....

Date:..... Date:.....

Ranhill SAJ Sdn. Bhd. (B)  
**Supply And Delivery Of Ductile Iron Specials**  
**To SAJ Specification PS/DI/001 For The Period Of ..... Year(s)** (Thickness of  
 specials for the main barrel shall follow the minimum nominal thickness of Ductile Iron  
 Pipes as in MS 1919:2013)

No	Description	Prov. Qty	Rate (RM)	Amount (RM)
<b>15</b>	<b>Flanged Spigot</b>			
1	80mm			
2	100mm			
3	125mm			
4	150mm			
5	200mm			
6	250mm			
7	300mm			
8	350mm			
9	400mm			
10	450mm			
11	500mm			
12	600mm			
13	700mm			
14	800mm			
<b>16</b>	<b>Blank Flange (PN16)</b>			
1	80mm			
2	100mm			
3	125mm			
4	150mm			
5	200mm			
6	250mm			
7	300mm			
8	350mm			
9	400mm			
10	450mm			
11	500mm			
12	600mm			
13	700mm			
14	800mm			

**(Ringgit:.....)**

Signature of Tenderer:..... Signature of witness:.....

Name:..... Name:.....

In the capacity of:..... Address:.....

Tenderer's Seal or chop:.....

Date:..... Date:.....





**Ranhill**  
**SAJ**