



**Bharat Heavy Electricals Limited
Tiruchirappalli-620 014**

Fuel Systems/PE (FB)



Title Sheet

Specification for

SPIRAL WOUND GASKET

Specification Number: TOS:PAT:FS:002 Revision No. : 00

Rev. No.	Date	Revision statement	Checked & Approved

	Name	Signature	Date
Prepared	Sairam N	-sd-	27.04.2021
Checked	SrinivasuArugula	-sd-	27.04.2021
Approved	G Saravana Kumar	-sd-	27.04.2021

1. **General information**

1.1 This technical specification specifies the constructional, functional and qualitative requirement of metallic spiral wound gaskets with graphite filler with centering plate for use with flanges (ASME B16.5) at different pressures and temperature.

2. **Design standard:**

The design standard for the metallic spiral wound gasket shall be as per ASME B16.20 latest edition

3. **Specification for SPIRAL WOUND GASKETS**

1.0 Item name: Self-aligning type Spiral Wound Gasket.

2.0 Application: For Heavy fuel oil (HFO) application. Flow medium – HFO at 5 kg/sq.cm at 67 deg C

3.0 Standard: Gasket shall be manufactured as per ASME B16.20 in line with size and rating as mentioned in the enquiry.

4.0 Material:

- a) Strip: SS 316
- b) The material of metallic spiral wound gasket shall be of Graphite.
- c) The centering ring and inner ring material shall be of AISI 304 stainless steel.
- d) Gaskets shall match with flanges conforming to ASME B 16.47 or 16.5, as applicable.

4. **Special construction features:**

2.1 Metallic Spiral Wound Gaskets, including centering ring and inner ring are identified by flange size (NPS), pressure class and appropriate flange standard (ASME B16.5).

2.2 The spiral wound gaskets shall be made of alternate plies of preformed metal winding and filler, tightly wound spirally.

2.3 The filler shall protrude above the metal strip by a maximum amount of 0.125 mm on either face of the gasket. At the start and conclusion of the spiral form, minimum 3 no. of metal plies can be provided without any filler material; however, the number of such plies shall not exceed 5 at each end.

2.4 The metal winding around the entire inside circumference of the gasket shall be suitably spot welded in equal spacing not exceeding 25mm with a minimum of 3 welds.

2.5 The metal winding on the outside shall be welded with a minimum of three welds, out of which one weld shall be at the terminal point.

5. **Inspection & Testing:**

2.6 **Visual Inspection**

2.6.1 The gasket shall be undamaged and the windings shall be intact.

- 2.6.2 At random, few samples shall be selected and subjected to dimensional inspection. Dimension shall conform to those given as per ASME B16.20.
- 2.6.3 The metal strip used shall be analyzed for its chemical composition and it shall conform to the specification.
- 2.6.4 The filler material shall be analyzed to estimate the percentage loss on ignition, graphite content and binder content.

2.7 **Compression Test**

- 2.7.1 The test shall consist of subjecting the gaskets to predetermined loads in the compression testing machine the thickness of the gaskets under the applied loads and after removal of loads.
- 2.7.2 The gaskets shall be subjected to a uniform unit compressive load as per ASME B16.20.
- 2.7.3 The thickness of the gasket shall be measured using dial indicators with the applied load on the gasket. The thickness shall be within the limits specified in ASME B16.20.
- 2.7.4 After the load is removed, the gasket shall recover at least 0.25 mm over the compressed thickness obtained in the compression test.
- 2.7.5 The gasket shall be visually examined after the compression test. No buckling on the inner edge of the gasket shall be allowed. The spot welds should not foil and the windings should be intact.

6. **Packing:**

Metallic Spiral Wound Gasket shall be packed in suitable cardboard containers to avoid damage during transit. It should carry proper identification giving the size, type, drawing number and supplier's name.

7. **Documents to be submitted:**

- a. **Along with offer**
 - i. Technical data sheet.
 - ii. Catalogues, Drawings
 - iii. Quality plan
- b. **After placement of order**
 - i. Test certificates



**Bharat Heavy Electricals Limited
Tiruchirappalli-620 014**

Fuel Systems/PE (FB)



Title Sheet

Specification for

SPIRAL WOUND GASKET

Specification Number: TFS: 1007

Revision No. : 00

Rev. No.	Date	Revision statement	Checked & Approved

	Name	Signature	Date
Prepared	Vikas Sethi	-sd-	20.12.2014
Checked	M Venkateswarlu	-sd-	20.12.2014
Approved	G Saravana Kumar	-sd-	20.12.2014



1. General information

- 1.1 This technical specification specifies the constructional, functional and qualitative requirement of metallic spiral wound gaskets with graphite filler with centering plate for use with flanges (ASME B16.5) at different pressures and temperature.
- 1.2 The ordering will be done with specific size and rating indicating Flange size (NPS) as per ASME standards.

2. Design standard:

The design standard for the metallic spiral wound gasket shall be as per ASME B16.20 latest edition

3. Material:

The material of metallic spiral wound gasket shall be of Graphite. The centering ring and inner ring material shall be of AISI 304 stainless steel.

4. Special construction features:

- 4.1 Metallic Spiral Wound Gaskets, including centering ring and inner ring are identified by flange size (NPS), pressure class and appropriate flange standard (ASME B16.5).
- 4.2 The spiral wound gaskets shall be made of alternate plies of preformed metal winding and filler, tightly wound spirally.
- 4.3 The filler shall protrude above the metal strip by a maximum amount of 0.125 mm on either face of the gasket. At the start and conclusion of the spiral form, minimum 3 no. of metal plies can be provided without any filler material; however, the number of such plies shall not exceed 5 at each end.
- 4.4 The metal winding around the entire inside circumference of the gasket shall be suitably spot welded in equal spacing not exceeding 25mm with a minimum of 3 welds.
- 4.5 The metal winding on the outside shall be welded with a minimum of three welds, out of which one weld shall be at the terminal point.

5. Inspection & Testing:

5.1 Visual Inspection

- 5.1.1 The gasket shall be undamaged and the windings shall be intact.
- 5.1.2 At random, few samples shall be selected and subjected to dimensional inspection. Dimension shall conform to those given as per ASME B16.20.
- 5.1.3 The metal strip used shall be analyzed for its chemical composition and it shall conform to the specification.
- 5.1.4 The filler material shall be analyzed to estimate the percentage loss on ignition, graphite content and binder content.



5.2 Compression Test

- 5.2.1 The test shall consist of subjecting the gaskets to predetermined loads in the compression testing machine the thickness of the gaskets under the applied loads and after removal of loads.
- 5.2.2 The gaskets shall be subjected to a uniform unit compressive load as per ASME B16.20.
- 5.2.3 The thickness of the gasket shall be measured using dial indicators with the applied load on the gasket. The thickness shall be within the limits specified in ASME B16.20.
- 5.2.4 After the load is removed, the gasket shall recover at least 0.25 mm over the compressed thickness obtained in the compression test.
- 5.2.5 The gasket shall be visually examined after the compression test. No buckling on the inner edge of the gasket shall be allowed. The spot welds should not foil and the windings should be intact.

6. Test Certificate

Supplier shall give the following test certificates for each item, for each lot and should contain all details of the following tests.

- 6.1 Compression Test Certificate.
- 6.2 Material Test Certificate.
- 6.3 Visual Inspection and dimensional Checks.

7. Packing:

Metallic Spiral Wound Gasket shall be packed in nos. of 10 in suitable cardboard containers to avoid damage during transit. It should carry proper identification giving the size, type, drawing number and supplier's name.

8. Documents to be submitted:

- 8.1 **Along with offer**
 - i. 2 sets of technical data sheet.
- 8.2 **After placement of order**
 - i. Test certificates



9.0 Check list for Metallic Spiral Wound Gaskets:

S.No	Description	Vendor Confirmation (mark to conform)	
		Yes	No
I	Along with the offer:		
a.	Technical data sheet		
II	After placement of order:		
a.	Test certificates		
III	GENERAL:		
<p><i>Without the above Details/confirmation the Offer will be treated as Incomplete and liable for Rejection.</i></p>			



10.0 Sizes

S.No	Description
1	Spiral wound gasket 0.5" 150# ASME B16.5
2	Spiral wound gasket 1" 150# ASME B16.5
3	Spiral wound gasket 1.5" 150# ASME B16.5
4	Spiral wound gasket 2" 150# ASME B16.5
5	Spiral wound gasket 3" 150# ASME B16.5
6	Spiral wound gasket 4" 150# ASME B16.5
7	Spiral wound gasket 6" 150# ASME B16.5
8	Spiral wound gasket 8" 150# ASME B16.5
9	Spiral wound gasket 10" 150# ASME B16.5
10	Spiral wound gasket 12" 150# ASME B16.5
11	Spiral wound gasket 16" 150# ASME B16.5
12	Spiral wound gasket 0.5" 300# ASME B16.5
13	Spiral wound gasket 1" 300# ASME B16.5
14	Spiral wound gasket 1.5" 300# ASME B16.5
15	Spiral wound gasket 2" 300# ASME B16.5
16	Spiral wound gasket 3" 300# ASME B16.5
17	Spiral wound gasket 4" 300# ASME B16.5
18	Spiral wound gasket 6" 300# ASME B16.5
19	Spiral wound gasket 8" 300# ASME B16.5
20	Spiral wound gasket Heater oil side(30, 40, 50 Sq.m) 4-42-030-04077 VAR:01
21	Spiral wound gasket Heater oil side(60 Sq.m) 4-42-030-04077 VAR:02
22	Spiral wound gasket Heater Steam side(30, 40, 50 Sq.m) 4-42-030-04078 VAR:01
23	Spiral wound gasket Heater Steam side(60 Sq.m) 4-42-030-04078 VAR:02

Technical Pre-Qualification Requirement (PQR) for

Spiral Wound Gasket

1. The bidder shall be an established **spiral wound gasket** manufacturer/supplier and shall have adequate Engineering, Manufacturing, testing and servicing facilities. Bidder shall furnish technical backup documents in proof of above requirements.
2. The bidder shall have experience of having supplied **spiral wound gaskets** for Heavy fuel oil (HFO) applications in thermal power plants or applications of similar severity. The bidder shall furnish supply reference list with details of PO, PO date, customer name of orders executed meeting the requirements mentioned in the technical specification of this enquiry.
3. The **spiral wound gasket** offered shall be from the existing regular manufacturing range of the bidder. Bidder shall furnish his official product catalogue.
4. Proven track record is required. Minimum One end user certificate for the satisfactory operational performance of their products' supplied.

(or)

Two numbers of successfully executed POs for the same item, meeting the technical specification requirements mentioned in the enquiry.

5. In case of ordering, the bidder shall have responsibility for the following and same to be confirmed point wise by submitting signed copy of this document with bidder's Seal.
 - i) Bidder should have the component replacement responsibility in case of defect / failure.
 - ii) Experts from the bidder's side shall associate in commissioning activities at site, if required.
 - iii) Bidder should ensure the product performance during erection & commissioning and ensure performance guarantee.

6. Backup document checklist to meet PQR:

S. No	Document description	Check list
1	Documents to meet clause(1)	<input type="checkbox"/>
2	Supply reference documents (General reference list) to meet clause (2)	<input type="checkbox"/>
3	Product Catalogues to meet clause (3)	<input type="checkbox"/>
4	Min. one end user certificate (or) Two POs to meet clause (4)	<input type="checkbox"/>
5	Confirmation to meet clause (5)	<input type="checkbox"/>



BHARAT HEAVY ELECTRICALS LIMITED
TIRUCHIRAPPALLI - 620 014, INDIA.
QUALITY ASSURANCE DEPARTMENT

STANDARD QUALITY PLAN FOR SPIRAL WOUND GASKET

SQP:SD:22 Rev No: 00

Page: 1 of 3

Prepared By
Quality Assurance

ABDUR RAHMAN SULTAN

Abdur Rahman Sultan
19.12.2016

Reviewed by	Signature
Quality Assurance (G. PANNDEERSELVAN)	<i>G. Panndeerselvan</i> 19/12/16
Engineering (N. KATHIRVEL)	<i>N. Kathirvel</i> 19/12/16
Material Management (SACHIN SANI)	<i>Sachin Sani</i> 19.12.16
Quality Control (T. CHITHAMBARARAJAN)	<i>T. Chithambararajan</i> 19.12.16

Rev No	Date	Approved by	Signature
00	19/12/2016	AGM / QA & BE	<i>Reinbarbaran</i> 19/12/16

Record of Revisions

Rev No	Details of Revision	Remarks
00	Fresh Issue	



MANUFACTURER'S
NAME & ADDRESS:
BHEL: TIRUCHIRAPPALLI
APPROVED SUPPLIERS

STANDARD QUALITY PLAN

PRODUCT: SPIRAL WOUND GASKET

SUB-SYSTEM: Steam Generator and Auxiliaries

QWI NO:SQP:SD:22

REV NO: 00 DATE: 19/12/2016

PAGE: 2 OF 3

SL. NO	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			REMARKS
					M	C				N	M	C	
1	2	3	4	5	M	C/N	7	8	9	D*	**	10	11

1.0 RAW MATERIAL:														
1.1	Winding Material SS304/SS304L (0.2mm)	Physical & Chemical Properties	A	ASTM A240 AISI 304/304L	Per heat/ Batch No.		ASTM A240 AISI 304/304L	ASTM A240 AISI 304/304L	Material Test Certificate	√	P	V	-	
1.2	Ring Material SS304/SS304L (3.00mm) Centering Ring/Inner	Physical & Chemical Properties	A	ASTM A240 AISI 304/304L	Per heat/ Batch No.		ASTM A240 AISI 304/304L	ASTM A240 AISI 304/304L	Material Test Certificate	√	P	V	-	
1.3	Filler Material Graphite (0.60mm)	Physical & Chemical Properties	A	Manufacturer's Standard	Per heat/ Batch No.		Manufacturer's Standard and BHEL Specification	Manufacturer's Standard and BHEL Specification	Material Test Certificate	√	P	V	-	
2.0 INPROCESS CONTROLS & FINAL INSPECTION:														
2.1	Visual Examination	Visual	A	No damage	100%	10%	BHEL drawing, BHEL Specification and ASME B16.20	BHEL drawing, BHEL Specification and ASME B16.20	Inspection Report	√	P	W	-	
2.2	Dimension Check	Dimensional conformity	A	Measurement	100%	10%	BHEL drawing, BHEL Specification and ASME B16.20	BHEL drawing, BHEL Specification and ASME B16.20	Inspection Report	√	P	W	-	
2.3	Compression and Recovery test	Testing	A	Gasket thickness, No buckling	One Gasket per pressure rating		BHEL drawing, BHEL Specification and ASME B16.20	BHEL drawing, BHEL Specification and ASME B16.20	Test Certificate	√	P	W	-	
2.4	Metal Strip	Chemical composition	A	Conformance to specification	100%	10%	BHEL drawing, BHEL Specification and ASME B16.20	BHEL drawing, BHEL Specification and ASME B16.20	IR	√	P	W	-	

LEGEND: * RECORDS IDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY THE SUPPLIER IN QA DOCUMENTATION;
**** M:** MANUFACTURER, **C:** BHEL QC/BHEL AIA, **N:** CUSTOMER; **P:** PERFORM. **W:** WITNESS, **V:** VERIFICATION; **CLASS:** A - CRITICAL ; B - MAJOR ; C - MINOR;
MTC- Manufacturer's Test Certificate; IR- Inspection/Test Report; COC: Certificate of Compliance; ALC: Approved Lab Test Certificate



MANUFACTURER'S
NAME & ADDRESS:
BHEL: TIRUCHIRAPPALLI
APPROVED SUPPLIERS

STANDARD QUALITY PLAN

PRODUCT: SPIRAL WOUND GASKET

SUB-SYSTEM: Steam Generator and Auxiliaries

QWI NO:SQP:SD:22
REV NO: 00 DATE: 19/12/2016
PAGE: 3 OF 3

SL. NO	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			REMARKS
					M	C				N	M	C	
1	2	3	4	5	M	C/N	7	8	9	D*	**	10	11

4.0 MARKING, PACKING AND PRESERVATION:

4.2	Marking/ Identification	Marking & Tagging with Po No., Size, Quantity, Flange size, Pressure class, Material, Manufacturer's name or trademark	A	Visual	100%	100%	BHEL Specification & Purchase Order, ASME B 16.20	BHEL Specification & Purchase Order, ASME B 16.20	IR	√	P	V	-
4.3	Packing & Preservation	Tightness & Stability	A	Visual	100%	100%	BHEL Specification & Purchase Order, ASME B 16.20	BHEL Specification & Purchase Order, ASME B 16.20	IR	√	P	V	-

5.0 CERTIFICATION

5.1	Data Folder	Completeness of documentation	A	Review of documents	100%	100%	Purchase Order, BHEL Spec, Approved datasheet		IR	√	P	V	-
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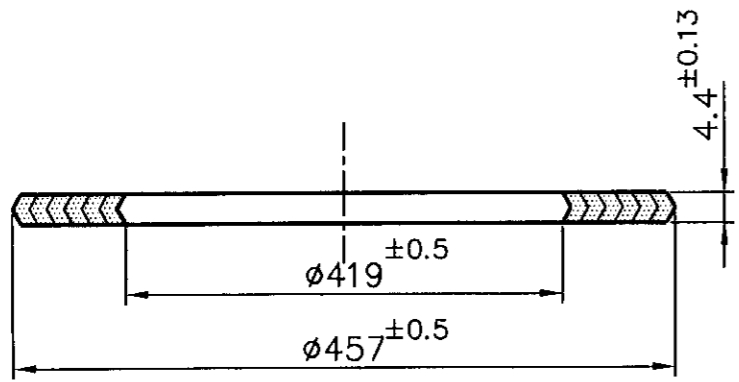
Notes:

- Customer verification stages specified above shall be followed. Any witness stages shall be as specified/indicated in BHEL PO.
- The construction features of the spiral wound gasket shall be as per BHEL Technical specification and ASME B16.20.

LEGEND: * RECORDS IDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY THE SUPPLIER IN QA DOCUMENTATION;
**** M:** MANUFACTURER, **C:** BHEL QC/BHEL AIA, **N:** CUSTOMER; **P:** PERFORM. **W:** WITNESS, **V:** VERIFICATION; **CLASS:** A - CRITICAL ; B - MAJOR ; C - MINOR;
MTC- Manufacturer's Test Certificate; IR- Inspection/Test Report; COC: Certificate of Compliance; ALC: Approved Lab Test Certificate

3-04-126-02368
DRAWING NO:

FOR TOLERANCES OF UNTOLERANCED
DIMENSIONS DURING MANUFACTURE
REFER PLANT STD.NO TP 023 0299



NOTES: -

1. FOR QUALITY REQUIREMENTS REFER THE TECHNICAL SPECIFICATION .
2. THE SPIRAL WOUND GASKET SHALL WITHSTAND A SERVICE PRESSURE AND SERVICE TEMP AS GIVEN BELOW:
 - a) SERVICE PRESSURE : 220 Kg/cm² } DURING OPERATION.
SERVICE TEMPERATURE : 375°C
 - b) SERVICE PRESSURE : 330 Kg/cm² } DURING HYDRO TEST.
SERVICE TEMPERATURE : 50°C
3. MATERIAL : AISI 304 WITH SPIRAL WOUND GRAFOIL FILLED.

VARIANT NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO	MATERIAL CODE	A/CF	UNIT	UNIT WEIGHT
					VAR NO	MATERIAL SPECN	DI	DI	QUANTITY
		SPIRAL WOUND GASKET (CIRCULAR GRAFOIL FILLED)				96-187-066			1.000

REV	DATE	ALTERED :
01		CHD & APPD:
ZONE		

CAUTION: The information on this document is the property of BHARAT HEAVY ELECTRICALS LTD. It must not be used directly or indirectly in any way detrimental to the interest of the company.

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT				Bharat Heavy Electricals Ltd UNIT: HIGH PRESSURE BOILER PLANT TIRUCHIRAPALLI - 620014 355-055			
DRN	C.P	SIGNATURE	DATE	CHD	R.J.B	SIGNATURE	DATE
APPD	I.K.S	SIGNATURE	DATE	REF TO ASSY / OLD DWG			
DEPT	ALL DIMENSIONS ARE IN MM	PROJECTION	SCALE	WEIGHT (Kg)	DRAWING NO :		
CODE			N.T.S	1.000	3-04-126-02368		
TITLE				REV			
SPIRAL WOUND GASKET (CIRCULAR GRAFOIL FILLED)							