

## Produkt

### Duktile Støpejernsrør, VOTEC

Produktdetaljer	
<b>Produkt</b>	VOTEC Støpejernsrør iht. EN545:2010 / ISO 2531:2009
<b>Anvendelse</b>	Vannledninger for drikkevann, produktet er godkjent iht. Drikkevannsforskriften, se SINTEF Produktsertifikat, vedlegg 12. Kan også benyttes til andre applikasjoner, f. eks. havbruk, gruvedrift, etc. PS! Påse at fluidet er iht. begrensingene nevnt her og i gjeldende PDB (Produkt Datablad).
<b>Type</b>	Push-Fit joint (muffe – spiss ende) med Tyton pakning som tetning. Om man skal ha strekkfast system anbefales VOTEC J-SAW Lock, som er 2-kamrede rør med mekaniske koblinger.
<b>Komponenter</b>	Duktilt støpejern med korrosjonsbeskyttelse og pakning (Tyton)
<b>Produsent</b>	Jindal SAW
<b>Godkjenninger / Sertifikater</b>	Alle godkjenninger og sertifiseringer er knyttet opp til produsenten
<b>Henvisninger</b>	Det henvises også til følgende nyttig informasjon: <ul style="list-style-type: none"><li>• Tilhørende FDV dokument og Monteringsanvisning for Duktile Støpejernsrør, Ikke-Strekkfaste VOTEC rør</li><li>• VA Miljøblad nr. 5, Grøfteutførelse fleksible rør</li><li>• VA Miljøblad nr. 6, Grøfteutførelse stive rør</li><li>• VA Miljøblad nr. 16, Kravspesifikasjon for duktile støpejernsrør</li><li>• VA Miljøblad nr. 25, Trykkprøving av trykkledninger</li></ul>

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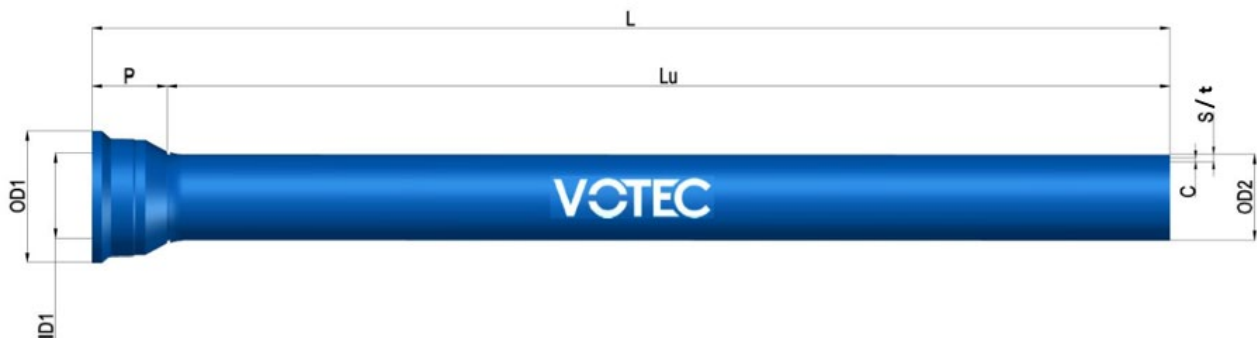
## 1. Forkortelser

BFSC	Blast-Furnace Slag Cement: Høyovns Slagg sement (tilsvarende HOZ)
ZnAL400	Sink og Aluminium i mengde 400 g/m <sup>2</sup> påført på røret

## 2. Mål og Dimensjoner, Støpejernsrør

DN	C-Klasse	NRF Nr.	OD1 [mm]	OD2 [mm]	ID1 [mm]	P [mm]	Lu [m]	L [m]	s [mm]	t [mm]	C [mm]	Vekt per meter [kg/m]	Max. Vinkel Defl.
DN100	C100	2030401	156	118	121	80	6,0	6,080	4,7	6,1	4,0	19,0	5°
	C64	2030402	156	118	121	80	6,0	6,080	4,0	5,4	4,0	17,0	5°
	C50	2030403	156	118	121	80	6,0	6,080	3,5	4,9	4,0	16,0	5°
	C40	2030404	156	118	121	80	6,0	6,080	3,0	4,4	4,0	15,0	5°
DN150	C100	2030407	208	170	173	85	6,0	6,085	5,9	7,35	4,0	32,0	5°
	C64	2030408	208	170	173	85	6,0	6,085	4,0	5,45	4,0	25,0	5°
	C50	2030409	208	170	173	85	6,0	6,085	3,5	4,95	4,0	24,0	5°
	C40	2030405	208	170	173	85	6,0	6,085	3,0	4,45	4,0	22,0	5°
DN200	C64	2030411	264	222	225	94	6,0	6,094	5,0	6,5	4,0	38,0	5°
	C50	2030412	264	222	225	94	6,0	6,094	3,9	5,4	4,0	33,0	5°
	C40	2030413	264	222	225	94	6,0	6,094	3,1	4,6	4,0	30,0	5°
DN250	C64	2030414	316	274	276	104	6,0	6,104	6,1	7,65	4,0	54,0	4°
	C50	2030415	316	274	276	104	6,0	6,104	4,8	6,35	4,0	47,0	4°
	C40	2030416	316	274	276	104	6,0	6,104	3,9	5,45	4,0	42,0	4°
DN300	C64	2030417	373	326	329	113	6,0	6,113	7,3	8,9	4,0	74,0	4°
	C50	2030418	373	326	329	113	6,0	6,113	5,7	7,3	4,0	63,0	4°
	C40	2030419	373	326	329	113	6,0	6,113	4,6	6,2	4,0	55,0	4°
DN400	C50	2030421	482	429	432	126	6,0	6,126	7,5	9,2	5,0	104,0	4°
	C40	2030422	482	429	432	126	6,0	6,126	6,0	7,7	5,0	91,0	4°
	C30	2030423	482	429	432	126	6,0	6,126	4,8	6,5	5,0	80,0	4°
DN500	C40	2030424	589	532	535	140	6,0	6,140	7,5	9,3	5,0	132,0	4°
	C30	2030425	589	532	535	140	6,0	6,140	5,6	7,4	5,0	111,0	4°
DN600	C40	2030426	695	635	638	152	6,0	6,152	8,9	10,8	5,0	180,0	4°
	C30	2030427	695	635	638	152	6,0	6,152	6,7	8,6	5,0	150,0	4°
DN700	C30	2030428	813	738	741	167	6,0	6,167	7,8	9,8	6,0	200,0	3°
	C25	2030429	813	738	741	167	6,0	6,167	6,8	8,8	6,0	184,0	3°
DN800	C30	2030431	938	842	845	160	6,0	6,160	8,9	11	6,0	253,0	3°
	C25	2030432	938	842	845	160	6,0	6,160	7,5	9,6	6,0	227,0	3°
DN900	C30	2030433	1046	945	948	175	6,0	6,175	10,0	12,2	6,0	311,0	3°
	C25	2030434	1046	945	948	175	6,0	6,175	8,4	10,6	6,0	279,0	3°
DN1000	C30	2030435	1150	1048	1051	185	6,0	6,185	11,1	13,4	6,0	375,0	3°
	C25	2030436	1150	1048	1051	185	6,0	6,185	9,3	11,6	6,0	335,0	3°
DN1100	C25	2030406	1257	1152	1155	200	6,0	6,200	10,2	12,6	6,0	395,0	2°
DN1200	C30	2030036	1349	1255	1258	206	6,0	6,206	13,3	15,8	6,0	523,0	2°
	C25	2030437	1349	1255	1258	206	6,0	6,206	11,1	13,6	6,0	464,0	2°
DN1400	C25	2030438	1577	1462	1466	212	6,0	6,212	12,9	15,6	9,0	652,0	2°
DN1500	C25	2030439	1708	1565	1569	260	6,0	6,260	13,9	16,7	9,0	733,0	2°
DN1600	C25	2030441	1786	1668	1672	245	6,0	6,245	14,8	17,7	9,0	833,0	2°
DN1800	C30	2030027	1998	1875	1879	257	6,0	6,257	19,9	23,0	9,0	1160,0	1°30'
DN1800	C25	2030004	1998	1875	1879	257	6,0	6,257	16,6	19,7	9,0	1026,0	1°30'
DN2000	C30	2030038	2242	2082	2086	335	6,0	6,335	22,1	25,4	9,0	1420,0	1°30'
DN2000	C25	2030037	2242	2082	2086	335	6,0	6,335	18,4	21,7	9,0	1254,0	1°30'

Tabell 1



P: Innstikkslengde, Lu: Leggelengde, L: Total rørlengde, s: Min. rørtykkelse, t: Nominell rørtykkelse, C: Tykkelse av indre sementforing

### 3. Tekniske Data

Leggelengde	6 meter
Materiale	Duktilt Støpejern
Muffe Design	Iht. side 7 i EN 545:2010 og side 1 i ISO 2531:2009
Fluidtemperatur	0 til 50° C
Innvendig beskyttelse	BFSC (Blast-Furnace Slag Cement) er en høyovnsement (tilsvarende HOZ)
Utvendig beskyttelse	<ul style="list-style-type: none"> <li>400 g/m<sup>2</sup> of Zinc-Aluminium legering (Zn 85% + Al 15%)</li> <li>Blå Epoxy minimum gjennomsnittlig tykkelse 70 µm</li> </ul>
Tettepakning	Tyton: Materiale i EPDM (godkjent for drikkevann)

### 4. Tekniske Karakteristikker

#### 2.1 Utvendig beskyttelse

<b>ZnAl 400 g/m<sup>2</sup> + Epoxy</b> Iht. EN545:2010	<p>Kan installeres i alle typer jordmasser, bortsett fra:</p> <ul style="list-style-type: none"> <li>Myrområder og masser med høyt innhold av sur jord</li> <li>Omliggende masser med innhold av avfall, skrap, aske, slagg eller forurensninger fra industri eller andre forurensninger</li> <li>Omliggende masser beliggende under marint vann-nivå med en motstand lavere enn 500 Ω*cm</li> </ul> <p>Se også tabell 2 under for anbefalte omfyllingsmasser ifht. type belegg.</p>
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#### 2.2 Innvendig beskyttelse

<b>Sement, BFSC</b> Iht. EN545:2010 / EN197-1	Innvendig sementbelegg, BFSC, er motstandsdyktig mot sulfater. For drikkevann / behandlet vann.				
<b>Parameter</b>	pH Minimum	Aggressive CO <sub>2</sub> [Mg/l] Maksimum	Sulfater, SO <sub>4</sub> [Mg/l] Maksimum	Magnesium, MG [Mg/l] Maksimum	Ammonium, NH <sub>4</sub> [Mg/l] Maksimum
<b>Verdi</b>	5.5	15	3000	500	30

#### Anbefalte Kornstørrelser av Omfyllingsmasser ifht. type ytre belegg:

	Avrundet	Fragmentert
<b>ZnAl 400 g/m<sup>2</sup> + Epoxy</b>	0-max. 32 mm Individuell max.: 63 mm	0-max. 16 mm Individuell max.: 63 mm

Tabell 2

## 5. Standarder og Godkjenninger

<b>Kvalitet / Produksjon</b>	ISO 9001:2015 (11.11.2024)	Vedlegg 1
	ISO 14001:2015 (03.03.2025)	Vedlegg 2
	ISO 45001:2018 (12.03.2025)	Vedlegg 3
<b>Produkt Sertifiseringer</b>	CoC, Støping, Testing, Sluttkontroll og Belegg: - EN 545:2010 og ISO 2531:2009 - EN 598:2007 + A1:2009 og ISO 7186:2011	Vedlegg 4
	ÖVGW Sertifikat Drikkevannsgodkjenning, Østerrike	Vedlegg 5
	SINTEF Produktsertifikat Nr. 3833 iht. EN545, DVGW W 270 og DVGW 347 (Godkjent for Drikkevann)	Vedlegg 12
<b>Innvendig Belegg</b>	Innvendig sementmørtelbelegg (BFSC): Sanitær Samsvarserklæring, CARSO CoC: godkjenning iht. godkjenningsliste for kjemisk innhold	Vedlegg 6
	Innvendig sementmørtelbelegg (BFSC): Test Sertifikat, DVGW W 347, Hygiene Institut Godkjenning av innvendig sementmørtelbelegg (BFSC) for produkter i kontakt med drikkevann	Vedlegg 7
	Innvendig epoxy belegg: Test Sertifikat, BS6920-1:2000, WRAS Godkjenning av innv. epoxy belegg i kontakt med drikkevann	Vedlegg 8
	Innvendig epoxy belegg: Test Sertifikat, CARSO godkjenning iht. godkjenningsliste for kjemisk innhold	Vedlegg 9
<b>Pakning</b>	Tyton pakninger (EPDM): Sanitær Samsvarserklæring, ACS, Eurofins. Godkjenning iht. godkjenningsliste for kjemisk innhold EN 1420, EN 13052-1 og EN 12873-1	Vedlegg 10
<b>Utvendig Belegg</b>	CoC, Belegg <ul style="list-style-type: none"> <li>• ISO 4179: 2005</li> <li>• ISO 8179-1: 2017</li> <li>• EN 545: 2006 Annex. D.2.3</li> <li>• EN 545: 2010 Annex. D.2.2</li> <li>• EN 15189: 2006</li> <li>• EN 15655-1: 2018</li> <li>• EN 545:2006 4.4.2/ ISO 2531:1998 4.4.1 – Inkl. Annex A</li> <li>• EN 545:2010 4.5.2/ ISO 2531:2009 4.4.1 – Inkl. Annex A</li> <li>• EN 598:2007+A1:2009 4.4.2/ ISO 7186:2011 4.5.2 - Inkl. Annex A</li> </ul>	Vedlegg 11
<b>Type Tester</b>	Iht. EN545, 7.2.5 og EN598, 7.8	Vedlegg 13
<b>Andre Sertifikater</b>	Test – og Inspeksjons Sertifikater	Vedlegg 14
<b>Data Blader</b>	Sikkerhet – og Material Datablader <ul style="list-style-type: none"> <li>• Sink wire</li> <li>• Epoxy</li> <li>• Innvendig sement</li> </ul>	Vedlegg 15

## 6. Vedlegg

1	ISO 9001:2008
2	ISO 14001:2004
3	ISO 45001:2018
4	CoC, EN 545 2010, EN 598 2007 + A1 2009, ISO 2531 2009, ISO 7186 2011
5	CARSO – CoC, Hygiene, BFSC (innvendig sement belegg)
6	DVGW W 347, CoC, Hygiene Institut
7	CoC, Belegg
8	Typeprøvingssertifikat, DVGW, Tyton pakninger
9	Type tester, rør, iht. EN545, 7.2.5 og EN598, 7.8
10	Test – og Inspeksjons Sertifikater
11	Sikkerhet – og Material Datablader
12	SINTEF Produktsertifikat Nr. 3833
13	Type Tester iht. EN545, 7.2.5 og EN598, 7.8
14	Test – og Inspeksjons Sertifikater
15	Sikkerhet – og Material Datablader

## Vedlegg 1



BUREAU  
VERITAS

Bureau Veritas Certification



# JINDAL SAW GULF LLC

Plot No.11, NR 28, ICAD-III, Musaffah - 92135 Abu Dhabi - United Arab Emirates

Certified site:

Plot No.11, NR 28, ICAD-III, Musaffah - 92135 Abu Dhabi - United Arab Emirates

*Bureau Veritas Italia S.p.A. certifies that the Management System of the above organisation has been audited and found to be in accordance with the requirements of the management system standards detailed below*

## ISO 9001:2015

*Scope of certification*

**Design, manufacturing and supply of ductile iron pipes and fittings for water, waste water and sewerage applications.**

**IAF: 17**

Original cycle start date:	12-November-2012
Expiry date of previous cycle:	11-November-2021
Certification / Recertification Audit date:	09-November-2021
Certification / Recertification cycle start date:	19-November-2021
Subject to the continued satisfactory operation of the organization's Management System, this certificate expires on:	11-November-2024

Certificate No.:	IT311140	Version:	1	Issue Date:	19-November-2021
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**GIORGIO LANZAFAME** - Local Technical Manager



SGQ N° 009A

Membro degli Accordi di Mutuo Riconoscimento EA, IAF e ILAC  
Signatory of EA, IAF and ILAC mutual Recognition Agreements

Certification body address:

Bureau Veritas Italia S.p.A., Viale Monza, 347 - 20126 Milano, Italia

Further clarifications regarding the scope of this certificate and the applicability of the management system requirements may be obtained by consulting the organisation.

To check this certificate validity please refer to the website [www.bureauveritas.it](http://www.bureauveritas.it)



## **Vedlegg 2**





Certificate AE16/3104

The management system of

# Jindal Saw Gulf LLC

Plot No 11NR28, ICAD-III, Musaffah,  
Abu Dhabi, PO Box: 92135, United Arab Emirates

has been assessed and certified as meeting the requirements of

## ISO 14001:2015

For the following activities

**Manufacturing and Supply of Ductile Iron Pipes & Fittings for Water,  
Waste water and Sewerage application**

This certificate is valid from 11 March 2022 until 3 March 2025 and  
remains valid subject to satisfactory surveillance audits.  
Recertification audit due a minimum of 60 days before the expiration date.  
Issue 4. Certified since 3 March 2016

The audit leading to this certificate commenced on 23/02/2022  
Previous issue certificate validity date was until 03/03/2022



Authorised by

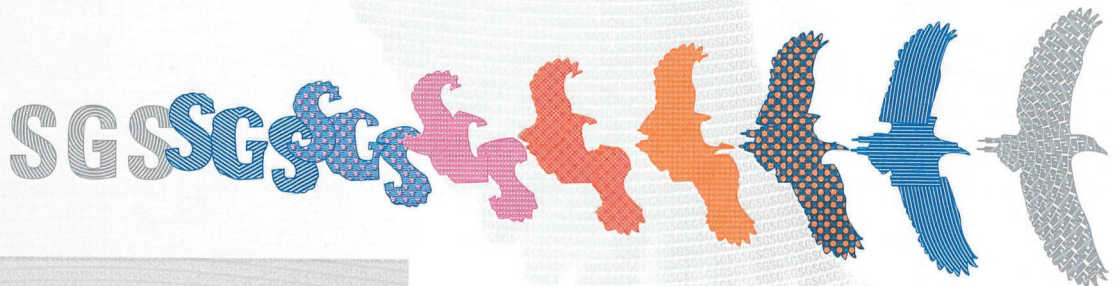


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## **Vedlegg 3**



Certificate AE19/0203

The management system of

# Jindal Saw Gulf LLC

Plot No 11NR28, ICAD-III, Musaffah,  
Abu Dhabi, PO Box: 92135, United Arab Emirates

has been assessed and certified as meeting the requirements of

## ISO 45001:2018

For the following activities

**Manufacturing and Supply of Ductile Iron Pipes & Fittings for Water,  
Waste water and Sewerage application**

This certificate is valid from 12 March 2022 until 12 March 2025 and  
remains valid subject to satisfactory surveillance audits.  
Recertification audit due a minimum of 60 days before the expiration date.  
Issue 2. Certified since 12 March 2019

The audit leading to this certificate commenced on 23/02/2022  
Previous issue certificate validity date was until 03/03/2022

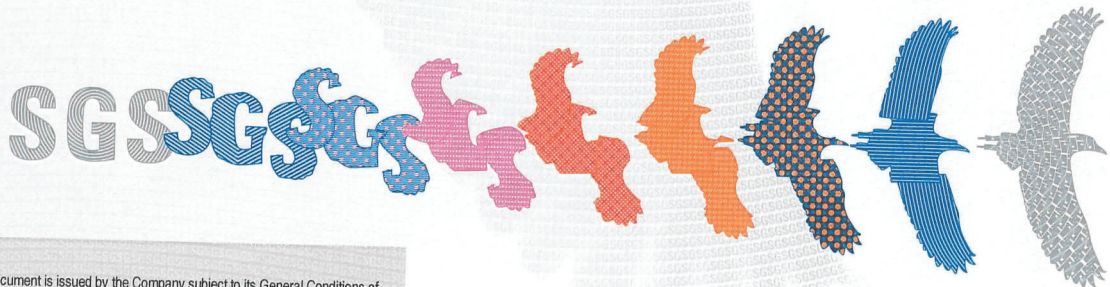
This organisation was previously certified to OHSAS 18001 since 03/03/2016

Authorised by

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## **Vedlegg 4**

**BUREAU VERITAS**  
Certification



## Certificate of Conformity

Awarded to:

**JINDAL SAW GULF LLC**

HEAD OFFICE AND PRODUCTION PLANT:

PLOT NO. 11 NR 28 ICAD-III, MUSSAFAH, P.O. 92135 ABU DHABI - (UNITED ARAB EMIRATES)

Bureau Veritas Italia S.p.A. certify that the following products:

PRODUCT	ACTIVITY	DN
Ductile Iron Pipes for water application	Casting/Testing/Finishing/Coating	from DN 100 to DN 1000 AJ from DN 100 to DN 2000 TJ from DN 100 to DN 1800 JSAW Lock (DC) from DN 100 to DN 300 RAJ
Ductile Iron Fittings for water application	Coating	from DN 100 to DN 2000

PRODUCT	ACTIVITY	DN
Ductile Iron Pipes for sewerage application	Casting/Testing/Finishing/Coating	from DN 100 to DN 1000 AJ from DN 100 to DN 2000 TJ from DN 100 to DN 1800 JSAW Lock (DC) from DN 100 to DN 300 RAJ
Ductile Iron Fittings for sewerage application	Coating	from DN 100 to DN 2000

**COMMERCIAL BRAND: JSAW-JAL Sertubi / JSAW-NIRJAL Sertubi**  
produced by JINDAL SAW GULF LLC under the trademark



have been evaluated and found in conformity against the requirements of the following standard:

**EN 545:2010**  
**ISO 2531:2009**  
Ductile iron pipes, fittings,  
accessories and their joints  
for water application

**EN 598:2007+A1:2009**  
**ISO 7186:2011**  
Ductile iron pipes, fittings,  
accessories and their joints  
for sewerage application

Certification according requirements stated in:

**RG-01-03 ACCREDIA**  
**QHSE-REG-02.TQR Bureau Veritas**  
**IND-REP-48-CP Bureau Veritas**

This Certificate has not to be intended as related to Notify Body activity according to  
UE Construction Products Regulation CPR 305/2011 neither can be used for the CE marking

Original Emission Date: 20/11/2012  
Last Emission Date: 16/11/2021  
Expiration Date: 15/11/2024

Subject to the continued satisfactory operation, to check this certificate validity please refer to website: [www.bureauveritas.it](http://www.bureauveritas.it)  
Further clarifications regarding the scope of this certificate and the applicability of standard's requirements may be obtained  
by consulting the organisation.



Date: 16/11/2021

Certificate N°: **684/001 Rev.17**

PRD N° 009B

Membro degli Accordi di Mutuo Riconoscimento EA, IAF e ILAC  
Signatory of EA, IAF and ILAC mutual Recognition Agreements

Bureau Veritas Italia S.p.A. – Viale Monza, 347 – 20126, Milan - ITALY

**BUREAU VERITAS**  
Certification



## Certificate of Conformity

Awarded to:

**JINDAL SAW GULF LLC**

HEAD OFFICE AND PRODUCTION PLANT:

PLOT NO. 11 NR 28 ICAD-III, MUSSAFAH, P.O. 92135 ABU DHABI - (UNITED ARAB EMIRATES)

Bureau Veritas Italia S.p.A. certify that the following products:

PRODUCT	ACTIVITY	DN
Ductile Iron Pipes for water application	Casting/Testing/Finishing/Coating	from DN 100 to DN 1000 AJ from DN 100 to DN 2000 TJ from DN 100 to DN 1800 JSAW Lock (DC) from DN 100 to DN 300 RAJ
Ductile Iron Fittings for water application	Coating	from DN 100 to DN 2000

PRODUCT	ACTIVITY	DN
Ductile Iron Pipes for sewerage application	Casting/Testing/Finishing/Coating	from DN 100 to DN 1000 AJ from DN 100 to DN 2000 TJ from DN 100 to DN 1800 JSAW Lock (DC) from DN 100 to DN 300 RAJ
Ductile Iron Fittings for sewerage application	Coating	from DN 100 to DN 2000

**COMMERCIAL BRAND: JSAW-JAL Sertubi / JSAW-NIRJAL Sertubi**  
produced by JINDAL SAW GULF LLC under the trademark



have been evaluated and found in conformity against the requirements of the following standard:

**EN 545:2006**  
**ISO 2531:1998**  
Ductile iron pipes, fittings,  
accessories and their joints  
for water application

**EN 598:2007+A1:2009**  
**ISO 7186:2011**  
Ductile iron pipes, fittings,  
accessories and their joints  
for sewerage application

Certification according requirements stated in:

**RG-01-03 ACCREDIA**  
**QHSE-REG-02.TQR Bureau Veritas**  
**IND-REP-48-CP Bureau Veritas**

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Further clarifications regarding the scope of this certificate and the applicability of standard's requirements may be obtained  
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Date: 16/11/2021

Certificate N°: **684/002 Rev.17**

PRD N° 009B

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Bureau Veritas Italia S.p.A. – Viale Monza, 347 – 20126, Milan - ITALY

## **Vedlegg 5**



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Telefon: +43 / 1 / 513 15 88-0\* / Telefax: +43 / 1 / 513 15 88-25  
E-Mail: office@ovgw.at / Internet: www.ovgw.at



Akkreditiert durch das Bundesministerium  
für Digitalisierung und Wirtschaftsstandort



## ÖVGW-Zertifikat

über die Verleihung des Rechtes  
zur Führung der ÖVGW-Qualitätsmarke Wasser <sup>1)</sup>

Registrierungsnummer

**ÖVGW/GRIS W 1.754**

Geltungsdauer

**bis Ende Oktober 2023**

Inhaber

**Jindal Saw Gulf LLC**

P.O Box: 92135

Abu Dhabi

VEREINTE ARABISCHE EMIRATE

◆ Vertrieb in Österreich

GEOTRADE Tiefbauprodukte

Handels Ges.m.b.H.

Hochstraß 84

4312 Ried in der Riedmark

Hersteller

- JINDAL SAW Ltd. / IN
- JINDAL SAW Ltd / AE

Prüfungsart

Verlängerungs- und Ergänzungsprüfung

Grund der Ergänzung

- Änderung der Vertriebsstelle auf GEOTRADE Tiefbauprodukte Handels Ges.m.b.H.
- Änderung des QM-Inhabers auf Jindal Saw Gulf LLC

Prüfbericht

2002192 / 12567k vom 25. November 2020

Qualitätsstandards/Prüfrichtlinien

- QS-W 401 Ausgabe 7.0, November 2019

Produkt

Rohre mit Steckmuffenverbindungen aus duktilem Gusseisen für die Trinkwasserversorgung

**STr Sertubi**

Rohre ohne Deckbeschichtungen oder mit Zementmörtelinnenauskleidung und Zn- oder ZnAl-Überzug und Epoxidharz-pulverdeckbeschichtung in DN 80, 100, 125, 150, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800, 900, 1000, 1100, 1200, 1400, 1500, 1600, 1800 und DN 2000

**JSAW LOCK**

Rohre ohne Deckbeschichtungen oder mit Zementmörtelinnenauskleidung und Zn- oder ZnAl-Überzug und Epoxidharz-pulverdeckbeschichtung in DN 100, 125, 150, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800, 900, 1000, 1100, 1200, 1400, 1500 und DN 1600

Die Verleihung erfolgt unter Zugrundelegung der Allgemeinen Geschäftsbedingungen GW 30 ÖVGW-Qualitätsmarke Produkte Gas & Wasser „Voraussetzungen für die Zuerkennung der ÖVGW-Qualitätsmarke für Produkte der Gas- und Wasserversorgung.“

Wien, am 16. Februar 2021

Dip.-Ing. (FH) Alexander Schwanzer  
Leiter der ÖVGW-Zertifizierungsstelle





Österreichische Vereinigung für das Gas- und Wasserfach  
A-1010 Wien, Schuberttring 14  
Telefon: +43 / 1 / 513 15 88-0\* / Telefax: +43 / 1 / 513 15 88-25  
E-Mail: office@ovgw.at / Internet: www.ovgw.at



Akkreditiert durch das Bundesministerium  
für Digitalisierung und Wirtschaftsstandort



<sup>1)</sup> HINWEIS: Durch die Erfüllung der Anforderungen des ÖVGW QS-W 401 ist der Inhaber der ÖVGW-Qualitätsmarke aufgrund des Beschlusses des Vorstands des GRIS vom 10.12.2007 gleichzeitig auch berechtigt, das GRIS-Gütezeichen für Rohre und Formstücke im Bereich Trinkwasserversorgung zu führen. Die von der ÖVGW vergebene ÖVGW-Registrierungsnummer gilt diesfalls gleichzeitig auch als GRIS-Registrierungsnummer. Die Kennzeichnung ist am Produkt wie folgt vorzunehmen: ÖVGW/GRIS W 1.754. Das Recht zur Führung des GRIS-Gütezeichens endet mit dem Recht zur Führung der ÖVGW-Qualitätsmarke.

ZVR 818158001

Die Verleihung erfolgt unter Zugrundelegung der Allgemeinen Geschäftsbedingungen GW 30 ÖVGW-Qualitätsmarke Produkte Gas & Wasser „Voraussetzungen für die Zuerkennung der ÖVGW-Qualitätsmarke für Produkte der Gas- und Wasserversorgung.“

Wien, am 16. Februar 2021

Dip.-Ing. (FH) Alexander Schwanzer  
Leiter der ÖVGW-Zertifizierungsstelle

## Vedlegg 6

# CARSO - LABORATOIRE SANTÉ ENVIRONNEMENT HYGIÈNE DE LYON

Laboratoire Agréé pour les analyses d'eaux par le Ministère de la Santé

Laboratoire habilité par le Ministère chargé de la santé en application de l'article R\*.1321-52 du code de la santé publique

## CERTIFICAT DE CONFORMITE AUX LISTES POSITIVES DE REFERENCE Certificate of conformity to positive lists

Conformément à l'arrêté du 29 mai 1997 modifié, aux circulaires du Ministère chargé de la santé  
DGS/VS4 n° 99/217 du 12 avril 1999 et DGS/VS4 n° 2000/232 du 27 avril 2000  
et aux avis parus au Journal Officiel du 24 février 2012 (texte n°119) et du 23 janvier 2018 (texte n°97)

<b>Coordonnées du demandeur :</b> <i>Contact details of the ACS owner</i>	<b>Nom(s) commercial(aux) du produit fini :</b> <i>Commercial name(s) of the finished product</i>
<b>JINDAL SAW GULF LLC</b> <b>P.O. Box 92135, Plot N°11 NR 28</b> <b>Industrial City of Abu Dhabi (ICAD-III)</b> <b>Mussafah, Abu Dhabi</b> <b>UAE</b>	<b>Blast Furnace Slag Cement Mortar</b> <b>JUGL-BFSC</b>

**Type de produit fini / Type of finished product :**

<input type="checkbox"/> Lubrifiant / Lubricant	<input type="checkbox"/> Ajout ou Adjuvant organique pour ciment / Organic cement admixture
<input type="checkbox"/> Graisse / Grease	<input checked="" type="checkbox"/> Revêtement à base de ciment / Cementitious coating
<input type="checkbox"/> Colle / Glue	<input type="checkbox"/> Joint diamètre inférieur à 63 mm / Seal, gasket, o-ring with a diameter lower than 63mm
<input type="checkbox"/> Autre / Other :	

**Commentaires / Comments :**  
**Couleur du produit / Product color :** grise / grey

**N° de dossier attribué par le laboratoire habilité / File reference :** **21 CLP LY 017**

**Formulation chimique / Chemical formulation :**

La formulation chimique vérifiée par le laboratoire est conforme aux listes positives de référence. Ce certificat est établi sous réserve de la non-modification de la composition chimique du produit et des préparations commerciales qui le constituent. Il peut par ailleurs être remis en cause par l'évolution des listes positives.

*The chemical formulation checked by the laboratory is conform to the positive lists. This certificate is issued provided that chemical composition of the product ( and commercial preparations that constitute it) stays unmodified. It can also be reconsidered by the positive lists evolution.*

**Remarque / Remark :**

**Attestation délivrée par / Certificate issued by :** Christelle AUTUGELLE Signature :  
Responsable Laboratoire MCDE  
CARSO - L.S.E.H.L.

A la date du / Date of issue : 13 Avril 2021

Date d'expiration du CLP / Expiry date : 16 Novembre 2025

**Commentaires / comments :** renouvellement / renewal 15 CLP LY 035

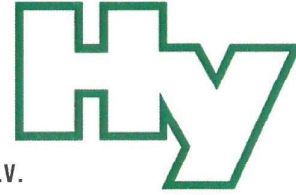
## **Vedlegg 7**

# Hygiene-Institut des Ruhrgebiets

Institut für Umwelthygiene und Toxikologie

Director: Dr. Thomas-Benjamin Seiler

Legal Entity: Verein zur Bekämpfung der Volkskrankheiten im Ruhrkohlengebiet e.V.



HYGIENE-INSTITUT · Postfach 10 12 55 · 45812 Gelsenkirchen / GERMANY

Jindal Saw Gulf LLC  
P.O. Box 132595, Plot 11 NR  
ICAD-III, Musaffah  
ABU DHABI  
U. A. E.

Visitor's/Parcel Address:

Rotthäuser Str. 21  
45879 Gelsenkirchen

Telephone + 49 (0) 209 9242-0  
Extension + 49 (0) 209 9242-270  
Telefax + 49 (0) 209 9242-212  
E-Mail k.stefanski@hyg.de  
Internet www.hyg.de

Reference-No.: K-355391-22-Sf/Lk  
Contact person: Karin Stefanski  
Prolongation: K-265452-15-WR

Gelsenkirchen, 02.02.2022

## TEST CERTIFICATE according to the DVGW Code of Practice W 347 "hygienic requirements for cement-bound materials for drinking water supply" (status 2006-05)

**Product:** BFSC Mortar lined Ductile Iron pipe sample DN 200

**Production Place:** Jindal Saw Gulf LLC, Musaffah, Abu Dhabi

**Test Specimen:** pipe samples DN 200 x 250 mm

### Test result:

The test specimen meet the requirements of the DVGW Code of Practice W 347 (status 2006-05) according to the test report no.: **K-265452-15-WR dated 18.12.2015** for the following scopes, as far as the material is qualified technically:

Scope	Products / Components	Assessment
I	mortar lining of cast iron pipes and steel pipes	passed
II	concrete pipes $\geq$ DN 300, reservoirs, cementitious coatings of reservoirs	passed
III	cement for tiles, joint filler, coating of fittings (e.g. for welding joints)	passed
IV	concrete components in protective areas of drinking water plants I, II, III	passed

This test certificate is valid beginning with the date of issue and is ending by **18.12.2025** as far as there are no changes in the formula.

The Director of the Hygiene-Institute  
on behalf of

Dr. rer. nat. Damian Pleschka  
Dept. for water hygienic material testing



The assessment was based on the assumption that the used starting substances and monomers used to manufacture the product may completely known and no other substances are present in the product. The validity of this document expires in case of modifications in the composition of the product or the processing conditions. The results and evaluations refer to the groups of test items. This document may not be published without our written permission only complete and unchanged or duplicated.

**Legal Entity:** Verein zur Bekämpfung der Volkskrankheiten im Ruhrkohlengebiet e.V., **Register:** VR 519 Local Court Gelsenkirchen (Germany); **VAT ID:** DE125018356  
**Directorate:** Prof. Dr. Jürgen Kretschmann (Head), Dr. Emanuel Grün, Dr. Dirk Waider, Joachim Löchte, Dr. Thomas-Benjamin Seiler (Executive Member)

## Vedlegg 8

Approval Number: 2011523  
Test Report: M107066



18<sup>th</sup> November 2020

PC Chanda & Co. PVT Ltd.  
Ravi Auto House,  
103 Park Street,  
6th Floor,  
Kolkata 700016,  
India

Water Regulations Advisory Scheme Ltd.  
Unit 13,  
Willow Road,  
Pen y Fan Industrial Estate,  
Crumlin,  
Gwent,  
NP11 4EG

**WATER REGULATIONS ADVISORY SCHEME LTD. (WRAS)**  
**MATERIAL APPROVAL**

The material referred to in this letter is suitable for contact with wholesome water for domestic purposes having met the requirements of BS6920-1:2000 and/or 2014 'Suitability of non-metallic products for use in contact with water intended for human consumption with regard to their effect on the quality of the water'.

The reference relates solely to its effect on the quality of the water with which it may come into contact and does not signify the approval of its mechanical or physical properties for any use.

**COATINGS, PAINTS & LININGS - FACTORY APPLIED PIPE & FITTINGS COATINGS.**

**5030**

'EDELPOXY FN 132 Blue'. Factory applied, blue coloured epoxy coating. Apply as per manufacturer's IFU reference 'PC 132' dated 'January 28, 2020'. Cure for 7 days@30°C. For use with water up to 85°C.

This material is only approved for the curing conditions that appear on the approval. If the cure conditions are varied from those specified on the approval then the material is not covered by the scope of the approval.

**APPROVAL NUMBER: 2011523**

**APPROVAL HOLDER: PC CHANDA & CO. PVT LTD.**

The Scheme reserves the right to review approval.  
Approval 2011523 is valid between November 2020 and November 2025

An entry, as above, will accordingly be included in the Water Fittings Directory on-line under the section headed, "Materials which have passed full tests of effect on water quality".

The Directory may be found at: [www.wras.co.uk/directory](http://www.wras.co.uk/directory)

Yours faithfully

A handwritten signature in black ink, appearing to read 'Jason Furnival', written in a cursive style.

Jason Furnival  
Approvals & Enquiries Manager  
Water Regulations Advisory Scheme

## **Vedlegg 9**



# CARSO - LABORATOIRE SANTÉ ENVIRONNEMENT HYGIÈNE DE LYON

Laboratoire Agréé pour les analyses d'eaux par le Ministère de la Santé

Laboratoire habilité par le Ministère chargé de la santé en application de l'article R\*. 1321-52 du code de la santé publique

## ATTESTATION DE CONFORMITE SANITAIRE (ACS)

### Certificate of sanitary conformity


Conformément à l'arrêté du 29 mai 1997 modifié et aux circulaires du Ministère de la santé  
DGS/VS4 n° 99/217 du 12 avril 1999 et DGS/VS4 n° 2000/232 du 27 avril 2000

<b>Coordonnées du demandeur /</b> <b>Contact details of the ACS owner :</b> <b>P C Chanda &amp; Co Pvt Ltd</b> <b>Ravi Auto House</b> <b>103, Park Street</b> <b>6th Floor</b> <b>Kolkata – 700 016</b> <b>INDE</b>	<b>Nom(s) commercial(aux) du produit fini /</b> <b>Commercial name(s) of the finished product :</b> <b>Edelpoxy FN 132</b>
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<b>Type de produit fini / Type of finished product :</b>		
<input type="checkbox"/> tube / pipe	<input type="checkbox"/> joint / seal, gasket, o-ring...	<input checked="" type="checkbox"/> revêtement / coating
<input type="checkbox"/> produit de jointoyage / sealing product	<input type="checkbox"/> raccord et manchon / fittings	<input type="checkbox"/> composant d'accessoires / accessories component
<input type="checkbox"/> autre / other :		
<b>Nature du matériau / Type of material :</b>		
<input type="checkbox"/> polychlorure de vinyl PVC	<input type="checkbox"/> polybutylène PB	<input type="checkbox"/> ethylene-propylène EPDM
<input type="checkbox"/> PVC surchloré PVC-C	<input type="checkbox"/> polyamide PA	<input type="checkbox"/> butadiène-acrylonitrile NBR
<input type="checkbox"/> polyéthylène PE	<input type="checkbox"/> polytétrafluoroéthylène PTFE	<input type="checkbox"/> autre / other :
<input type="checkbox"/> polyéthylène réticulé PEX	<input type="checkbox"/> acrylonitrile-butadiène-styrène ABS	
<input type="checkbox"/> polypropylène PP	<input checked="" type="checkbox"/> à base de résine époxydique / epoxy resin	
<b>Commentaires / Comments :</b> Renouvellement / Renewal 15 MAT LY 082		
<b>Couleur du matériau / material color :</b> bleue / blue		
<b>N° de dossier attribué par le laboratoire habilité / File reference :</b> 20 MAT LY 127		

<b>Formulation chimique / Chemical formulation :</b> Vérifiée par le laboratoire et conforme aux listes positives. <i>Checked by the laboratory and conform to the positive lists.</i>
--

<b>Essais d'inertie réalisés selon la norme XP P 41-250 /</b> <b>Migration tests performed according to the standard XP P 41-250 :</b> Rapport S/V testé / S/V tested ratio : 3 cm <sup>2</sup> /L Date des essais / Tests date : / Commentaires : La composition chimique du matériau n'ayant pas évolué et étant toujours conforme aux listes positives, de nouveaux essais d'inertie ne sont pas nécessaires. Les essais réalisés en 2015 restent valables et conformes. Comments : The chemical composition of the material did not change and it is still in compliance with our positive lists. New testings are not requested ; those performed in 2015 remain valid and compliant.
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<b>Attestation délivrée par / Certificate issued by :</b> Christelle AUTUGELLE Responsable MCDE CARSO - L.S.E.H.L.	<b>Signature :</b> 
<b>A la date du / Date of issue :</b> 10 Août 2020	
<b>Date d'expiration de l'ACS / Expiry date :</b> 17 Juillet 2025	
<b>Commentaires / Comments :</b> /	

## **Vedlegg 10**

# ATTESTATION DE CONFORMITE SANITAIRE (ACS)

## Certificate of sanitary conformity

Conformément à l'arrêté du 29 mai 1997 modifié et aux circulaires du Ministère de la Santé  
 DGS/VS4 n° 99/217 du 12 avril 1999 et DGS/VS4 n° 2000/232 du 27 avril 2000

<b>Coordonnées du demandeur /                  Contact details of the ACS owner :</b>  POLYTECH INDUSTRIES LLC Rakia Industrial Zone WIZ-04, WH-25-28 Al Jazira Al Hamra P.O. Box - 35892 RAS AL KHIMAH UNITED ARAB EMIRATES	<b>Nom(s) commercial(aux) du produit fini /                  Commercial name(s) of the finished product :</b>  EW50
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**Type de produit fini / Type of finished product :**

<input type="checkbox"/> tube / pipe	<input type="checkbox"/> Réservoirs / Storage systems	<input checked="" type="checkbox"/> joint / seal, gasket, o-ring...
<input type="checkbox"/> revêtement pour tubes / coating for pipes	<input type="checkbox"/> Produits pour réservoirs / Products for storage systems	<input type="checkbox"/> composant d'accessoires / accessories components
<input type="checkbox"/> produit de jointoyage / sealing product	<input type="checkbox"/> raccord et manchon / fittings	<input type="checkbox"/> autre / other :

**Nature du matériau / Type of material :**

<input type="checkbox"/> polychlorure de vinyl PVC	<input type="checkbox"/> polybutylène PB	<input checked="" type="checkbox"/> éthylène-propylène EPDM
<input type="checkbox"/> PVC surchloré PVC-C	<input type="checkbox"/> polyamide PA	<input type="checkbox"/> butadiène-acrylonitrile NBR
<input type="checkbox"/> polyéthylène PE	<input type="checkbox"/> polytétrafluoroéthylène PTFE	<input type="checkbox"/> autre / other :
<input type="checkbox"/> polyéthylène réticulé PEX	<input type="checkbox"/> acrylonitrile-butadiène-styrène ABS	
<input type="checkbox"/> polypropylène PP	<input type="checkbox"/> à base de résine époxydique / epoxy resin	

**Température(s) d'utilisation / Temperature(s) for the use :**

<input checked="" type="checkbox"/> Eau froide / Cold water	<input type="checkbox"/> Eau chaude / Warm water	<input type="checkbox"/> Eau très chaude / Hot water
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**Commentaires / Comments :**  
 Couleur du matériau / Material color : Noir / Black

**N° de dossier attribué par le laboratoire habilité / File reference : 21 MAT NY 091**

**Formulation chimique / Chemical formulation :**

Vérfiée par le laboratoire et conforme aux listes positives /  
 Checked by the laboratory and conform to the positive lists

**Essais de migration réalisés selon les normes NF EN 1420, NF EN 13052-1 & NF EN 12873-1 ou -2:  
 Migration tests performed according to the standards NF EN 1420, NF EN 13052-1 & NF EN 12873-1 or -2 :**

Rapport S/V testé / S/V tested ratio : 0,2 dm<sup>-1</sup> (NF EN 1420, NF EN 13052-1) et 5 dm<sup>-1</sup> (NF EN 12873-1)  
 Facteur de conversion associé / Associated conversion factor : 0,2 jour/dm / 0,2 day/dm  
 Date des essais / Tests date : du 1er février au 22 avril 2021 / from February 01 to April 22, 2021.

Commentaires : Les essais d'inertie n'ont fait apparaître aucune anomalie. Les résultats sont conformes aux critères d'acceptabilité fixés en annexe 1.  
 Comments : The migration tests do not bring out any anomaly. The results are in accordance with the acceptance criteria set out in annex 1.

**Attestation délivrée par / Certificate issued by :**

Emilie Bailly Responsable Technique / Technical Manager A la date du / Date of issue : 10 juin 2021 Date d'expiration de l'ACS / Expiry date : 10 juin 2026 Commentaires / Comments : Transfert de l'ACS 20 MAT NY 184 / Transfer of ACS 20 MAT NY 184	Signature : 
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## ATTESTATION DE CONFORMITE SANITAIRE (ACS)

### Certificate of sanitary conformity

Conformément à l'arrêté du 29 mai 1997 modifié et aux circulaires du Ministère de la Santé  
 DGS/VS4 n° 99/217 du 12 avril 1999 et DGS/VS4 n° 2000/232 du 27 avril 2000

<b>Coordonnées du demandeur /</b> <b>Contact details of the ACS owner :</b>  POLYTECH INDUSTRIES LLC Rakia Industrial Zone WIZ-04, WH-25-28 Al Jazira Al Hamra P.O. Box - 35892 RAS AL KHIMAH UNITED ARAB EMIRATES	<b>Nom(s) commercial(aux) du produit fini /</b> <b>Commercial name(s) of the finished product :</b>  <p style="text-align: center;">EWA 14165</p>
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<b>Type de produit fini / Type of finished product :</b> <input type="checkbox"/> tube / pipe <input type="checkbox"/> revêtement pour tubes / coating for pipes <input type="checkbox"/> produit de jointoyage / sealing product <input type="checkbox"/> Réservoirs / Storage systems <input type="checkbox"/> Produits pour réservoirs / Products for storage systems <input type="checkbox"/> raccord et manchon / fittings <input checked="" type="checkbox"/> joint / seal, gasket, o-ring... <input type="checkbox"/> composant d'accessoires / accessories components <input type="checkbox"/> autre / other :		
<b>Nature du matériau / Type of material :</b> <input type="checkbox"/> polychlorure de vinyl PVC <input type="checkbox"/> PVC surchloré PVC-C <input type="checkbox"/> polyéthylène PE <input type="checkbox"/> polyéthylène réticulé PEX <input type="checkbox"/> polypropylène PP <input type="checkbox"/> polybutylène PB <input type="checkbox"/> polyamide PA <input type="checkbox"/> polytétrafluoroéthylène PTFE <input type="checkbox"/> acrylonitrile-butadiène-styrène ABS <input type="checkbox"/> à base de résine époxydique / epoxy resin <input checked="" type="checkbox"/> éthylène-propylène EPDM <input type="checkbox"/> butadiène-acrylonitrile NBR <input type="checkbox"/> autre / other :		
<b>Température(s) d'utilisation / Temperature(s) for the use :</b> <input checked="" type="checkbox"/> Eau froide / Cold water <input type="checkbox"/> Eau chaude / Warm water <input type="checkbox"/> Eau très chaude / Hot water		
<b>Commentaires / Comments :</b> Couleur du matériau / Material color : Noir / Black  N° de dossier attribué par le laboratoire habilité / File reference : 21 MAT NY 092		

<b>Formulation chimique / Chemical formulation :</b>  Vérifiée par le laboratoire et conforme aux listes positives / Checked by the laboratory and conform to the positive lists
---

<b>Essais de migration réalisés selon les normes NF EN 1420, NF EN 13052-1 &amp; NF EN 12873-1 ou -2:</b> <b>Migration tests performed according to the standards NF EN 1420, NF EN 13052-1 &amp; NF EN 12873-1 or -2 :</b>  Rapport S/V testé / S/V tested ratio : 0,2 dm <sup>-1</sup> (NF EN 1420) et 5 dm <sup>-1</sup> (NF EN 12873-1) Facteur de conversion associé / Associated conversion factor : 0,2 jour/dm / 0,2 day/dm Date des essais / Tests date : du 08 février au 11 mars 2021 / from February 08 to March 11, 2021.  Commentaires : Les essais d'inertie n'ont fait apparaître aucune anomalie. Les résultats sont conformes aux critères d'acceptabilité fixés en annexe 1. Comments : The migration tests do not bring out any anomaly. The results are in accordance with the acceptance criteria set out in annex 1.
---

<b>Attestation délivrée par / Certificate issued by :</b> Emilie Bailly Responsable Technique / Technical Manager A la date du / Date of issue : 16 juin 2021 Date d'expiration de l'ACS / Expiry date : 10 juin 2026 Commentaires / Comments : Transfert de l'ACS 20 MAT NY 185 / Transfer of ACS 20 MAT NY 185	Signature : 
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## **Vedlegg 11**

**BUREAU VERITAS**  
Certification



## Certificate of Conformity

Awarded to:

**JINDAL SAW GULF LLC**

HEAD OFFICE AND PRODUCTION PLANT:

PLOT NO. 11 NR 28 ICAD-III, MUSSAFAH, P.O. Box 92135, ABU DHABI - (UNITED ARAB EMIRATES)

Bureau Veritas Italia S.p.A. certify that the process of application of coatings for the following products:

**Ductile iron pipes  
for water and sewerage application**  
From DN 100 to DN 1000 AJ  
From DN 100 to DN 2000 TJ  
From DN 100 to DN 1800 JSAW Lock(DC)  
From DN 100 to DN 300 RAJ

**Ductile iron fittings  
for water and sewerage application**  
From DN 100 to DN 2000

**COMMERCIAL BRAND: JSAW-JAL Sertubi / JSAW-NIRJAL Sertubi**  
produced by JINDAL SAW GULF LLC under the trademark



have been evaluated and found in conformity against the requirement listed in  
Annex of this certificate

Certification according requirements stated in:

**RG-01-03 ACCREDIA**  
**QHSE-REG-02.TQR Bureau Veritas**  
**IND-REP-48-CP Bureau Veritas**

Original Emission Date: 07/11/2017  
Last Emission Date: 16/11/2021  
Expiration Date: 15/11/2024

Subject to the continued satisfactory operation, to check this certificate validity please refer to website: [www.bureauveritas.it](http://www.bureauveritas.it).  
Further clarifications regarding the scope of this certificate and the applicability of standard's requirements may be obtained by consulting the organisation.

**Scheme Technical Manager**

Date: 16/11/2021

Certificate N°: **1050/001 Rev.5**



PRD N° 009B

Membro degli Accordi di Mutuo Riconoscimento EA, IAF e ILAC  
Signatory of EA, IAF and ILAC mutual Recognition Agreements

**BUREAU VERITAS**  
Certification



Annex 1/2 to  
Certificate of Conformity

Awarded to:

**JINDAL SAW GULF LLC**

HEAD OFFICE AND PRODUCTION PLANT:

PLOT NO. 11 NR 28 ICAD-III, MUSSAFAH, P.O. Box 92135, ABU DHABI - (UNITED ARAB EMIRATES)

Bureau Veritas Italia S.p.A. certify that the process of application of coatings have been evaluated and found in conformity against the requirements of the following:

Ductile Iron Pipes
<b>ISO 4179:2005</b> <i>Ductile iron pipes and fittings for pressure and non pressure pipelines Cement mortar lining</i>
<b>ISO 8179-1:2017</b> <i>Ductile iron pipes - External zinc-based coating Part 1: Metallic zinc with finishing layer (130-200 g/m<sup>2</sup>)</i>
<b>EN 545:2006 Annex D.2.3</b> <i>External Coating - Zn-Al alloy 85/15 (400 g/m<sup>2</sup>) with finishing layer</i>
<b>EN 545:2010 Annex D.2.2</b> <i>External Coating - Zn-Al alloy (400 g/m<sup>2</sup>) with finishing layer</i>
<b>EN 15189:2006</b> <i>Ductile iron pipes, fittings and accessories External polyurethane lining for pipes and fitting Requirements and test methods</i>
<b>EN 15655-1:2018</b> <i>Ductile iron pipes, fittings and accessories - Requirements and test methods for organic linings of ductile iron pipes and fittings Part 1: Polyurethane lining of pipes and fittings</i>
<b>External coating of Black Bitumen, Red or Blue Epoxy</b> <i>EN 545:2006 4.4.2/ISO 2531:1998 4.4.1 - Including Annex A EN 545:2010 4.5.2/ISO 2531:2009 4.4.1 - Including Annex A EN 598:2007+A1:2009 4.4.2/ISO 7186:2011 4.5.2 - Including Annex A</i>

Date: 16/11/2021

Certificate N°: **1050/001 Rev.5**



PRD N° 009B

Membro degli Accordi di Mutuo Riconoscimento EA, IAF e ILAC  
Signatory of EA, IAF and ILAC Mutual Recognition Agreements

**BUREAU VERITAS**  
Certification



Annex 2/2 to  
Certificate of Conformity

Awarded to:

**JINDAL SAW GULF LLC**

HEAD OFFICE AND PRODUCTION PLANT:

PLOT NO. 11 NR 28 ICAD-III, MUSSAFAH, P.O. Box 92135, ABU DHABI - (UNITED ARAB EMIRATES)

Bureau Veritas Italia S.p.A. certify that the process of application of coatings have been evaluated and found in conformity against the requirements of the following:

<b>Ductile Iron Fittings</b>
<b>ISO 4179:2005</b> <i>Ductile iron pipes and fittings for pressure and non pressure pipelines Cement mortar lining</i>
<b>ISO 8179-2:2017</b> <i>Ductile iron pipes - External zinc coating Part 2: Zinc rich paint with finishing layer</i>
<b>EN 14901:2014+A1:2019</b> <i>Ductile iron pipes, fittings and accessories Requirements and test methods for organic coatings of ductile iron fittings and accessories - Part 1: Epoxy coating (heavy duty)</i>
<b>EN 15189:2006</b> <i>Ductile iron pipes, fittings and accessories External polyurethane lining for pipes and fitting Requirements and test methods</i>
<b>EN 15655-1:2018</b> <i>Ductile iron pipes, fittings and accessories - Requirements and test methods for organic linings of ductile iron pipes and fittings Part 1: Polyurethane lining of pipes and fittings</i>
<b>External coating of Black Bitumen or Red Epoxy</b> <i>EN 545:2006 4.4.2/ ISO 2531:1998 4.4.1 – Including Annex A EN 545:2010 4.5.2/ ISO 2531:2009 4.4.1 – Including Annex A EN 598:2007+A1:2009 4.4.2/ ISO 7186:2011 4.5.2 - Including Annex A</i>

Date: 16/11/2021

Certificate N°: **1050/001 Rev.5**



PRD N° 009B

Membro degli Accordi di Mutuo Riconoscimento EA, IAF e ILAC  
Signatory of EA, IAF and ILAC mutual Recognition Agreements



## **Vedlegg 12**

# SINTEF Produktsertifikat

## Nr. 3833

Utstedt: 15.12.2023  
Gyldig til: 01.01.2029  
forutsatt publisert på  
[www.sintefcertification.no](http://www.sintefcertification.no)

SINTEF bekrefter at

## Jindal SAW duktile støpejernsrør med tilhørende rørdeler for drikkevann fra DN 100 opp til DN 2000

er i samsvar med kravene i

- › EN 545 (\*)
- › DVGW Arbeitsblatt W 270 (\*)
- › DVGW Arbeitsblatt W 347 (\*)



### Innehaver

Jindal Saw Gulf L.L.C.  
Plot No.11, NR 28, ICAD-III, Musaffah  
92135 Abu Dhabi, De forente arabiske emirater

### Produsent

Jindal Saw Gulf L.L.C.  
Plot No.11, NR 28, ICAD-III, Musaffah  
92135 Abu Dhabi, De forente arabiske emirater

### Produkt- og produksjonskontroll

Produktet er underlagt overvåking i samsvar med kravene i NS-EN ISO/IEC 17065.

### Produktbeskrivelse

Jindal SAW duktile støpejernsrør med tilhørende rørdeler for drikkevann fra DN 100 opp til DN 2000.

Innvendig belegg: Sement, type BFSC (blast furnace slag cement).

Utvendig belegg: 400 g/m<sup>2</sup> ZnAl med 70 µm blå epoxy.

Rørene produseres med Push-Fit joint (muffe og spiss ende) med Tyton tettestpakning for dimensjoner fra DN 100 opp til DN 2000.

For strekkfaste systemer benyttes JSAW-LOCK som er dobbeltkammerede rør med mekanisk kobling. Produseres i dimensjoner fra DN 100 opp til DN 1800.

### Funksjonskrav i TEK

#### Driftstrykk

Produktet tåler forutsatte ytelser ved normalt driftstrykk.

#### Påvirkning på drikkevann

Produktet avgir ikke stoffer som kan forringe kvaliteten på drikkevannet eller medføre helsefare.

Produktet er testet for utlekking til drikkevann etter DVGW Arbeitsblatt W 270 og DVGW Arbeitsblatt W 347.

### Andre sertifiseringskrav

#### Merking

Produktet kan merkes med SINTEFs sertifikatmerke slik som avbildet ovenfor. Merket kan også benyttes på emballasje og markedsføringsmateriell som angår de sertifiserte produkter.



Anne-Jorunn Enstad  
Sertifiseringsleder

## **Vedlegg 13**

**(Type test Report- Flexible Pipes)**

**JINDAL SAW GULF LLC**

**PERFORMANCE TESTING REQUIREMENT AS PER BSEN545:2010 / BSEN598:2007+ A1:2009  
STANDARD (TYPE TEST)**

NAME OF MANUFACTURER : M/s JINDAL SAW GULF LLC

DATE / PERIOD AND PLACE OF INSPECTION : 29.06.13 to 16.07.13 at JSGL, Abu Dhabi

NAME OF INSPECTING AGENCY : M/s BV ITALIA and M/s TUV NORD Middle East

SIZE & CLASS : DN 1600 Class C25

IDENTIFICATION : A20S01 (Socket), E09S02 (Spigot)

**LEAKTIGHTNESS OF FLEXIBLE JOINTS TO DYNAMIC INTERNAL PRESSURE AS PER CLAUSE 7.2.5 OF BSEN545:2010**

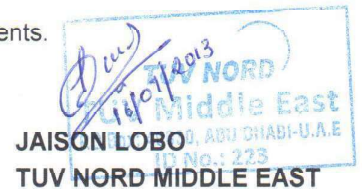
The test had been started on 29.06.13 and witnessed at 3.40pm by Mr.Roberto Pili of M/s BV Italia.  
Test had been completed on 16.07.13 at 11.30am in presence of Mr.Jaison Lobo of M/s TUV NORD and the test had also been witnessed by Mr.Pavel Petr of M/s SZU, Engg. Test Institute, Jablonec n.N on 10.07.13.

SL.NO.	DESCRIPTION OF REQUIREMENTS	OBSERVEVATION	REMARKS
1	<p>The leak tightness of joints to dynamic internal pressure shall be type tested in accordance with clause 7.2.5 (BSEN545) &amp; 7.8 (BSEN598). The pressure shall be steadily increased up to PMA30 Bar), the allowable maximum operating pressure of the joint, then automatically monitored according to the following pressure cycle.</p> <p>a) steady pressure reduction to (PMA - 5) bar; b) maintain (PMA - 5) bar for at least 5 s; c) steady pressure increase to PMA; d) maintain PMA for at least 5 s;</p> <p>The number of cycles (24000 cycles) shall be recorded and the test stopped automatically in the occurrence of a failure of the joint. The joints shall exhibit no visibal leakage in the following position: Joints aligned and withdrawn subjected to shear the shear force across the joint, expressed in N, shall be not less than 50 times DN (Shear load 65.7KN / 54.6 Bar).</p>	<p>Test done with joint aligned and withdrawn condition. Joints found no leakage when tested between 30 and 25 bar for 24614 cycles with 66KN shear force (56 bar) and found satisfactory.</p> <p>Joint is checked at every 15 min. and found no sign of leakage.</p> <p>Starting Time : 02.27pm dt. 29.06.13 End Time : 11.30am dt. 16.07.13</p> <p>Cyclic recording log sheet enclosed.</p>	<p>Conformed as per the requirement</p>

Rubber Gasket used for the joints are from VIP, Polymers UK, found conforming as per the drawing 014-ABU-GSK-1127

**Remarks:** The above test had been conducted as per BSEN545:2010, which has higher shear load than as per BSEN598 and meeting the specifications.  
Hence for the same test as per BSEN598 considered as meeting the requirements.

*T. Venkatachalam*  
T.VENKATACHALAM  
JINDAL SAW GULF LLC



## JINDAL SAW GULF LLC

### PERFORMANCE TESTING REQUIREMENT AS PER ISO:2531:2009 / BSEN545:2010 / BSEN598:2007+ A1:2009 / ISO7186:2011 STANDARD (TYPE TEST)

NAME OF MANUFACTURER : M/s JINDAL SAW GULF LLC  
DATE AND PLACE OF INSPECTION : 27.06.2013 and JSGL, Abu Dhabi  
NAME OF INSPECTING AGENCY : M/s BV ITALIA  
SIZE : DN 1600  
IDENTIFICATION : E09S05(BARREL) , E07S01(SOCKET-1) , E07S05(SOCKET-2)

#### LEAKTIGHTNESS OF JOINTS TO EXTERNAL PRESSURE AS PER CLAUSE 5.0 & 7.0

SL.NO.	DESCRIPTION OF REQUIREMENTS	OBSERVEVATION	REMARKS
1	Maximum design radial gap between the components to be jointed (smallest spigot together with largest socket) with a tolerance of 0 to - 5%	Radial gap found minus 2.64% & minus 1.71%. Dimension sheet is enclosed as Annexure-1	With in the limit.
2	Shall comprise of two joints made with two pipe sockets Conected together and one double spigot piece	Comprise of two joints made with two sockets welded together and jointed with one double spigot piece	Conformed as per the requirement
3	One half of load shall be applied to the spigot end on each side of the test assembly at 0.5DN or 200mm from socket ends, whichever is largest.	Load applied 40KN (52bar) for DN 1600 at 800mm from socket end. (Load Calculation details enclosed as Annexure-1)	Conformed as per the requirement
4	Water filling and increasing pressure upto 2bar and holding for at least 2hours with in $\pm$ 0.1bar.	Water filled and pressure increased to 2.1bar and kept constant for 2hours. Joints are checked for every 15 minutes and no leakage noticed.  Starting Time : 11.15am End Time : 1.15pm	Conformed as per the requirement

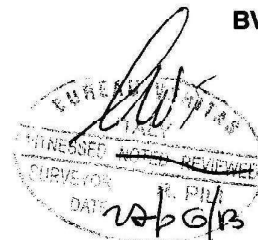
Rubber Gasket used for the joints are from VIP, Polymers UK, found conforming as per the drawing 014-ABU-GSK-1127

**Remarks:** The above test had been conducted as per BSEN545:2010, which has higher shear load than as per BSEN598, ISO2531 & ISO7186 and meeting the specifications.  
Hence for the same test as per BSEN598, ISO2531 & ISO7186 considered as meeting the requirements.

T.VENKATACHALAM  
JINDAL SAW GULF LLC



ROBERTO PILI  
BV ITALIA



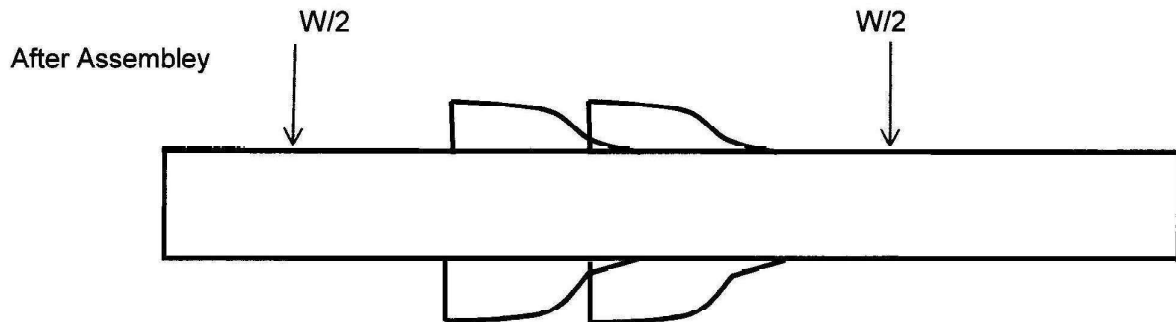
## Annexure - 1

### Type test Pipe Sample Dimensions and Shear Load Calculation for External Pressure Testing - DN 1600

**Spec: BSEN545:2010 / ISO 2531:2009 / BSEN 598:2007 / ISO 7186:2011**

<u>Sample - A ( Spigot)</u>	<u>Sample - B ( Socket1)</u>	<u>Sample - C ( Socket2)</u>
Sample No. E09S05	Sample No. E07S01	Sample No. E07S05
Length 3500 mm	Length 270mm	Length 270mm
DE 1661.5mm	J 1724.2mm	J 1724.8 mm

Size	DE		J		Radial gap		
	Required	Observed	Required	Observed	Design	Actual	%
DN 1600	1660.6 to 1669	1661.5	1719 TO 1725	1724.2	64.4	62.7	-2.64
DN 1600	1660.6 to 1669	1661.5	1719 TO 1725	1724.8	64.4	63.3	-1.71



#### Shear Load Calculation

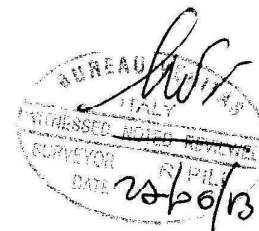
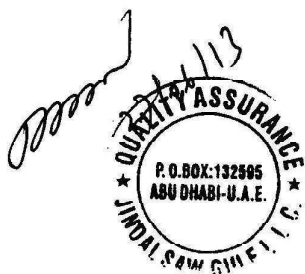
Load = 50xDN

=80000 N

=80 KN

W/2 = 40 KN

Equivalent pressure = 51.9 bar

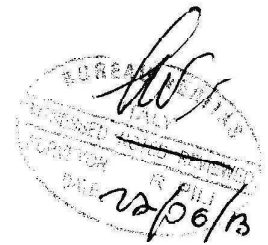




# JINDAL SAW GULF LLC

PRESSURE RECORDING LOG SHEET						
TEST DETAILS:		<u>LEAKTIGHTNESS OF JOINTS TO POSITIVE EXTERNAL PRESSURE</u>				
		<u>AS PER CLAUSE 5.0 &amp; 7.0</u>				
TEST UNIT:	EXTERNAL TEST	DATE: 27.06.13	TIME: 11.15 am			
TEST TYPE:	POSITIVE EXTERNAL PRESSURE TEST					
PIPE SIZE:	DN1600					
IDENTIFICATION:	: E076S01 (Socket 1), E07S05 (Socket 2), E09S05 (Spigot)					
TEST REPORT:						
TIME	WATER PRESSURE (BAR)	FORCE "W" (Bar)	Remarks			
11.15 am	2.1	52.0	No leakage at joint area			
11.30 am	2.1	52.0	No leakage at joint area			
11.45 am	2.1	52.0	No leakage at joint area			
12.00 pm	2.1	52.0	No leakage at joint area			
12.15 pm	2.1	52.0	No leakage at joint area			
12.30 pm	2.1	52.0	No leakage at joint area			
12.45 pm	2.1	52.0	No leakage at joint area			
01.00 pm	2.1	52.0	No leakage at joint area			
01.15 pm	2.1	52.0	No leakage at joint area			

*Handwritten signature and date: 27/06/13*





**JINDAL SAW GULF LLC**

**PERFORMANCE TESTING REQUIREMENT AS PER ISO:2531:2009 / BSEN545:2010 / BSEN598:2007+ A1:2009 / ISO7186:2011 STANDARD (TYPE TEST)**

NAME OF MANUFACTURER : M/s JINDAL SAW GULF LLC  
 DATE AND PLACE OF INSPECTION : 28.06.2013 and JSGL, Abu Dhabi  
 NAME OF INSPECTING AGENCY : M/s BV ITALIA  
 SIZE & CLASS : DN 1600 Class C25  
 IDENTIFICATION : A20S01 (Socket), E09S02 (Spigot)

**LEAKTIGHTNESS OF FLEXIBLE JOINTS TO NEGATIVE INTERNAL PRESSURE AS PER CLAUSE 5.0 & 7.0**

SL.NO.	DESCRIPTION OF REQUIREMENTS	OBSERVEVATION	REMARKS
1	Maximum design radial gap between the components to be jointed (smallest spigot together with largest socket) with a tolerance of 0 to - 5%	Radial gap found minus 2.17% (Dimension sheet is enclosed as Annexure-1)	With in the limit.
2	Joints shall be tested with a spigot having an average iron wall thickness equal to the specified minimum value with a tolerance of 0 to +10%	Average iron wall thickness of 15.8mm found and the details are enclosed in Annexure-1.	Conformed as per the requirement
3	The leak tightness of flexible joints to negative internal pressure shall be type tested in accordance with clause 7.3 at a test pressure of 0.9 bar below atmospheric pressure (approximately 0.1 bar absolute pressure). The maximum pressure change during the test period shall not be more than 0.09 bar after 2 h, when tested in the two following positions: a) Joints aligned and subjected to shear the shear force across the joint, expressed in N, shall be not less than 50 times DN b) Joints deflected: the test angular deflection shall be the maximum allowable deflection indicated in the manufacturer's catalogue, but not less than 1° 30' for DN 1600	Test done with joint deflected condition. No pressure change more than specified observed when tested at 0.9 bar for 2hours with 105KN (88 bar) shear force and kept constant within ±0.09bar and found satisfactory. (Load calculation details enclosed as Annexure-1) Joint is checked at every 15 min. and found no change in pressure than specified. Starting Time : 12.15pm End Time : 02.15pm As the above test has been done with deflected condition and passed the requirement. Hence it has been considered as passed for Joints aligned position also.	Conformed as per the requirement.

Rubber Gasket used for the joints are from VIP, Polymers UK, found conforming as per the drawing 014-ABU-GSK-1127

**Remarks:** The above test had been conducted as per BSEN545:2010, which has higher shear load than as per BSEN598, ISO2531 & ISO7186 and meeting the specifications.  
 Hence for the same test as per BSEN598, ISO2531 & ISO7186 considered as meeting the requirements.

T.VENKATACHALAM  
 JINDAL SAW GULF LLC



ROBERTO PILI  
 BV ITALIA



## Annexure - 1

### Type test Pipe Sample Dimensions and Shear Load Calculation for Negative Internal Pressure Testing - DN 1600

Spec: BSEN545:2010 / ISO 2531:2009 / BSEN 598:2007 / ISO7186:2011

Size	DE		J		Radial gap		
	Required	Observed	Required	Observed	Design	Actual	%
DN 1600	1660.6 to 1669	1661.5	1719 TO 1725	1724.5	64.4	63	-2.17

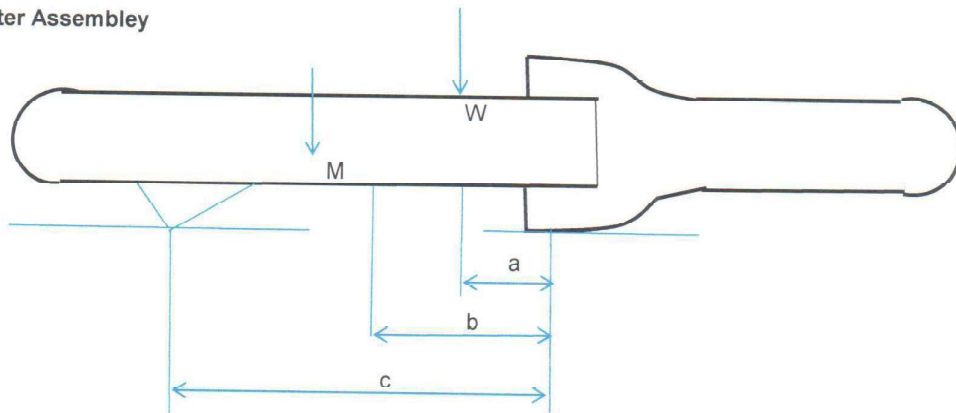
**Sample - A ( Spigot)**

Sample No. E09S02  
 Length 3955 MM  
 DE 1661.5 mm  
 Thickness Avg 15.8mm (15.6, 15.8, 16.0, 15.8, 16.2, 15.7)

**Sample - B ( Socket)**

Sample No. A20S01  
 Length 3590 mm  
 J 1724.5 mm  
 15.85

**After Assembly**



M= 21.2 KN  
 a= 845 mm  
 b= 1255 mm  
 c= 2510 mm

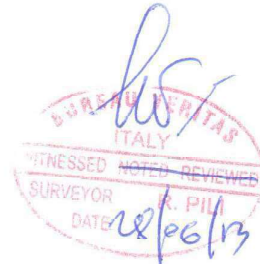
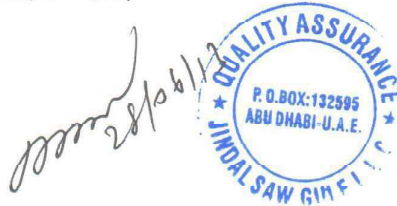
**Shear Load Calculation**

$$W = \frac{Fxc - M(c-b)}{c - a}$$

W = 104.5 KN (86.9 Bar)

Where

F = 80000 N ( 50 x DN )





# JINDAL SAW GULF LLC

PRESSURE RECORDING LOG SHEET				
TEST DETAILS:		LEAKTIGHTNESS OF JOINTS TO NEGATIVE INTERNAL PRESSURE		
		AS PER CLAUSE 5.0 & 7.0		
TEST UNIT:	INTERNAL TEST	DATE: 28.06.13	TIME: 12.15 pm	
TEST TYPE:	NEGATIVE INTERNAL PRESSURE TEST			
PIPE SIZE:	DN1600			
IDENTIFICATION:	: A20S01 (Socket), E09S02 (Spigot)			
TEST REPORT:				
TIME	VACUUM PRESSURE (BAR)	FORCE "W" (Bar)	Remarks	
12.15 pm	- 0.9 bar	88.0	No change in pressure	
12.30 pm	- 0.9 bar	88.0	No change in pressure	
12.45 pm	- 0.9 bar	88.0	No change in pressure	
01.00 pm	- 0.9 bar	88.0	No change in pressure	
01.15 pm	- 0.9 bar	88.0	No change in pressure	
01.30 pm	- 0.9 bar	88.0	No change in pressure	
01.45 pm	- 0.9 bar	88.0	No change in pressure	
02.00 pm	- 0.9 bar	88.0	No change in pressure	
02.15 pm	- 0.9 bar	88.0	No change in pressure	

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28/06/13



**JINDAL SAW GULF LLC**

**PERFORMANCE TESTING REQUIREMENT AS PER ISO:2531:2009 / BSEN545:2010 / BSEN598:2007+ A1:2009 / ISO7186:2011 STANDARD (TYPE TEST)**

NAME OF MANUFACTURER : M/s JINDAL SAW GULF LLC  
 DATE AND PLACE OF INSPECTION : 27.06.2013 and JSGL, Abu Dhabi  
 NAME OF INSPECTING AGENCY : M/s BV ITALIA  
 SIZE & CLASS : DN 1600 Class C25  
 IDENTIFICATION : A20S01 (Socket), E09S02 (Spigot)

**LEAKTIGHTNESS OF FLEXIBLE JOINTS TO POSITIVE INTERNAL PRESSURE AS PER CLAUSE 5.0 & 7.0**


SL.NO.	DESCRIPTION OF REQUIREMENTS	OBSERVEVATION	REMARKS
1	Maximum design radial gap between the components to be jointed (smallest spigot together with largest socket) with a tolerance of 0 to - 5%	Radial gap found minus 2.17% (Dimension sheet is enclosed as Annexure-1)	With in the limit.
2	Joints shall be tested with a spigot having an average iron wall thickness equal to the specified minimum value with a tolerance of 0 to +10%	Average iron wall thickness of 15.8mm found and the details are enclosed in Annexure-1.	Conformed as per the requirement
3	The leak tightness of flexible joints to positive internal pressure shall be type tested in accordance with clause 7.2 at a test pressure 42.5 bar (1.5PFA+5 bar), the joints shall exhibit no visibal leakage in the two following positions: a) Joints aligned and subjected to shear the shear force across the joint, expressed in N, shall be not less than 50 times DN b) Joints deflected: the test angular deflection shall be the maximum allowable deflection indicated in the manufacturer's catalogue, but not less than 1° 30'for DN DN 1600	Test done with joint deflected condition. Joints found no leakage when tested at 44 bar for 2hours with 66KN (56 bar) shear force and kept constant within +0.5-0.5bar and found satisfactory. (Load calculation details enclosed as Annexure-1) Joint is checked at every 15 min. and found no sign of leakage. Starting Time : 05.15pm End Time : 07.15pm As the above test has been done with deflected condition and passed the requirement. Hence it has been considered as passed for Joints aligned position also.	Conformed as per the requirement.

Rubber Gasket used for the joints are from VIP, Polymers UK, found conforming as per the drawing 014-ABU-GSK-1127

**Remarks:** The above test had been conducted as per BSEN545:2010, which has higher shear load than as per BSEN598, ISO2531 & ISO7186 and meeting the specifications.  
 Hence for the same test as per BSEN598, ISO2531 & ISO7186 considered as meeting the requirements.

*27/06/13*  
 T.VENKATACHALAM  
 JINDAL SAW GULF LLC



ROBERTO PILI  
 BV ITALIA  
  


## Annexure - 1

### Type test Pipe Sample Dimensions and Shear Load Calculation for Positive Internal Pressure Testing - DN 1600

**Spec: BSEN545:2010 / ISO 2531:2009 / BSEN 598:2007 / ISO 7186:2011**

Size	DE		J		Radial gap		
	Required	Observed	Required	Observed	Design	Actual	%
DN 1600	1660.6 to 1669	1661.5	1719 TO 1725	1724.5	64.4	63	-2.17

**Sample - A ( Spigot)**

Sample No. E09S02

Length 3955 MM

DE 1661.5 mm

Thickness Avg 15.8mm (15.6, 15.8, 16.0, 15.8, 16.2, 15.7)

**Sample - B ( Socket)**

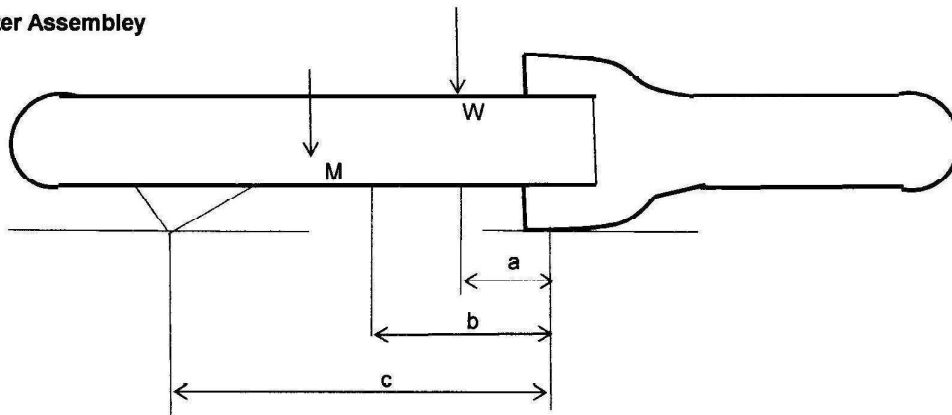
Sample No. A20S01

Length 3590 mm

J 1724.5 mm

15.85

**After Assembly**



M= 72.8 KN

a= 845 mm

b= 1255 mm

c= 2510 mm

**Shear Load Calculation**

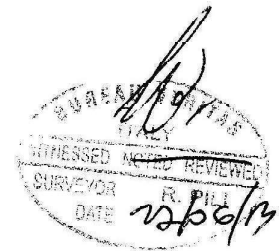
$$W = \frac{Fxc - M(c-b)}{c - a}$$

W = 65.7 KN (54.6 Bar)

Where

F = 80000 N ( 50 x DN )

*Handwritten signature and date: 22/06/13*





# JINDAL SAW GULF LLC

PRESSURE RECORDING LOG SHEET						
TEST DETAILS:		LEAKTIGHTNESS OF JOINTS TO POSITIVE INTERNAL PRESSURE				
		AS PER CLAUSE 5.0 & 7.0				
TEST UNIT:	INTERNAL TEST	DATE: 27.06.13	TIME: 5.15 pm			
TEST TYPE:	POSITIVE INTERNAL PRESSURE TEST					
PIPE SIZE:	DN1600					
IDENTIFICATION:	: A20S01 (Socket), E09S02 (Spigot)					
TEST REPORT:						
TIME	WATER PRESSURE (BAR)	FORCE "W" (Bar)	Remarks			
5.15 pm	44.0	57.0	No leakage at Joint area			
5.30 pm	44.0	57.0	No leakage at Joint area			
5.45 pm	44.0	57.0	No leakage at Joint area			
6.00 pm	44.0	57.0	No leakage at Joint area			
6.15 pm	44.0	56.0	No leakage at Joint area			
6.30 pm	44.0	56.0	No leakage at Joint area			
6.45 pm	44.0	56.0	No leakage at Joint area			
7.00 pm	44.0	56.0	No leakage at Joint area			
7.15 pm	44.0	56.0	No leakage at Joint area			

*Handwritten signature*  
27/06/13

*Handwritten signature*

**JINDAL SAW GULF LLC**

**PERFORMANCE TESTING REQUIREMENT AS PER ISO:2531:2009 / BSEN545:2010 / BSEN598:2007+ A1:2009 / ISO7186:2011 STANDARD (TYPE TEST)**

NAME OF MANUFACTURER : M/s JINDAL SAW GULF LLC  
 DATE AND PLACE OF INSPECTION : 28.06.2013 and JSGL, Abu Dhabi  
 NAME OF INSPECTING AGENCY : M/s BV ITALIA  
 SIZE & CLASS : DN 1600 Class C25  
 IDENTIFICATION : A20S01 (Socket), E09S02 (Spigot)

**LEAKTIGHTNESS OF FLEXIBLE JOINTS TO NEGATIVE INTERNAL PRESSURE AS PER CLAUSE 5.0 & 7.0**

SL.NO.	DESCRIPTION OF REQUIREMENTS	OBSERVEVATION	REMARKS
1	Maximum design radial gap between the components to be jointed (smallest spigot together with largest socket) with a tolerance of 0 to - 5%	Radial gap found minus 2.17% (Dimension sheet is enclosed as Annexure-1)	With in the limit.
2	Joints shall be tested with a spigot having an average iron wall thickness equal to the specified minimum value with a tolerance of 0 to +10%	Average iron wall thickness of 15.8mm found and the details are enclosed in Annexure-1.	Conformed as per the requirement
3	The leak tightness of flexible joints to negative internal pressure shall be type tested in accordance with clause 7.3 at a test pressure of 0.9 bar below atmospheric pressure (approximately 0.1 bar absolute pressure). The maximum pressure change during the test period shall not be more than 0.09 bar after 2 h, when tested in the two following positions: a) Joints aligned and subjected to shear the shear force across the joint, expressed in N, shall be not less than 50 times DN b) Joints deflected: the test angular deflection shall be the maximum allowable deflection indicated in the manufacturer's catalogue, but not less than 1° 30' for DN 1600	Test done with joint deflected condition. No pressure change more than specified observed when tested at 0.9 bar for 2hours with 105KN (88 bar) shear force and kept constant within ±0.09bar and found satisfactory. (Load calculation details enclosed as Annexure-1) Joint is checked at every 15 min. and found no change in pressure than specified. Starting Time : 12.15pm End Time : 02.15pm As the above test has been done with deflected condition and passed the requirement. Hence it has been considered as passed for Joints aligned position also.	Conformed as per the requirement.

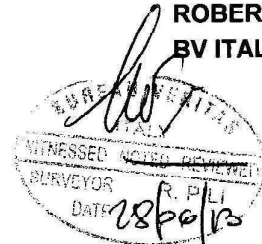
Rubber Gasket used for the joints are from VIP, Polymers UK, found conforming as per the drawing 014-ABU-GSK-1127

**Remarks:** The above test had been conducted as per BSEN545:2010, which has higher shear load than as per BSEN598, ISO2531 & ISO7186 and meeting the specifications.  
 Hence for the same test as per BSEN598, ISO2531 & ISO7186 considered as meeting the requirements.

T.VENKATACHALAM  
 JINDAL SAW GULF LLC



ROBERTO PILI  
 BV ITALIA





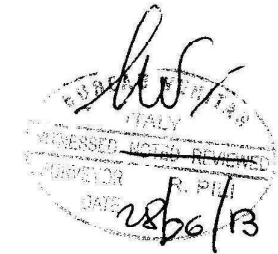




# JINDAL SAW GULF LLC

PRESSURE RECORDING LOG SHEET						
TEST DETAILS:		LEAKTIGHTNESS OF JOINTS TO NEGATIVE INTERNAL PRESSURE				
		AS PER CLAUSE 5.0 & 7.0				
TEST UNIT:	INTERNAL TEST	DATE: 28.06.13	TIME: 12.15 pm			
TEST TYPE:	NEGATIVE INTERNAL PRESSURE TEST					
PIPE SIZE:	DN1600					
IDENTIFICATION:	: A20S01 (Socket), E09S02 (Spigot)					
TEST REPORT:						
TIME	VACUUM PRESSURE (BAR)	FORCE "W" (Bar)	Remarks			
12.15 pm	- 0.9 bar	88.0	No change in pressure			
12.30 pm	- 0.9 bar	88.0	No change in pressure			
12.45 pm	- 0.9 bar	88.0	No change in pressure			
01.00 pm	- 0.9 bar	88.0	No change in pressure			
01.15 pm	- 0.9 bar	88.0	No change in pressure			
01.30 pm	- 0.9 bar	88.0	No change in pressure			
01.45 pm	- 0.9 bar	88.0	No change in pressure			
02.00 pm	- 0.9 bar	88.0	No change in pressure			
02.15 pm	- 0.9 bar	88.0	No change in pressure			

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28/06/13



# JINDAL SAW GULF LLC

## PERFORMANCE TESTING REQUIREMENT AS PER ISO:2531:2009 / BSEN545:2010 STANDARD (TYPE TEST)

NAME OF MANUFACTURER : M/s JINDAL SAW GULF LLC  
DATE AND PERIOD OF INSPECTION : 09.11.12 to 17.11.12  
NAME OF INSPECTING AGENCY : M/s BV ITALIA and M/s TUV Middle East  
SIZE & CLASS : DN 800 Class C64  
IDENTIFICATION : J04P46 (Socket), J04P46 (Spigot)

### LEAKTIGHTNESS OF FLEXIBLE JOINTS TO DYNAMIC INTERNAL PRESSURE AS PER CLAUSE 7.2.5 OF BSEN545:2010

The test had been started on 09.11.12 and witnessed at 9.30am on 10.11.12 by Mr.Roberto Pili of M/s BV Italy.  
Test had been completed on 17.11.12 at 11.13am in presence of Mr.Justine Jose of M/s TUV and the test had also been witnessed by M/s TUV Middle East on 16.11.12 and 17.11.12.

SL.NO.	DESCRIPTION OF REQUIREMENTS	OBSERVEVATION	REMARKS
1	<p>The leak tightness of joints to dynamic internal pressure shall be type tested in accordance with clause 7.2.5 (BSEN545) &amp; 7.8 (BSEN598). The pressure shall be steadily increased up to PMA77 Bar), the allowable maximum operating pressure of the joint, then automatically monitored according to the following pressure cycle.</p> <p>a) steady pressure reduction to (PMA - 5) bar; b) maintain (PMA - 5) bar for at least 5 s; c) steady pressure increase to PMA; d) maintain PMA for at least 5 s;</p> <p>The number of cycles (24000 cycles) shall be recorded and the test stopped automatically in the occurrence of a failure of the joint. The joints shall exhibit no visibal leakage in the following position: Joints aligned and withdrawn subjected to shear the shear force across the joint, expressed in N, shall be not less than 50 times DN (Shear load 51.5KN / 67 Bar).</p>	<p>Test done with joint aligned and withdrawn condition. Joints found no leakage when tested between 72 and 77 bar for 25402 cycles with 52KN shear force (70 bar) and found satisfactory.</p> <p>Joint is checked at every 15 min. and found no sign of leakage.</p> <p>Starting Time : 10.23pm dt. 09.11.12 End Time : 11.13am dt. 17.11.12</p> <p>Cyclic recording log sheet enclosed.</p>	Conformed as per the requirement

Rubber Gasket used for the joints, found conforming as per the drawing D14-GSK-2B-0136 Rev.07 Dated:10.06.2010

**Remarks:** The above test had been conducted as per BSEN545:2010, which has higher shear load than as per BSEN598 and meeting the specifications.  
Hence the same test as per BSEN598 considered as meeting the requirements.

  
T.VENKATACHALAM  
JINDAL SAW GULF LLC

  
JUSTINE JOSE  
TUV MIDDLE EAST  
P.O.Box: 46030, ABU DHABI-U.A.E  
ID No.: 201  
17/11/12

# JINDAL SAW GULF LLC

## PERFORMANCE TESTING REQUIREMENT AS PER ISO:2531:2009 / BSEN545:2010

### STANDARD (TYPE TEST)

NAME OF MANUFACTURER : M/s JINDAL SAW GULF LLC  
DATE AND PLACE OF INSPECTION : 16.10.2012 and JSGL, Abu Dhabi  
NAME OF INSPECTING AGENCY : M/s BV ITALIA  
SIZE : DN 800  
IDENTIFICATION : G31P04(BARREL) , G31P03(SOCKET-1) , G31P08(SOCKET-2)

### LEAKTIGHTNESS OF JOINTS TO EXTERNAL PRESSURE AS PER CLAUSE 5.0 & 7.0

SL.NO.	DESCRIPTION OF REQUIREMENTS	OBSERVEVATION	REMARKS
1	Maximum design radial gap between the components to be jointed (smallest spigot together with largest socket) with a tolerance of 0 to - 5%	Radial gap found minus 3.82% & minus 4.58%. Dimension sheet is enclosed as Annexure-1	With in the limit.
2	Shall comprise of two joints made with two pipe sockets Connected together and one double spigot piece	Comprise of two joints made with two sockets welded together and jointed with one double spigot piece	Conformed as per the requirement
3	One half of load shall be applied to the spigot end on each side of the test assembly at 0.5DN or 200mm from socket ends, whichever is largest.	Load applied 20KN for DN 800 at 400mm from socket end. (Load Calculation details enclosed as Annexure-1)	Conformed as per the requirement
4	Water filling and increasing pressure upto 2bar and holding for at least 2hours with in $\pm$ 0.1bar.	Water filled and pressure increased to 2bar and kept constant for 2hours. Joints are checked for every 15 minutes and no leakage noticed.  Starting Time : 4.04pm End Time : 6.06pm	Conformed as per the requirement

Rubber Gasket used for the joints, found conforming as per the drawing D14-GSK-2B-0136 Rev.07  
Dated:10.06.2010

**Remarks:** The above test had been conducted as per BSEN545:2010, which has higher shear load than as per BSEN598 & ISO2531 and meeting the specifications.  
Hence the same test as per BSEN598 & ISO2531 considered as meeting the requirements.

*[Signature]*  
16/10/12  
T.VENKATACHALAM  
JINDAL SAW GULF LLC

*[Signature]*  
TONY DEXTER  
JINDAL SAW GULF LLC

FABIO PIRAINO  
BV ITALIA

ROBERTO PILI  
BV ITALIA



## Annexure - 1

### Type test Pipe Sample Dimensions and Shear Load Calculation for External Pressure Testing - DN 800

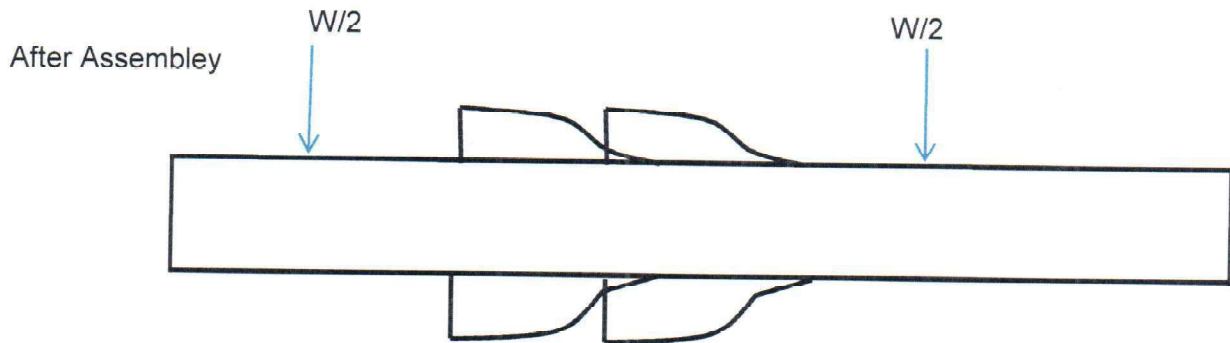
**Spec: BSEN545:2010 / ISO 2531:2009**

<u>Sample - A ( Spigot)</u>	
Sample No.	G31P04
Length	1780 mm
DE	838.7mm

<u>Sample - B ( Socket1)</u>	
Sample No.	G31P03
Length	160mm
J	889.1mm

<u>Sample - C ( Socket2)</u>	
Sample No.	G31P08
Length	160mm
J	888.7 mm

Size	DE		J		Radial gap		
	Required	Observed	Required	Observed	Design	Actual	%
DN 800	837.5 to 843	838.7	884.9 to 889.7	889.1	52.4	50.4	3.82
DN 800	837.5 to 843	838.7	884.9 to 889.7	888.7	52.4	50	4.58



#### Shear Load Calculation

Load = 50xDN  
 =40000 N  
 =40 KN  
 W/2 = 20 KN

*16/10/12*





# JINDAL SAW GULF LLC

PRESSURE RECORDING LOG SHEET							
TEST DETAILS:		LEAKTIGHTNESS OF JOINTS TO EXTERNAL PRESSURE					
		AS PER CLAUSE 5.0 & 7.0					
TEST UNIT:	EXTERNAL TEST	DATE:	10/16/2012	TIME:	4:04:01 PM		
TEST TYPE:	POSITIVE EXTERNAL PRESSURE TEST						
PIPE SIZE:	DN800						
IDENTIFICATION:	G31P04(BARREL) , G31P03(SOCKET-1) , G31P08(SOCKET-2)						
TEST REPORT:							
TIME	WATER PRESSURE (BAR)	FORCE 1"W" (KN)	Remarks	TIME	WATER PRESSURE (BAR)	FORCE 1"W" (KN)	Remarks
4:04:31 PM	2.0	20.1	No Leak	5:08:32 PM	2.1	20.4	No Leak
4:06:31 PM	2.0	20.1	No Leak	5:10:32 PM	2.1	20.4	No Leak
4:08:31 PM	2.0	20.0	No Leak	5:12:32 PM	2.1	20.4	No Leak
4:10:31 PM	2.0	20.0	No Leak	5:14:32 PM	2.1	20.4	No Leak
4:12:31 PM	2.0	20.2	No Leak	5:16:32 PM	2.1	20.4	No Leak
4:14:31 PM	2.0	20.2	No Leak	5:18:32 PM	2.1	20.4	No Leak
4:16:31 PM	2.0	20.2	No Leak	5:20:32 PM	2.1	20.4	No Leak
4:18:31 PM	2.0	20.3	No Leak	5:22:32 PM	2.1	20.4	No Leak
4:20:31 PM	2.0	20.2	No Leak	5:24:32 PM	2.1	20.4	No Leak
4:22:31 PM	2.0	20.3	No Leak	5:26:32 PM	2.1	20.4	No Leak
4:24:31 PM	2.0	20.3	No Leak	5:28:32 PM	2.1	20.3	No Leak
4:26:31 PM	2.0	20.3	No Leak	5:30:32 PM	2.1	20.3	No Leak
4:28:31 PM	2.0	20.3	No Leak	5:32:32 PM	2.1	20.3	No Leak
4:30:31 PM	2.0	20.2	No Leak	5:34:32 PM	2.1	20.3	No Leak
4:32:31 PM	2.0	20.2	No Leak	5:36:32 PM	2.1	20.2	No Leak
4:34:31 PM	2.0	20.2	No Leak	5:38:32 PM	2.1	20.2	No Leak
4:36:31 PM	2.0	20.2	No Leak	5:40:32 PM	2.1	20.2	No Leak
4:38:31 PM	2.0	20.2	No Leak	5:42:32 PM	2.1	20.1	No Leak
4:40:32 PM	2.1	20.2	No Leak	5:44:32 PM	2.1	20.1	No Leak
4:42:32 PM	2.1	20.1	No Leak	5:46:32 PM	2.1	20.1	No Leak
4:44:32 PM	2.1	20.1	No Leak	5:48:32 PM	2.1	20.0	No Leak
4:46:32 PM	2.1	20.1	No Leak	5:50:32 PM	2.1	20.4	No Leak
4:48:32 PM	2.1	20.1	No Leak	5:52:32 PM	2.1	20.4	No Leak
4:50:32 PM	2.1	20.0	No Leak	5:54:32 PM	2.1	20.4	No Leak
4:52:32 PM	2.1	20.5	No Leak	5:56:32 PM	2.1	20.4	No Leak
4:54:32 PM	2.1	20.5	No Leak	5:58:32 PM	2.1	20.4	No Leak
4:56:32 PM	2.1	20.5	No Leak	6:00:32 PM	2.1	20.4	No Leak
4:58:32 PM	2.1	20.4	No Leak	6:02:32 PM	2.1	20.4	No Leak
5:00:32 PM	2.1	20.4	No Leak	6:04:32 PM	2.1	20.4	No Leak
5:02:32 PM	2.1	20.4	No Leak	6:06:32 PM	2.1	20.4	No Leak
5:04:32 PM	2.1	20.4	No Leak				
5:06:32 PM	2.1	20.4	No Leak				

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**JINDAL SAW GULF LLC**

**PERFORMANCE TESTING REQUIREMENT AS PER ISO:2531:2009 / BSEN545:2010 STANDARD**  
**(TYPE TEST)**

NAME OF MANUFACTURER : M/s JINDAL SAW GULF LLC  
 DATE AND PLACE OF INSPECTION : 17.10.2012 and JSGL, Abu Dhabi  
 NAME OF INSPECTING AGENCY : M/s BV ITALIA  
 SIZE & CLASS : DN 800 Class C64  
 IDENTIFICATION : G31P04 (Socket), G31P04 (Spigot)

**LEAKTIGHTNESS OF FLEXIBLE JOINTS TO NEGATIVE INTERNAL PRESSURE AS PER CLAUSE 5.0 & 7.0**

SL.NO.	DESCRIPTION OF REQUIREMENTS	OBSERVEVATION	REMARKS
1	Maximum design radial gap between the components to be jointed (smallest spigot together with largest socket) with a tolerance of 0 to - 5%	Radial gap found minus 4.96% (Dimension sheet is enclosed as Annexure-1)	With in the limit.
2	Joints shall be tested with a spigot having an average iron wall thickness equal to the specified minimum value with a tolerance of 0 to +10%	Average iron wall thickness of 20.0mm found and the details are enclosed in Annexure-1.	Conformed as per the requirement
3	The leak tightness of flexible joints to negative internal pressure shall be type tested in accordance with clause 7.3 at a test pressure of 0.9 bar below atmospheric pressure (approximately 0.1 bar absolute pressure). The maximum pressure change during the test period shall not be more than 0.09 bar after 2 h, when tested in the two following positions: a) Joints aligned and subjected to shear the shear force across the joint, expressed in N, shall be not less than 50 times DN b) Joints deflected: the test angular deflection shall be the maximum allowable deflection indicated in the manufacturer's catalogue, but not less than 1° 30' for DN 800	Test done with joint deflected condition. No pressure change more than specified observed when tested at 0.9 bar for 2hours with 56KN (73.5 bar) shear force and kept constant within ±0.09bar and found satisfactory. (Load calculation details enclosed as Annexure-1) Joint is checked at every 15 min. and found no change in pressure than specified. Starting Time : 10.30am End Time : 12.42pm As the above test has been done with deflected condition and passed the requirement. Hence it has been considered as passed for Joints aligned position also.	Conformed as per the requirement.

Rubber Gasket used for the joints, found conforming as per the drawing D14-GSK-2B-0136 Rev.07  
 Dated:10.06.2010

**Remarks:** The above test had been conducted as per BSEN545:2010, which has higher shear load than as per BSEN598 & ISO2531 and meeting the specifications.  
 Hence the same test as per BSEN598 & ISO2531 considered as meeting the requirements.

T.VENKATACHALAM  
 JINDAL SAW GULF LLC

TONY DEXTER  
 JINDAL SAW GULF LLC

FABIO PIRAINO  
 BV ITALIA

ROBERTO PILI  
 BV ITALIA



## Annexure - 1

### Type test Pipe Sample Dimensions and Shear Load Calculation for Negative Internal Pressure Testing - DN 800

Spec: BSEN545:2010 / ISO 2531:2009

Size	DE		J		Radial gap		
	Required	Observed	Required	Observed	Design	Actual	%
DN 800	837.5 to 843	838.5	884.9 to 889.7	888.3	52.4	49.8	4.96

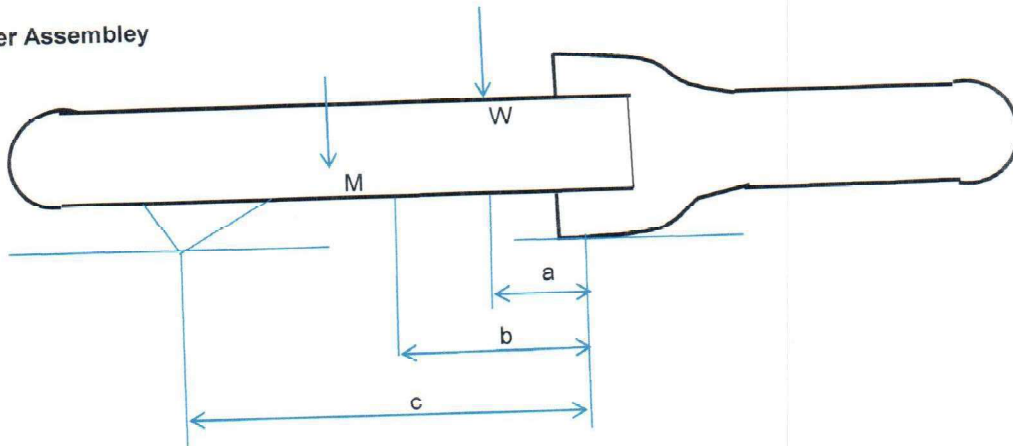
**Sample - A ( Spigot)**

Sample No. G31P04  
 Length 2050 MM  
 DE 838.5 mm  
 Thickness Avg 20.0mm

**Sample - B ( Socket)**

Sample No. G31P04  
 Length 1880 mm  
 J 888.3 mm

After Assembly



M= 5.7 KN  
 a= 400 mm  
 b= 595 mm  
 c= 1190 mm

**Shear Load Calculation**

$$W = \frac{Fxc - M(c-b)}{c - a}$$

W = 56 KN (73 Bar)

Where

F = 40000 N ( 50 x DN )

*Handwritten signature and date: 21/11/12*





# JINDAL SAW GULF LLC

## PRESSURE RECORDING LOG SHEET

PRESSURE RECORDING LOG SHEET							
TEST DETAILS:		LEAKTIGHTNESS OF FLEXIBLE JOINTS TO NEGATIVE INTERNAL PRESSURE					
		AS PER CLAUSE 5.0 & 7.0					
TEST UNIT:	INTERNAL TEST	DATE:	10/17/2012	TIME:	10:30:32 AM		
TEST TYPE:	NEGATIVE INTERNAL TEST						
PIPE SIZE:	DN800	Vacuum Pressure : 0.9 bar +/- 0.09 bar				Duration : 2 hrs	
IDENTIFICATION:	: G31P04 (Socket), G31P04 (Spigot)						
TEST REPORT:							
TIME	Vacuum PRESSURE(B ar)	FORCE1"W" (KN) / Shear Pressure (Bar)	Remarks	TIME	Vacuum PRESSUR E(Bar)	FORCE1"W" (KN) / Shear Pressure (Bar)	Remarks
10:30:32 AM	0.89	56 / 73.5	No Change	11:01:32 AM	0.89	56 / 73.5	No Change
10:31:32 AM	0.89	56 / 73.5	No Change	11:02:32 AM	0.89	56 / 73.5	No Change
10:32:32 AM	0.89	56 / 73.5	No Change	11:03:32 AM	0.89	56 / 73.5	No Change
10:33:32 AM	0.89	56 / 73.5	No Change	11:04:32 AM	0.88	56 / 73.5	No Change
10:34:32 AM	0.89	56 / 73.5	No Change	11:05:32 AM	0.88	56 / 73.5	No Change
10:35:32 AM	0.89	56 / 73.5	No Change	11:06:32 AM	0.88	56 / 73.5	No Change
10:36:32 AM	0.89	56 / 73.5	No Change	11:07:32 AM	0.88	56 / 73.5	No Change
10:37:32 AM	0.89	56 / 73.5	No Change	11:08:32 AM	0.88	56 / 73.5	No Change
10:38:32 AM	0.89	56 / 73.5	No Change	11:09:32 AM	0.88	56 / 73.5	No Change
10:39:32 AM	0.89	56 / 73.5	No Change	11:10:32 AM	0.88	56 / 73.5	No Change
10:40:32 AM	0.89	56 / 73.5	No Change	11:11:33 AM	0.88	56 / 73.5	No Change
10:41:32 AM	0.89	56 / 73.5	No Change	11:12:34 AM	0.88	56 / 73.5	No Change
10:42:32 AM	0.89	56 / 73.5	No Change	11:13:35 AM	0.88	56 / 73.5	No Change
10:43:32 AM	0.89	56 / 73.5	No Change	11:14:36 AM	0.88	56 / 73.5	No Change
10:44:32 AM	0.89	56 / 73.5	No Change	11:15:37 AM	0.88	56 / 73.5	No Change
10:45:32 AM	0.89	56 / 73.5	No Change	11:16:39 AM	0.88	56 / 73.5	No Change
10:46:32 AM	0.89	56 / 73.5	No Change	11:17:40 AM	0.88	56 / 73.5	No Change
10:47:32 AM	0.89	56 / 73.5	No Change	11:18:41 AM	0.88	56 / 73.5	No Change
10:48:32 AM	0.89	56 / 73.5	No Change	11:19:42 AM	0.88	56 / 73.5	No Change
10:49:32 AM	0.89	56 / 73.5	No Change	11:20:43 AM	0.88	56 / 73.5	No Change
10:50:32 AM	0.89	56 / 73.5	No Change	11:21:44 AM	0.88	56 / 73.5	No Change
10:51:32 AM	0.89	56 / 73.5	No Change	11:22:45 AM	0.88	56 / 73.5	No Change
10:52:32 AM	0.89	56 / 73.5	No Change	11:23:46 AM	0.88	56 / 73.5	No Change
10:53:32 AM	0.89	56 / 73.5	No Change	11:24:47 AM	0.88	56 / 73.5	No Change
10:54:32 AM	0.89	56 / 73.5	No Change	11:25:48 AM	0.88	56 / 73.5	No Change
10:55:32 AM	0.89	56 / 73.5	No Change	11:26:49 AM	0.88	56 / 73.5	No Change
10:56:32 AM	0.89	56 / 73.5	No Change	11:27:50 AM	0.88	56 / 73.5	No Change
10:57:32 AM	0.89	56 / 73.5	No Change	11:28:51 AM	0.88	56 / 73.5	No Change
10:58:32 AM	0.89	56 / 73.5	No Change	11:29:52 AM	0.88	56 / 73.5	No Change
10:59:32 AM	0.89	56 / 73.5	No Change	11:30:53 AM	0.88	56 / 73.5	No Change
11:00:32 AM	0.89	56 / 73.5	No Change	11:31:53 AM	0.88	56 / 73.5	No Change





# JINDAL SAW GULF LLC

11:32:53 AM	0.88	56 / 73.5	No Change	12:20:07 PM	0.87	56 / 73.5	No Change
11:33:53 AM	0.88	56 / 73.5	No Change	12:21:07 PM	0.87	56 / 73.5	No Change
11:34:53 AM	0.88	56 / 73.5	No Change	12:22:07 PM	0.87	56 / 73.5	No Change
11:35:53 AM	0.88	56 / 73.5	No Change	12:23:07 PM	0.87	56 / 73.5	No Change
11:36:53 AM	0.88	56 / 73.5	No Change	12:24:07 PM	0.87	56 / 73.5	No Change
11:37:53 AM	0.88	56 / 73.5	No Change	12:25:07 PM	0.87	56 / 73.5	No Change
11:38:53 AM	0.88	56 / 73.5	No Change	12:26:07 PM	0.87	56 / 73.5	No Change
11:39:53 AM	0.88	56 / 73.5	No Change	12:27:07 PM	0.87	56 / 73.5	No Change
11:40:53 AM	0.88	56 / 73.5	No Change	12:28:07 PM	0.87	56 / 73.5	No Change
11:41:53 AM	0.88	56 / 73.5	No Change	12:29:07 PM	0.87	56 / 73.5	No Change
11:42:53 AM	0.88	56 / 73.5	No Change	12:30:07 PM	0.87	56 / 73.5	No Change
11:43:53 AM	0.88	56 / 73.5	No Change	12:31:07 PM	0.87	56 / 73.5	No Change
11:44:53 AM	0.88	56 / 73.5	No Change	12:32:07 PM	0.87	56 / 73.5	No Change
11:45:53 AM	0.88	56 / 73.5	No Change	12:33:07 PM	0.87	56 / 73.5	No Change
11:46:53 AM	0.88	56 / 73.5	No Change	12:34:07 PM	0.87	56 / 73.5	No Change
11:47:53 AM	0.88	56 / 73.5	No Change	12:35:08 PM	0.87	56 / 73.5	No Change
11:48:53 AM	0.88	56 / 73.5	No Change	12:36:09 PM	0.87	56 / 73.5	No Change
11:49:54 AM	0.88	56 / 73.5	No Change	12:37:10 PM	0.87	56 / 73.5	No Change
11:50:55 AM	0.88	56 / 73.5	No Change	12:38:11 PM	0.87	56 / 73.5	No Change
11:51:56 AM	0.88	56 / 73.5	No Change	12:39:12 PM	0.87	56 / 73.5	No Change
11:52:57 AM	0.88	56 / 73.5	No Change	12:40:13 PM	0.87	56 / 73.5	No Change
11:53:58 AM	0.88	56 / 73.5	No Change	12:41:14 PM	0.87	56 / 73.5	No Change
11:54:59 AM	0.88	56 / 73.5	No Change	12:42:15 PM	0.87	56 / 73.5	No Change
11:56:01 AM	0.88	56 / 73.5	No Change				
11:57:02 AM	0.88	56 / 73.5	No Change				
11:58:03 AM	0.88	56 / 73.5	No Change				
11:59:04 AM	0.88	56 / 73.5	No Change				
12:00:05 PM	0.87	56 / 73.5	No Change				
12:01:06 PM	0.87	56 / 73.5	No Change				
12:02:07 PM	0.87	56 / 73.5	No Change				
12:03:07 PM	0.87	56 / 73.5	No Change				
12:04:07 PM	0.87	56 / 73.5	No Change				
12:05:07 PM	0.87	56 / 73.5	No Change				
12:06:07 PM	0.87	56 / 73.5	No Change				
12:07:07 PM	0.87	56 / 73.5	No Change				
12:08:07 PM	0.87	56 / 73.5	No Change				
12:09:07 PM	0.87	56 / 73.5	No Change				
12:10:07 PM	0.87	56 / 73.5	No Change				
12:11:07 PM	0.87	56 / 73.5	No Change				
12:12:07 PM	0.87	56 / 73.5	No Change				
12:13:07 PM	0.87	56 / 73.5	No Change				
12:14:07 PM	0.87	56 / 73.5	No Change				
12:15:07 PM	0.87	56 / 73.5	No Change				
12:16:07 PM	0.87	56 / 73.5	No Change				
12:17:07 PM	0.87	56 / 73.5	No Change				
12:18:07 PM	0.87	56 / 73.5	No Change				
12:19:07 PM	0.87	56 / 73.5	No Change				

112 ✓



# JINDAL SAW GULF LLC

## PERFORMANCE TESTING REQUIREMENT AS PER ISO:2531:2009 / BSEN545:2010 STANDARD (TYPE TEST)

NAME OF MANUFACTURER : M/s JINDAL SAW GULF LLC  
DATE AND PLACE OF INSPECTION : 07.11.2012  
NAME OF INSPECTING AGENCY : M/s BV ITALIA  
SIZE & CLASS : DN 800 Class C64  
IDENTIFICATION : J04P46 (Socket), J04P46 (Spigot)

### LEAKTIGHTNESS OF FLEXIBLE JOINTS TO POSITIVE INTERNAL PRESSURE AS PER CLAUSE 5.0 & 7.0

SL.NO.	DESCRIPTION OF REQUIREMENTS	OBSERVEVATION	REMARKS
1	Maximum design radial gap between the components to be jointed (smallest spigot together with largest socket) with a tolerance of 0 to - 5%	Radial gap found minus 4.20% (Dimension sheet is enclosed as Annexure-1)	With in the limit.
2	Joints shall be tested with a spigot having an average iron wall thickness equal to the specified minimum value with a tolerance of 0 to +10%	Average iron wall thickness of 19.2mm found and the details are enclosed in Annexure-1.	Conformed as per the requirement
3	The leak tightness of flexible joints to positive internal pressure shall be type tested in accordance with clause 7.2 at a test pressure 101 bar (1.5PFA+5 bar), the joints shall exhibit no visibal leakage in the two following positions: a) Joints aligned and subjected to shear the shear force across the joint, expressed in N, shall be not less than 50 times DN b) Joints deflected: the test angular deflection shall be the maximum allowable deflection indicated in the manufacturer's catalogue, but not less than 1° 30'for DN DN 800	Test done with joint deflected condition. Joints found no leakage when tested at 102 bar for 2hours with 53KN (72 bar) shear force and kept constant within +0.5-0.5bar and found satisfactory. (Load calculation details enclosed as Annexure-1) Joint is checked at every 15 min. and found no sign of leakage. Starting Time : 04.35pm End Time : 06.35pm As the above test has been done with deflected condition and passed the requirement. Hence it has been considered as passed for Joints aligned position also.	Conformed as per the requirement.

Rubber Gasket used for the joints, found conforming as per the drawing D14-GSK-2B-0136 Rev.07  
Dated:10.06.2010

**Remarks:** The above test had been conducted as per BSEN545:2010, which has higher shear load than as per BSEN598 & ISO2531 and meeting the specifications.  
Hence the same test as per BSEN598 & ISO2531 considered as meeting the requirements.

  
T.VENKATACHALAM  
JINDAL SAW GULF LLC

ROBERTO PILI  
BV ITALIA



## Annexure - 1

### Type test Pipe Sample Dimensions and Shear Load Calculation for Positive Internal Pressure Testing - DN 800

Spec: BSEN545:2010 / ISO 2531:2009

Size	DE		J		Radial gap		
	Required	Observed	Required	Observed	Design	Actual	%
DN 800	837.5 to 843	838.3	884.9 to 889.7	888.5	52.4	50.2	4.20

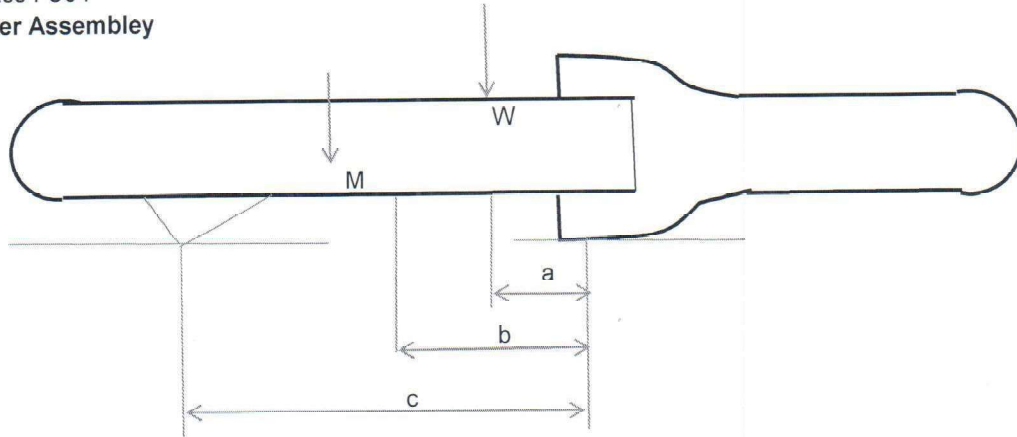
**Sample - A ( Spigot)**

Sample No. J04P46  
 Length 1985 mm  
 DE 838.5 mm  
 Thickness Avg 19.2mm  
 Class : C64

**Sample - B ( Socket)**

Sample No. J04P46  
 Length 1840 mm  
 J 888.3 mm

**After Assembly**



M= 11.6 KN

a= 400 mm

b= 570 mm

c= 1140 mm

**Shear Load Calculation**

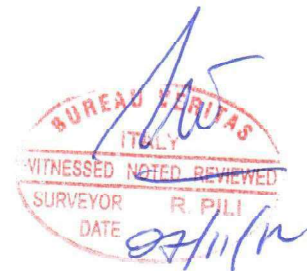
$$W = \frac{Fxc - M(c-b)}{c - a}$$

W = 52 KN

Where

F = 40000 N ( 50 x DN )

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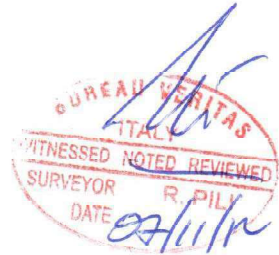




# JINDAL SAW GULF LLC

PRESSURE RECORDING LOG SHEET							
TEST DETAILS:		LEAKTIGHTNESS OF JOINTS TO POSITIVE INTERNAL PRESSURE					
		AS PER CLAUSE 5.0 & 7.0					
TEST UNIT:	INTERNAL TEST	DATE:	7-Nov-12	TIME:	4:35:14 PM		
TEST TYPE:	POSITIVE INTERNAL PRESSURE TEST						
PIPE SIZE:	DN800						
IDENTIFICATION:	J04P46 (Socket), J04P46 (Spigot)						
TEST REPORT:							
TIME	WATER PRESSURE (BAR)	FORCE 1"W" (Bar)	Remarks	TIME	WATER PRESSURE (BAR)	FORCE 1"W" (Bar)	Remarks
4:35:34 PM	102.0	72.0	No Leak	5:40:34 PM	102.0	72.0	No Leak
4:40:34 PM	102.0	72.0	No Leak	5:45:34 PM	102.0	72.0	No Leak
4:45:34 PM	102.0	72.0	No Leak	5:50:34 PM	102.0	72.0	No Leak
4:50:34 PM	102.0	72.0	No Leak	5:55:34 PM	102.0	72.0	No Leak
4:55:34 PM	102.0	72.0	No Leak	6:00:34 PM	102.0	72.0	No Leak
5:00:34 PM	102.0	72.0	No Leak	6:05:34 PM	102.0	72.0	No Leak
5:05:34 PM	102.0	72.0	No Leak	6:10:34 PM	102.0	72.0	No Leak
5:10:34 PM	102.0	72.0	No Leak	6:15:34 PM	102.0	72.0	No Leak
5:15:34 PM	102.0	72.0	No Leak	6:20:34 PM	102.0	72.0	No Leak
5:20:34 PM	102.0	72.0	No Leak	6:25:34 PM	102.0	72.0	No Leak
5:25:34 PM	102.0	72.0	No Leak	6:30:34 PM	102.0	72.0	No Leak
5:30:34 PM	102.0	72.0	No Leak	6:35:34 PM	102.0	72.0	No Leak
5:35:34 PM	102.0	72.0	No Leak				

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7/11/12



**JINDAL SAW GULF LLC**

**PERFORMANCE TESTING REQUIREMENT AS PER ISO:2531:2009 / BSEN545:2010 STANDARD (TYPE TEST)**

NAME OF MANUFACTURER : M/s JINDAL SAW GULF LLC  
DATE AND PERIOD OF INSPECTION : 09.11.12 to 17.11.12  
NAME OF INSPECTING AGENCY : M/s BV ITALIA and M/s TUV Middle East  
SIZE & CLASS : DN 400 Class C100  
IDENTIFICATION : J18R10 (Socket), J18R10 (Spigot)

**LEAKTIGHTNESS OF FLEXIBLE JOINTS TO DYNAMIC INTERNAL PRESSURE AS PER CLAUSE 7.2.5 OF BSEN545:2010**

The test had been started on 09.11.12 at 10.43am in presence of Mr.Roberto Pili of M/s BV Italy.  
Test had been completed on 17.11.12 at 11.08am in presence of Mr.Justine Jose of M/s TUV and the test had also been witnessed by M/s TUV Middle East on 16.11.12 and 17.11.12.

SL.NO.	DESCRIPTION OF REQUIREMENTS	OBSERVEVATION	REMARKS
1	<p>The leak tightness of joints to dynamic internal pressure shall be type tested in accordance with clause 7.2.5 (BSEN545) &amp; 7.8 (BSEN598). The pressure shall be steadily increased up to PMA 120 Bar), the allowable maximum operating pressure of the joint, then automatically monitored according to the following pressure cycle.</p> <p>a) steady pressure reduction to (PMA - 5) bar; b) maintain (PMA - 5) bar for at least 5 s; c) steady pressure increase to PMA; d) maintain PMA for at least 5 s;</p> <p>The number of cycles (24000 cycles) shall be recorded and the test stopped automatically in the occurrence of a failure of the joint. The joints shall exhibit no visibal leakage in the following position: Joints aligned and withdrawn subjected to shear the shear force across the joint, expressed in N, shall be not less than 50 times DN (Shear load 23.5KN / 47.7 Bar).</p>	<p>Test done with joint aligned and withdrawn condition. Joints found no leakage when tested between 115 and 120 bar for 28477 cycles with 24 KN shear force (50 bar) and found satisfactory.</p> <p>Joint is checked at every 15 min. and found no sign of leakage.</p> <p>Starting Time : 10.43am dt. 09.11.12 End Time : 11.08am dt. 17.11.12</p> <p>Cyclic recording log sheet enclosed.</p>	<p>Conformed as per the requirement</p>

Rubber Gasket used for the joints, found conforming as per the drawing D14-GSK-2B-0136 Rev.07 Dated:10.06.2010

**Remarks:** The above test had been conducted as per BSEN545:2010, which has higher shear load than as per BSEN598 and meeting the specifications.  
Hence the same test as per BSEN598 considered as meeting the requirements.

*T. Venkatachalam*  
**T.VENKATACHALAM**  
JINDAL SAW GULF LLC

*Justine Jose*  
**JUSTINE JOSE**  
TUV MIDDLE EAST  
P.O.Box: 46030, Abu Dhabi  
ID No.: 201 *17/11/12*

## JINDAL SAW GULF LLC

### PERFORMANCE TESTING REQUIREMENT AS PER ISO:2531:2009 / BSEN545:2010 STANDARD (TYPE TEST)

NAME OF MANUFACTURER : M/s JINDAL SAW GULF LLC

DATE AND PLACE OF INSPECTION : 07.11.2012

NAME OF INSPECTING AGENCY : M/s BV ITALIA

SIZE : DN 400

IDENTIFICATION : J06R06(BARREL) , J21R12(SOCKET-1) , J21R27(SOCKET-2)

#### LEAKTIGHTNESS OF JOINTS TO EXTERNAL PRESSURE AS PER CLAUSE 5.0 & 7.0

SL.NO.	DESCRIPTION OF REQUIREMENTS	OBSERVEVATION	REMARKS
1	Maximum design radial gap between the components to be jointed (smallest spigot together with largest socket) with a tolerance of 0 to - 5%	Radial gap found minus 4.68% & minus 4.09%. Dimension sheet is enclosed as Annexure-1	With in the limit.
2	Shall comprise of two joints made with two pipe sockets Conected together and one double spigot piece	Comprise of two joints made with two sockets welded together and jointed with one double spigot piece	Conformed as per the requirement
3	One half of load shall be applied to the spigot end on each side of the test assembly at 0.5DN or 200mm from socket ends, whichever is largest.	Load applied 52 bar for DN 400 at 200mm from socket end. (Load Calculation details enclosed as Annexure-1)	Conformed as per the requirement
4	Water filling and increasing pressure upto 2bar and holding for at least 2hours with in $\pm$ 0.1bar.	Water filled and pressure increased to 2.1bar and kept constant for 2hours. Joints are checked for every 15 minutes and no leakage or pressure drop noticed. Starting Time : 10.30am End Time : 12.30pm	Conformed as per the requirement

Rubber Gasket used for the joints, found conforming as per the drawing D14-GSK-2B-0136 Rev.07  
Dated:10.06.2010

**Remarks:** The above test had been conducted as per BSEN545:2010, which has highest shear load than as per BSEN598 & ISO2531 and meeting the specifications.

Hence the same test as per BSEN598 & ISO2531 considered as meeting the requirements.

  
T.VENKATACHALAM  
JINDAL SAW GULF LLC

ROBERTO PILI  
BV ITALIA



## Annexure - 1

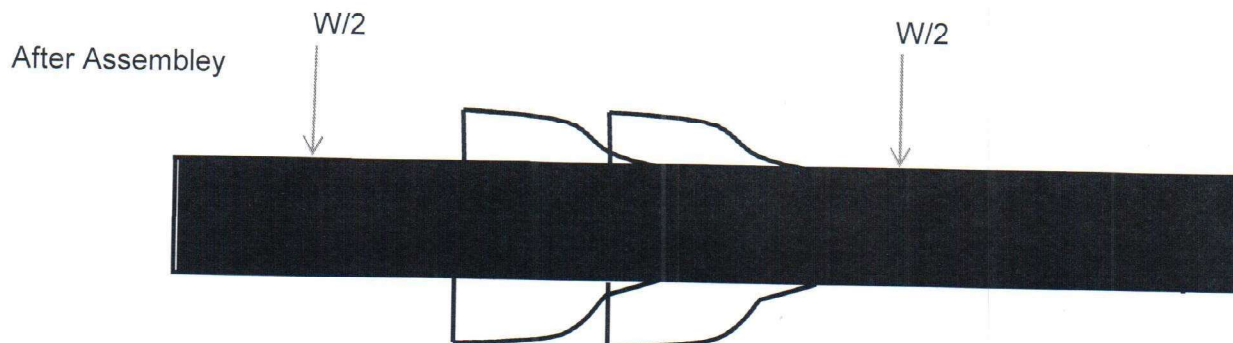
### Type test Pipe Sample Dimensions and Shear Load Calculation for External Pressure Testing - DN 400

Spec: BSEN545:2010 / ISO 2531:2009 / BSEN598:2007

Sample - A ( Spigot)	
Sample No.	J06R06
Length	1100 mm
DE	426.4mm

Sample - B ( Socket1)		Sample - C ( Socket2)	
Sample No.	J21R12	Sample No.	J21R27
Length	110mm	Length	115mm
J	459mm	J	459.2 mm

Size	DE		J		Radial gap		
	Required	Observed	Required	Observed	Design	Actual	%
DN 400	425.5 to 430	426.4	456.2 to 459.7	459	34.2	32.6	4.68
DN 400	425.5 to 430	426.4	456.2 to 459.7	459.2	34.2	32.8	4.09



#### Shear Load Calculation

Load = 50xDN  
 =20000 N  
 =20 KN      =20 KN/2  
 10 KN

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# JINDAL SAW GULF LLC

PRESSURE RECORDING LOG SHEET							
TEST DETAILS:		LEAKTIGHTNESS OF JOINTS TO POSITIVE EXTERNAL PRESSURE					
		AS PER CLAUSE 5.0 & 7.0					
TEST UNIT:	INTERNAL TEST	DATE:	7-Nov-12	TIME:	10:30:15 AM		
TEST TYPE:	POSITIVE EXTERNAL PRESSURE TEST						
PIPE SIZE:	DN400						
IDENTIFICATION:	J06R06(BARREL) , J21R12(SOCKET-1) , J21R27(SOCKET-2)						
TEST REPORT:							
TIME	WATER PRESSURE (BAR)	FORCE 1"W" (Bar)	Remarks	TIME	WATER PRESSURE (BAR)	FORCE 1"W" (Bar)	Remarks
10:30:25 AM	2.1	52.0	No Leak	11:35:25 AM	2.1	52.0	No Leak
10:35:25 AM	2.1	52.0	No Leak	11:40:25 AM	2.1	52.0	No Leak
10:40:25 AM	2.1	52.0	No Leak	11:45:25 AM	2.1	52.0	No Leak
10:45:25 AM	2.1	52.0	No Leak	11:50:25 AM	2.1	52.0	No Leak
10:50:25 AM	2.1	52.0	No Leak	11:55:25 AM	2.1	52.0	No Leak
10:55:25 AM	2.1	52.0	No Leak	12:00:25 PM	2.1	52.0	No Leak
11:00:25 AM	2.1	52.0	No Leak	12:05:25 PM	2.1	52.0	No Leak
11:05:25 AM	2.1	52.0	No Leak	12:10:25 PM	2.1	52.0	No Leak
11:10:25 AM	2.1	52.0	No Leak	12:15:25 PM	2.1	52.0	No Leak
11:15:25 AM	2.1	52.0	No Leak	12:20:25 PM	2.1	52.0	No Leak
11:20:25 AM	2.1	52.0	No Leak	12:25:25 PM	2.1	52.0	No Leak
11:25:25 AM	2.1	52.0	No Leak	12:30:25 PM	2.1	52.0	No Leak
11:30:25 AM	2.1	52.0	No Leak				

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7/11/12

BUREAU VERITAS  
ITALY  
WITNESSED NOTED REVIEWED  
SURVEYOR R. PILLI  
DATE 07/11/12



# JINDAL SAW GULF LLC

## PERFORMANCE TESTING REQUIREMENT AS PER ISO:2531:2009 / BSEN545:2010 STANDARD (TYPE TEST)

NAME OF MANUFACTURER : M/s JINDAL SAW GULF LLC  
DATE AND PLACE OF INSPECTION : 07.11.2012  
NAME OF INSPECTING AGENCY : M/s BV ITALIA  
SIZE & CLASS : DN 400 Class C100  
IDENTIFICATION : J18R10 (Socket), J18R10 (Spigot)

### LEAKTIGHTNESS OF JOINTS TO NEGATIVE INTERNAL PRESSURE AS PE CLAUSE 5.0 & 7.0

SL.NO.	DESCRIPTION OF REQUIREMENTS	OBSERVEVATION	REMARKS
1	Maximum design radial gap between the components to be jointed (smallest spigot together with largest socket) with a tolerance of 0 to - 5%	Radial gap found minus 4.73% (Dimension sheet is enclosed as Annexure-1)	With in the limit.
2	Joints shall be tested with a spigot having an average iron wall thickness (over a distance of 2 DN, in mm from the spigot end face) equal to the specified minimum value with a tolerance of 0 to +10%	Average iron wall thickness of 15.5mm found and the details are enclosed in Annexure-1.	Conformed as per the requirement
3	The leak tightness of joints to internal pressure shall be type tested in accordance with clause 7.3 at a test pressure of 0.9 bar below atmospheric pressure (approximately 0.1 bar absolute pressure). The maximum pressure change during the test period shall not be more than 0.09 bar after 2 h, when tested in the two following positions: a) Joints aligned and subjected to shear the shear force across the joint, expressed in N, shall be not less than 50 times DN b) Joints deflected: the test angular deflection shall be the maximum allowable deflection indicated in the manufacturer's catalogue, but not less than 2° 30' for DN 400	Test done with joint deflected condition. No pressure change more than specified observed when tested at 0.91 bar for 2hours with 24KN shear force (52 bar) and kept constant within ±0.09bar and found satisfactory. (Load calculation details enclosed as Annexure-1) Joint is checked at every 15 min. and found no sign of leakage. Starting Time : 10.15am End Time : 12.15pm As the above test has been done with deflected condition and passed the requirement. Hence it has been considered as passed for Joints aligned position also.	Conformed as per the requirement.

Rubber Gasket used for the joints, found conforming as per the drawing D14-GSK-2B-0136 Rev.07  
Dated:10.06.2010

**Remarks:** The above test had been conducted as per BSEN545:2010, which has highest shear load than as per BSEN598 & ISO2531 and meeting the specifications.  
Hence the same test as per BSEN598 & ISO2531 considered as meeting the requirements.

*T. Venkatachalam*  
T.VENKATACHALAM  
JINDAL SAW GULF LLC

ROBERTO PILI  
BV ITALIA





# JINDAL SAW GULF LLC

PRESSURE RECORDING LOG SHEET							
TEST DETAILS:		LEAKTIGHTNESS OF JOINTS TO NEGATIVE INTERNAL PRESSURE					
		AS PER CLAUSE 5.0 & 7.0					
TEST UNIT:		INTERNAL TEST	DATE:	7-Nov-12	TIME:	10:15:10 AM	
TEST TYPE:		NEGATIVE INTERNAL PRESSURE TEST					
PIPE SIZE:		DN400					
IDENTIFICATION:		J18R10 (Socket), J18R10 (Spigot)					
TEST REPORT:							
TIME	VACUUM PRESSURE (BAR)	FORCE 1"W" (Bar)	Remarks	TIME	VACUUM PRESSURE (BAR)	FORCE 1"W" (Bar)	Remarks
10:15:34 AM	-0.91	52.0	No Pr. Change	11:20:34 AM	-0.91	52.0	No Pr. Change
10:20:34 AM	-0.91	52.0	No Pr. Change	11:25:34 AM	-0.91	52.0	No Pr. Change
10:25:34 AM	-0.91	52.0	No Pr. Change	11:30:34 AM	-0.91	52.0	No Pr. Change
10:30:34 AM	-0.91	52.0	No Pr. Change	11:35:34 AM	-0.91	52.0	No Pr. Change
10:35:34 AM	-0.91	52.0	No Pr. Change	11:40:34 AM	-0.91	52.0	No Pr. Change
10:40:34 AM	-0.91	52.0	No Pr. Change	11:45:34 AM	-0.91	52.0	No Pr. Change
10:45:34 AM	-0.91	52.0	No Pr. Change	11:50:34 AM	-0.91	52.0	No Pr. Change
10:50:34 AM	-0.91	52.0	No Pr. Change	11:55:34 AM	-0.91	52.0	No Pr. Change
10:55:34 AM	-0.91	52.0	No Pr. Change	12:00:34 PM	-0.91	52.0	No Pr. Change
11:00:34 AM	-0.91	52.0	No Pr. Change	12:05:34 PM	-0.91	52.0	No Pr. Change
11:05:34 AM	-0.91	52.0	No Pr. Change	12:10:34 PM	-0.91	52.0	No Pr. Change
11:10:34 AM	-0.91	52.0	No Pr. Change	12:15:34 PM	-0.91	52.0	No Pr. Change
11:15:34 AM	-0.91	52.0	No Pr. Change				

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BUREAU VERITAS  
 ITALY  
 WITNESSED NOTED REVIEWED  
 SURVEYOR R. PILLI  
 DATE 02/11/12

## Annexure - 1

### Type test Pipe Sample Dimensions and Shear Load Calculation for Negative Internal Pressure Testing - DN 400

Spec: BSEN545:2010 / ISO 2531:2009

Size	DE		J		Radial gap		
	Required	Observed	Required	Observed	Design	Actual	%
DN 400	425.5 to 430	426.5	456.2 to 459.3	458.7	33.8	32.2	4.73

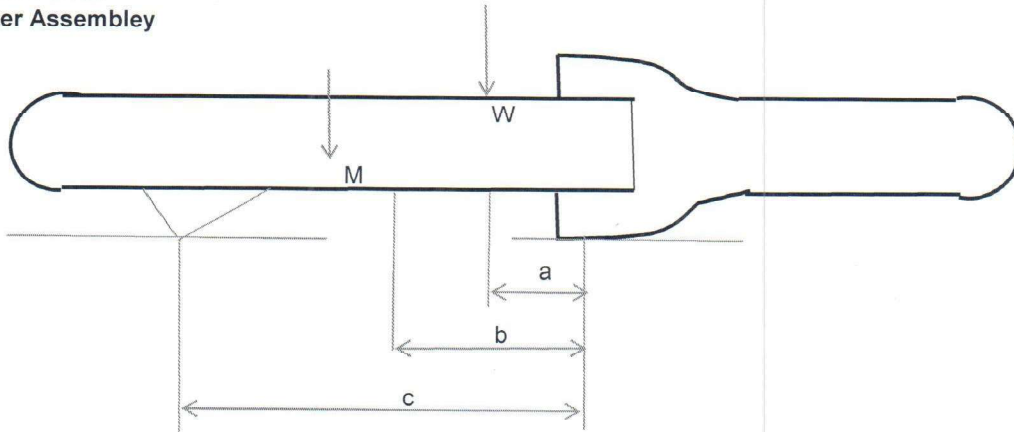
**Sample - A ( Spigot)**

Sample No. J18R10  
 Length 1600 mm  
 DE 426.5  
 Thickness Avg 15.5mm  
 Class : C100

**Sample - B ( Socket)**

Sample No. J18R10  
 Length 1460 mm  
 J 458.7 mm

**After Assembly**



M= 1.05 KN  
 a= 250 mm  
 b= 500 mm  
 c= 1000 mm

**Shear Load Calculation**

$$W = \frac{Fxc - M(c-b)}{c - a}$$

W = 23.3 KN

Where

F = 20000 N ( 50 x DN )

*Handwritten signature*



## JINDAL SAW GULF LLC

### PERFORMANCE TESTING REQUIREMENT AS PER ISO:2531:2009 / BSEN545:2010 STANDARD (TYPE TEST)

NAME OF MANUFACTURER : M/s JINDAL SAW GULF LLC  
DATE AND PLACE OF INSPECTION : 06.11.2012  
NAME OF INSPECTING AGENCY : M/s BV ITALIA  
SIZE & CLASS : DN 400 Class C100  
IDENTIFICATION : J18R10 (Socket), J18R10 (Spigot)

#### LEAKTIGHTNESS OF FLEXIBLE JOINTS TO POSITIVE INTERNAL PRESSURE AS PER CLAUSE 5.0 & 7.0

SL.NO.	DESCRIPTION OF REQUIREMENTS	OBSERVEVATION	REMARKS
1	Maximum design radial gap between the components to be jointed (smallest spigot together with largest socket) with a tolerance of 0 to - 5%	Radial gap found minus 4.73% (Dimension sheet is enclosed as Annexure-1)	With in the limit.
2	Joints shall be tested with a spigot having an average iron wall thickness equal to the specified minimum value with a tolerance of 0 to +10%	Average iron wall thickness of 15.5mm found and the details are enclosed in Annexure-1.	Conformed as per the requirement
3	The leak tightness of flexible joints to positive internal pressure shall be type tested in accordance with clause 7.2 at a test pressure 155 bar (1.5PFA+5 bar), the joints shall exhibit no visibal leakage in the two following positions: a) Joints aligned and subjected to shear the shear force across the joint, expressed in N, shall be not less than 50 times DN b) Joints deflected: the test angular deflection shall be the maximum allowable deflection indicated in the manufacturer's catalogue, but not less than 2° 30'for DN DN 400	Test done with joint deflected condition. Joints found no leakage when tested at 155 bar for 2hours with 24KN (49 bar) shear force and kept constant within +0.5-0.5bar and found satisfactory. (Load calculation details enclosed as Annexure-1) Joint is checked at every 15 min. and found no sign of leakage. Starting Time : 04.30pm End Time : 06.35m As the above test has been done with deflected condition and passed the requirement. Hence it has been considered as passed for Joints aligned position also.	Conformed as per the requirement.

Rubber Gasket used for the joints, found conforming as per the drawing D14-GSK-2B-0136 Rev.07  
Dated:10.06.2010

**Remarks:** The above test had been conducted as per BSEN545:2010, which has higher shear load than as per BSEN598 & ISO2531 and meeting the specifications.  
Hence the same test as per BSEN598 & ISO2531 considered as meeting the requirements.

  
T.VENKATACHALAM  
JINDAL SAW GULF LLC

ROBERTO PILI  
BV ITALIA



## Annexure - 1

### Type test Pipe Sample Dimensions and Shear Load Calculation for Positive Internal Pressure Testing - DN 400

Spec: BSEN545:2010 / ISO 2531:2009

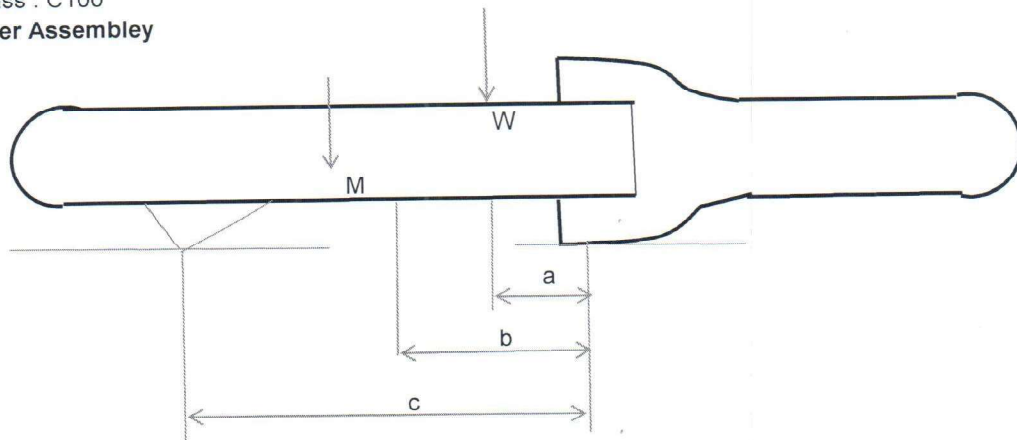
Size	DE		J		Radial gap		
	Required	Observed	Required	Observed	Design	Actual	%
DN 400	425.5 to 430	426.5	456.2 to 459.3	458.7	33.8	32.2	4.73

**Sample - A ( Spigot)**

Sample No. J18R10  
 Length 1600 mm  
 DE 426.5  
 Thickness Avg 15.5mm  
 Class : C100  
**After Assembly**

**Sample - B ( Socket)**

Sample No. J18R10  
 Length 1460 mm  
 J 458.7 mm



M= 2.36 KN  
 a= 250 mm  
 b= 500 mm  
 c= 1000 mm

**Shear Load Calculation**

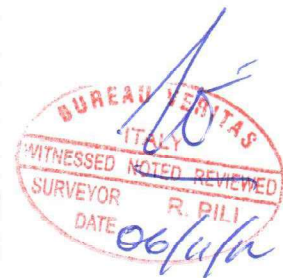
$$W = \frac{Fxc - M(c-b)}{c - a}$$

W = 23.5 KN

Where

F = 20000 N ( 50 x DN )

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6/11/12



**JINDAL SAW GULF LLC**

**PERFORMANCE TESTING REQUIREMENT AS PER BSEN545:2010 / BSEN598:2007 + A1:2009  
STANDARD (TYPE TEST)**

NAME OF MANUFACTURER : M/s JINDAL SAW GULF LLC

**CALIBRATION DETAILS:**

DATE AND PERIOD OF INSPECTION : 09.01.14 to 22.01.14

Pressure Gauge (Water): JSGL/QA/ID-39N

NAME OF INSPECTING AGENCY : M/s BV ITALIA and M/s SGS

Valid till 12.10.2014

SIZE & CLASS : DN 200 Class C100

Pressure Gauge (Shear Force) : JSGL/QA/ID-39T

IDENTIFICATION : M22R20(SPIGOT) , M22R20(SOCKET)

Valid till 17.02.2014

**LEAKTIGHTNESS OF FLEXIBLE JOINTS TO DYNAMIC INTERNAL PRESSURE AS PER CLAUSE 7.2.5 OF BSEN545:2010**

The test had been started on 09.01.14 at 08.30pm and was stopped in presence of Mr.Roberto Pili on 14.01.14 to conduct other possible tests and to restart during his visit period 14th to 16th Jan14. Test had also been witnessed by Mr.Rodel Galang of M/s SGS from 19.01.14 to the test completion on 22.01.2014.

SL.NO.	DESCRIPTION OF REQUIREMENTS	OBSERVEVATION	REMARKS
1	<p>The leak tightness of joints to dynamic internal pressure shall be type tested in accordance with clause 7.2.5 (BSEN545) &amp; 7.8 (BSEN598). The pressure shall be steadily increased up to PMA 120 Bar), the allowable maximum operating pressure of the joint, then automatically monitored according to the following pressure cycle.</p> <p>a) steady pressure reduction to (PMA - 5) bar; b) maintain (PMA - 5) bar for at least 5 s; c) steady pressure increase to PMA; d) maintain PMA for at least 5 s;</p> <p>The number of cycles (24000 cycles) shall be recorded and the test stopped automatically in the occurrence of a failure of the joint. The joints shall exhibit no visibal leakage in the following position: Joints aligned and withdrawn subjected to shear the shear force across the joint, expressed in N, shall be not less than 50 times DN (Shear load 11.7KN / 38.5 Bar).</p>	<p>Test done with joint aligned and withdrawn condition. Joints found no leakage when tested between 115 and 120 bar for 25404 cycles with shear force (40 bar) and found satisfactory.</p> <p>Joint is checked at every 15 min. and found no sign of leakage.</p> <p>Starting Time : 08.30pm dt. 09.01.14 End Time : 12.58pm dt. 22.01.14</p> <p>Cyclic recording log sheet enclosed.</p>	<p>Conformed as per the requirement</p>

Rubber Gasket used for the joints, found conforming as per the drawing D14-GSK-2B-0136 Rev.10 Dated:13.07.2013

**Remarks:** The above test had been conducted as per BSEN545:2010, which has higher shear load than as per BSEN598 and meeting the specifications.

Hence the same test as per BSEN598 considered as meeting the requirements.

T.VENKATACHALAM  
JINDAL SAW GULF LLC



RODEL GALANG  
SGS GULF LIMITED



**JINDAL SAW GULF LLC**

**PERFORMANCE TESTING REQUIREMENT AS PER ISO:2531:2009 / ISO:7186:2011 /  
BSEN545:2010 / BSEN598:2007 + A1:2009 STANDARD (TYPE TEST)**

NAME OF MANUFACTURER : M/s JINDAL SAW GULF LLC  
DATE AND PLACE OF INSPECTION : 14.01.2014

NAME OF INSPECTING AGENCY : M/s BV ITALIA  
SIZE : DN 200  
IDENTIFICATION : M23R109(BARREL) , M23R07(SOCKET-1) , M23R109(SOCKET-2)

**LEAKTIGHTNESS OF JOINTS TO EXTERNAL PRESSURE AS PER CLAUSE 5.0 & 7.0**

SL.NO.	DESCRIPTION OF REQUIREMENTS	OBSERVEVATION	REMARKS
1	Maximum design radial gap between the components to be jointed (smallest spigot together with largest socket) with a tolerance of 0 to - 5%	Radial gap found minus 4.69% & minus 3.97%. Dimension sheet is enclosed as Annexure-1	With in the limit.
2	Shall comprise of two joints made with two pipe sockets Conected together and one double spigot piece	Comprise of two joints made with two sockets welded together and jointed with one double spigot piece	Conformed as per the requirement
3	One half of load shall be applied to the spigot end on each side of the test assembly at 0.5DN or 200mm from socket ends, whichever is largest.	Load applied 26 bar for DN 200 at 200mm from socket end. (Load Calculation details enclosed as Annexure-1)	Conformed as per the requirement
4	Water filling and increasing pressure upto 2bar and holding for at least 2hours with in $\pm$ 0.1bar.	Water filled and pressure increased to 2.2 bar and kept constant for 2hours. Joints are checked for every 15 minutes and no leakage or pressure drop noticed. Starting Time : 12.30pm End Time : 02.30pm	Conformed as per the requirement

Rubber Gasket used for the joints, found conforming as per the drawing D14-GSK-2B-0136 Rev.10  
Dated:13.07.2013

**Remarks:** The above test had been conducted as per BSEN545:2010, which has highest shear load than as per BSEN598, ISO2531 & ISO 7186 and meeting the specifications.  
Hence the same test as per BSEN598, ISO2531 & ISO 7186 considered as meeting the requirements.

*T. Venkatachalam*  
T.VENKATACHALAM  
JINDAL SAW GULF LLC

ROBERTO PILI  
BV ITALIA



## Annexure - 1

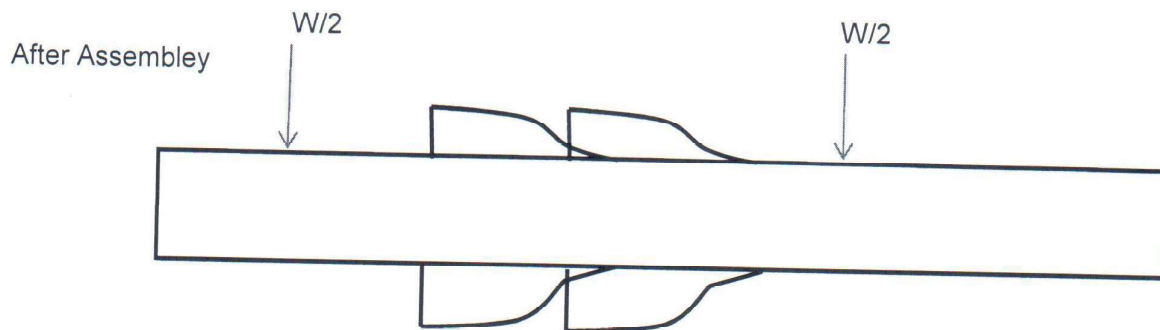
### Type test Pipe Sample Dimensions and Shear Load Calculation for External Pressure Testing - DN 200

Spec: BSEN545:2010 / ISO 2531:2009 / ISO 7186:2011 / BSEN598:2007

<u>Sample - A ( Spigot)</u>	
Sample No.	M23R109
Length	1005 mm
DE	220.1mm

<u>Sample - B ( Socket1)</u>		<u>Sample - C ( Socket2)</u>	
Sample No.	M23R07	Sample No.	M23R109
Length	100mm	Length	100mm
J	246.2mm	J	246.4 mm

Size	DE		J		Radial gap		
	Required	Observed	Required	Observed	Design	Actual	%
DN 200	219 to 223	219.8	244.2 to 246.7	246.2	27.7	26.4	-4.69
DN 200	219 to 223	219.8	244.2 to 246.7	246.4	27.7	26.6	-3.97



#### Shear Load Calculation

$$\begin{aligned}
 \text{Load} &= 50 \times \text{DN} && = 50 \times 200 \\
 &= 10000 \text{ N} \\
 &= 10 \text{ KN} && = 10/2 \text{ KN} = 5 \text{ KN}
 \end{aligned}$$



*[Signature]*  
 14/01/14





# JINDAL SAW GULF LLC

PRESSURE RECORDING LOG SHEET				
TEST DETAILS:		LEAKTIGHTNESS OF JOINTS TO POSITIVE EXTERNAL PRESSURE		
		AS PER CLAUSE 5.0 & 7.0		
TEST UNIT:	EXTERNAL TEST	DATE:	14.01.2014	
TEST TYPE:	POSITIVE EXTERNAL PRESSURE TEST			
PIPE SIZE:	DN 200			
IDENTIFICATION:	: M23R109(BARREL) , M23R07(SOCKET-1) , M23R109(SOCKET-2)			
TEST REPORT:				
SI.No.	TIME	WATER PRESSURE (BAR)	SHERA FORCE 1"W/2" (Bar)	Remarks
1	12.30pm	2.2	26.0	No Leak at joint area
2	12.45pm	2.2	26.0	No Leak at joint area
3	1.00pm	2.2	26.0	No Leak at joint area
4	1.15pm	2.2	26.0	No Leak at joint area
5	1.30pm	2.2	26.0	No Leak at joint area
6	1.45pm	2.2	26.0	No Leak at joint area
7	2.00pm	2.2	26.0	No Leak at joint area
8	2.15pm	2.2	26.0	No Leak at joint area
9	2.30pm	2.2	26.0	No Leak at joint area

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14/01/14

BUREAU VERITAS  
ITALY  
WITNESSED NOTED REVIEWED  
SURVEYOR R. PILLI  
DATE 14/01/14

## JINDAL SAW GULF LLC

### PERFORMANCE TESTING REQUIREMENT AS PER ISO:2531:2009 / ISO:7186:2011 / BSEN545:2010 / BSEN598:2007 + A1:2009 STANDARD (TYPE TEST)

NAME OF MANUFACTURER : M/s JINDAL SAW GULF LLC  
 DATE AND PLACE OF INSPECTION : 15.01.2014  
 NAME OF INSPECTING AGENCY : M/s BV ITALIA  
 SIZE & CLASS : DN 200 Class C100  
 IDENTIFICATION : M22R20(SPIGOT) , M22R20(SOCKET)

#### LEAKTIGHTNESS OF JOINTS TO NEGATIVE INTERNAL PRESSURE AS PER CLAUSE 5.0 & 7.0

SL.NO.	DESCRIPTION OF REQUIREMENTS	OBSERVEVATION	REMARKS
1	Maximum design radial gap between the components to be jointed (smallest spigot together with largest socket) with a tolerance of 0 to - 5%	Radial gap found minus 4.69% (Dimension sheet is enclosed as Annexure-1)	With in the limit.
2	Joints shall be tested with a spigot having an average iron wall thickness (over a distance of 2 DN, in mm from the spigot end face) equal to the specified minimum value with a tolerance of 0 to +10%	Average iron wall thickness of 8.3mm found and the details are enclosed in Annexure-1.	Conformed as per the requirement
3	The leak tightness of joints to internal pressure shall be type tested in accordance with clause 7.3 at a test pressure of 0.9 bar below atmospheric pressure (approximately 0.1 bar absolute pressure). The maximum pressure change during the test period shall not be more than 0.09 bar after 2 h, when tested in the two following positions: a) Joints aligned and subjected to shear the shear force across the joint, expressed in N, shall be not less than 50 times DN b) Joints deflected: the test angular deflection shall be the maximum allowable deflection indicated in the manufacturer's catalogue, but not less than 3° 30' for DN 200	Test done with joint deflected condition. No pressure change more than specified observed when tested at -0.91 bar for 2hours with 12KN shear force (40 bar) and kept constant within ±0.09bar and found satisfactory. (Load calculation details enclosed as Annexure-1) Joint is checked at every 15 min. and found no sign of leakage. Starting Time : 10.15am End Time : 12.15pm As the above test has been done with deflected condition and passed the requirement. Hence it has been considered as passed for Joints aligned position also.	Conformed as per the requirement.

Rubber Gasket used for the joints, found conforming as per the drawing D14-GSK-2B-0136 Rev.10  
 Dated:13.07.2013

**Remarks:** The above test had been conducted as per BSEN545:2010, which has highest shear load than as per BSEN598, ISO2531 & ISO 7186 and meeting the specifications.  
 Hence the same test as per BSEN598, ISO2531 & ISO 7186 considered as meeting the requirements.

T.VENKATACHALAM  
 JINDAL SAW GULF LLC

ROBERTO PILI  
 BV ITALIA



## Annexure - 1

### Type test Pipe Sample Dimensions and Shear Load Calculation for Negative Internal Pressure Testing - DN 200

Spec: BSEN545:2010 / ISO 2531:2009 / ISO 7186:2011 / BSEN598:2007

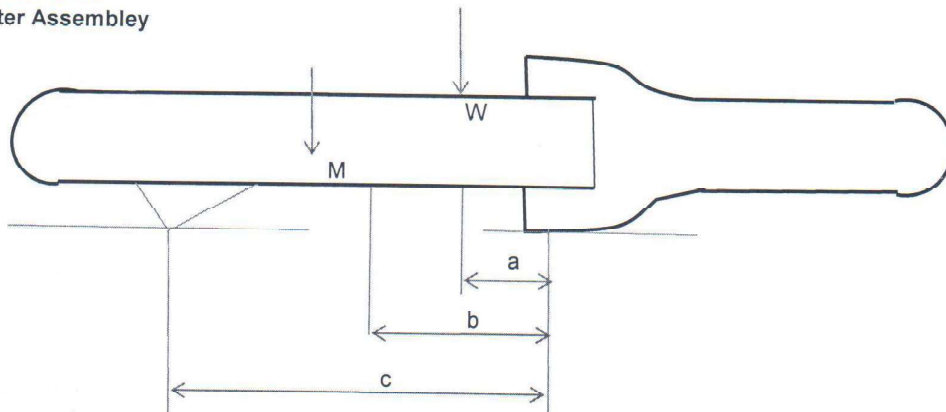
Size	DE		J		Radial gap		
	Required	Observed	Required	Observed	Design	Actual	%
DN 200	219 to 223	220.1	244.2 to 246.7	246.5	27.7	26.4	-4.69

**Sample - A ( Spigot)**

Sample No. M22R20  
 Length 1550 mm  
 DE 220.1  
 Thickness Avg 8.3mm  
 Class : C100  
**After Assembly**

**Sample - B ( Socket)**

Sample No. M22R20  
 Length 1485 mm  
 J 246.5 mm



M= 0.54 KN  
 a= 210 mm  
 b= 487 mm  
 c= 975 mm

**Shear Load Calculation**

$$W = \frac{Fxc - M(c-b)}{c - a}$$

W = 12.4 KN

Where

F = 10000 N ( 50 x DN )



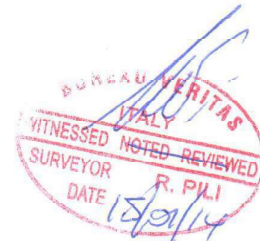
15/01/14



# JINDAL SAW GULF LLC

PRESSURE RECORDING LOG SHEET				
TEST DETAILS:		LEAKTIGHTNESS OF JOINTS TO NEGATIVE INTERNAL PRESSURE		
		AS PER CLAUSE 5.0 & 7.0		
TEST UNIT:		INTERNAL TEST	DATE:	15.01.2014
TEST TYPE:		NEGATIVE INTERNAL PRESSURE TEST		
PIPE SIZE:		DN 200		
IDENTIFICATION:		: M22R20(SPIGOT) , M22R20(SOCKET)		
TEST REPORT:				
SI.No.	TIME	VACCUM PRESSURE (BAR)	SHEAR FORCE 1"W" (Bar)	Remarks
1	10.15am	-0.91	40.0	No pressure change
2	10.30am	-0.91	40.0	No pressure change
3	10.45am	-0.91	40.0	No pressure change
4	11.00am	-0.91	40.0	No pressure change
5	11.15am	-0.91	40.0	No pressure change
6	11.30am	-0.91	40.0	No pressure change
7	11.45am	-0.91	40.0	No pressure change
8	12.00noon	-0.91	40.0	No pressure change
9	12.15am	-0.91	40.0	No pressure change

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15/01/14



## JINDAL SAW GULF LLC

### PERFORMANCE TESTING REQUIREMENT AS PER ISO:2531:2009 / ISO:7186:2011 / BSEN545:2010 / BSEN598:2007 + A1:2009 STANDARD (TYPE TEST)

NAME OF MANUFACTURER : M/s JINDAL SAW GULF LLC  
DATE AND PLACE OF INSPECTION : 14.01.2014  
NAME OF INSPECTING AGENCY : M/s BV ITALIA  
SIZE & CLASS : DN 200 Class C100  
IDENTIFICATION : M22R20(SPIGOT) , M22R20(SOCKET)

#### LEAKTIGHTNESS OF FLEXIBLE JOINTS TO POSITIVE INTERNAL PRESSURE AS PER CLAUSE 5.0 & 7.0

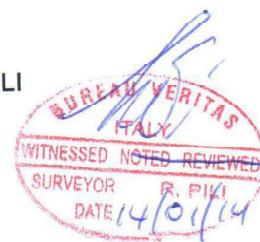
SL.NO.	DESCRIPTION OF REQUIREMENTS	OBSERVEVATION	REMARKS
1	Maximum design radial gap between the components to be jointed (smallest spigot together with largest socket) with a tolerance of 0 to - 5%	Radial gap found minus 4.69% (Dimension sheet is enclosed as Annexure-1)	With in the limit.
2	Joints shall be tested with a spigot having an average iron wall thickness equal to the specified minimum value with a tolerance of 0 to +10%	Average iron wall thickness of 8.3mm found and the details are enclosed in Annexure-1.	Conformed as per the requirement
3	The leak tightness of flexible joints to positive internal pressure shall be type tested in accordance with clause 7.2 at a test pressure 155 bar (1.5PFA+5 bar), the joints shall exhibit no visibal leakage in the two following positions: a) Joints aligned and subjected to shear the shear force across the joint, expressed in N, shall be not less than 50 times DN b) Joints deflected: the test angular deflection shall be the maximum allowable deflection indicated in the manufacturer's catalogue, but not less than 3° 30'for DN DN 200	Test done with joint deflected condition. Joints found no leakage when tested at 156 bar for 2hours with 12KN (40 bar) shear force and kept constant within +0.5-0.5bar and found satisfactory. (Load calculation details enclosed as Annexure-1) Joint is checked at every 15 min. and found no sign of leakage. Starting Time : 03.45pm End Time : 05.45m As the above test has been done with deflected condition and passed the requirement. Hence it has been considered as passed for Joints aligned position also.	Conformed as per the requirement.

Rubber Gasket used for the joints, found conforming as per the drawing D14-GSK-2B-0136 Rev.10  
Dated:13.07.2013

**Remarks:** The above test had been conducted as per BSEN545:2010, which has highest shear load than as per BSEN598, ISO2531 & ISO 7186 and meeting the specifications.  
Hence the same test as per BSEN598, ISO2531 & ISO 7186 considered as meeting the requirements.

T.VENKATACHALAM  
JINDAL SAW GULF LLC

ROBERTO PILI  
BV ITALIA



## Annexure - 1

### Type test Pipe Sample Dimensions and Shear Load Calculation for Positive Internal Pressure Testing - DN 200

Spec: BSEN545:2010 / ISO 2531:2009 / ISO 7186:2011 / BSEN598:2007

Size	DE		J		Radial gap		
	Required	Observed	Required	Observed	Design	Actual	%
DN 200	219 to 223	220.1	244.2 to 246.7	246.5	27.7	26.4	-4.69

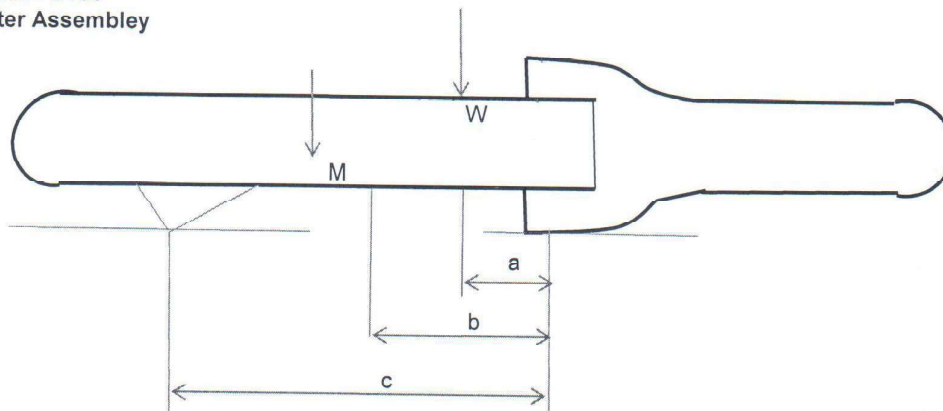
**Sample - A ( Spigot)**

Sample No. M22R20  
 Length 1550 mm  
 DE 220.1  
 Thickness Avg 8.3mm  
 Class : C100

**Sample - B ( Socket)**

Sample No. M22R20  
 Length 1485 mm  
 J 246.5 mm

After Assembly



M= 1.55 KN  
 a= 210 mm  
 b= 487 mm  
 c= 975 mm

**Shear Load Calculation**

$$W = \frac{Fxc - M(c-b)}{c - a}$$

W = 11.7 KN

Where

F = 10000 N ( 50 x DN )



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# JINDAL SAW GULF LLC

PRESSURE RECORDING LOG SHEET				
TEST DETAILS:		LEAKTIGHTNESS OF JOINTS TO POSITIVE INTERNAL PRESSURE		
		AS PER CLAUSE 5.0 & 7.0		
TEST UNIT:		INTERNAL TEST	DATE:	14.01.2014
TEST TYPE:		POSITIVE INTERNAL PRESSURE TEST		
PIPE SIZE:		DN 200		
IDENTIFICATION:		: M22R20(SPIGOT) , M22R20(SOCKET)		
TEST REPORT:				
Sl.No.	TIME	WATER PRESSURE (BAR)	SHEAR FORCE 1"W" (Bar)	Remarks
1	03.45pm	156.0	40.0	No Leak at joint area
2	04.00pm	156.0	40.0	No Leak at joint area
3	04.15pm	156.0	40.0	No Leak at joint area
4	04.30pm	156.0	40.0	No Leak at joint area
5	04.45pm	156.0	40.0	No Leak at joint area
6	05.00pm	156.0	40.0	No Leak at joint area
7	05.15pm	156.0	40.0	No Leak at joint area
8	05.30pm	156.0	40.0	No Leak at joint area
9	05.45pm	156.0	40.0	No Leak at joint area

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14/01/14



**(Type test Report- Restrained Pipes)**



**JINDAL SAW GULF LLC**

**TEST REPORT ON LEAK TIGHTNESS OF “JSAW – LOCK (DC)” JOINTS TO  
DYNAMIC INTERNAL PRESSURE AS PER BSEN 545:2010(E), BSEN598: 2007**

1. Scope of Testing : To confirm leak tightness of JSAW LOCK (DC) joint under Cyclic internal hydrostatic pressure to joint of maximum annulus, with shear load.
2. Date of Inspection : 31.01.2017 (start at 8.38am) to 13.02.2017 (stop at 3.10pm)
3. Place of inspection : Jindal Saw Gulf LLC,  
Abu Dhabi - 132595, UAE
4. Size and Class : DN 1200 – PFA25 (Id no. 7A12P05 & P09)
5. Type testing as per : BS EN 545:2010(E), BSEN 598:2007
6. Type Test Witnessed By : Mr. Roberto Pili M/s Bureau Veritas Italy,  
Mr. Asif Majeed, SGS, Dubai

**TEST DESCRIPTION:**

**a) DIMENSIONS AND TESTING DETAILS**

PARAMETER	REQUIREMENT	OBSERVATION	REMARKS
Annular gap between the sealing surfaces.	Maximum design value plus 0%, minus 5%	Maximum design value minus 4.76%.	Within the specified limit. Refer annexure - A for details of dimensions.
Test assembly	Comprise of joints made with socket and spigot aligned together/assembled with lock plates.	Comprise of joints made with socket and spigot aligned together. Sealing component of joint is EPDM rubber gasket (Prabhat) and lock plates.	Length of samples found within the limit. Refer Annexure-A for sample length & wall thickness.
Cyclic Internal hydraulic pressure- Joint of maximum annulus, with shear load.	The vertical force W shall be applied to the spigot end at 0.5DN or 200mm from socket ends, whichever is the largest. Water filling and increasing pressure up to (PMA bar) and hold for atleast 5 seconds and steady reduction to (PMA-5bar) and hold for atleast 5 seconds and then steady pressure increase to (PMA bar) and maintained to atleast 5 seconds. The cycle is to continue for 24000 cycles.	Load applied is 53KN (52 bar) at 600mm from socket end. Water filled and hydrostatic pressure raised to 30 bar and maintained for 5 seconds then steady reduction to 25 bar and maintained for 5 seconds and then steady pressure increase to 30 bar and maintained for 5 seconds. The cycle is continued for more than 24000 cycles i.e upto 24521 (cycle graphs attached).	The results found confirming to specification requirements.

Drawing references: Rubber gasket dimensions- D14-GSK-ABU-1044, Pipe dimensions – D14-ABU-JL-PIP-2230 & Lock segment dimensions – D14-ABU-LOCK DCP1200-1901.

The 1200mm “JSAW – LOCK (DC)” joint assembly is found confirming to the specification requirements with respect to leak tightness and mechanical stability to Cyclic internal hydraulic pressure under joint of maximum annulus, with shear load.

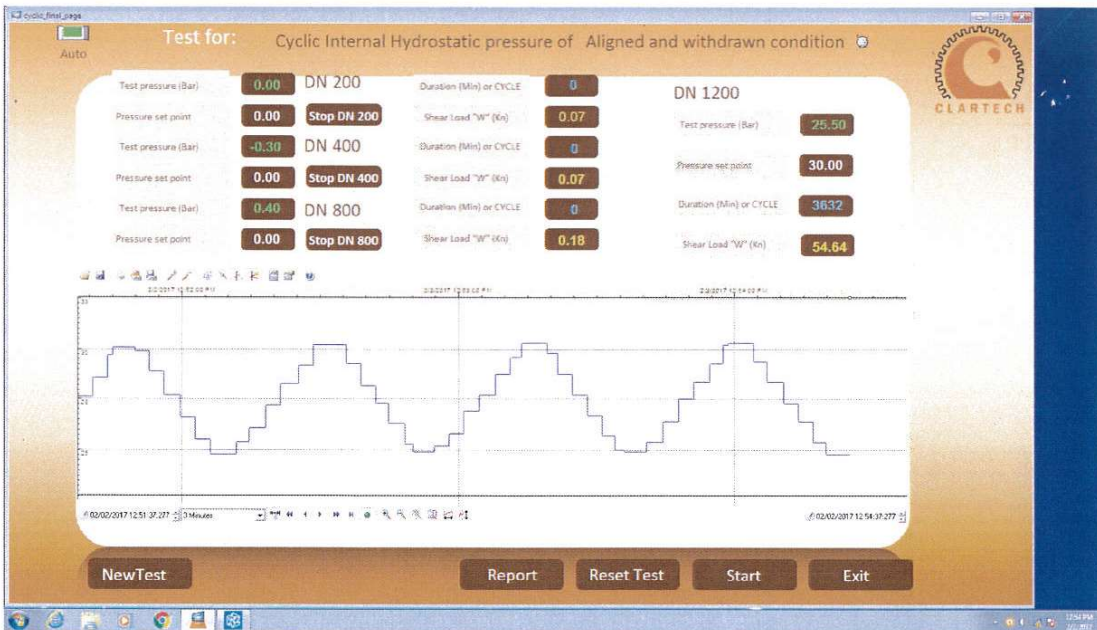
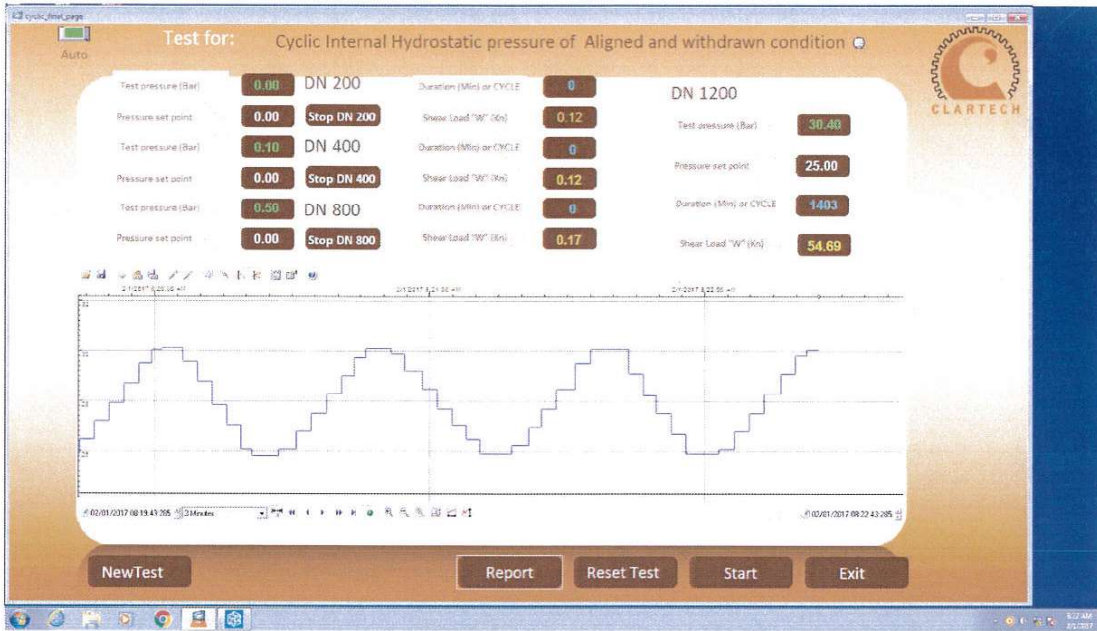
**For M/s. Jindal Saw Gulf LLC**

**For SGS Dubai**

*T. Venkatachalam*  
13/02/17  
**T. Venkatachalam**

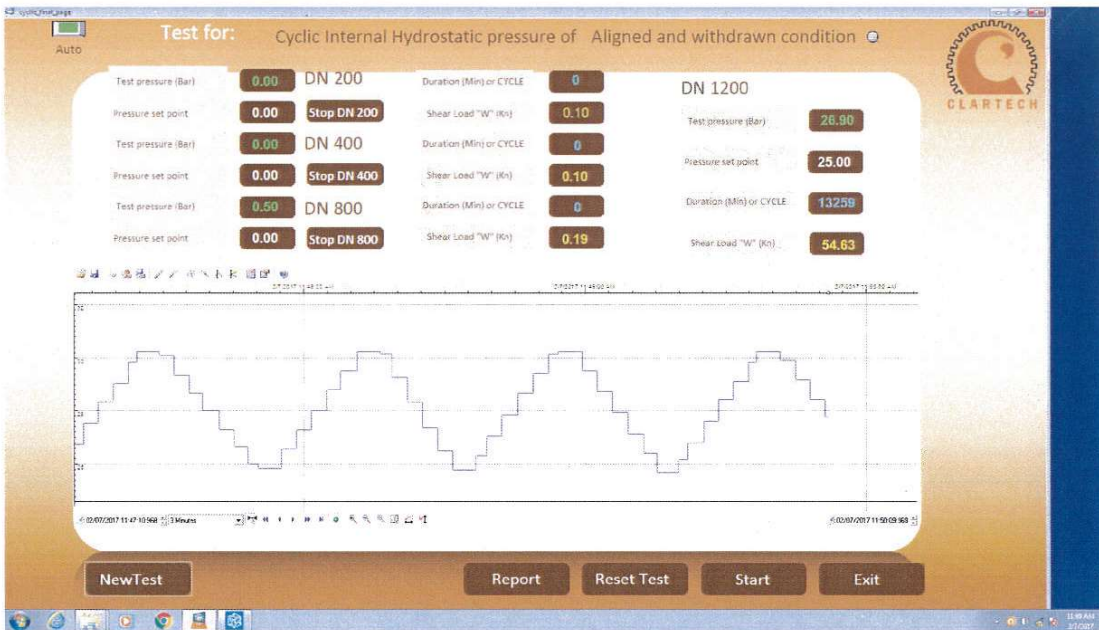
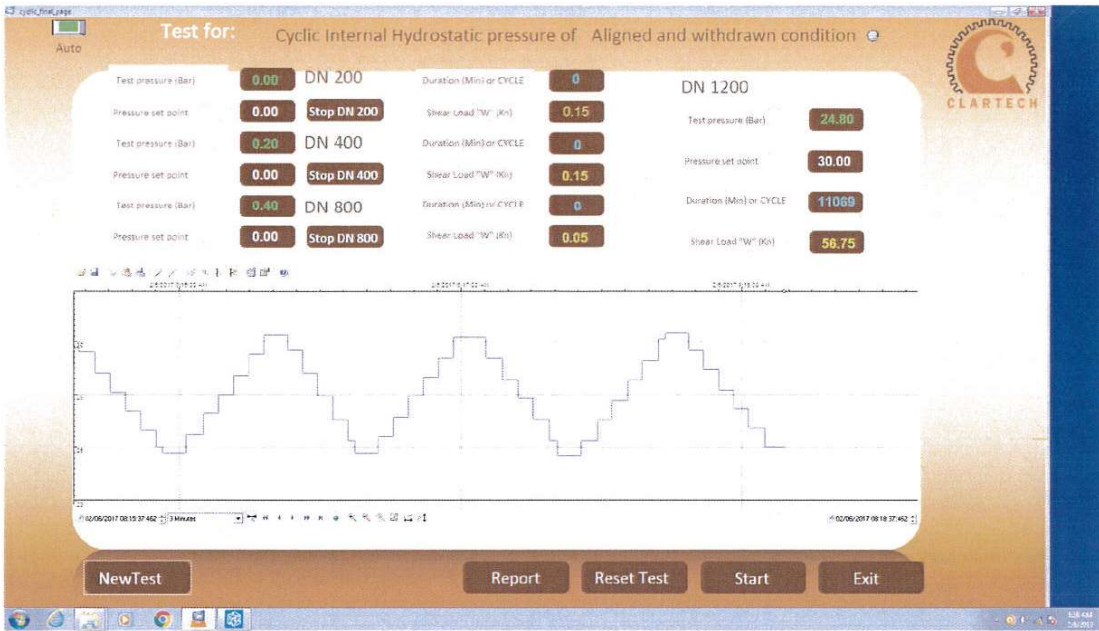
**Asif Majeed**





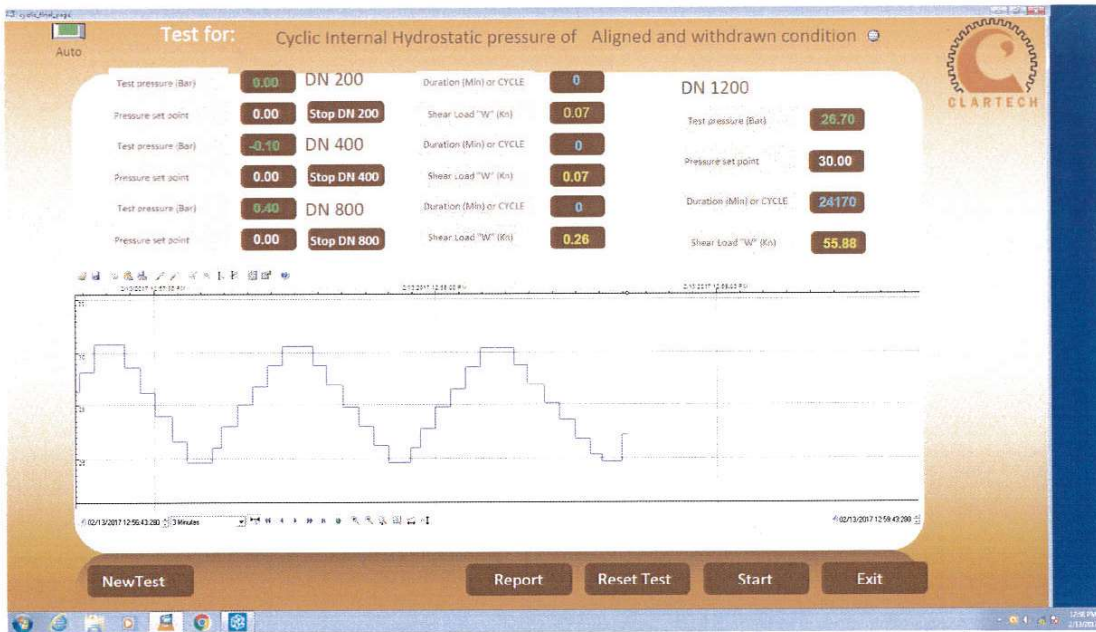
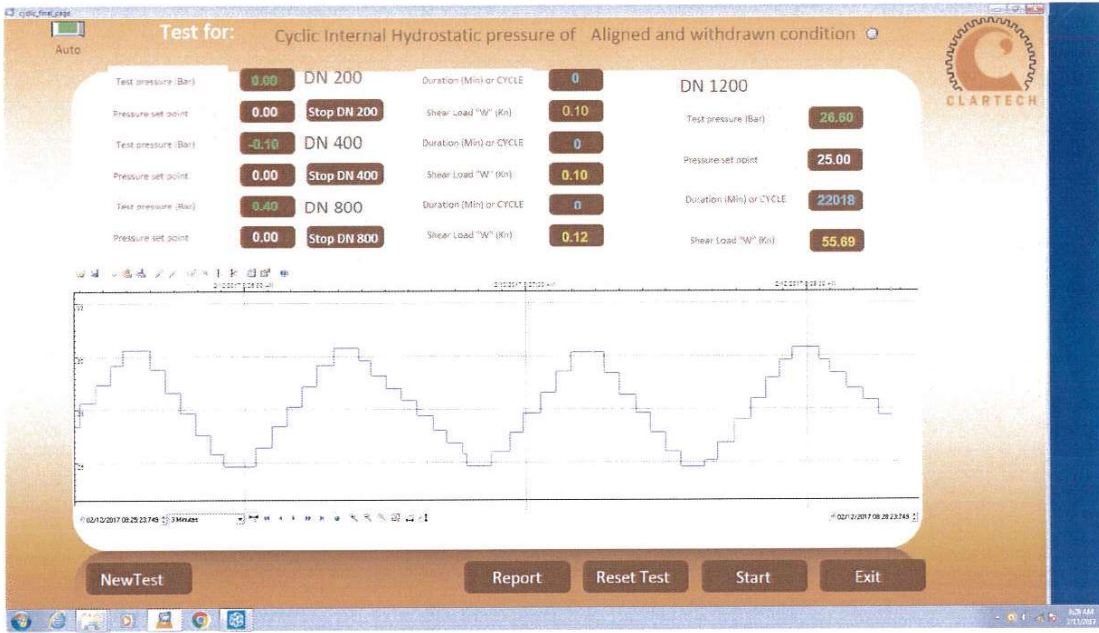
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SGS GULF LIMITED  
14  
WITNESSED  REVIEWED  INSPECTED



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## JINDAL SAW GULF LLC

### TEST REPORT ON LEAK TIGHTNESS OF "JSAW – LOCK (DC)" JOINTS TO POSITIVE INTERNAL PRESSURE AS PER BSEN 545:2010(E), BSEN598: 2007, ISO 2531-2009, ISO 7186:2011 & ISO 10804-1

1. Scope of Testing : To conform leak tightness of JSAW-LOCK (DC) joint under positive internal hydrostatic pressure to joint of maximum annulus, with shear load and deflected.
2. Date of Inspection : 30.01.2017
3. Place of inspection : Jindal Saw Gulf LLC,  
Abu Dhabi - 132595, UAE
4. Size and Class : DN 1200 – PFA25 (Id no. 7A12P05 & P09)
5. Type testing as per : BS EN 545:2010(E), BSEN 598:2007, ISO2531:2009,  
ISO7186:2011 & ISO 10804-1
6. Type Test Witnessed By : Mr. Roberto Pili M/s Bureau Veritas Italy,  
Mr.Asif Majeed, SGS, Dubai

#### TEST DESCRIPTION:

##### a) DIMENSIONS AND TESTING DETAILS

PARAMETER	REQUIREMENT	OBSERVATION	REMARKS
Annular gap between the sealing surfaces.	Maximum design value plus 0%, minus 5%	Maximum design value minus 4.76%.	Within the specified limit. Refer annexure -A for details of dimensions.
Test assembly	Comprise of joints made with socket and spigot aligned together/assembled with lock plates.	Comprise of joints made with socket and spigot aligned together. Sealing component of joint is EPDM rubber gasket (Prabhat) and lock plates.	Length of samples found within the limit. Refer Annexure-A for sample length & wall thickness.
Positive Internal hydrostatic pressure- Joint of maximum annulus, with shear load, deflected.	The vertical force W shall be applied to the spigot end at 0.5DN or 200mm from socket ends, whichever is the largest. Water filling and increasing pressure up to 42.5 bar (1.5PFA+5bar) and Pressure shall be kept constant for at least 2 hours. Joints shall be inspected for every 15 minutes.	Load applied is 53KN (50 bar) at 600mm from socket end. The joint is deflected to 1.2°. Water filled and hydrostatic pressure raised to 43 bar and kept constant for 2 hours. Joint is checked for every 15 minutes and observed no leakages or pressure drop. As the said test have been passed in deflected condition and hence it is considered as meeting the aligned test requirement also.	The results found conforming to specification requirements. Refer Annexure-B for detailed results recording.

**Remarks :** As the above test had been conducted with highest shear load as per BSEN545 than BSEN598, ISO2531, ISO10804 & ISO7186 and meeting the specifications. Hence the same test is considered as meeting as per ISO2531, ISO7186, ISO10804 & BSEN598.

Drawing references: Rubber gasket dimensions- D14-GSK-ABU-1044, Pipe dimensions – D14-ABU-JL-PIP-2230 & Lock segment dimensions – D14-ABU-LOCK DCP1200-1901.

The 1200mm "JSAW – LOCK (DC)" joint assembly is found conforming to the specification requirements with respect to leak tightness and mechanical stability to positive internal hydrostatic pressure under joint of maximum annulus, with shear load, Joint of maximum annulus, deflected.

For M/s. Jindal Saw Gulf LLC

For SGS Dubai

For M/S. Bureau Veritas Italy

T.Venkatachalam



Roberto Pili



**JINDAL SAW GULF LLC**

**TEST REPORT ON LEAK TIGHTNESS OF “JSAW – LOCK (DC)” JOINTS TO  
NEGATIVE INTERNAL PRESSURE AS PER BSEN 545:2010(E), BSEN598: 2007, ISO 2531-2009,  
ISO 7186:2011 & ISO 10804-1**

1. Scope of Testing : To conform leak tightness of JSAW-LOCK (DC) joint under Negative internal hydrostatic pressure to joint of maximum annulus, with shear load and deflected.
2. Date of Inspection : 30.01.2017
3. Place of inspection : Jindal Saw Gulf LLC,  
Abu Dhabi - 132595, UAE
4. Size and Class : DN 1200 – PFA25 (Id no. 7A12P05 & P09)
5. Type testing as per : BS EN 545:2010(E), BSEN 598:2007, ISO2531:2009,  
ISO7186:2011 & ISO 10804-1
6. Type Test Witnessed By : Mr. Roberto Pili M/s Bureau Veritas Italy, Mr.Asif Majeed  
M/s SGS Dubai

**TEST DESCRIPTION:**

**a) DIMENSIONS AND TESTING DETAILS**

PARAMETER	REQUIREMENT	OBSERVATION	REMARKS
Annular gap between the sealing surfaces.	Maximum design value plus 0%, minus 5%	Maximum design value minus 4.76%.	Within the specified limit. Refer annexure -A for details of dimensions.
Test assembly	Comprise of joints made with socket and spigot aligned together/assembled with lock plates.	Comprise of joints made with socket and spigot aligned together. Sealing component of joint is EPDM rubber gasket (Prabhat) and lock plates..	Length of samples found within the limit. Refer Annexure-A for sample length & wall thickness.
Negative Internal pressure - Joint of maximum annulus, with shear load, deflected.	The vertical force W shall be applied to the spigot end at 0.5DN or 200mm from socket ends, whichever is the largest. The test assembly shall be empty of water and shall be evacuated to a negative pressure of 0.9bar and vacuum shall be kept constant for at least 2 hours. Joints shall be inspected for every 15 minutes. Pressure shall not have changed by more than 0.09bar.	Load applied is 71KN (62 bar) at 600mm from socket end. The joint is deflected to 1.2°. Water removed from test assembly and evacuated to a negative pressure of 0.9bar and kept constant for 2 hours. Joint is checked for every 15 minutes and observed no leakages or pressure drop. As the said test have been passed in deflected condition and hence it is considered as meeting the aligned test requirement also.	The results found conforming to specification requirements. Refer Annexure-C for detailed results recording.

**Remarks :** As the above test had been conducted with highest shear load as per BSEN545 than BSEN598, ISO2531, ISO10804 & ISO7186 and meeting the specifications. Hence the same test is considered as meeting as per ISO2531, ISO7186, ISO10804 & BSEN598.

Drawing references: Rubber gasket dimensions- D14-GSK-ABU-1044, Pipe dimensions – D14-ABU-JL-PIP-2230 & Lock segment dimensions – D14-ABU-LOCK DCP1200-1901.

The 1200mm “JSAW – LOCK (DC)” joint assembly is found conforming to the specification requirements with respect to leak tightness and mechanical stability to Negative internal pressure under joint of maximum annulus, with shear load, Joint of maximum annulus, deflected.

**For M/s. Jindal Saw Gulf LLC**

**For SGS Dubai**

**For M/S. Bureau Veritas Italy**

T.Venkatachalam

Asif Majeed

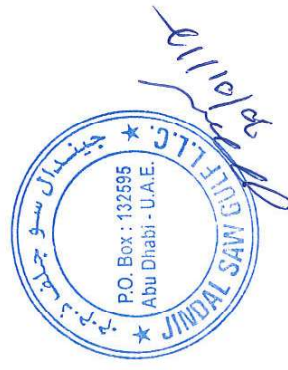
Roberto Pili



**ANNEX - A**  
**JINDAL SAW GULF LLC**  
**Annular Gap Calculation Details**

Size / Class	Actual DE	Actual J	J - DE	As per design	% of Deviation Negative	Length of Socket Speciman with Flange	Length of Spigot Speciman with Flange	Average Pipe Thickness
1200 PFA25	1251.00	1311.00	60.00	63.00	4.76	3510	3630	14.50

Thickness Readings						
	1	2	3	4	5	Average
1200	14.0	14.9	14.6	14.6	15.0	14.52
	13.9	14.2	14.8	15.0	14.2	



FOR JINDALSAW GULF LLC



FOR SGS DUBAI



FOR BUREAU-VERITAS ITALY

## TYPE TEST REPORT ANNEX - B

TEST UNIT:	INTERNAL TEST			
TEST TYPE:	POSITIVE STATIC TEST DEF 1.2 DEG		SOCKET ID NO	SPIGOT ID NO.
PIPE SIZE:	DN1200 PFA25 "JSAW - LOCK (DC)" PIPE		7A12P09	7A12P05
START DATE:	1/30/2017		TIME:	12:40 PM

TIME	PRESSURE(Bar)	FORCE1"W"(Bar)	Remarks
12:40 PM	43.0	50.0	No leakages found
12:55 PM	43.0	50.0	No leakages found
1:10 PM	43.0	50.0	No leakages found
1:25 PM	43.0	50.0	No leakages found
1:40 PM	43.0	50.0	No leakages found
1:55 PM	43.0	50.0	No leakages found
2:10 PM	43.0	50.0	No leakages found
2:25 PM	43.0	50.0	No leakages found
2:40 PM	43.0	50.0	No leakages found

Note : Also No axial movement observed at 43 bar and found satisfactory.

FOR JINDAL SAW GULF LLC



FOR SGS DUBAI

FOR BUREAU VERITAS ITALY





## TYPE TEST REPORT ANNEX - C

TEST UNIT:	INTERNAL TEST			
TEST TYPE:	NEGATIVE INTERNAL TEST DEF 1.2 DEG	SOCKET ID NO	SPIGOT ID NO.	
PIPE SIZE:	DN1200 PFA25 "JSAW - LOCK (DC)" PIPE	7A12P09	7A12P05	
START DATE:	1/30/2017	TIME:	5:28 PM	

TIME	VACUUM PRESSURE(Bar)	FORCE1"W"(BAR)	Remarks
5:28 PM	0.9	62.0	No pressure change found
5:43 PM	0.9	62.0	No pressure change found
5:58 PM	0.9	62.0	No pressure change found
6:13 PM	0.9	62.0	No pressure change found
6:28 PM	0.9	62.0	No pressure change found
6:43 PM	0.9	62.0	No pressure change found
6:58 PM	0.9	62.0	No pressure change found
7:13 PM	0.9	62.0	No pressure change found
7:28 PM	0.9	62.0	No pressure change found

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FOR JINDAL SAW GULF LLC



FOR SGS DUBAI

FOR BUREAU VERITAS ITALY



## JINDAL SAW GULF LLC

### TEST REPORT ON LEAK TIGHTNESS OF "JSAW – LOCK (DC)" JOINTS TO DYNAMIC INTERNAL PRESSURE AS PER BSEN 545:2010(E), BSEN598: 2007

1. Scope of Testing : To confirm leak tightness of JSAW LOCK (DC) joint under Cyclic internal hydrostatic pressure to joint of maximum annulus, with shear load.
2. Date of Inspection : 03.06.2017 (start at 1.05pm) to 13.06.2017 (stop at 10.00am)
3. Place of inspection : Jindal Saw Gulf LLC, Abu Dhabi - 132595, UAE
4. Size and Class : DN 800 – PFA25 (Id nos. 7E11Q07 & 7E11Q09)
5. Type testing as per : BS EN 545:2010(E), BSEN 598:2007
6. Type Test Witnessed By : Mr.Ahmed Raziuddin & Mr.Asif Majeed, SGS, Dubai

#### TEST DESCRIPTION:

##### a) DIMENSIONS AND TESTING DETAILS

PARAMETER	REQUIREMENT	OBSERVATION	REMARKS
Annular gap between the sealing surfaces.	Maximum design value plus 0%, minus 5%	Maximum design value minus 4.44%.	Within the specified limit. Refer annexure - A for details of dimensions.
Test assembly	Comprise of joints made with socket and spigot aligned together/assembled with lock plates.	Comprise of joints made with socket and spigot aligned together. Sealing component of joint is EPDM rubber gasket (Prabhat) and lock plates.	Length of samples found within the limit. Refer Annexure-A for sample length & wall thickness.
Cyclic Internal hydraulic pressure-Joint of maximum annulus, with shear load.	The vertical force W shall be applied to the spigot end at 0.5DN or 200mm from socket ends, whichever is the largest. Water filling and increasing pressure up to (PMA bar) and hold for atleast 5 seconds and steady reduction to (PMA-5bar) and hold for atleast 5 seconds and then steady pressure increase to (PMA bar) and maintained to atleast 5 seconds. The cycle is to continue for 24000 cycles.	Load applied is 53KN (70 bar) at 410mm from socket end. Water filled and hydrostatic pressure raised to 30 bar and maintained for 5 seconds then steady reduction to 25 bar and maintained for 5 seconds and then steady pressure increase to 30 bar and maintained for 5 seconds. The cycle is continued for more than 24000 cycles i.e upto 24453 (cycle graphs attached).	The results found confirming to specification requirements.

Drawing references: Rubber gasket dimensions- D14-GSK-2B-8286, Pipe dimensions – D14-ABU-JL-PIP-2230 & Lock segment dimensions – D14-ABU-LOCK 800-2154.

The 800mm "JSAW – LOCK (DC)" joint assembly is found confirming to the specification requirements with respect to leak tightness and mechanical stability to Cyclic internal hydraulic pressure under joint of maximum annulus, with shear load.

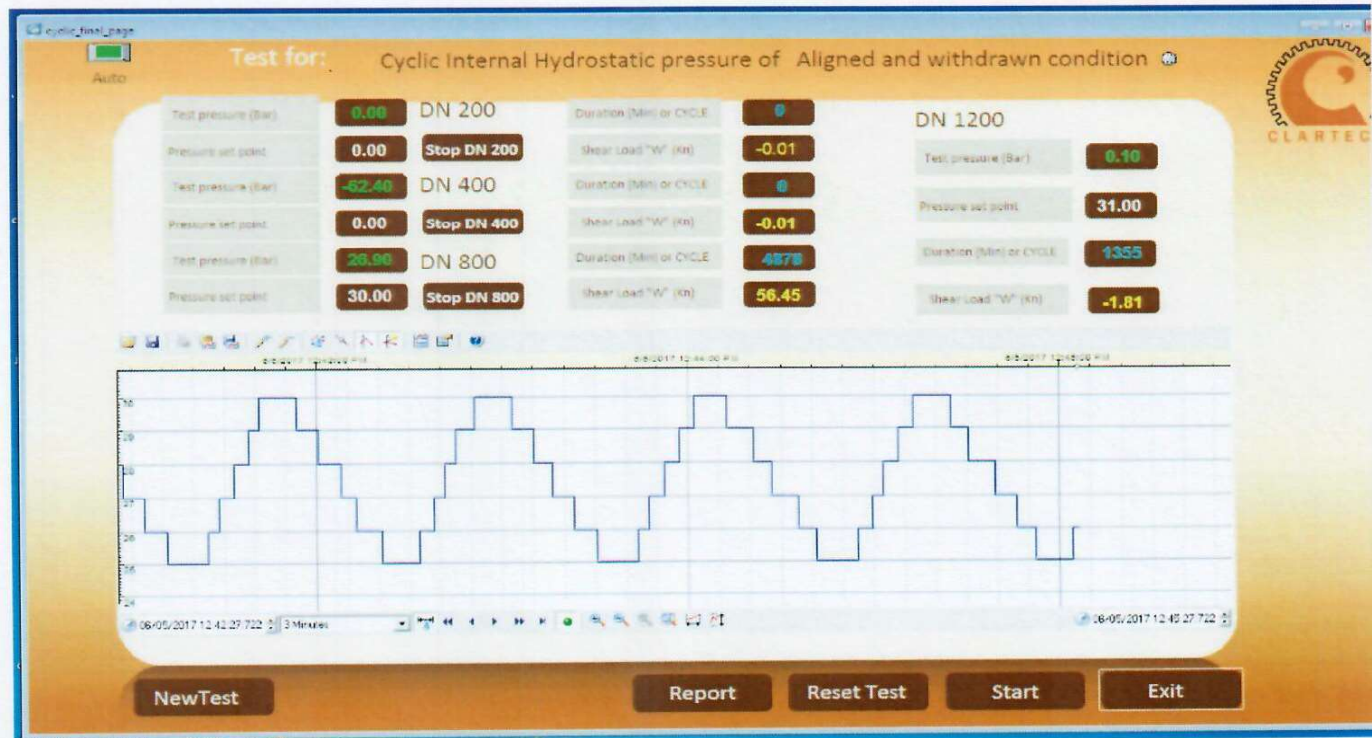
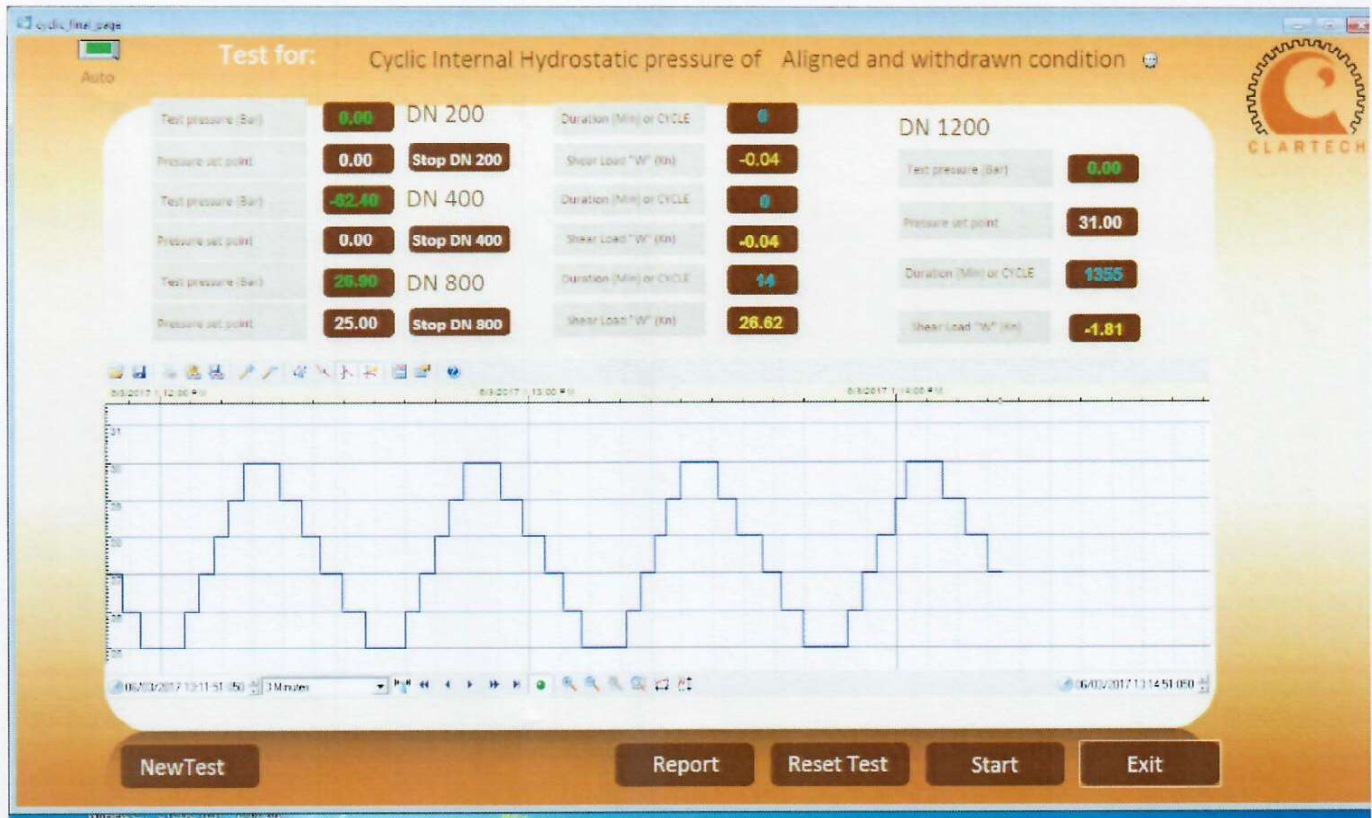
For M/s. Jindal Saw Gulf LLC

T.Venkatachalam

For SGS Dubai

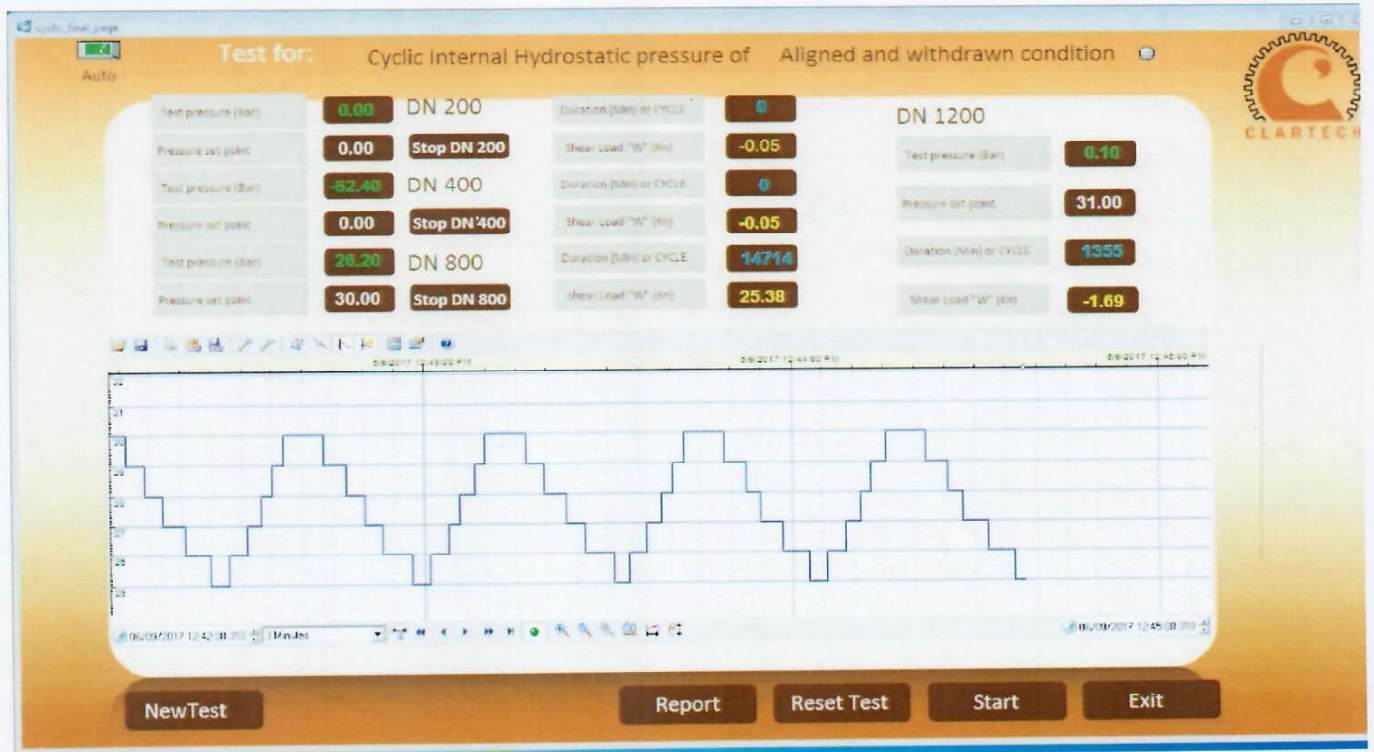
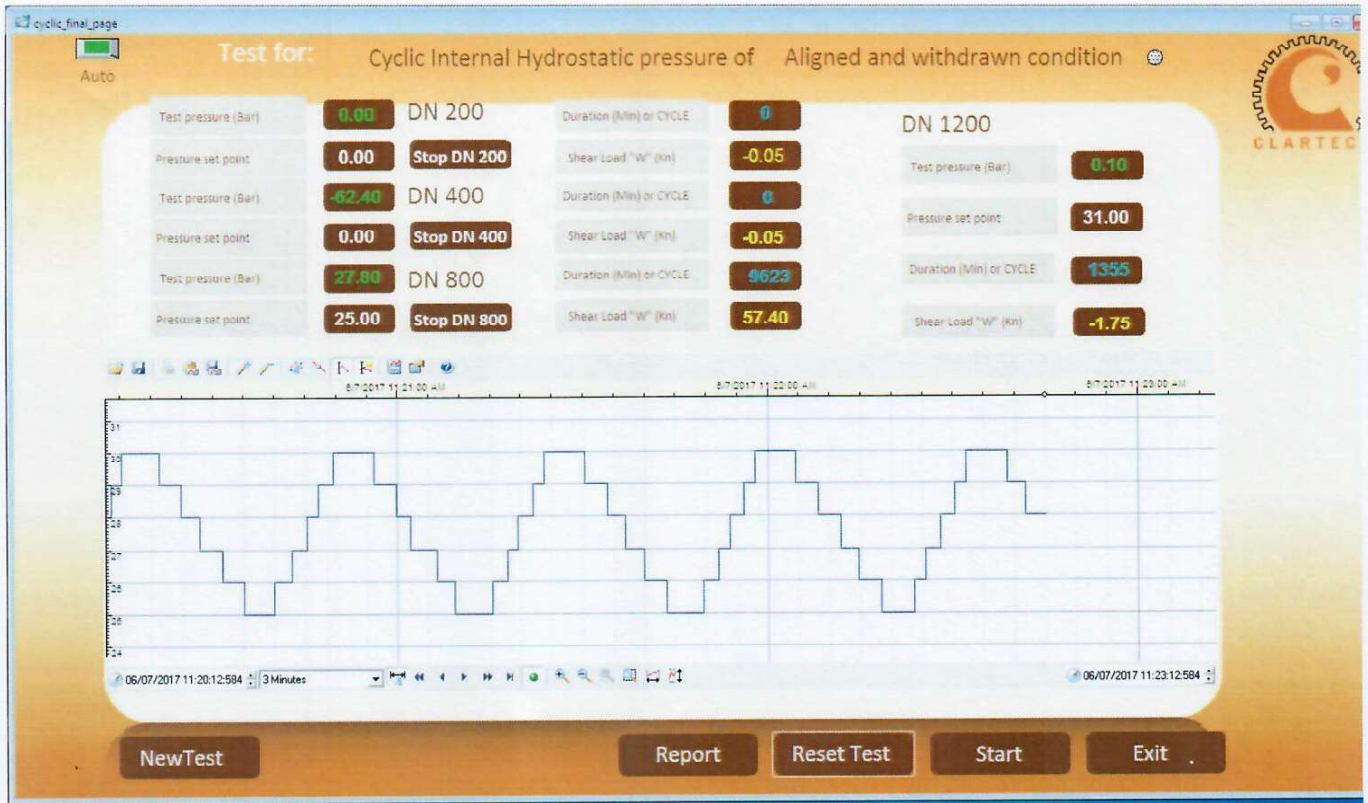
Asif Majeed





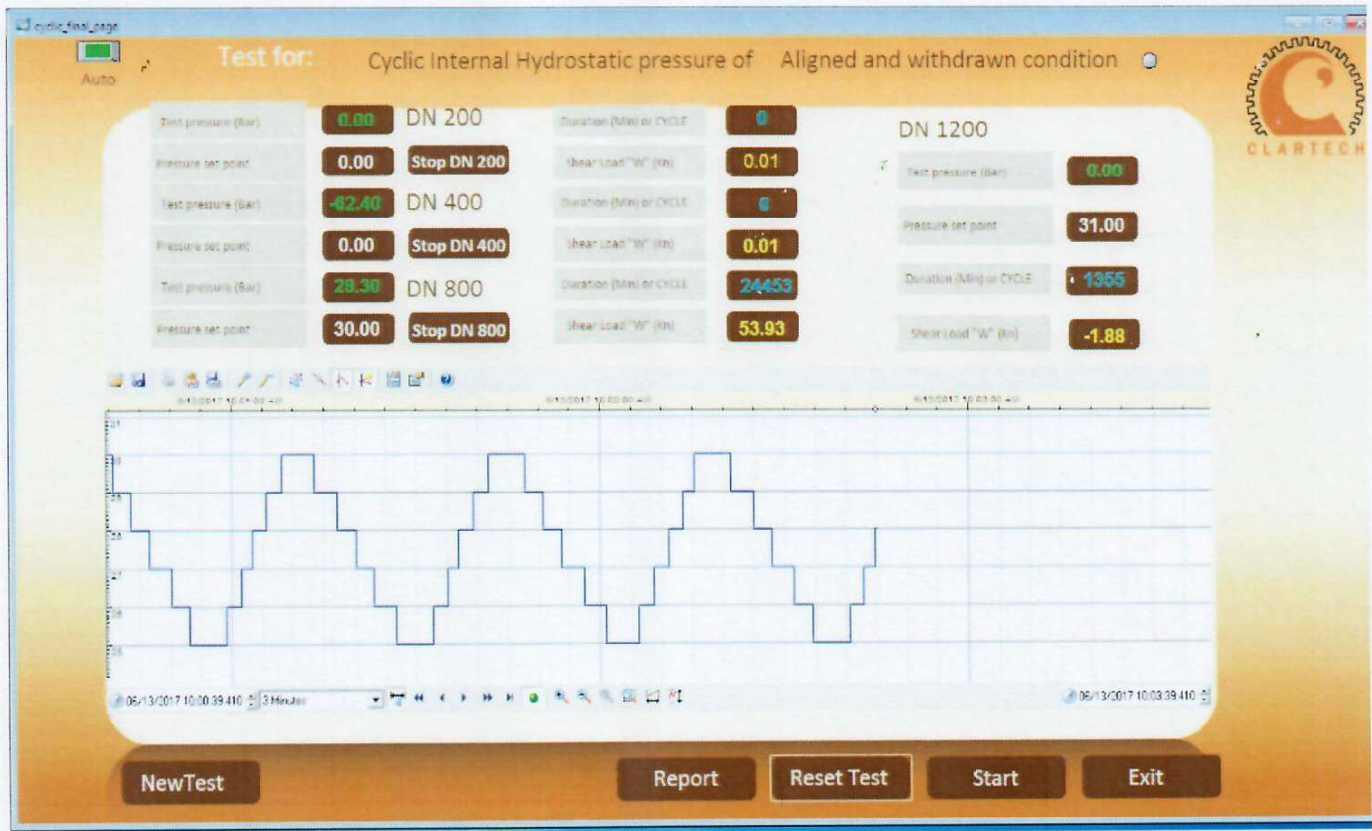
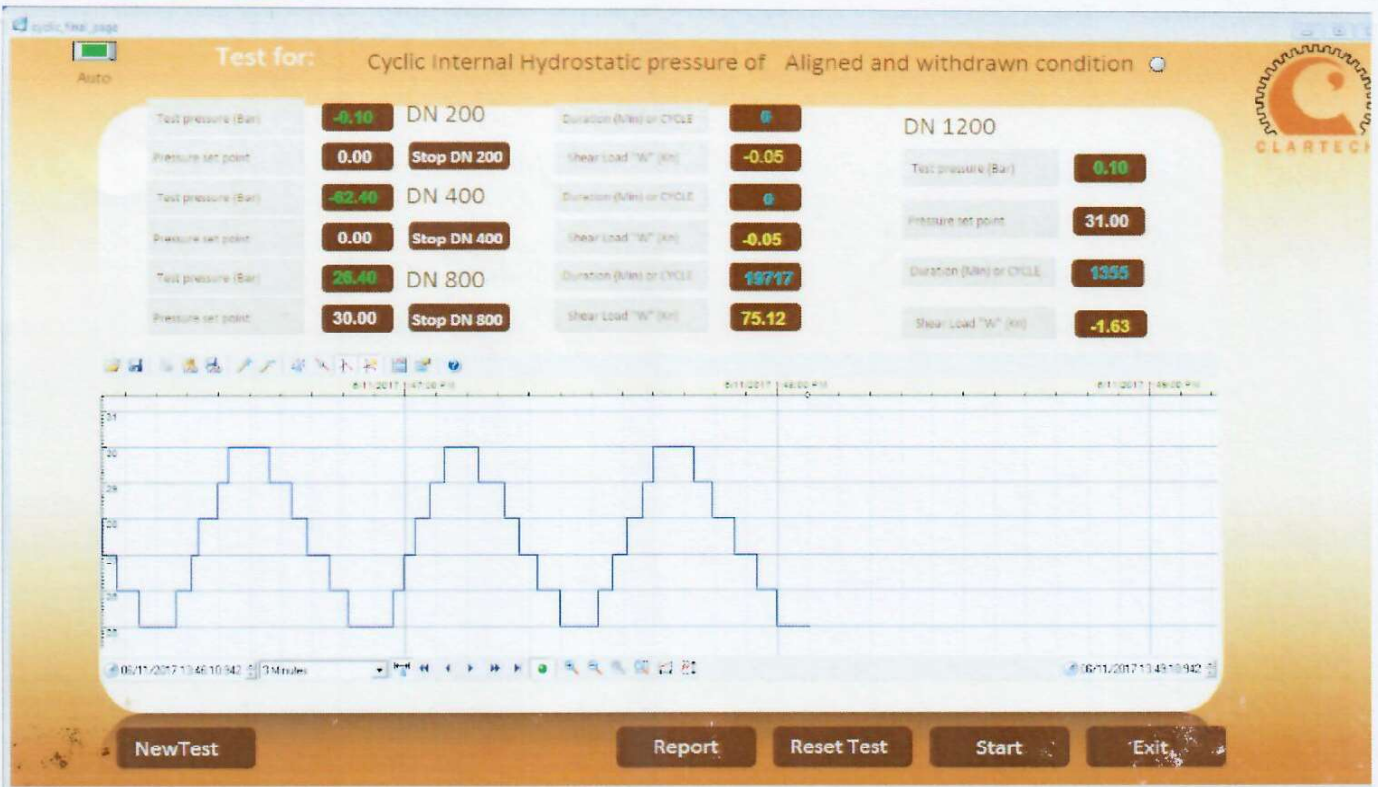
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SGS | SGS GULF LIMITED  
14  
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**JINDAL SAW GULF LLC**  
**TEST REPORT ON LEAK TIGHTNESS OF “JSAW – LOCK (DC)” JOINTS TO**  
**POSITIVE INTERNAL PRESSURE AS PER BSEN 545:2010(E), BSEN598: 2007, ISO 2531-2009,**  
**ISO 7186:2011 & ISO 10804-1**

1. Scope of Testing : To conform leak tightness of JSAW-LOCK (DC) joint under positive internal hydrostatic pressure to joint of maximum annulus, with shear load and deflected.
2. Date of Inspection : 27.05.2017 & 29.05.2017
3. Place of inspection : Jindal Saw Gulf LLC,  
Abu Dhabi - 132595, UAE
4. Size and Class : DN 800 – PFA25 (Id nos. 7E11Q07 & 7E11Q09)
5. Type testing as per : BS EN 545:2010(E), BSEN 598:2007, ISO2531:2009,  
ISO7186:2011 & ISO 10804-1
6. Type Test Witnessed By : Mr.Ahmed Raziuddin, SGS Dubai

**TEST DESCRIPTION:**

**a) DIMENSIONS AND TESTING DETAILS**

PARAMETER	REQUIREMENT	OBSERVATION	REMARKS
Annular gap between the sealing surfaces.	Maximum design value plus 0%, minus 5%	Maximum design value minus 4.44%.	Within the specified limit. Refer annexure -A for details of dimensions.
Test assembly	Comprise of joints made with socket and spigot aligned together/assembled with lock plates.	Comprise of joints made with socket and spigot aligned together. Sealing component of joint is EPDM rubber gasket (Prabhat) and lock plates.	Length of samples found within the limit. Refer Annexure-A for sample length & wall thickness.
Positive Internal hydrostatic pressure- Joint of maximum annulus, with shear load.	The vertical force W shall be applied to the spigot end at 0.5DN or 200mm from socket ends, whichever is the largest. Water filling and increasing pressure up to 42.5 bar (1.5PFA+5bar) and Pressure shall be kept constant for at least 2 hours. Joints shall be inspected for every 15 minutes.	Load applied is 53KN (69 bar) at 410mm from socket end. Water filled and hydrostatic pressure raised to 43 bar and kept constant for 2 hours. Joint is checked for every 15 minutes and observed no leakages or pressure drop.	The results found conforming to specification requirements. Refer Annexure-B for detailed results recording.
Positive Internal hydrostatic pressure- Joint of maximum annulus, with shear load, deflected.	Water filling and increasing pressure up to 42.5 bar (1.5PFA+5bar) and Pressure shall be kept constant for at least 2 hours. Joints shall be inspected for every 15 minutes.	The joint is deflected to 1.5°. Water filled and hydrostatic pressure raised to 43 bar and kept constant for 2 hours. Joint is checked for every 15 minutes and observed no leakages or pressure drop.	The results found conforming to specification requirements. Refer Annexure-C for detailed results recording.

**Remarks :** As the above test had been conducted with highest shear load as per BSEN545 than BSEN598, ISO2531, ISO10804 & ISO7186 and meeting the specifications. Hence the same test is considered as meeting as per ISO2531, ISO7186, ISO10804 & BSEN598.

Drawing references: Rubber gasket dimensions- D14-GSK-2B-8286, Pipe dimensions – D14-ABU-JL-PIP-2230 & Lock segment dimensions – D14-ABU-LOCK 800-2154.

The 800mm “JSAW – LOCK (DC)” joint assembly is found conforming to the specification requirements with respect to leak tightness and mechanical stability to positive internal hydrostatic pressure under joint of maximum annulus, with shear load, Joint of maximum annulus, deflected.

For M/s. Jindal Saw Gulf LLC

T.Venkatachalam



**ANNEX - A**  
**JINDAL SAW GULF LLC**  
**Annular Gap Calculation Details**

Size / Class	Actual DE	Actual J	J - DE	As per design	% of Deviation Negative	Length of Socket Speciman with Flange	Length of Spigot Speciman with Flange	Average Pipe Thickness
800 PFA25	838.00	881.00	43.00	45.00	4.44	1935	1850	10.0

Thickness Readings						
	1	2	3	4	5	Average
PFA25						
800	10.1	10.3	10.0	9.7	10.2	10.0
	10.0	9.8	9.6	10.1	9.7	



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## TYPE TEST REPORT ANNEX - B

TEST UNIT:	INTERNAL TEST		
TEST TYPE:	POSITIVE STATIC TEST	SOCKET ID NO	SPIGOT ID NO.
PIPE SIZE:	DN800 PFA25 "JSAW - LOCK (DC)" PIPE	7E11Q09	7E11Q07
START DATE:	5/27/2017	TIME:	02:00 PM

TIME	PRESSURE (Bar)	FORCE1"W" (Bar)	Remarks
2:00 PM	43.0	69.0	No leakages found
2:15 PM	43.0	69.0	No leakages found
2:30 PM	43.0	69.0	No leakages found
2:45 PM	43.0	69.0	No leakages found
3:00 PM	43.0	69.0	No leakages found
3:15 PM	43.0	69.0	No leakages found
3:30 PM	43.0	69.0	No leakages found
3:45 PM	43.0	69.0	No leakages found
4:00 PM	43.0	69.0	No leakages found

Note : Also No axial movement observed at 43 bar and found satisfactory

*[Signature]*  
27/05/17  
FOR JINDAL SAW GULF LLC

**SGS** SGS GULF LIMITED  
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 WITNESSED  REVIEWED  INSPECTED  
FOR SGS DUBAI



## TYPE TEST REPORT ANNEX - C

TEST UNIT:	INTERNAL TEST		
TEST TYPE:	POSITIVE STATIC TEST DEF 1.5°	SOCKET ID NO	SPIGOT ID NO.
PIPE SIZE:	DN800 PFA25 "JSAW - LOCK (DC)" PIPE	7E11Q09	7E11Q07
START DATE:	5/29/2017	TIME:	3:45 PM

TIME	PRESSURE (Bar)	FORCE1"W" (Bar)	Remarks
3:45 PM	43.0	69.0	No leakages found
4:00 PM	43.0	69.0	No leakages found
4:15 PM	43.0	69.0	No leakages found
4:30 PM	43.0	69.0	No leakages found
4:45 PM	43.0	69.0	No leakages found
5:00 PM	43.0	69.0	No leakages found
5:15 PM	43.0	69.0	No leakages found
5:30 PM	43.0	69.0	No leakages found
5:45 PM	43.0	69.0	No leakages found

Note : Also No axial movement observed at 43 bar and found satisfactory

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28/05/17  
FOR JINDAL SAW GULF LLC



## JINDAL SAW GULF LLC

### TEST REPORT ON LEAK TIGHTNESS OF "JSAW – LOCK (DC)" JOINTS TO NEGATIVE INTERNAL PRESSURE AS PER BSEN 545:2010(E), BSEN598: 2007, ISO 2531-2009, ISO 7186:2011 & ISO 10804-1

1. Scope of Testing : To conform leak tightness of JSAW-LOCK (DC) joint under Negative internal hydrostatic pressure to joint of maximum annulus, with shear load and deflected.
2. Date of Inspection : 30.05.2017
3. Place of inspection : Jindal Saw Gulf LLC,  
Abu Dhabi - 132595, UAE
4. Size and Class : DN 800 – PFA25 (Id nos. 7E11Q07 & 7E11Q09)
5. Type testing as per : BS EN 545:2010(E), BSEN 598:2007, ISO2531:2009,  
ISO7186:2011 & ISO 10804-1
6. Type Test Witnessed By : Mr. Ahmed Raziuddin, SGS Dubai

#### TEST DESCRIPTION:

##### a) DIMENSIONS AND TESTING DETAILS

PARAMETER	REQUIREMENT	OBSERVATION	REMARKS
Annular gap between the sealing surfaces.	Maximum design value plus 0%, minus 5%	Maximum design value minus 4.44%.	Within the specified limit. Refer annexure -A for details of dimensions.
Test assembly	Comprise of joints made with socket and spigot aligned together/assembled with lock plates.	Comprise of joints made with socket and spigot aligned together. Sealing component of joint is EPDM rubber gasket (Prabhat) and lock plates.	Length of samples found within the limit. Refer Annexure-A for sample length & wall thickness.
Negative Internal pressure - Joint of maximum annulus, with shear load, deflected.	The vertical force W shall be applied to the spigot end at 0.5DN or 200mm from socket ends, whichever is the largest. The test assembly shall be empty of water and shall be evacuated to a negative pressure of 0.9bar and vacuum shall be kept constant for at least 2 hours. Joints shall be inspected for every 15 minutes. Pressure shall not have changed by more than 0.09bar.	Load applied is 56KN(73bar) at 410mm from socket end. The joint is deflected to 1.5°. Water removed from test assembly and evacuated to a negative pressure of 0.9bar and kept constant for 2 hours. Joint is checked for every 15 minutes and observed no leakages or pressure drop. As the said test have been passed in deflected condition and hence it is considered as meeting the aligned test requirement also.	The results found conforming to specification requirements. Refer Annexure-D for detailed results recording.

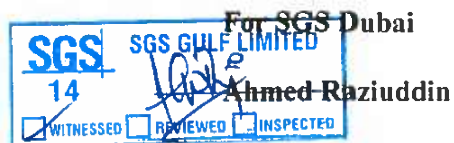
**Remarks :** As the above test had been conducted with highest shear load as per BSEN545 than BSEN598, ISO2531, ISO10804 & ISO7186 and meeting the specifications. Hence the same test is considered as meeting as per ISO2531, ISO7186, ISO10804 & BSEN598.

Drawing references: Rubber gasket dimensions- D14-GSK-2B-8286, Pipe dimensions – D14-ABU-JL-PIP-2230 & Lock segment dimensions – D14-ABU-LOCK 800-2154.

The 800mm "JSAW – LOCK (DC)" joint assembly is found conforming to the specification requirements with respect to leak tightness and mechanical stability to Negative internal pressure under joint of maximum annulus, with shear load, Joint of maximum annulus, deflected.

For M/s. Jindal Saw Gulf LLC

T.Venkatachalam



## TYPE TEST REPORT ANNEX - D

TEST UNIT:	INTERNAL TEST		
TEST TYPE:	NEGATIVE INTERNAL TEST DEF 1.5°	SOCKET ID NO	SPIGOT ID NO.
PIPE SIZE:	DN800 PFA25 "JSAW - LOCK (DC)" PIPE	7E11Q09	7E11Q07
START DATE:	5/30/2017	TIME:	2:00 PM

TIME	VACUUM PRESSURE(Bar)	FORCE1"W" (BAR)	Remarks
2:00 PM	-0.9	73.0	No pressure change found
2:15 PM	-0.9	73.0	No pressure change found
2:30 PM	-0.9	73.0	No pressure change found
2:45 PM	-0.9	73.0	No pressure change found
3:00 PM	-0.9	73.0	No pressure change found
3:15 PM	-0.9	73.0	No pressure change found
3:30 PM	-0.9	73.0	No pressure change found
3:45 PM	-0.9	73.0	No pressure change found
4:00 PM	-0.9	73.0	No pressure change found

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22/05/17

FOR JINDAL SAW GULF LLC



FOR SGS DUBAI

## JINDAL SAW GULF LLC

### TEST REPORT ON LEAK TIGHTNESS OF "JSAW – LOCK (DC)" JOINTS TO DYNAMIC INTERNAL PRESSURE AS PER BSEN 545:2010(E), BSEN598: 2007

1. Scope of Testing : To confirm leak tightness of JSAW LOCK (DC) joint under Cyclic internal hydrostatic pressure to joint of maximum annulus, with shear load.
2. Date of Inspection : 01.03.2017 (start at 2.50pm) to 09.03.2017 (stop at 2.30pm)
3. Place of inspection : Jindal Saw Gulf LLC,  
Abu Dhabi - 132595, UAE
4. Size and Class : DN 400 – PFA40 (Id no. 7B06R120)
5. Type testing as per : BS EN 545:2010(E), BSEN 598:2007
6. Type Test Witnessed By : Mr.Rodel Galang, SGS, Dubai

#### TEST DESCRIPTION:

#### a) DIMENSIONS AND TESTING DETAILS

PARAMETER	REQUIREMENT	OBSERVATION	REMARKS
Annular gap between the sealing surfaces.	Maximum design value plus 0%, minus 5%	Maximum design value minus 4.37%.	Within the specified limit. Refer annexure - A for details of dimensions.
Test assembly	Comprise of joints made with socket and spigot aligned together/assembled with lock plates.	Comprise of joints made with socket and spigot aligned together. Sealing component of joint is EPDM rubber gasket (Prabhat) and lock plates.	Length of samples found within the limit. Refer Annexure-A for sample length & wall thickness.
Cyclic Internal hydraulic pressure-Joint of maximum annulus, with shear load.	The vertical force W shall be applied to the spigot end at 0.5DN or 200mm from socket ends, whichever is the largest. Water filling and increasing pressure up to (PMA bar) and hold for atleast 5 seconds and steady reduction to (PMA-5bar) and hold for atleast 5 seconds and then steady pressure increase to (PMA bar) and maintained to atleast 5 seconds. The cycle is to continue for 24000 cycles.	Load applied is 25KN (50 bar) at 210mm from socket end. Water filled and hydrostatic pressure raised to 48 bar and maintained for 5 seconds then steady reduction to 43 bar and maintained for 5 seconds and then steady pressure increase to 48 bar and maintained for 5 seconds. The cycle is continued for more than 24000 cycles i.e upto 24702 (cycle graphs attached).	The results found confirming to specification requirements.

Drawing references: Rubber gasket dimensions- D14-GSK-2B-8286, Pipe dimensions – D14-ABU-JL-PIP-2230 & Lock segment dimensions – D14-ABU-LOCK 400-2136.

The 400mm "JSAW – LOCK (DC)" joint assembly is found confirming to the specification requirements with respect to leak tightness and mechanical stability to Cyclic internal hydraulic pressure under joint of maximum annulus, with shear load.

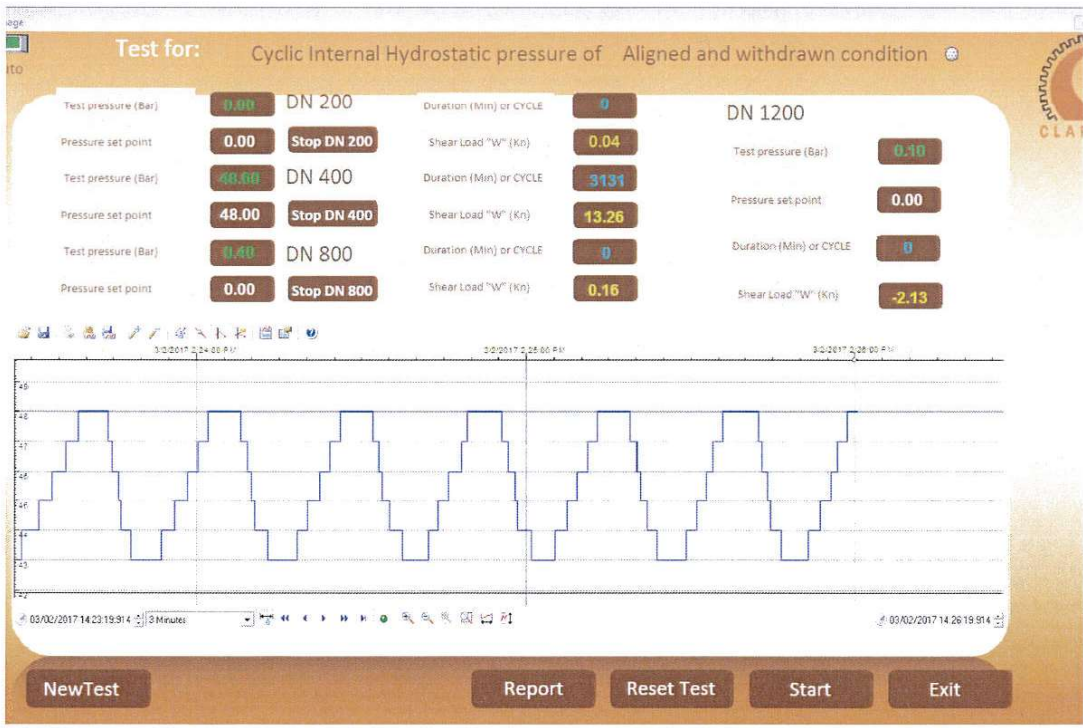
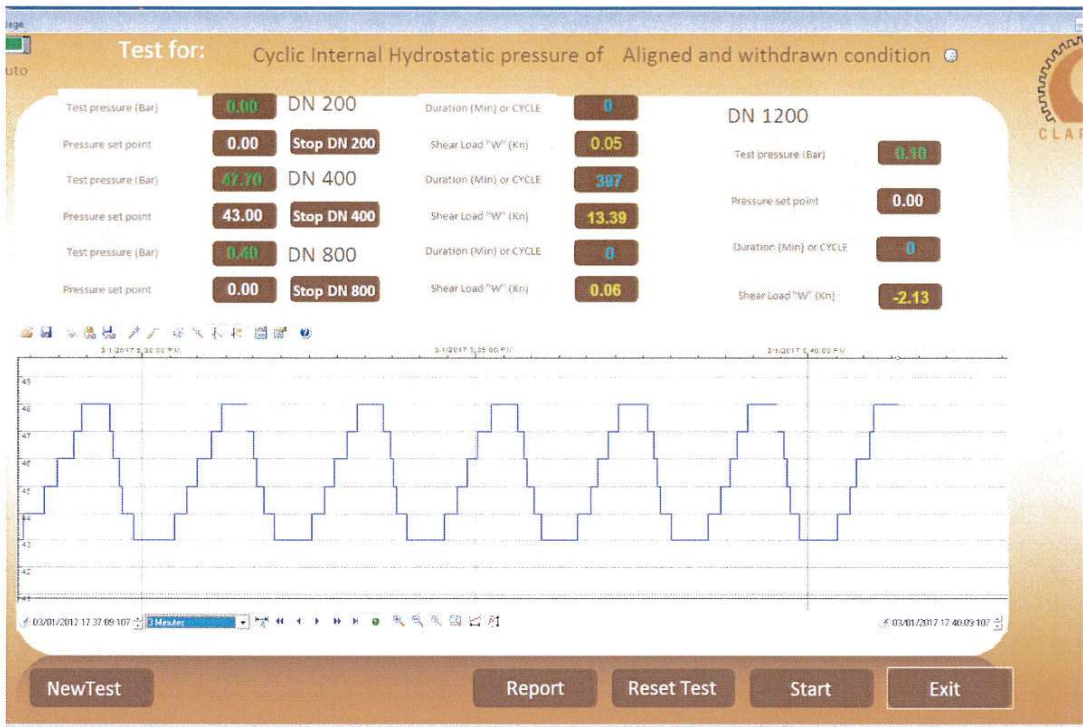
For M/s. Jindal Saw Gulf LLC

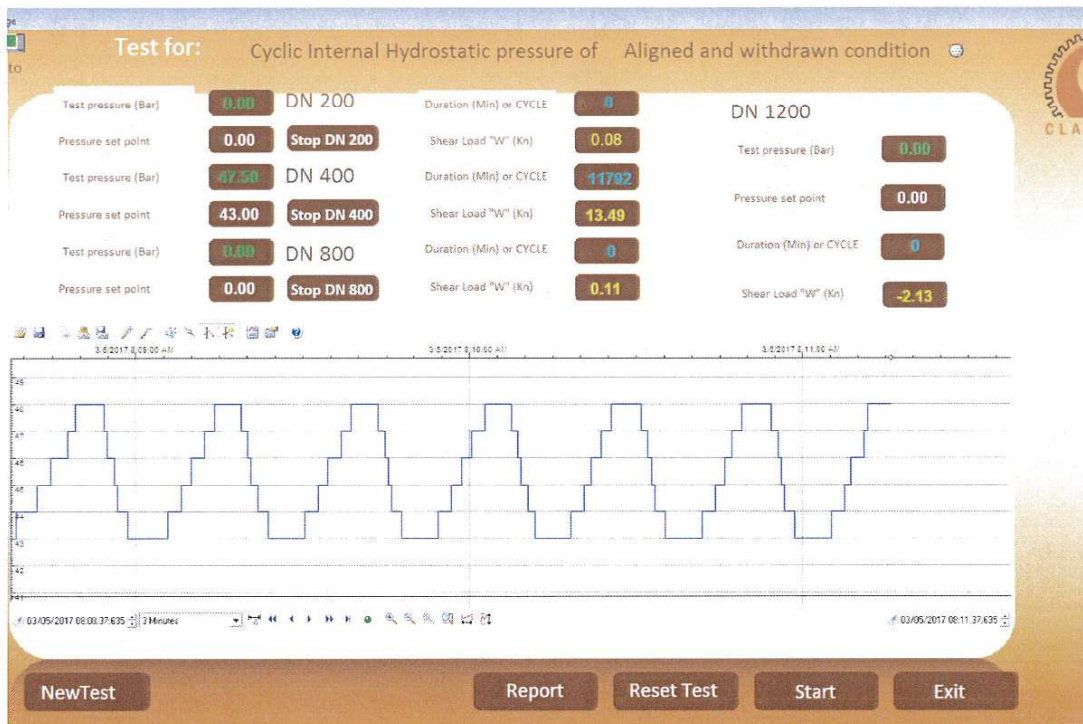
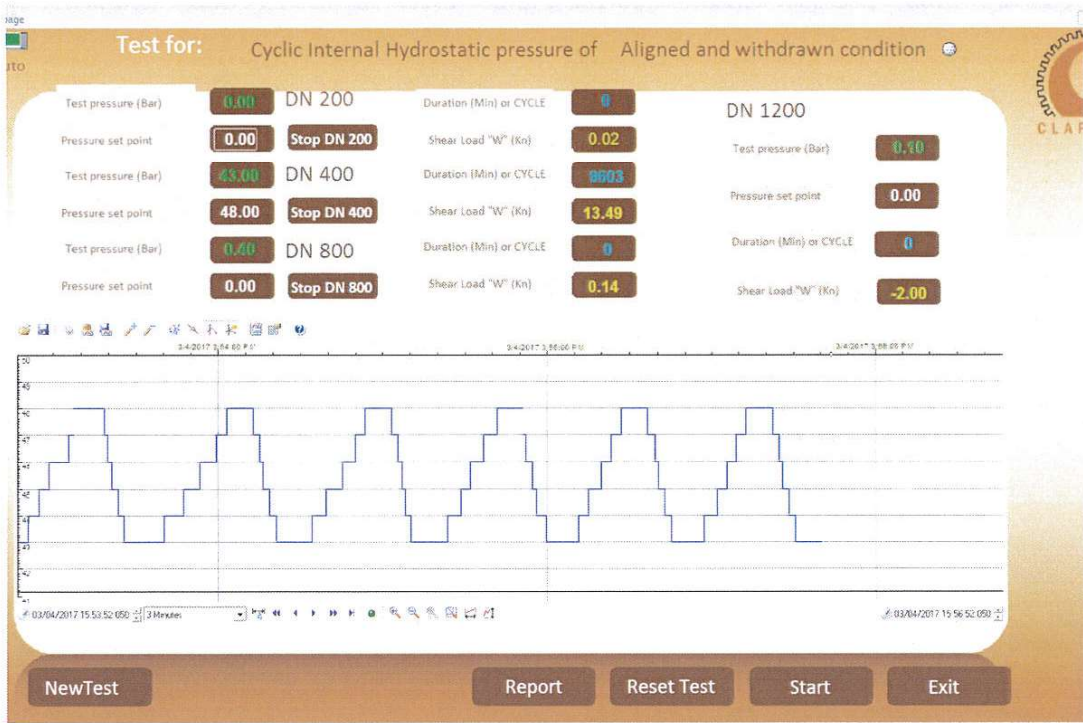
For SGS Dubai

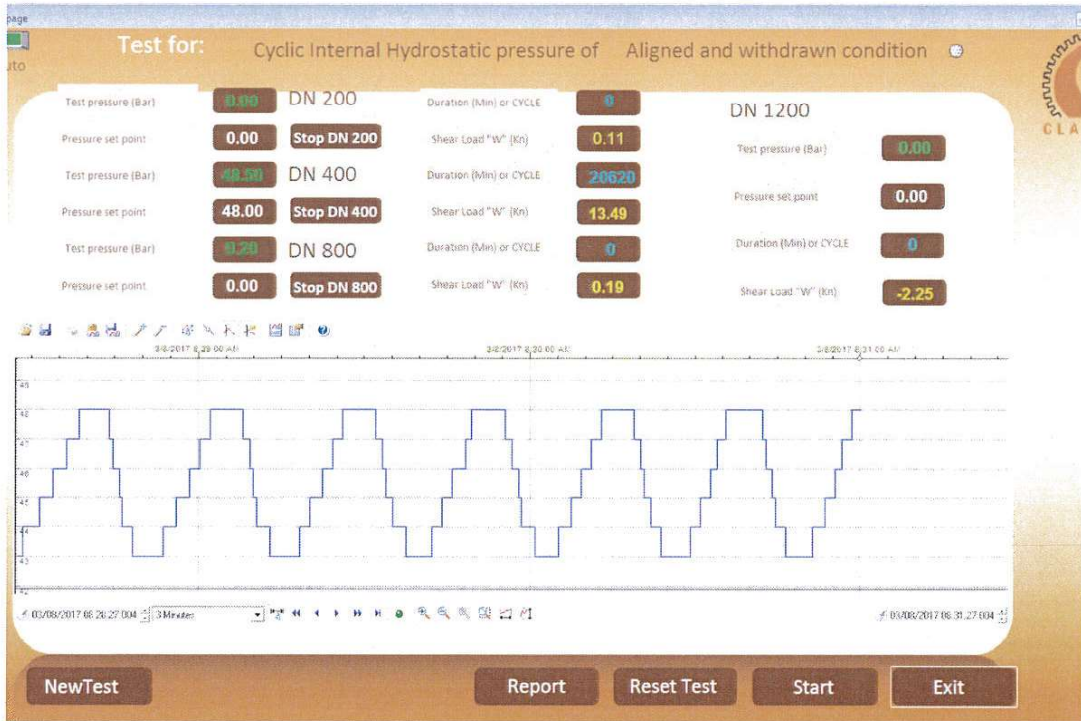
T.Venkatachalam

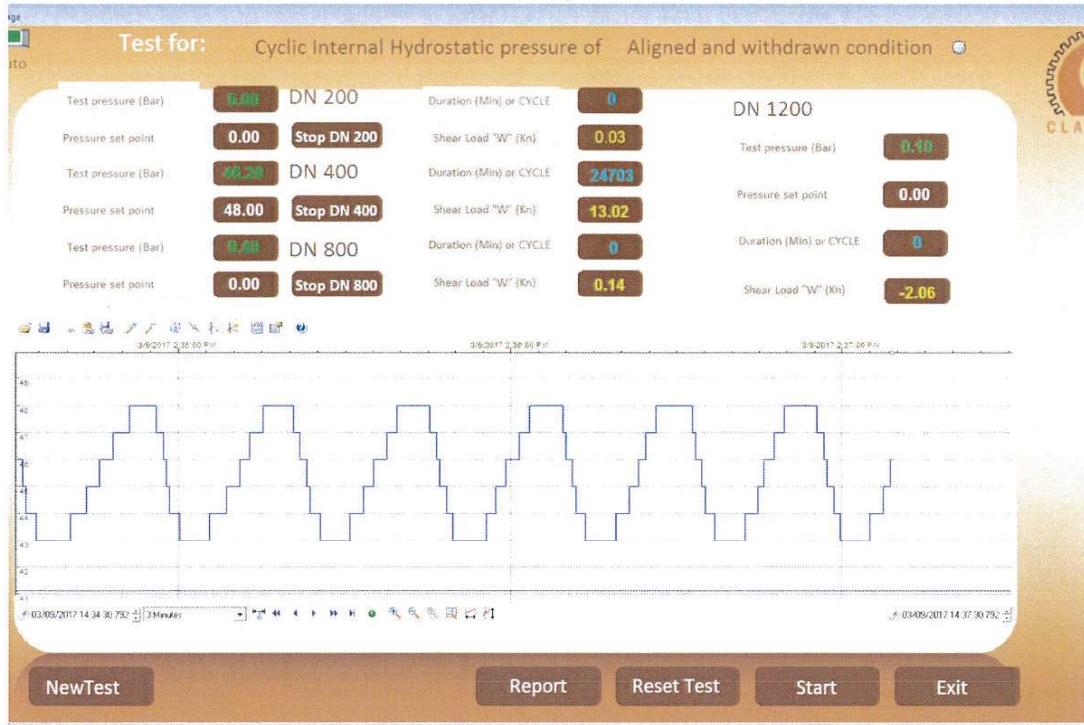


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**JINDAL SAW GULF LLC**  
**TEST REPORT ON LEAK TIGHTNESS OF "JSAW – LOCK (DC)" JOINTS TO**  
**POSITIVE INTERNAL PRESSURE AS PER BSEN 545:2010(E), BSEN598: 2007, ISO 2531-2009,**  
**ISO 7186:2011 & ISO 10804-1**

1. Scope of Testing : To conform leak tightness of JSAW-LOCK (DC) joint under positive internal hydrostatic pressure to joint of maximum annulus, with shear load and deflected.
2. Date of Inspection : 27.02.2017
3. Place of inspection : Jindal Saw Gulf LLC,  
Abu Dhabi - 132595, UAE
4. Size and Class : DN 400 – PFA40 (Id no. 7B06R120)
5. Type testing as per : BS EN 545:2010(E), BSEN 598:2007, ISO2531:2009,  
ISO7186:2011 & ISO 10804-1
6. Type Test Witnessed By : Mr.Rodel Galang, SGS Dubai

**TEST DESCRIPTION:**

**a) DIMENSIONS AND TESTING DETAILS**

PARAMETER	REQUIREMENT	OBSERVATION	REMARKS
Annular gap between the sealing surfaces.	Maximum design value plus 0%, minus 5%	Maximum design value minus 4.37%.	Within the specified limit. Refer annexure -A for details of dimensions.
Test assembly	Comprise of joints made with socket and spigot aligned together/assembled with lock plates.	Comprise of joints made with socket and spigot aligned together. Sealing component of joint is EPDM rubber gasket (Prabhat) and lock plates.	Length of samples found within the limit. Refer Annexure-A for sample length & wall thickness.
Positive Internal hydrostatic pressure- Joint of maximum annulus, with shear load.	The vertical force W shall be applied to the spigot end at 0.5DN or 200mm from socket ends, whichever is the largest. Water filling and increasing pressure up to 65 bar (1.5PFA+5bar) and Pressure shall be kept constant for at least 2 hours. Joints shall be inspected for every 15 minutes.	Load applied is 25KN (50 bar) at 210mm from socket end. Water filled and hydrostatic pressure raised to 66 bar and kept constant for 2 hours. Joint is checked for every 15 minutes and observed no leakages or pressure drop.	The results found conforming to specification requirements. Refer Annexure-B for detailed results recording.
Positive Internal hydrostatic pressure- Joint of maximum annulus, with shear load, deflected.	Water filling and increasing pressure up to 65 bar (1.5PFA+5bar) and Pressure shall be kept constant for at least 2 hours. Joints shall be inspected for every 15 minutes.	The joint is deflected to 3°. Water filled and hydrostatic pressure raised to 66 bar and kept constant for 2 hours. Joint is checked for every 15 minutes and observed no leakages or pressure drop.	The results found conforming to specification requirements. Refer Annexure-C for detailed results recording.

**Remarks :** As the above test had been conducted with highest shear load as per BSEN545 than BSEN598, ISO2531, ISO10804 & ISO7186 and meeting the specifications. Hence the same test is considered as meeting as per ISO2531, ISO7186, ISO10804 & BSEN598.

Drawing references: Rubber gasket dimensions- D14-GSK-2B-8286, Pipe dimensions – D14-ABU-JL-PIP-2230 & Lock segment dimensions – D14-ABU-LOCK 400-2136.

The 400mm "JSAW – LOCK (DC)" joint assembly is found conforming to the specification requirements with respect to leak tightness and mechanical stability to positive internal hydrostatic pressure under joint of maximum annulus, with shear load, Joint of maximum annulus, deflected.

**For M/s. Jindal Saw Gulf LLC**

T.Venkatachalam



**For SGS Dubai**



## JINDAL SAW GULF LLC

### TEST REPORT ON LEAK TIGHTNESS OF “JSAW – LOCK (DC)” JOINTS TO NEGATIVE INTERNAL PRESSURE AS PER BSEN 545:2010(E), BSEN598: 2007, ISO 2531-2009, ISO 7186:2011 & ISO 10804-1

1. Scope of Testing : To conform leak tightness of JSAW-LOCK (DC) joint under Negative internal hydrostatic pressure to joint of maximum annulus, with shear load and deflected.
2. Date of Inspection : 28.02.2017
3. Place of inspection : Jindal Saw Gulf LLC,  
Abu Dhabi - 132595, UAE
4. Size and Class : DN 400 – PFA40 (Id no. 7B06R120)
5. Type testing as per : BS EN 545:2010(E), BSEN 598:2007, ISO2531:2009,  
ISO7186:2011 & ISO 10804-1
6. Type Test Witnessed By : Mr.Rodel Galang, SGS Dubai

#### TEST DESCRIPTION:

##### a) DIMENSIONS AND TESTING DETAILS

PARAMETER	REQUIREMENT	OBSERVATION	REMARKS
Annular gap between the sealing surfaces.	Maximum design value plus 0%, minus 5%	Maximum design value minus 4.37%.	Within the specified limit. Refer annexure -A for details of dimensions.
Test assembly	Comprise of joints made with socket and spigot aligned together/assembled with lock plates.	Comprise of joints made with socket and spigot aligned together. Sealing component of joint is EPDM rubber gasket (Prabhat) and lock plates..	Length of samples found within the limit. Refer Annexure-A for sample length & wall thickness.
Negative Internal pressure - Joint of maximum annulus, with shear load, deflected.	The vertical force W shall be applied to the spigot end at 0.5DN or 200mm from socket ends, whichever is the largest. The test assembly shall be empty of water and shall be evacuated to a negative pressure of 0.9bar and vacuum shall be kept constant for at least 2 hours. Joints shall be inspected for every 15 minutes. Pressure shall not have changed by more than 0.09bar.	Load applied is 25KN(50bar) at 210mm from socket end. The joint is deflected to 3°. Water removed from test assembly and evacuated to a negative pressure of 0.9bar and kept constant for 2 hours. Joint is checked for every 15 minutes and observed no leakages or pressure drop. As the said test have been passed in deflected condition and hence it is considered as meeting the aligned test requirement also.	The results found conforming to specification requirements. Refer Annexure-D for detailed results recording.

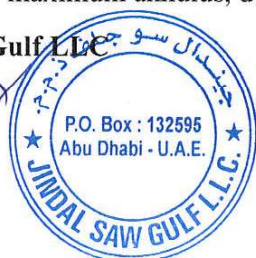
**Remarks :** As the above test had been conducted with highest shear load as per BSEN545 than BSEN598, ISO2531, ISO10804 & ISO7186 and meeting the specifications. Hence the same test is considered as meeting as per ISO2531, ISO7186, ISO10804 & BSEN598.

Drawing references: Rubber gasket dimensions- D14-GSK-2B-8286, Pipe dimensions – D14-ABU-JL-PIP-2230 & Lock segment dimensions – D14-ABU-LOCK 400-2136.

The 400mm “JSAW – LOCK (DC)” joint assembly is found conforming to the specification requirements with respect to leak tightness and mechanical stability to Negative internal pressure under joint of maximum annulus, with shear load, Joint of maximum annulus, deflected.

For M/s. Jindal Saw Gulf LLC

T.Venkatachalam



For SGS Dubai



**ANNEX - A**  
**JINDAL SAW GULF LLC**  
**Annular Gap Calculation Details**

Size / Class	Actual DE	Actual J	J - DE	As per design	% of Deviation Negative	Length of Socket Speciman with Flange	Length of Spigot Speciman with Flange	Average Pipe Thickness
400 PFA40	426.70	459.50	32.80	34.30	4.37	1310	1580	7.59

Thickness Readings						
	1	2	3	4	5	Average
400	7.5	7.0	7.2	8.0	8.1	7.59
	7.7	7.2	7.1	7.8	8.3	



*[Handwritten Signature]*  
**FOR JINDALSAW GULF LLC**



**FOR SGS DUBAI**

## TYPE TEST REPORT ANNEX - B

TEST UNIT:	INTERNAL TEST			
TEST TYPE:	POSITIVE STATIC TEST		SOCKET ID NO	SPIGOT ID NO.
PIPE SIZE:	DN400 PFA40 "JSAW - LOCK (DC)" PIPE		7B06R120	7B06R120
START DATE:	2/27/2017		TIME:	12:25 PM

TIME	PRESSURE(Bar)	FORCE1"W"(Bar)	Remarks
12:25 PM	66.0	50.0	No leakages found
12:40 PM	66.0	50.0	No leakages found
12:55 PM	66.0	50.0	No leakages found
1:10 PM	66.0	50.0	No leakages found
1:25 PM	66.0	50.0	No leakages found
1:40 PM	66.0	50.0	No leakages found
1:55 PM	66.0	50.0	No leakages found
2:10 PM	66.0	50.0	No leakages found
2:25 PM	66.0	50.0	No leakages found

Note : Also No axial movement observed at 66 bar and found satisfactory.

FOR JINDAL SAW GULF LLC



FOR SGS DUBAI



## TYPE TEST REPORT ANNEX - C

TEST UNIT:	INTERNAL TEST				
TEST TYPE:	POSITIVE STATIC TEST DEF 3 <sup>0</sup>		SOCKET ID NO	SPIGOT ID NO.	
PIPE SIZE:	DN400 PFA40 "JSAW - LOCK (DC)" PIPE		7B06R120	7B06R120	
START DATE:	2/27/2017		TIME:	3:30 PM	

TIME	PRESSURE(Bar)	FORCE1"W"(Bar)	Remarks
3:30 PM	66.0	49.0	No leakages found
3:45 PM	66.0	49.0	No leakages found
4:00 PM	66.0	49.0	No leakages found
4:15 PM	66.0	49.0	No leakages found
4:30 PM	66.0	49.0	No leakages found
4:45 PM	66.0	49.0	No leakages found
5:00 PM	66.0	49.0	No leakages found
5:15 PM	66.0	49.0	No leakages found
5:30 PM	66.0	49.0	No leakages found

Note : Also No axial movement observed at 66 bar and found satisfactory.



FOR JINDAL SAW GULF LLC



FOR SGS DUBAI



## TYPE TEST REPORT ANNEX - D

TEST UNIT:	INTERNAL TEST			
TEST TYPE:	NEGATIVE INTERNAL TEST DEF 3 DEG	SOCKET ID NO	SPIGOT ID NO.	
PIPE SIZE:	DN400 PFA40 "JSAW - LOCK (DC)" PIPE	7B06R120	7B06R120	
START DATE:	2/28/2017	TIME:	1:45 PM	

TIME	VACUUM PRESSURE(Bar)	FORCE1"W"(BAR)	Remarks
1:45 PM	0.9	50.0	No pressure change found
2:00 PM	0.9	50.0	No pressure change found
2:15 PM	0.9	50.0	No pressure change found
2:30 PM	0.9	50.0	No pressure change found
2:45 PM	0.9	50.0	No pressure change found
3:00 PM	0.9	50.0	No pressure change found
3:15 PM	0.9	50.0	No pressure change found
3:30 PM	0.9	50.0	No pressure change found
3:45 PM	0.9	50.0	No pressure change found

FOR JINDAL SAW GULF LLC



FOR SGS DUBAI



BUREAU  
VERITAS
 Interim  
 Final

INSPECTION REPORT Nr : JSL/KAN/IR/004

BV Job no: IND.A.4.17.0156 BVIL

<b>PROJECT:</b> WITNESS OF PERFORMANCE TEST FOR PUSH ON FLEXIBLE "JSAW - LOCK (DC)" JOINT PIPES FOR SIZE DN 200-PFA40	<b>Ref:-</b>
<b>BV Client:</b> M/s Jindal Saw Limited DI Div., Samaghogha - Mundra	<b>P/o nr:</b> -- As per Agreement made for file no. - IND.A.4.17.0156 BVIL Dated 30.03.2017
<b>Manufacturer:</b> M/s Jindal Saw Limited(IPU), Ductile Iron Pipe Div., Samaghogha - Mundra, Gujarat-India	

**Inspection requested by:** M/s Jindal Saw Limited - Ductile Iron Pipe Div., Samaghogha - Mundra, Gujarat

SUPPLY / SUBJECT OF INSPECTION	Item No	Qty
WITNESS OF PERFORMANCE TEST FOR PUSH ON FLEXIBLE "JSAW - LOCK (DC)" JOINT PIPES FOR SIZE DN 200-PFA40 AS PER BS EN 545 : 2010, ISO 2531 :2009, ISO 10804-1, BS EN 598:2007 A1:2009 & ISO 7186:2011	NA.	NA.

**DOCUMENTS OF REFERENCE :** See continuation sheet for additional documents:  Yes  No

Title	Reference no	Rev.	Approved by	Date
Specification	BSEN 545	---	---	2010
Specification	ISO 2531	---	---	2009
Specification	ISO 10804-1			2010
Specification	BS EN 598:2007	A1		2009
Specification	ISO 7186			2011
Agreement	IND.A.4.17.0156	---	---	30.03.2017
Drawing - Gasket	D14-GSK-2B-8286	R2	---	22.01.2015
Drawing - Pipe dimension	D14-ABU-JL-PIP-2230	R2	---	24.05.2017
Drawing - Lock Segment	D14-ABU-JSAWLOCK200-2132	--	--	15.12.2016

**INSPECTIONS :**

**Results of inspection :**  Satisfactory  Unsatisfactory

**Inspection place & Date or Period :**

M/s Jindal Saw Limited - DI Div., Samaghogha.  
19.07.2017 to 21.07.2017 & 24.07.2017 to 30.07.2017

**Non Conformities Reports (NCR) :**

o NCR's issued during reported period: Nil.

o List of outstanding NCR's: Nil.

**Stage of inspection :**

- Before manufacturing  
 During manufacturing  
 Final  
 Packing

**Main Conclusions & Remarks:**

The inspection carried out with respect to the Bureau Veritas scope of work mentioned in Agreement No. IND.A.4.17.0156 BVIL & above mentioned Specifications. The supply/ subject of inspection mention above are accepted.

**Kind of inspection:**

- Pre-inspection meeting  
 Document and QC record review  
 Visual examination, checks  
 Witnessing Tests  
 Manufacturing progress status  
 Vendor assessment  
 Final inspection  
 Packing

(for details see continuation sheet)

**Next visit scheduled:** Not Required.

**Stamping:**

No

INSP 002 En  
GM SI 10 1





## INSPECTION REPORT Nr : JSL/KAN/IR/004

BV Job no: IND.A.4.17.0156 BVIL

Description of the inspections carried out:❖ Description of the inspections carried out:➤ Introduction:

M/s Jindal has signed a contract for WITNESS OF PERFORMANCE TEST FOR PUSH ON FLEXIBLE "JSAW - LOCK (DC)" JOINT PIPES FOR SIZE DN 200-PFA40 as per BS EN 545 : 2010 and ISO 2531 :2009, ISO 10804, BS EN 598:2007 A1:2009 & ISO 7186:2011 with Bureau Veritas (India) Private Limited, Gandhidham at Works of M/s Jindal Saw Pipes Ltd. - DI Div., Samaghogha. The Subject inspection was carried out from 19.07.2017 to 21.07.2017 & 24.07.2017 to 30.07.2017 with respect to the contract IND.A.4.17.0156 BVIL & General Conditions of Service stated in BVIL GTCS -rev 03. Inspection assignment attendees were as under.

1. Mr. Bharat Khushalani (Business Manager) – Bureau Verities (India) Private Limited.
2. Mr. Mehul Prajapati (Sr. Surveyor) – Bureau Verities (India) Private Limited.
3. Mr. Pulin Dave (Sr. Surveyor) – Bureau Verities (India) Private Limited.
4. Mr. Ravindra Jivani (Surveyor) – Bureau Verities (India) Private Limited.
5. Mr. Sunil Yadav (Sr. Surveyor) – Bureau Verities (India) Private Limited.
6. Mr. K. Subramonian (Dy. General Manager – QA/QC) – M/s Jindal Saw Ltd., DI Div.- Samaghogha

❖ Details of Inspection activities carried out with respect to scope of work:1. General :

Pipe Manufacturer : M/s Jindal Saw Limited DI Div., Samaghogha - Mundra  
 Size : DN 200-PFA40 - "JSAW - LOCK (DC)" Joint pipes,

2. Observations and results:

1. Identification of the sampling marking - Carried Out.
2. Test conditions - As per reference standard
3. Coherence of the data between drawings nameplate and calculation notes - Found in Order
4. Checking of the conformity of the material & Characteristics according to the construction code - Found as per required Code
5. Results obtained and recorded - Following tests results were witnessed as follows

## DN 200 PFA40 - "JSAW - LOCK (DC)" PIPE DIMENSIONS AND TESTING DETAILS

Test	Test Requirements	Test Conditions	Results
1) Positive internal hydrostatic pressure	Test pressure: (1.5 PFA + 5) bar = 65 bar Test duration: 2 h No visible leakage	Joint of maximum annulus, with shear load - 13KN	Conforming to specification
		Joint of maximum annulus, deflected - 4°	
2) Negative internal pressure	Test pressure: - 0.9 bar Test duration: 2 h Maximum pressure change during test period: 0.09 bar	Joint of maximum annulus, with shear load - 13KN	Conforming to specification
		Joint of maximum annulus, deflected- 4°	
3) Cyclic internal pressure	24000 cycles Test pressure : between PMA & (PMA-5) bar = 48 - 43 bar. No visible leakage	Joint of maximum annulus, with shear load - 13KN	Conforming to specification





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 Interim  
 Final

## INSPECTION REPORT Nr : JSL/KAN/IR/004

BV Job no: IND.A.4.17.0156 BVIL

❖ **Results of Inspection :** Performance test for push on Flexible "JSAW - LOCK (DC)" joint pipes for DN200 PFA40 as per BS EN 545:2010, ISO 2531:2009, ISO 10804, BS EN 598:2007 A1:2009 & ISO 7186:2011 was inspected as per drawings, applicable reference standards and contract IND.A.4.17.0156 BVIL, within the general conditions of service of Bureau Veritas, Test meets the requirement of standards on basis of inspection carried out as per BVIL scope of work.

❖ **Problems pending :** Nil.

❖ **Calibration status of Instruments:**

Calibration certificates of the instruments used for inspection were reviewed and found valid & acceptable.

❖ **Attachments:** All the examined documents, including tests reports.

ANNEXES  Yes No

**Witnessed by:** Mr. Bharat Khushalani, Mr. Mehul Prajapati, Mr. Pulin Dave,

Mr. Ravindra Jivani & Mr. Sunil Yadav

Checked by:-

**Report issued by :** Mr. Mehul Prajapati

Signature:-

Signature:-

Date of issue: 12.09.2017

**Inspection centre:** BV KANDLA.

**Distribution:**  M/s JINDAL

BV AHMEDABAD

BV KANDLA



## **Vedlegg 14**

## CERTIFICATE OF INSPECTION

At the request of M/s. JINDAL SAW GULF LLC., we carried out inspection of below referred material as per the order requirement & we report as under:

**MATERIAL DESCRIPTION** : Centrifugally Cast Ductile Iron Pipes DN 200, 5.5 meters length of Class K9 (Socket & Spigot) push on Tyton joint (TJ) pipes as per BSEN: 545 - 2006. Internally lined with Ordinary Portland Cement Mortar as BSEN: 545-2006, externally protection, finishing layer with Polyurethane (PU) of minimum thickness 700 microns and nominal thickness 900 microns as per BS EN: 15189-2006 and Purchase Order Specification. Jointing areas inside socket, spigot end coated with red epoxy paint of minimum thickness 100 microns.

Details of materials as under: DN 200 K9, Ordered Quantity: 6,380.0 Meters

Offer List Date	Batch Nos.	Offered Quantity (Meters)	Balance Quantity (Meters)
20.07.2019	9F30	1,276	NIL

Previously Inspected Quantities: 5,104.0 Meters.

**CUSTOMER NAME** : SIN SONG KIANG TRADING PTE. LTD.,  
 11 WOODLANDS CLOSE, HEX 08-23 WOODLANDS 11,  
 SINGAPORE 737853.

**CONSIGNEE NAME** : SIN SONG KIANG TRADING PTE. LTD.,  
 11 WOODLANDS CLOSE, HEX 08-23 WOODLANDS 11,  
 SINGAPORE 737853.

**SELLER/ MANUFACTURER** : JINDAL SAW GULF LLC.  
 P.O. BOX 92135, PLOT 11 NR 28.  
 ICAD 3, MUSAFFAH, ABU DHABI,  
 U.A.E.

**PURCHASE ORDER NO.** : SSK/JINDAL/2017/ 02/ 071 DATED 02.05.2017 AND  
 AMENDMENT DATED 14.11.2017.

**SAP S.O & ORDER ACCEPTANCE NO.** : 4111002639/ 4666000213 & JSGL/AD/EXP/17-016 DATED: 04.05.2017.



## CERTIFICATE OF INSPECTION

- PLACE & DATE OF INSPECTION** : July 20, 2019 at manufacturer's plant, Musaffah, Abu Dhabi.
- INPROCESS INSPECTION** :
1. Visual examination & Physical inspection.
  2. Randomly witnessed the chemical analysis before casting and reviewed the test.
  3. Hydrostatic pressure test witnessed online for randomly selected pipes of the offered lot & no leakage/sweating observed.
  4. Review of Polyurethane (PU) coating reports.
  5. Witnessed Coating thickness, Holiday, Adhesion, Direct Impact Test and Shore D Hardness of PU Coating & Red Epoxy coating at jointing areas.
  6. Review of test reports of Pig Iron, Sand, and Ordinary Portland Cement, Red Epoxy paint & PU raw materials
  7. One test specimen from each Batch No. of DN 200 K9 pipe taken and witnessed mechanical testing with respect to Tensile Strength, Percentage Elongation and Hardness, results were satisfactory.
  8. Jointing areas coated with Red Epoxy Paint of minimum 100 microns.
- PRE-SHIPMENT INSPECTION** :
1. Visual Inspection for workmanship and finish.
  2. Quantity verified.
  3. Dimensions checked on pipes at random as per QAP: JSGL/QAP/545:2006, Rev.02, dated: 01.10.2015/ PO Specification.
  4. Sampled Pipes verified for Cement lining thickness found satisfactory as per QAP: JSGL/QAP/545:2006, Rev.02, dated: 01.10.2015/ PO Specification.
  5. Sampled Pipes verified for PU Coating thickness & Jointing Areas Red Epoxy Coating thickness and found satisfactory as per QAP: JSGL/QAP/PUPE, Rev.02, dated: 01.10.2015/ PO Specification
  6. Verified Markings.
  7. Reviewed Raw Material Test Certificates and Internal Inspection Reports.
- STANDARD FOLLOWED** : As per BSEN: 545 – 2006 & BSEN: 15189-2006.
- OBSERVATIONS** :
- Hydrostatic pressure test
  - Chemical Analysis Test
  - Dimension checking
  - Thickness of Cement lining
  - Thickness of PU Coating
  - Jointing Areas Red Epoxy Coating
  - Visual examination for workmanship & finishing
  - Quantity verification
  - Mechanical properties (tensile strength, percentage elongation & hardness)
  - Marking check
  - Raw Material Certificates

} SATISFACTORY

} Reviewed



## CERTIFICATE OF INSPECTION

**MARKINGS** :

- Stenciled:** On pipe barrel: JINDAL Logo along with JSAW – JAL  
 (with paint ) BSEN: 545/ 15189  
 SIZE: DN 200  
 CLASS: K9  
 TYPE: POJ  
 MADE IN U.A.E
- Painted:** On socket face: Batch No. / Pipe No. (8F30R50)  
 Class No. (K9)  
 Pipe Length (5.5)  
 Nominal Diameter (200)  
 OP – Ordinary Portland Cement  
 P – Polyurethane  
 8 – Manufacturer Year (2018)
- Cast On:** Inside socket: "JSAW-18" & "DI – 200"  
 Manufacture Brand Name: JSAW  
 Manufacture Year: 2018  
 Ductile Iron: DI  
 Size: 200
- Markings:** SSK  
 as per PO.

**SGS-IDENTIFICATION** :

- Hard punched/stamped "SGS Gulf" over white paint on socket face.

**CONCLUSION** :

- On the basis of inspection, we found that the materials were in conformity with the Purchase Order requirements.  
 This Certificate reflects our observations at the time, date and place of Inspection.

Prepared by:	Mr. Vinay Kumar QA/QC Inspector 	Date: 23.07.2019
Approved by:	Mr. Barry Mendoza Operations Manager 	Date: 23.07.2019

This document is issued by the Company under its General Conditions of Service accessible at [http://www.sgs.com/terms\\_and\\_conditions.html](http://www.sgs.com/terms_and_conditions.html). Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein.

Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

"For the witness Tests, the Company's involvement has been limited to witnessing/observing of test done at the vendor's facility as per Client's instructions. The Company's sole responsibility was to be present at the time of the test and forward the results, or confirm the occurrence, of the intervention(s). The Company is not responsible for the condition or calibration of apparatus, instruments and measuring devices used, the analysis methods applied the qualifications, actions or omissions of the third party's personnel or the analysis results."



**WORKS TEST CERTIFICATE**

Test Certificate No & Date: JSGL/QA/TC/18 - 457 Dated 20.07.2018

This is to certify that the Centrifugally Cast (Spun) Ductile Iron Pipes suitable for Socket & Spigot push on Joints as detailed below are manufactured and tested by us at our WORKS in accordance with the Specification BSEN: 545-2006 and all the test results were satisfactory.

Customer Name : SIN SONG KIANG TRADING PTE. LTD., 11 WOODLANDS CLOSE,  
HEX 08-23 WOODLANDS 11, SINGAPORE 737853.

Consignee Name : SIN SONG KIANG TRADING PTE. LTD., 11 WOODLANDS CLOSE,  
HEX 08-23 WOODLANDS 11, SINGAPORE 737853.

Purchase Order No : SSK/JINDAL/2017/02/071 DATED 02.05.2017 AND AMENDMENT  
DATED 14.11.2017.

SAP S. O. & O. A. No : 4111002639/ 4666000213 & JSGL/AD/EXP/17-016 DATED 04.05.2017.

**Material Details** : DN 200 Class K9, Centrifugally Cast Ductile Iron (Spun) Pipes conforming to BS EN: 545-2006, Suitable for push on flexible tyton joints (TJ) in standard length of 5.5 Meter, Internally lined with Ordinary Portland Cement as per BSEN: 545-2006 and externally protection, finishing layer with Polyurethane (PU) of minimum coating thickness 700 microns and nominal coating thickness 900 microns as per BS EN: 15189-2006 and Purchase Order Specification. Jointing areas inside socket, spigot end coated with red epoxy paint of minimum thickness 100 microns.

Size	Class/Joint	Length of Pipe (Mtrs)	Total Numbers	Total length (Mtrs)
DN 200	K9/ Push On (TJ)	5.5	232	1,276
		Total	232	1,276

**Inspection certificate according to EN 10204 of "Type 3.1"**

- a. **Visual appearance** : 100% visually checked and found satisfactory.
- b. **Lining appearance/crack width /Radial displacement** : 100% pipes checked and found satisfactory.
- c. **Dimensions** : External diameter, Wall thickness, ovality, length and Straightness are checked and found comply with specification.

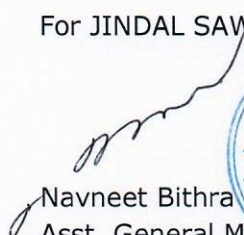


- d. **Mechanical Properties** : The test results are found conforming to BS EN: 545-2006 & Results are given below.

Batch No.	8F30
Tensile Strength Required Min: 420 MPa	462.52
Elongation Required Min: 10 %	12.52
BHN Required : 230 Max	178

- e. **Hydro-static Pressure Test:** 100% pipes are tested at 50 Bar for the total duration of the pressure Cycle is not less than 15 second, including 10 second at test pressure, as per specification and found no leakage or any kind of defects.
- f. **Inside Lining:** The DI pipes are internally lined with Ordinary Portland cement mortar and thickness of Cement lining is checked and found conforming to the specification BS EN: 545-2006 and purchase order specification.
- g. **External Protection:** The DI pipes are externally protection and finishing layer with Polyurethane (PU) of minimum coating thickness 700 microns and nominal thickness 900 microns as per BS EN: 15189-2006 and Purchase Order Specification.
- h. **Polyurethane Coating (PU) Testing:** Holiday, Adhesion, Direct impact strength & Shore D Hardness, Polyurethane coating testing done and found conforming to the specification BSEN: 15189-2006 and purchase order specification.
- i. **Jointing Areas Protection:** Jointing areas inside socket, spigot end coated with zinc and red epoxy paint.
- j. **Marking:** All pipes are Cast-on marked for Manufacturer name, Year, Ductile Iron & Size as "JSAW1-18" & "DI-200" and reference standard, type of joints, size and class, length and other Marking painted/ Stenciled as per JSGL SOP: JSGL/SP/18, international specification and Purchase Order specification.

For JINDAL SAW GULF LLC

  
Navneet Bithra  
Asst. General Manager, Quality



REF: 50005509/IC-572/DB18

DATE: 01.07.2018

At the request of M/s. JINDAL SAW GULF LLC., we carried out inspection of below referred material as per the order requirement & we report as under:

**MATERIAL DESCRIPTION** : Centrifugally Cast Ductile Iron Pipes DN 300, 5.5 meters length of Class K9 (Socket & Spigot) push on Tyton joint (TJ) pipes as per BSEN: 545 - 2006. Internally lined with Ordinary Portland Cement Mortar as BSEN: 545-2006, externally protection, finishing layer with Polyurethane (PU) of minimum thickness 700 microns and nominal thickness 900 microns as per BS EN: 15189-2006 and Purchase Order Specification. Jointing areas inside socket, spigot end coated with red epoxy paint of minimum thickness 100 microns.

Details of materials as under: DN 300 K9, Ordered Quantity: 4,620.0 Meters

Offer List Date	Batch Nos.	Offered Quantity (Meters)	Balance Quantity (Meters)
30.06.2018	8A17, 8A18, 8E13	660	NIL

Previously Inspected Quantities: 3,960.0 Meters.

**CUSTOMER NAME/ CONSIGNEE NAME** : SIN SONG KIANG TRADING PTE. LTD.,  
11 WOODLANDS CLOSE, HEX 08-23 WOODLANDS 11,  
SINGAPORE 737853.

**SELLER/ MANUFACTURER** : JINDAL SAW GULF LLC.  
P.O. BOX 92135, PLOT 11 NR 28.  
ICAD 3, MUSAFFAH, ABU DHABI,  
U.A.E.

**PURCHASE ORDER NO.** : SSK/JINDAL/2017/ 02/ 071 DATED 02.05.2017 AND  
AMENDMENT DATED 14.11.2017.

**SAP S.O & ORDER ACCEPTANCE NO.** : 4111002639 & JSGL/AD/EXP/17-016 DATED: 04.05.2017.





**PLACE & DATE OF INSPECTION** : June 30, 2018 at manufacturer's plant, Musaffah, Abu Dhabi.

**INPROCESS INSPECTION** :

1. Visual examination & Physical inspection.
2. Randomly witnessed the chemical analysis before casting and reviewed the test.
3. Hydrostatic pressure test witnessed online for randomly selected pipes of the offered lot & no leakage/sweating observed.
4. Review of Polyurethane (PU) coating reports.
5. Witnessed Coating thickness, Holiday, Adhesion, Direct Impact Test and Shore D Hardness of PU Coating & Red Epoxy coating at jointing areas.
6. Review of test reports of Pig Iron, Sand, and Ordinary Portland Cement, Red Epoxy paint & PU raw materials
7. One test specimen from each Batch No. of DN 300 K9 pipe taken and witnessed mechanical testing with respect to Tensile Strength, Percentage Elongation and Hardness, results were satisfactory.
8. Jointing areas coated with Red Epoxy Paint of minimum 100 microns.

**PRE-SHIPMENT INSPECTION** :

1. Visual Inspection for workmanship and finish.
2. Quantity verified.
3. Dimensions checked on pipes at random as per QAP: JSGL/QAP/545:2006, Rev.02, dated: 01.10.2015/ PO Specification.
4. Sampled Pipes verified for Cement lining thickness found satisfactory as per QAP: JSGL/QAP/545:2006, Rev.02, dated: 01.10.2015/ PO Specification.
5. Sampled Pipes verified for PU Coating thickness found satisfactory as per QAP: JSGL/QAP/PUPE, Rev.02, dated: 01.10.2015/ PO Specification
6. Verified Markings.
7. Reviewed Raw Material Test Certificates and Internal Inspection Reports.

**STANDARD FOLLOWED** : As per BSEN: 545 – 2006 & BSEN: 15189-2006.

**OBSERVATIONS** :

- Hydrostatic pressure test
- Chemical Analysis Test
- Dimension checking
- Thickness of Cement lining
- Thickness of PU Coating
- Visual examination for workmanship & finishing
- Quantity verification
- Mechanical properties (tensile strength, percentage elongation & hardness)
- Marking check
- Raw Material Certificates

} SATISFACTORY  
]- Reviewed



**MARKINGS** : **Stenciled:** On pipe barrel: JINDAL Logo along with JSAW – JAL  
 (with paint ) BSEN: 545/ 15189  
 SIZE: DN 300  
 CLASS: K9  
 TYPE: POJ  
 MADE IN U.A.E

**Painted:** On socket face: Batch No. / Pipe No. (8E13R410)  
 Class No. (K9)  
 Pipe Length (5.5)  
 Nominal Diameter (300)  
 OP – Ordinary Portland Cement  
 P – Polyurethane  
 8 – Manufacturer Year (2018)

**Cast On:** Inside socket: "JSAW1-18" & "DI – 300"

**Markings:** SSK  
 as per PO.

**SGS-IDENTIFICATION** : Hard punched/stamped "SGS Gulf" over white paint on socket face.

**CONCLUSION** : On the basis of inspection, we found that the materials were in conformity with the Purchase Order requirements.  
 This Certificate reflects our observations at the time, date and place of Inspection.



**For SGS GULF LTD.**  
**Vinay Kumar**  
**Inspector QA/QC**

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"For the witness Tests, the Company's involvement has been limited to witnessing/observing of test done at the vendor's facility as per Client's instructions. The Company's sole responsibility was to be present at the time of the test and forward the results, or confirm the occurrence, of the intervention(s). The Company is not responsible for the condition or calibration of apparatus, instruments and measuring devices used, the analysis methods applied the qualifications, actions or omissions of the third party's personnel or the analysis results."

**WORKS TEST CERTIFICATE**

Test Certificate No & Date: JSGL/QA/TC/18 - 422 Dated 30.06.2018

This is to certify that the Centrifugally Cast (Spun) Ductile Iron Pipes suitable for Socket & Spigot push on Joints as detailed below have been manufactured and tested by us at our WORKS in accordance with the Specification BSEN: 545-2006 and all the test results were satisfactory.

Customer Name : SIN SONG KIANG TRADING PTE. LTD., 11 WOODLANDS CLOSE, HEX 08-23 WOODLANDS 11, SINGAPORE 737853.  
 Consignee Name : SIN SONG KIANG TRADING PTE. LTD., 11 WOODLANDS CLOSE, HEX 08-23 WOODLANDS 11, SINGAPORE 737853.  
 Purchase Order No : SSK/JINDAL/2017/02/071 DATED 02.05.2017 AND AMENDMENT DATED 14.11.2017.  
 SAP S. O. & O. A. No : 4111002639 & JSGL/AD/EXP/17-016 DATED 04.05.2017.

**Material Details** : Centrifugally Cast Ductile Iron Pipes conforming to BS EN: 545-2006, DN 300 of Class K9, suitable for push on flexible Tyton joints (TJ) in standard length of 5.5 Mtrs, Internally lined with Ordinary Portland Cement mortar as per BSEN: 545-2006, externally protection, finishing layer with Polyurethane (PU) of minimum thickness 700 microns and nominal thickness 900 microns as per BS EN: 15189-2006 and Purchase Order Specification. Jointing areas inside socket, spigot end coated with red epoxy paint of minimum thickness 100 microns.

Size	Class/Joint	Length of Pipe (Mtrs)	Total Numbers	Total length (Mtrs)
DN 300	K9/ Push On (TJ)	5.5	120	660
		Total	120	660

**Inspection certificate according to EN 10204 of "Type 3.1"**



- a. **Visual appearance** : 100% visually checked and found satisfactory.
- b. **Lining appearance/crack width /Radial displacement** : 100% pipes checked and found satisfactory.
- c. **Dimensions** : External diameter, Wall thickness, ovality and straightness are checked and found comply with specification.
- d. **Mechanical Properties** : The test results are found conforming to BS EN: 545-2006 & results from our internal records are given below.

Batch No.	8A17	8A18	8E13
Tensile Strength Required Min: 420 MPa	444.38	440.94	497.13
Elongation Required Min: 10 %	17.26	15.20	13.60
BHN Required : 230 Max	168	166	178



- e. **Hydro-static Test:** 100% pipes have been tested at 50 Bar for a pressure cycle of 15 second and holding time of 10 Seconds, as per the specification and found no leakage or any kind of defects.
- f. **Inside Lining:** The DI pipes have been internally lined with Ordinary Portland cement mortar and thickness of Cement lining has been found conforming to the specification BS EN: 545-2006 and purchase order specification.
- g. **External Protection:** The DI pipes have been externally protection and finishing layer with Polyurethane (PU) of minimum thickness 700 microns and nominal thickness 900 microns as per BS EN: 15189-2006 and Purchase Order Specification.
- h. **Polyurethane Coating (PU) Testing:** Holiday, Adhesion, Direct impact strength & Shore D Hardness, Polyurethane coating testing done and found conforming to the specification BSEN: 15189-2006 and purchase order specification.
- i. **Jointing Areas Protection:** Jointing areas inside socket, spigot end coated with red epoxy paint of minimum thickness 100 microns.
- j. **Marking:** Marking of the pipes is done as per the specification / Purchase order specification.

For JINDAL SAW GULF LLC

  
  
Navneet Bithra  
Sr. Manager - QA



### INSPECTION CERTIFICATE

At the request of M/s. JINDAL SAW GULF LLC., we carried out inspection of below referred material as per the order requirement & we report as under:

**MATERIAL DESCRIPTION** : Centrifugally Cast Ductile Iron Pipes conforming to BS EN 545-2010, DN 400 of Class C30 (Socket & Spigot Pipes), Suitable for push on flexible Tyton joints in Standard length of 6.0 Mtrs, Internally lined with Sulphate Resistant cement mortar as per BSEN: 545-2010 and externally protected with Polyurethane coating thickness of minimum 700 microns (Average 900 Microns) as per BSEN: 15189-2006 and Jointing area coated Zinc coating with finishing layer of blue Epoxy coating minimum 100 microns as per BSEN: 545-2010/ Purchase Order specification.

Details of materials as under: DN 400 C30 (Socket & Spigot Pipes),  
 Ordered Quantity: 54.0 Meters.

Offer List Date	Batch Nos.	Offered Quantity (Meters)	Balance Quantity (Meter)
08.04.2019	9A28, 9A29, 9A31	54	NIL

**CUSTOMER NAME** : LARSEN & TOUBRO (OMAN) LLC,  
 POST BOX NO. 598, RUWI, MUSCAT - 112, MUSCAT, OMAN.

**CONSIGNEE NAME** : LARSEN & TOUBRO (OMAN) LLC,  
 POST BOX NO. 598, RUWI, MUSCAT - 112, MUSCAT, OMAN.

**SELLER/ MANUFACTURER** : JINDAL SAW GULF LLC.  
 P.O. BOX 92135, PLOT NO. 11 NR 28, ICAD III, MUSAFFAH, ABU DHABI, U.A.E.

**PROJECT NAME** : CONSTRUCTION OF TRANSMISSION PIPELINE FROM BAUSHER TO SEEB.

**CLIENT NAME** : PUBLIC AUTHORITY FOR ELECTRICITY & WATER (PAEW).

**PURCHASE ORDER NO.** : OF033PO8000345 DATED 25.11.2019.

**SAP S.O. & ORDER ACCEPTANCE NO.** : 3022000140/ 4666000146 & JSGL/AD/EXP/18 - 143 DATED 13.12.2018.



## INSPECTION CERTIFICATE

**PLACE & DATE OF INSPECTION**

: April 08, 2019 at manufacturer's plant, Musaffah, Abu Dhabi.

**INPROCESS INSPECTION**

- :
1. Visual examination & Physical inspection.
  2. Randomly witnessed the chemical analysis before casting and reviewed the test results.
  3. Hydrostatic pressure test witnessed online for randomly selected pipes of the offered lot & no leakage/sweating observed.
  4. Review of Zinc mass coating reports.
  5. Review of material test certificates for pig iron, cement, sand, Polyurethane Material and blue Epoxy paint.
  6. One specimen from each Batch No. of DN 400 C30 pipe, tested and witnessed mechanical testing with respect to Tensile Strength, Percentage Elongation & Hardness; results were satisfactory.
  7. Abrasive Blasting & Polyurethane coating inspection.

**PRE-SHIPMENT INSPECTION**

- :
1. Visual Inspection for workmanship and finish.
  2. Quantity verified.
  3. Dimensions checked on pipes at random as per QAP: JSGL/QAP/545-2010 Rev.03, dated: 01.10.2018 & JSGL /QAP/PUPE, Rev.01 Dated: 01.10.2018.
  4. Sampled Pipes verified for Cement lining thickness & External polyurethane coating thickness with jointing areas Blue Epoxy coating thickness and found satisfactory as per QAP: JSGL/QAP/545-2010 Rev.03, dated: 01.10.2018 & JSGL /QAP/PUPE, Rev.01 Dated: 01.10.2018.
  5. Abrasive Blasting, Holiday, Adhesion, Direct impact strength & Shore D Hardness, Polyurethane coating thickness and found satisfactory.
  6. Verified Markings.
  7. Review of Raw Material Test Certificates and Internal Inspection Reports.

**STANDARD FOLLOWED OBSERVATIONS**

: As per BSEN: 545-2010/ BSEN 15189-2006/ PAEW Project Specification.

- :
- Hydrostatic pressure test
  - Chemical Analysis Test
  - Reviewed Zinc mass deposition
  - Dimensions checking
  - Internal thickness of Cement lining
  - External Polyurethane Coating thickness
  - Jointing areas Blue Epoxy coating thickness
  - Visual examination for workmanship & finishing
  - Quantity verification
  - Mechanical properties (tensile strength, percentage elongation, hardness)
  - Markings check
  - Raw Material Test Certificates

} SATISFACTORY

} Reviewed



**INSPECTION CERTIFICATE**

**MARKINGS** :

- Stenciled:** On pipe barrel: JINDAL Logo along with JSAW – JAL  
 (with paint ) BSEN: 545/ BSEN: 15189  
 SIZE: DN400  
 CLASS: C30  
 TYPE: POJ  
 MADE IN U.A.E.
- Painted:** On socket face: Batch No. / Pipe No. (8A28V32)  
 Class No. (C30)  
 Pipe Length (6.0)  
 Nominal Diameter (400)  
 SP – Sulphate Resistant Cement,  
 Polyurethane – 700 Microns  
 9– Year of Manufacture (2019)
- Cast On:** Inside socket : “JSAW1-19” & “DI – 400”
- Special Marking** : Made in UAE  
 Buyer: LARSEN & TOUBRO (OMAN) LLC  
 Project: Construction of Transmission Pipeline from  
 Bausher to Seeb.  
 Authority: Public Authority for Electricity & Water.

**SGS-IDENTIFICATION** : Hard punched/stamped “SGS Gulf” over white paint on socket face.

**CONCLUSION** : On the basis of inspection, we found that the materials were in conformity with the Purchase Order requirements.  
 This Certificate reflects our observations at the time, date and place of Inspection.

Prepared by:	 Mr. Vinay Kumar QA/QC Inspector		Date: 08.04.2019
Approved by:	Mr. Barry Mendoza Operations Manager		Date: 08.04.2019

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"For the witness Tests, the Company's involvement has been limited to witnessing/observing of test done at the vendor's facility as per Client's instructions. The Company's sole responsibility was to be present at the time of the test and forward the results, or confirm the occurrence, of the intervention(s). The Company is not responsible for the condition or calibration of apparatus, instruments and measuring devices used, the analysis methods applied the qualifications, actions or omissions of the third party's personnel or the analysis results."

### WORKS TEST CERTIFICATE

Test Certificate No & Date: JSGL/QA/TC/19 - 223 Dated 08.04.2019

This is to certify that the Centrifugally Cast (Spun) Ductile Iron Pipes suitable for Socket & Spigot push on Joints as detailed below have been manufactured and tested by us at our WORKS in accordance with the Specification BS EN: 545-2010 and all the test results were satisfactory.

Customer Name : LARSEN & TOUBRO (OMAN) LLC,  
PB NO. 598, RUWI, MUSCAT - 112, MUSCAT, OMAN.  
Consignee Name : LARSEN & TOUBRO (OMAN) LLC,  
PB NO. 598, RUWI, MUSCAT - 112, MUSCAT, OMAN.  
Purchase Order No : OF033PO8000345 DATED 25.11.2019.  
SAP S.O. & O. A. No : 3022000140/ 4666000146 & JSGL/AD/EXP/18 - 143 DATED 13.12.2018.

**Material Details** : Centrifugally Cast Ductile Iron Pipes conforming to BS EN 545-2010, DN 400 of Class C30 (Socket & Spigot Pipes), Suitable for push on flexible Tyton joints in Standard length of 6.0 Mtrs, Internally lined with Sulphate Resistant cement mortar as per BSEN: 545-2010 and externally protected with Polyurethane coating of minimum 700 microns (Average 900 Microns) as per BSEN: 15189-2006 and Jointing area coated Zinc Rich Paint with finishing layer of blue Epoxy minimum 100 microns as per BSEN: 545-2010/ Purchase Order specification.

Size	Class/Joint	Length of Pipe (Mtrs)	Total Numbers	Total length (Mtrs)
DN 400	C30/ Push On (Socket & Spigot)	6.0	09	54
		Total	09	54

#### Inspection Certificate according to EN 10204 of "Type 3.1"

- a. **Visual appearance** : 100% visually checked and found satisfactory.
- b. **Lining appearance/crack width /Radial displacement** : 100% pipes checked and found satisfactory.
- c. **Dimensions** : External diameter, Wall thickness, ovality, Holiday, Impact Strength, PU Hardness, PU Adhesion and straightness are checked and found comply with specification.
- d. **Mechanical Properties** : The test results are found conforming to BS EN: 545-2010 & results from our internal records are given below.

Batch No.	9A28	9A29	9A31
Tensile Strength Required Min: 420 MPa	450.91	452.45	451.12
Elongation Required Min: 10 %	12.46	18.69	13.28
BHN Required : 230 Max	184	174	174





- e. **Hydro-static Test:** 100% pipes of have been tested at 30 Bar for a pressure cycle of 15 second and holding time of 10 Seconds, as per specification and found no leakage or any kind of defects.
- f. **Inside Lining:** The DI pipes have been internally lined with Sulphate Resistant cement mortar as per BSEN: 545-2010. The Lining thickness is checked and found conforming to BSEN: 545-2010/ Purchase order specification.
- g. **External Protection:** The DI pipes have been externally protected with Polyurethane coating of minimum thickness 700 microns (Average 900 Microns) as per BSEN: 15189-2006. The coating thickness is checked and found conforming to BSEN: 15189-2006/ Purchase order specification.
- h. **Polyurethane Coating (PU) Testing:** Holiday, Adhesion, Direct impact strength & Shore D Hardness, Polyurethane coating testing done and found conforming to the specification BSEN: 15189-2006 and purchase order specification.
- i. **Jointing Areas Protection:** The socket inner side and spigot jointing areas were protected zinc coating with finishing layer of blue Epoxy minimum thickness 100 microns as per BSEN: 545-2010/ Purchase order specification.
- j. **Marking:** Marking of the pipes is done as per the specification / Purchase order specification.

For JINDAL SAW GULF LLC



Navneet Bhatia  
Asst. General Manager - Quality



**CERTIFICATE OF INSPECTION**

At the request of M/s. JINDAL SAW GULF LLC., we carried out inspection of below referred material as per the order requirement & we report as under:

**MATERIAL DESCRIPTION** : DN 700 of class C25, Centrifugally Cast Ductile Iron (Spun) socket and spigot Pipes conforming to BSEN: 545-2010. Suitable for push on flexible Tyton joints in standard length of 5.5 meter. Internally lined with Sulphate Resistant Cement mortar as per ISO: 4179-2005 and externally protected with Polyurethane coating of minimum thickness 700 microns as per BSEN: 15189-2006 and jointing areas coating with zinc rich paint 130gm/m<sup>2</sup> with finishing blue epoxy layer of total DFT 100 microns, Purchase order Specification.

Details of materials as under: DN 700 C25 (Push on Joint),  
 Ordered Quantity: 1,001.0 Meters.

Offer List Date	Batch Nos.	Offered Quantity (Meters)	Balance Quantity (Meter)
10.06.2020	20E24, 20E25, 20E26, 20E27 20E28, 20E29, 20E30, 20E31 20F01, 20F02	528	209

Previously Inspected Quantities: 264.0 Meter

**CUSTOMER NAME** : LUDWIG PFEIFFER HOCH – LILIENTHALSTR. 33, 34123 KASSEL.

**APPLICANT NAME** : LUDWIG PFEIFFER HOCH – LILIENTHALSTR. 33, 34123 KASSEL.

**NOTIFY** : LUDWIG PFEIFFER HOCH-UND Gmbh AND Co KG – SURAL  
 HANN MARINAS BEL AIR 09 BIS.

**CONSIGNEE** : TO ORDER

**SELLER/ MANUFACTURER** : JINDAL SAW GULF LLC.  
 P.O. BOX 92135, PLOT NO 11 NR 28, ICAD III, MUSSAFFAH, ABU DHABI,  
 U.A.E.

**PROJECT** : REPUBLIQUE DU SENEGAL/MEA/SONES AEP DE DAKAR /DESSALEMENT-  
 LOT 2.

**PURCHASE ORDER NO.** : 710SN801 DATED 03.03.2020.

**SAP S.O. & O. A. NO.** : 6033000080/ 4666000511 & JSGL/AD/EXP/19-241 DATED 09.03.2020..

**DOCUMENTARY CREDIT NO** : 19735010026047 DATED 02.04.2020 ISSUED BY HYPOVEREINSBANK  
 CORPORATE BAERISCHE HYPO-UND VEREINSBANK AG GERMANY.

**CERTIFICATE OF INSPECTION**

**PLACE & DATE OF INSPECTION** : June 10, 2020 at manufacturer’s plant, Musaffah, Abu Dhabi.

**IN PROCESS INSPECTION** :

1. Visual examination & Physical inspection.
2. Randomly witnessed the chemical analysis before casting and reviewed the test results.
3. Hydrostatic pressure test witnessed online for randomly selected pipes of the offered lot & no leakage/sweating observed.
4. Before polyurethane coating inspection shot blasting, surface preparation, Surface roughness.
5. After polyurethane coating inspection Surface appearance, Non-porosity, PU coating thickness, direct Impact Strength, Polyurethane coating Hardness and Adhesion Test.
6. Review of test reports of pig iron, cement, Sand, Polyurethane material and Blue Epoxy paint.
7. One test specimen from each Batch No. of DN 700 C25 pipe taken and witnessed mechanical testing with respect to Tensile Strength, Percentage Elongation and Hardness, results were satisfactory.

All the reports for in-process inspection were compiled and reviewed on 10.06.2020

**PRE-SHIPMENT INSPECTION** :

1. Visual Inspection for workmanship and finish.
2. Quantity verified.
3. Dimensions checked on pipes at random as per QAP: JSGL/QAP/545-2010 Rev.04, dated: 02.11.2019 & JSGL /QAP/PUPE, Rev.02 Dt : 02.11.2019.
4. Sampled Pipes verified for Cement mortar lining thickness & finishing layer of Polyurethane Coating found satisfactory as per QAP: JSGL/QAP/545-2010 Rev.04, dated: 02.11.2019 & JSGL /QAP/PUPE, Rev.02 Dt : 02.11.2019.
5. Verified Markings.
6. Reviewed Raw Material Test Certificates and Internal Inspection Reports. Witnessed Material Receiving Inspection: Dimensional and Shore A hardness of EPDM gaskets.

**STANDARD FOLLOWED** : As per BSEN: 545-2010, BSEN: 15189-2006 & Purchase Order Specification.

**OBSERVATIONS** :

- Hydrostatic pressure test
- Chemical Analysis Test
- Dimensions checking
- Polyurethane Coating Thickness
- Thickness of Cement mortar lining
- Jointing areas Blue Epoxy Coating thickness
- Workmanship & finish
- Quantity
- Mechanical properties (tensile strength, percentage elongation and hardness)
- Markings
- Raw Material Certificates

} SATISFACTORY  
 } Reviewed

**CERTIFICATE OF INSPECTION**

**MARKINGS** :

- Stenciled:** On pipe barrel: JINDAL Logo along with JSAW – JAL  
 (with paint) BSEN: 545/ 15189  
 SIZE: DN700  
 CLASS: C25  
 TYPE: POJ
- Painted:** On socket face: Batch No. / Pipe No. (20E30Q22)  
 Class No. (C25)  
 Pipe Length (5.5)  
 Nominal Diameter (700)  
 SP – Sulphate Resistant Cement  
 Polyurethane – 700 Microns  
 20– Year of Manufacture (2020)
- Cast On:** Inside socket : “JSAW1-20” & “DI-700”  
 Manufacture Brand Name: JSAW  
 Manufacture Year: 2020  
 Ductile Iron: DI  
 Size: 700
- Marking as per P.O.** On pipe barrel: MADE IN U.A.E.  
 DU SENEGAL/MEA/SONES  
 AEP de Dakar /DESSALEMENT- LOT 2

**SGS-IDENTIFICATION** : Hard punched/stamped “SGS Gulf” over white paint on socket face.

**CONCLUSION** : On the basis of inspection, we found that the materials were in conformity with the Purchase Order requirements.  
 This Certificate reflects our observations at the time, date and place of Inspection.

Prepared by:	Mr. Vinay Kumar QA/QC Inspector	Date:	13.06.2020
Approved by:	Mr. Barry Mendoza Operations Manager	Date:	13.06.2020

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“For the witness Tests, the Company's involvement has been limited to witnessing/observing of test done at the vendor's facility as per Client's instructions. The Company's sole responsibility was to be present at the time of the test and forward the results, or confirm the occurrence, of the intervention(s). The Company is not responsible for the condition or calibration of apparatus, instruments and measuring devices used, the analysis methods applied the qualifications, actions or omissions of the third party's personnel or the analysis results.”

**WORKS TEST CERTIFICATE**

Test Certificate No & Date: JSGL/QA/TC/20 - 279 Dated 10.06.2020

This is to certify that the Centrifugally Cast (Spun) Ductile Iron Pipes suitable for Socket & Spigot push on Joints as detailed below have been manufactured and tested by us at our WORKS in accordance with the Specification BSEN: 545-2010 and all the test results were satisfactory.

Customer Name : LUDWIG PFEIFFER HOCH-UND TIEFBAU GMBH & CO.KG,  
 LILIENTHALSTRASSE 33, 34123 KASSEL, GERMANY.  
 Consignee Name : LUDWIG PFEIFFER HOCH-UND TIEFBAU GMBH & CO.KG,  
 LILIENTHALSTRASSE 33, 34123 KASSEL, GERMANY.  
 Purchase Order No : 710SN801 DATED 03.03.2020.  
 SAP S.O. & O. A. No : 6033000080/ 4666000511 & JSGL/AD/EXP/19-241 DATED 09.03.2020.  
 Project : REPUBLIQUE DU SENEGAL/MEA/SONES AEP DE DAKAR /DESSALEMENT-  
 LOT 2.  
 Documentary Credit No : 19735010026047 DATED 02.04.2020 ISSUED BY HYPOVEREINSBANK  
 CORPORATE BAERISCHE HYPO-UND VEREINSBANK AG GERMANY.

**Material Details** : DN 700 of class C25, Centrifugally Cast Ductile Iron (Spun) socket and spigot Pipes conforming to BSEN: 545-2010. Suitable for push on flexible Tyton joints in standard length of 5.5 meter. Internally lined with Sulphate Resistant Cement mortar as per ISO: 4179-2005 and externally protected with Polyurethane coating of minimum thickness 700 microns as per BSEN: 15189-2006 and jointing areas coating with zinc rich paint 130gm/m2 with finishing blue epoxy layer of total DFT 100 microns, Purchase order Specification.

Size	Class/Joint	Length of Pipe (Mtrs)	Total Numbers	Total length (Mtrs)
DN 700	C25/ Push On	5.5	96	528
		Total	96	528

**Inspection/ Testing:** The DI pipe is inspected and tested during production for chemical analysis, microstructure analysis, mechanical testing, dimensions, hydro-static Pressure test, internal lining & external coating thickness/mass.

**Inspection certificate according to EN 10204 of "Type 3.1"**

- a. **Visual appearance** : 100% visually checked and found satisfactory.
- b. **Lining appearance/crack width /Radial displacement** : 100% pipes checked and found satisfactory.



- c. **Dimensions** : External diameter, Wall thickness, ovality, length and Straightness are checked and found comply with specification.
- d. **Mechanical Properties** : The test results are found conforming to BSEN: 545-2010 & records are given below.

Batch No.	20E24	20E25	20E26	20E27	20E28
Tensile Strength Required Min: 420 MPa	457.67	455.57	465.70	445.69	445.91
Elongation Required Min: 10 %	12.88	16.86	19.03	16.52	19.96
BHN Required : 230 Max	178	174	174	172	170
Batch No.	20E29	20E30	20E31	20F01	20F02
Tensile Strength Required Min: 420 MPa	449.26	456.86	444.42	442.42	444.87
Elongation Required Min: 10 %	18.60	12.08	12.60	19.24	15.80
BHN Required : 230 Max	172	172	172	172	170

- e. **Hydro-static Pressure Test:** 100% pipes are tested at 25 Bar for the total duration of the pressure Cycle is not less than 15 second, including 10 second at test pressure, as per specification and found no leakage or any kind of defects.
- f. **Inside Lining:** The DI pipes are internally lined with Sulphate Resistant cement mortar. The thickness of Cement lining is checked and found conforming to the specification BSEN: 545-2010, purchase Order specification.
- g. **External Protection:** The DI pipes are externally protected with Polyurethane coating of minimum thickness 700 microns. The coating thickness is checked and found conforming to the specification BSEN: 15189-2006, Purchase Order Specification.
- h. **Jointing areas:** The jointing areas internal surface of the Socket is coated with a layer of zinc 130 gm/m<sup>2</sup> and with a finishing layer of Blue Epoxy paint to a dry film coating minimum 100 microns as per JSGL procedure, Purchase Order Specification.



- i. **Polyurethane Coating (PU) Testing:** Holiday, Adhesion, Direct impact strength & Shore D Hardness, Polyurethane coating testing done and found conforming to the specification BSEN: 15189-2006, purchase order specification.
- j. **Marking:** The DI pipes are Cast-on marked for Manufacturer name or mark, Year, Ductile Iron & Size as "JSAW1-20" & "DI-700" and reference standard, type of joints, size and class, length and other Marking painted/ Stenciled as per JSGL SOP: JSGL/SP/18, international specification and Purchase Order specification.

For JINDAL SAW GULF LLC

  
Navneet Bithra  
Head – Quality





**CONFORMITY AND INSPECTION CERTIFICATE**

At the request of M/s. JINDAL SAW GULF LLC., we carried out inspection of below referred materials as per the order requirement & we report as under:

**ITEM DESCRIPTION :** +16800 ML DE TUYAUX EN FONTE DUCTILE ET 840 RACCORDES ET ACCESSOIRES (DUCTILE IRON PIPES AND FITTINGS) WICH QUANTITY AND TECHNICAL REFERENCES AS PER PROFORMA INVOICE NR JSAW/EXP/PARC MEGRINE DD 25/02/2019 AND AS PER CONTRAT NR CM I 17032006 DD 16/11/2018.  
 ORIGIN: UAE CFR TUNISIAN PORT(SELON INOTERM 2010 of ICC)

**MATERIAL :** DN 800 of Class C25 (Push on Anchor Joint and Weld bead at spigot end with JSAW Lock DC Restrained Joint pipes & Restrained Joint Accessories) & DN 1000 C25 (Push on Anchor Joint), Centrifugally Cast Ductile Iron (Spun) Pipes conforming to ISO: 2531-2009/ISO: 10804-2010. Suitable for push on flexible Restrained/ Anchor joints in standard length of 5.5 Meter. Internally lined with Blast Furnace Slag Cement Mortar as per ISO: 4179-2005 and externally protected with Polyurethane coating of minimum 900 microns as per BSEN: 15189-2006. Jointing areas are protected with Zinc Mass deposition of 150 gm/m<sup>2</sup> with finishing external Blue Epoxy layer of minimum Coating thickness 300 microns as per BSEN: 14901-2014/ Purchase Order Specification.

Details of materials as under: DN 800 C25 (Anchor Joint),  
 Ordered Quantity: 2,230.0 Meters

Offer List Date	Batch Nos.	Offered Quantity (Meters)	Balance Quantity (Meters)
18.11.2019	9H08, 9H14, 9H16, 9H17, 9H18, 9H19, 9H20, 9H21, 9H27	797.5	2.5

Previously Inspected Quantities: 1,430.0 Meter

Details of materials as under: DN 800 C25 (JSAW LOCK DC),  
 Ordered Quantity: 520.0 Meters

Offer List Date	Batch Nos.	Offered Quantity (Meters)	Balance Quantity (Meters)
18.11.2019	9H15, 9H16, 9H18 9H19, 9H20, 9H21	517	03

Details of materials as under: DN 1000 C25 (Anchor Joint),  
 Ordered Quantity: 50.0 Meters

Offer List Date	Batch Nos.	Offered Quantity (Meters)	Balance Quantity (Meters)
18.11.2019	9E28, 9E29, 9F01 9F02, 9F09, 9F10	49.5	0.5





**CONFORMITY AND INSPECTION CERTIFICATE**

- APPLICANT NAME** : SOCIETE NATIONALE D'EXPLOITATION ET DISTRIBUTION DES EAUX (SONEDE) 23, RUE JAWAHER LEL NEHRU BP 1300, MONTFLEURY 1008 TUNIS TUNISIA.
- CONSIGNEE** : TO ORDER OF BANQUE DE L'HABITAT 18, AVENUE MOHAMED V, 1080 TUNIS, TUNISIA.
- MANUFACTURER** : JINDAL SAW GULF LLC.  
 P. O. BOX. 92135, PLOT NO. 11 NR 28  
 ICAD-III, MUSAFFAH, ABU DHABI,  
 U.A.E.
- BENEFICIARY's PROFORMA INVOICE NR** : JSAW/EXP/PARC MEGRINE DD 25/02/2019.
- APPLICANTS CONTRACT NO** : CM I 17032006 DD 16/11/2018.
- SAP S.C. & O. A. NO.** : 3022000333/ 4666000329 & JSGL/AD/EXP/19-078 DATED 20.08.2019
- LETTER OF CREDIT REFERENCE NO** : CDI2019.032.0511 DATED OF ISSUE 190628.
- PLACE & DATE OF INSPECTION** : 19 & 20 November, 2019 at manufacturers plant, Musaffah, Abu Dhabi.
- STANDARD FOLLOWED** : ISO: 2531-2009 / BSEN: 15189-2006/ Purchase Order Specification.
- INPROCESS INSPECTION** :
1. Visual examination & Physical inspection.
  2. Randomly witnessed the chemical analysis before casting and reviewed the test results.
  3. Hydrostatic pressure test witnessed online for randomly selected pipes of the offered lot & no leakage/sweating observed.
  4. Review/ Witness of jointing areas coating thickness reports.
  5. Review/ Witness Internally Cement Mortar lining & externally polyurethane coating thickness.
  6. Review of material test certificates for pig iron, cement, sand, zinc rich Blue Epoxy paint & Polyurethane material.
  7. Weld Bead Dimensions checked and found satisfactory.
  8. JSAW LOCK DC Restrained joint accessories coating thickness checked and found satisfactory.
  9. Review/ Witness Holiday, direct impact strength test, Hardness, Adhesion & Thickness test.
  10. One specimen from each Batch No. of DN 800 C25 & DN 1000 C25 pipe, tested and witnessed mechanical testing with respect to Tensile Strength, Percentage Elongation & Hardness; results were satisfactory.

All the reports for in-process inspection were compiled and reviewed  
 On 18.11.2019.



## CONFORMITY AND INSPECTION CERTIFICATE

### PRE-SHIPMENT INSPECTION

- :
1. Visual Inspection for workmanship and finish.
  2. Quantity verified.
  3. Dimensions checked on pipes at random as per QAP: JSGL/QAP/
  4. 2531:2009 Rev.04, dated: 02.11.2019 & QAP: JSGL/QAP/ PUPE Rev.02, dated: 02.11.2019.
  5. Sampled Pipes verified for Cement lining thickness & Polyurethane Coating and found satisfactory as per QAP: JSGL/QAP/
  6. 2531:2009 Rev.04, dated: 02.11.2019 & QAP: JSGL/QAP/ PUPE Rev.02, dated: 02.11.2019.
  7. Verified Markings.
  8. Reviewed of Raw Material Test Certificates and Internal Inspection Reports.

### STANDARD FOLLOWED

: As per ISO: 2531 – 2009/ BSEN: 15189-2006/ BSEN: 14901-2014/ Purchase Order Specification.

### OBSERVATIONS

- Hydrostatic pressure test
  - Chemical Analysis Test
  - Dimensions checking
  - Thickness of Cement lining & Polyurethane Coating
  - Visual examination for workmanship & finishing
  - Quantity verification
  - Mechanical properties (tensile strength, percentage elongation, hardness)
  - Markings check
  - Raw Material Test Certificates
- } SATISFACTORY
- } Reviewed

### MARKINGS

- :
- Stenciled:** On pipe barrel: JINDAL Logo along with JSAW – JAL  
 (with paint) ISO: 2531  
 SIZE: DN 800 / 1000  
 CLASS: C25  
 TYPE: AJ/ JSAW LOCK (DC)
- Painted:** On socket face: Batch No. / Pipe No.  
 (DN 800 C25 AJ -9H16P51)  
 (DN 800 C25 DC -9H19Q02)  
 (DN 800 C25 AJ -9F10P03)  
 Class No. (C25)  
 Pipe Length (5.5)  
 Nominal Diameter (800/1000)  
 BP – Blast Furnace Slag Cement,  
 Polyurethane - 900 Microns  
 9 – Year of Manufacture (2019)
- Cast On:** Inside socket : "JSAW1-19" & "DI – 800", "DI – 1000"  
 Manufacture Brand Name: JSAW  
 Manufacture Year: 2019  
 Ductile Iron: DI  
 Size: 800/ 1000



## CONFORMITY AND INSPECTION CERTIFICATE

**Marking:** On pipe barrel: MADE IN U.A.E.  
**as per**  
**P.O**

**SGS-IDENTIFICATION** : Hard stamped "SGS Gulf" over white paint on socket face.

**CONCLUSION** : On the basis of inspection, we found that the materials were in conformity with the Purchase Order requirements.  
 This Certificate reflects our observations at the time, date and place of Inspection.

This certificate attests that goods inspected in factory, shipped on board and delivered are in conformity with goods stipulated on bill of lading

Prepared by:	Mr. Vinay Kumar QA/QC Inspector		Date: 20.11.2019
Approved by:	Mr. Barry Mendoza Operations Manager		Date: 20.11.2019

This document is issued by the Company under its General Conditions of Service accessible at [http://www.sgs.com/terms\\_and\\_conditions.html](http://www.sgs.com/terms_and_conditions.html). Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein.

Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

"For the witness Tests, the Company's involvement has been limited to witnessing/observing of test done at the vendor's facility as per Client's instructions. The Company's sole responsibility was to be present at the time of the test and forward the results, or confirm the occurrence, of the intervention(s). The Company is not responsible for the condition or calibration of apparatus, instruments and measuring devices used, the analysis methods applied the qualifications, actions or omissions of the third party's personnel or the analysis results."

**WORKS TEST CERTIFICATE**

Test Certificate No & Date: JSGL/QA/TC/19 – 729 Dated 19.11.2019

This is to certify that the Centrifugally Cast (Spun) Ductile Iron Pipes suitable for Socket & Spigot push on Joints as detailed below are manufactured and tested by us at our WORKS in accordance with the Specification ISO: 2531-2009 and all the test results were satisfactory.

Customer Name : SOCIETE NATIONALE D'EXPLOITATION ET DISTRIBUTION  
DES EAUX (SONEDE), 23, RUE JAWAHER LEL NEHRU BP 1300  
MONTFLEURY 1008 TUNIS TUNISIA.

SAP S.O. & O. A. No : 3022000333/ 4666000329 & JSGL/AD/EXP/19-078 DATED  
20.08.2019.

Consignee Name : SOCIETE NATIONALE D'EXPLOITATION ET DISTRIBUTION  
DES EAUX (SONEDE), 23, RUE JAWAHER LEL NEHRU BP 1300  
MONTFLEURY 1008 TUNIS TUNISIA.

Applicants Contract No : CM I 17032006 DD 16/11/2018.

Beneficiary's Proforma : JSAW/EXP/PARC MEGRINE DD 25/02/2019.

Invoice Nr

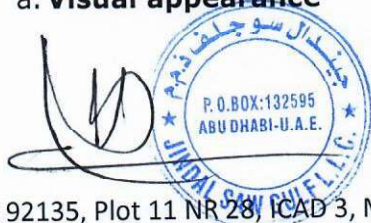
Letter of Credit Reference No : CDI2019.032.0511 DATE OF ISSUE 190628.

**Product description** : DN 800 of Class C25 (Push on Anchor Joint), Centrifugally Cast Ductile Iron (Spun) Pipes conforming to ISO: 2531-2009, Suitable for push on flexible Anchor joints in standard length of 5.5 Meter. Internally lined with Blast Furnace Slag Cement Mortar as per ISO: 4179-2005 and externally protected with Polyurethane coating of minimum 900 microns as per BSEN: 15189-2006. Jointing areas are protected with Zinc Mass deposition of 150 gm/m<sup>2</sup> with finishing external Blue Epoxy layer of minimum Coating thickness 300 microns as per BSEN: 14901-2014/ Purchase Order Specification.

Size	Class/Joint	Length of Pipe (Mtrs)	Total Numbers	Total length (Mtrs)
DN 800	C25/ Push On (AJ)	5.5	145	797.5
		Total	145	797.5

**Inspection Certificate according to EN 10204 of "Type 3.1"**

a. **Visual appearance** : 100% visually checked and found satisfactory.



- b. **Lining appearance/crack width /Radial displacement** : 100% pipes checked and found satisfactory.
- c. **Dimensions** : External diameter, Wall thickness, ovality, Holiday, Impact Strength, PU Hardness, PU Adhesion, straightness and length are checked and found comply with specification.
- d. **Mechanical Properties** : The test results are found conforming to ISO: 2531-2009 & results are given below.

Batch No.	9H08	9H14	9H16	9H17
Tensile Strength Required Min:420 MPa	439.73	433.75	434.04	447.75
Elongation Required Min: 10 %	15.44	17.28	12.80	14.60
BHN Required : 230 Max	174	170	166	170
Batch No.	9H18	9H19	9H20	9H21
Tensile Strength Required Min:420 MPa	434.55	443.59	446.62	443.93
Elongation Required Min: 10 %	17.36	14.36	18.68	16.00
BHN Required : 230 Max	170	168	174	170

- e. **Hydro-static Pressure Test:** 100% pipes are tested at 25 Bar for the total duration of the pressure Cycle is not less than 15 second, including 10 second at test pressure, as per specification and found no leakage or any kind of defects.
- f. **Inside Lining:** The DI pipes are internally lined with Blast Furnace Slag Cement Mortar. The Lining thickness is checked and found conforming to ISO: 4179-2005/ Purchase order specification.
- g. **External Protection:** The DI pipes are externally protected with Polyurethane coating of minimum thickness 900 microns. The coating thickness is checked and found conforming to BSEN: 15189-2006/ Purchase order specification.



- h. **Polyurethane Coating (PU) Testing:** Holiday, Adhesion, Direct impact strength & Shore D Hardness, Polyurethane coating testing done and found conforming to the specification BSEN: 15189-2006/ purchase order specification.
- i. **Jointing Areas Protection:** The socket inner side and spigot jointing areas are protected with Zinc Rich Paint plus finishing Blue Epoxy layer of minimum coating thickness 250 microns as per BSEN: 14901-2014/ Purchase order specification.
- j. **Marking:** All pipes are Cast-on marked for Manufacturer name or mark, Year, Ductile Iron & Size as "JSAW1-19" & "DI-800" and reference standard, type of joints, size and class, length and other marking painted/ Stenciled as per JSGL SOP: JSGL/SP/18, international specification and Purchase order specification.

For JINDAL SAW GULF LLC



Navneet Bithra  
Asst. General Manager - Quality



**WORKS TEST CERTIFICATE**

Test Certificate No & Date: JSGL/QA/TC/19 – 730 Dated 26.11.2019

This is to certify that the Centrifugally Cast (Spun) Ductile Iron Pipes suitable for Socket & Spigot push on Joints as detailed below are manufactured and tested by us at our WORKS in accordance with the Specification ISO: 2531-2009 and all the test results were satisfactory.

Customer Name : SOCIETE NATIONALE D'EXPLOITATION ET DISTRIBUTION  
DES EAUX (SONEDE), 23, RUE JAWAHER LEL NEHRU BP 1300  
MONTFLEURY 1008 TUNIS TUNISIA.

SAP S.O. & O. A. No : 3022000333/ 4666000329 & JSGL/AD/EXP/19-078 DATED  
20.08.2019.

Consignee Name : SOCIETE NATIONALE D'EXPLOITATION ET DISTRIBUTION  
DES EAUX (SONEDE), 23, RUE JAWAHER LEL NEHRU BP 1300  
MONTFLEURY 1008 TUNIS TUNISIA.

Applicants Contract No : CM I 17032006 DD 16/11/2018.

Beneficiary's Proforma : JSAW/EXP/PARC MEGRINE DD 25/02/2019.

Invoice Nr

Letter of Credit Reference No : CDI2019.032.0511 DATE OF ISSUE 190628.

**Product description** : DN 800 of Class C25 (Weld bead at spigot end with JSAW Lock DC Restrained Joint pipes & Restrained Joint Accessories), Centrifugally Cast Ductile Iron (Spun) Pipes conforming to ISO: 2531-2009/ ISO: 10804-2010. Suitable for push on flexible Restrained Anchor joints in standard length of 5.5 Meter. Internally lined with Blast Furnace Slag Cement Mortar as per ISO: 4179-2005 and externally protected with Polyurethane coating of minimum 900 microns as per BSEN: 15189-2006. Jointing areas are protected with Zinc Mass deposition of 150 gm/m<sup>2</sup> with finishing external Blue Epoxy layer of minimum Coating thickness 300 microns as per BSEN: 14901-2014/ Purchase Order Specification.

Size	Class/Joint	Length of Pipe (Mtrs)	Total Numbers	Total length (Mtrs)
DN 800	C25/ Push On (JSAW Lock DC)	5.5	94	517
		Total	94	517

**Inspection Certificate according to EN 10204 of "Type 3.1"**


a. **Visual appearance** : 100% visually checked and found satisfactory.




- b. **Lining appearance/crack width /Radial displacement** : 100% pipes checked and found satisfactory.
- c. **Dimensions** : External diameter, Wall thickness, ovality, Holiday, Impact Strength, PU Hardness, PU Adhesion, straightness and length are checked and found comply with specification.
- d. **Mechanical Properties** : The test results are found conforming to ISO: 2531-2009 & results are given below.

Batch No.	9H15	9H16	9H18	9H19	9H20	9H21
Tensile Strength Required Min:420 MPa	455.83	441.89	434.88	447.43	450.07	443.36
Elongation Required Min: 10 %	16.80	14.32	12.36	19.60	21.00	14.72
BHN Required : 230 Max	174	170	166	170	174	170

- e. **Hydro-static Pressure Test:** 100% pipes are tested at 25 Bar for the total duration of the pressure Cycle is not less than 15 second, including 10 second at test pressure, as per specification and found no leakage or any kind of defects.
- f. **Inside Lining:** The DI pipes are internally lined with Blast Furnace Slag Cement Mortar. The Lining thickness is checked and found conforming to ISO: 4179-2005/ Purchase order specification.
- g. **External Protection:** The DI pipes are externally protected with Polyurethane coating of minimum thickness 900 microns. The coating thickness is checked and found conforming to BSEN: 15189-2006/ Purchase order specification.
- h. **Polyurethane Coating (PU) Testing:** Holiday, Adhesion, Direct impact strength & Shore D Hardness, Polyurethane coating testing done and found conforming to the specification BSEN: 15189-2006/ purchase order specification.
- i. **Jointing Areas Protection:** The socket inner side and spigot jointing areas are protected with Zinc Rich Paint plus finishing Blue Epoxy layer of minimum coating thickness 250 microns as per BSEN: 14901-2014/ Purchase order specification.







- j. **Restrained Joint accessories Protection:** JSAW DC Locks are coated with zinc and with finishing layer of blue epoxy coating to a total thickness of minimum 100 microns. The approved Blue Epoxy paint is suitable when in contact with portable water, intended for human consumption. The coating thickness is checked and found conforming to ISO: 2531-2009, Customer Purchase order.
- k. **Weld Bead at spigot End:** Weld bead dimension checked in line with SOP: JSGL/SP/29 and JSGL drawing, found satisfactory.
- l. **Marking:** All pipes are Cast-on marked for Manufacturer name or mark, Year, Ductile Iron & Size as "JSAW1-19" & "DI-800" and reference standard, type of joints, size and class, length and other marking painted/ Stenciled as per JSGL SOP: JSGL/SP/18, international specification and Purchase order specification.

For JINDAL SAW GULF LLC

  
Navneet Bithra  
Asst. General Manager - Quality



**WORKS TEST CERTIFICATE**

Test Certificate No & Date: JSGL/QA/TC/19 – 717 Dated 25.11.2019

This is to certify that the Centrifugally Cast (Spun) Ductile Iron Pipes suitable for Socket & Spigot push on Joints as detailed below are manufactured and tested by us at our WORKS in accordance with the Specification BS EN: 545-2010 and all the test results were satisfactory.

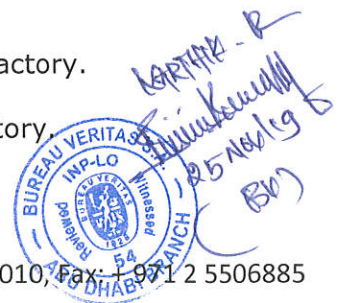
Customer Name : SIN SONG KIANG PTE. LTD., 6, SIXTH LOK YANG ROAD, SINGAPORE 628104.  
 Purchase Order No : SSK/JINDAL/2019/08/090 DATED 03.09.2019.  
 SAP S. O. & O. A. No : 3022000374/ 4666000361 & JSGL/AD/EXP/19 - 111 DATED 04.10.2019.  
 Consignee Name : SIN SONG KIANG PTE. LTD., 6, SIXTH LOK YANG ROAD, SINGAPORE 628104.  
 Project Name : TUAS WATER RECLAMATION PLANT PROJECT # 131211 – C1A.  
 Contractor Name : MCCONNELL DOWELL SOUTH EAST ASIA PTE LTD.  
 Consultant Name : JACOBS ENGINEERING SINGAPORE PTE LTD.  
 Client Name : PUBLIC UTILITIES BOARD, SINGAPORE.

**Product description** : DN 1200 of Class C25 JSAW LOCK DC (Weld bead at spigot end with JSAW Lock DC Restrained Joint pipes and Accessories). Centrifugally Cast Ductile Iron (Spun) Pipes conforming to BS EN: BSEN: 545-2010. Suitable for push on flexible Restrained Anchor joints in standard length of 6.0 Meter. Internally lined with Polyurethane coating of minimum thickness 800 microns as per BSEN: 15655-1:2018 and externally protected with Polyurethane coating of minimum thickness 700 microns as per BSEN: 15189-2006 and Jointing area coated with Blue Epoxy of minimum 300 microns as per BSEN: 14901-2014/ Customer Approved Quality Assurance Plan: JSGL/QAP/19-019 Rev 01 dated 22.09.2019/Purchase Order specification.

Size	Class/Joint	Length of Pipe (Mtrs)	Total Numbers	Total length (Mtrs)
DN 1200	C25/ Push On (JSAW LOCK DC)	6.0	42	252
		Total	42	252

**Inspection Certificate according to EN 10204 of "Type 3.1"**

- a. **Visual appearance** : 100% visually checked and found satisfactory.
- b. **Lining appearance/crack width /Radial displacement** : 100% pipes checked and found satisfactory.



- c. **Dimensions** : External diameter, Wall thickness, ovality, Holiday, Impact Strength, PU Hardness, PU Adhesion and straightness are checked and found comply with specification.
- d. **Mechanical Properties** : The test results are found conforming to BS EN: 545-2010, And results are given below.

Batch No.	9J12	9J14	9J15	9J16	9J17
Tensile Strength Required Min:420 MPa	477.44	450.53	449.09	465.93	466.28
Elongation Required Min: 7.0 %	12.20	9.60	13.33	14.07	15.60
BHN Required : 230 Max	174	170	184	174	174

- e. **Hydro-static Pressure Test:** 100% pipes are tested at 25 Bar for the total duration of the pressure Cycle is not less than 15 second, including 10 second at test pressure, as per specification and found no leakage or any kind of defects.
- f. **Inside Lining:** The DI pipes are internally lined with Polyurethane of minimum lining thickness 800 microns. The lining thickness is checked and found conforming to BSEN: 15655-1:2019/ Customer Approved Quality Assurance Plan: JSGL/QAP/19-019 Rev 01 dated 22.09.2019/Purchase Order specification.
- g. **External Protection:** The DI pipes are externally protected with Polyurethane coating of minimum thickness 700 microns. The coating thickness is checked and found conforming to BSEN: 15189-2006/ Customer Approved Quality Assurance Plan: JSGL/QAP/19-019 Rev 01 dated 22.09.2019/Purchase Order specification.
- h. **Polyurethane Coating (PU) Testing:** Holiday, Adhesion, Direct- Indirect impact strength & Shore D Hardness, Polyurethane coating testing done and found conforming to the specification BSEN: 15189-2006 & BSEN: 15655-1:2018 and Customer Approved Quality Assurance Plan: JSGL/QAP/19-019 Rev 01 dated 22.09.2019/Purchase Order specification.
- i. **Jointing Areas Protection:** The socket inner side and spigot jointing areas are protected with Blue Epoxy of minimum thickness 300 microns as per BSEN: 14901-2014/ Customer Approved Quality Assurance Plan: JSGL/QAP/19-019 Rev 01 dated 22.09.2019/Purchase Order specification.
- j. **Restrained Joint accessories Protection:** JSAW DC Locks are coated with zinc and with finishing layer of blue epoxy coating to a total thickness of minimum 100 microns. The approved Blue Epoxy paint is suitable when in contact with portable water, intended for human consumption. The coating thickness is checked and found conforming to BSEN: 545-2010.



- k. **Weld Bead at spigot End:** Weld bead dimension checked in line with SOP: JSGL/SP/29 and JSGL drawing, found satisfactory.
- l. **Marking:** The DI pipes are Cast-on marked for Manufacturer name, Year, Ductile Iron & Size as "JSAW1-19" & "DI-1200" and reference standard, type of joints, size and class, length and other marking painted/ Stenciled as per JSGL SOP: JSGL/SP/18, international specification and Purchase order specification.

For JINDAL SAW GULF LLC



for

Navneet Bithra  
Asst. General Manager – Quality



KARTHIK-R  
25 Nov 19  
(BV)



**WORKS TEST CERTIFICATE**

Test Certificate No & Date: JSGL/QA/TC/19 – 718 Dated 25.11.2019

This is to certify that the Centrifugally Cast (Spun) Ductile Iron Pipes suitable for Socket & Spigot push on Joints as detailed below are manufactured and tested by us at our WORKS in accordance with the Specification BS EN: 545-2010 and all the test results were satisfactory.

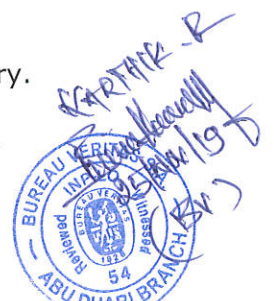
Customer Name : SIN SONG KIANG PTE. LTD., 6, SIXTH LOK YANG ROAD, SINGAPORE 628104.  
 Purchase Order No : SSK/JINDAL/2019/08/090 DATED 03.09.2019.  
 SAP S. O. & O. A. No : 3022000374/ 4666000361 & JSGL/AD/EXP/19 - 111 DATED 04.10.2019.  
 Consignee Name : SIN SONG KIANG PTE. LTD., 6, SIXTH LOK YANG ROAD, SINGAPORE 628104.  
 Project Name : TUAS WATER RECLAMATION PLANT PROJECT # 131211 – C1A.  
 Contractor Name : MCCONNELL DOWELL SOUTH EAST ASIA PTE LTD.  
 Consultant Name : JACOBS ENGINEERING SINGAPORE PTE LTD.  
 Client Name : PUBLIC UTILITIES BOARD, SINGAPORE.

**Product description** : DN 1600 of Class C25 JSAW LOCK DC (Weld bead at spigot end with JSAW Lock DC Restrained Joint pipes and Accessories). Centrifugally Cast Ductile Iron (Spun) Pipes conforming to BS EN: BSEN: 545-2010. Suitable for push on flexible Restrained Anchor joints in standard length of 6.0 Meter. Internally lined with Polyurethane coating of minimum thickness 800 microns as per BSEN: 15655-1:2018 and externally protected with Polyurethane coating of minimum thickness 700 microns as per BSEN: 15189-2006 and Jointing area coated with Blue Epoxy of minimum 300 microns as per BSEN: 14901-2014/ Customer Approved Quality Assurance Plan: JSGL/QAP/19-019 Rev 01 dated 22.09.2019/Purchase Order specification.

Size	Class/Joint	Length of Pipe (Mtrs)	Total Numbers	Total length (Mtrs)
DN 1600	C25/ Push On (JSAW LOCK DC)	6.0	46	276
		Total	46	276

**Inspection Certificate according to EN 10204 of "Type 3.1"**

- a. **Visual appearance** : 100% visually checked and found satisfactory.
- b. **Lining appearance/crack width /Radial displacement** : 100% pipes checked and found satisfactory.



c. **Dimensions** : External diameter, Wall thickness, ovality, Holiday, Impact Strength, PU Hardness, PU Adhesion and straightness are checked and found comply with specification.

d. **Mechanical Properties** : The test results are found conforming to BS EN: 545-2010, And results are given below.

Batch No.	9J12	9J13	9J15	9J19	9J20
Tensile Strength Required Min:420 MPa	463.48	440.61	468.65	449.86	458.98
Elongation Required Min: 7.0 %	13.73	17.93	16.17	18.73	20.67
BHN Required : 230 Max	174	170	174	170	170
Batch No.	9J21	9J24	9J25	9L04	9L05
Tensile Strength Required Min:420 MPa	449.08	455.04	454.09	462.20	441.19
Elongation Required Min: 7.0 %	19.07	18.73	15.63	18.47	17.17
BHN Required : 230 Max	166	170	174	174	170

e. **Hydro-static Pressure Test:** 100% pipes are tested at 25 Bar for the total duration of the pressure Cycle is not less than 15 second, including 10 second at test pressure, as per specification and found no leakage or any kind of defects.

f. **Inside Lining:** The DI pipes are internally lined with Polyurethane of minimum lining thickness 800 microns. The lining thickness is checked and found conforming to BSEN: 15655-1:2019/ Customer Approved Quality Assurance Plan: JSGL/QAP/19-019 Rev 01 dated 22.09.2019/Purchase Order specification.

g. **External Protection:** The DI pipes are externally protected with Polyurethane coating of minimum thickness 700 microns. The coating thickness is checked and found conforming to BSEN: 15189-2006/ Customer Approved Quality Assurance Plan: JSGL/QAP/19-019 Rev 01 dated 22.09.2019/Purchase Order specification.

h. **Polyurethane Coating (PU) Testing:** Holiday, Adhesion, Direct- Indirect impact strength & Shore D Hardness, Polyurethane coating testing done and found conforming to the specification BSEN: 15189-2006 & BSEN: 15655-1:2018 and Customer Approved Quality Assurance Plan: JSGL/QAP/19-019 Rev 01 dated 22.09.2019/Purchase Order specification.



- i. **Jointing Areas Protection:** The socket inner side and spigot jointing areas are protected with Blue Epoxy of minimum thickness 300 microns as per BSEN: 14901-2014/ Customer Approved Quality Assurance Plan: JSGL/QAP/19-019 Rev 01 dated 22.09.2019/Purchase Order specification.
- j. **Restrained Joint accessories Protection:** JSAW DC Locks are coated with zinc and with finishing layer of blue epoxy coating to a total thickness of minimum 100 microns. The approved Blue Epoxy paint is suitable when in contact with portable water, intended for human consumption. The coating thickness is checked and found conforming to BSEN: 545-2010.
- k. **Weld Bead at spigot End:** Weld bead dimension checked in line with SOP: JSGL/SP/29 and JSGL drawing, found satisfactory
- l. **Marking:** The DI pipes are Cast-on marked for Manufacturer name, Year, Ductile Iron & Size as "JSAW1-19" & "DI-1600" and reference standard, type of joints, size and class, length and other marking painted/ Stenciled as per JSGL SOP: JSGL/SP/18, international specification and Purchase order specification.

For JINDAL SAW GULF LLC

for

Navneet Bithra  
Asst. General Manager - Quality



## **Vedlegg 15**



# **SUPER CEMENT MANUFACTURING CO.L .L.C**

## **GGBS MSDS**

### **I, MATERIAL IDENTIFICATION :**

**Material Name** : Ground Granulated Blast Furnace Slag (GGBS/GGBFS,  
Or Slag Powder)

**USE** : Granulated Blast Furnace slag is used as a supplementary cementitious material in blended cements and hydraulic binder systems. It can also be used in glass making, as construction sand, in agriculture and for grit blasting

**Description** : A ground powder made with an appropriate mill from a glassy granular material formed when molten iron blast furnace slag is rapidly chilled as by immersion in water.

Hazchem Code : None allocated

### **2. PHYSICAL / CHEMICAL CHARACTERISTICS :**

<b>Boiling Point</b>	: N/A
<b>Specific Gravity (H<sub>2</sub>O=1)</b>	: 2.80-2.95
<b>Vapor Pressure (mm Hg)</b>	: N/A
<b>Melting Point</b>	: N/A
<b>Vapor Density (AIR-1)</b>	: N/A
<b>Evaporation Rate</b>	: N/A
<b>Solubility in Water</b>	: 0.1-0.5%
<b>Appearance &amp; Odor</b>	: Beige to white powder with traces of sulfur odor

### **3. REACTIVITY DATA :**

**Stability** : Stable

**Conditions to Avoid (Stability)** : Avoid moisture. Keep dry until used.

**Incompatibility** : None known.

**Hazardous Decomposition/Byproducts:** Respirable dust particles may be generated when the product is handled.

**Hazardous Polymerization** : Will not occur. No conditions to avoid

### **4. HEALTH HAZARDS:**

**Eye Contact:** Minor irritation to the eyes. Direct contact by larger amounts of material or splashes of wet material may cause effects ranging from moderate eye irritation to chemical burns and blindness.

**Inhalation:** Dusts may irritate the nose, throat, and respiratory tract. Coughing, sneezing, and shortness of breath may occur following exposures in excess of appropriate exposure limits.

**Skin Contact:** Exposure to dry material may cause drying of the skin with consequent Mild irritation. Dry material contacting wet skin or exposure to moist or Wet material may cause more severe skin effects including thickening, cracking or fissuring of the skin. Prolonged exposure can cause severe Skin damage in the form of (caustic) chemical burns.

**Ingestion:** Ingestion of large amounts may cause gastrointestinal irritation and Blockage.

## **5. EMERGENCY & FIRST AID PROCEDURES:**

**Eyes:** Immediately flush eye(s) with plenty of clean water for at least 15 minutes, while holding the eyelid(s) open. Beyond flushing, do not attempt to remove material from the eye(s). Contact a physician if irritation persists or later develops.

**Inhalation:** Remove to fresh air. Dust in throat and nasal passages should clear Spontaneously. Contact a physician if irritation persists or later develops.

**Skin:** Wash with cool water and a pH-neutral soap or mild detergent intended for use on skin. Seek medical treatment in all cases of prolonged direct Exposure to wet product or prolonged wet skin exposure to dry product.

**Ingestion:** Do not induce vomiting. If person is conscious, give large quantity of water. Get immediate medical attention.

## **6. PERSONAL PROTECTION AND CONTROL MEASURES :**

**Respiratory Protection:** When exposure levels exceed or are likely to exceed Appropriate exposure limits, follow MSHA or OSHA regulations, as appropriate, for use of NIOSH-approved respiratory protection equipment.

**Skin Protection:** Protective gloves, shoes and protective clothing that are Impervious to water should be worn to avoid contact with Skin.

**Eye Protection:** Safety glasses with side shields should be worn as Minimum protection. Dust goggles should be worn when Excessive (visible) dust conditions are present or Anticipated. Contact lenses should not be worn when Working with this product.

**Hygiene:** Periodically wash exposed skin with a pH-neutral soap. Wash again before eating, drinking, smoking, and using toilet facilities. Wash work clothes after each use. If clothing becomes saturated with wet material, it should be removed and replaced with clean, dry clothing.

## **7. STORAGE AND HANDLING PRECAUTIONS :**

**Respirable dust** may be generated during processing, handling, and storage. The personal Protection and controls identified in Section VII of the MSDS should be applied as Appropriate.

**Keep product** dry until used.

**Do not** store or handle near food and beverages or smoking materials.

**The personal protection and controls** identified in Section VII of the MSDS should be Applied as appropriate

**Steps to be taken if material is released or spilled:** Use dry clean-up methods that do not disperse dust into the air. Avoid actions that cause dust to become airborne. Avoid Inhalation of dust and contact with skin. Wear appropriate personal protective equipment. Scrape up wet material and place in an appropriate container. Allow the material to "dry" Before disposal.

**Waste Disposal Method:** Do not attempt to wash material down drains. Dispose of waste, Materials only in accordance with applicable federal, state, and local laws and regulations.

**Storage and Transport** : Transportation is by Rail or Ship in Bulk Form

**Fire /Explosion Hazard** : Not flammable. Does not Cause Dust Explosions

## **Contact Point**

**For further information on this product, contact:**

**SUPER CEMENT MANUFACTURING CO.L.L.C**

**MUSSAFAH , ABUDHABI**

**UAE**

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# BHUJ POLYMERS PVT. LTD.

Survey No. 339/1, Paiki-1, Village : Samaghogha, Tal. Mundra, Kutch. Pin. 370415.

E-mail : lokesh@bhujpolymers.com Mob.: +91 93774 74421, 75675 50553

## MATERIAL SAFETY DATA SHEET

### SECTION 1 – CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

**Product Name:** Zinc Wire

**Manufactured For:** BHUJ POLYMERS PVT LTD , SAMGHOGHA,MUNDRA,370415 GUJARAT,INDIA

### SECTION 2 –HAZARDS DATA

Under normal handling conditions the solid alloy presents no significant health hazards. Processing of the alloy by dust or fume producing operations (grinding, buffing, sawing, forging, cutting, welding, etc.) may result in the potential for exposure to airborne metal particulates or fume. The exposure levels in Section 2 are relevant to fumes or dusts.

#### Effects of Overexposure:

Acute exposure to Zinc dust or fume from welding can cause eyes, nose or throat; leave a metallic taste in the mouth; result in metal fume fever, or produce flu-like symptoms.

**Cadmium:** Loss of smell, ulceration of the nose, shortness of breath (emphysema), kidney damage, and mild anemia, also reported to cause an increased incident of cancer of the prostate in men

**Copper:** No chronic debilitating symptoms indicated.

**Iron:** Siderosis

**Lead:** Anemia, urinary dysfunction, metallic taste in mouth, weakness, constipation, nausea, nervous disorder

**Zinc:** Chromosomal anomalies in leukocytes reported. Arthritic, lameness and inflammation of the gastrointestinal tract reported from animal studies.

**Ingestion:** Ingestion of significant amounts of Zinc alloy are unlikely. Seek medical help if large quantities of product are ingested.

### SECTION 3 – COMPOSITION INFORMATION ON INGREDIENTS

Chemical Name	CAS #	% by Weight	OSHA (PEL) mg/m <sup>3</sup>	ACGIH (TLV) mg/m <sup>3</sup>
Zinc	7440-66-6	98-99.99	5.0 fume 10.0 dust	5.0 fume 10.0 dust
Cadmium	7440-43-9	0-.007	0.1 fume 0.2 dust	0.05 fume & dust
Copper	7440-50-8	0-.800	0.1 fume 1.0 dust	0.2fume 1.0 dust
Iron	7439-89-6	0-.013	10.0 fume & dust	5.0 fume
Lead	7439-92-1	0-.006	50.0ug/m3	0.15

### SECTION 4 – FIRST AID MEASURES

**Eyes:** Flush with plenty of water or saline for at least 15 minutes. Consult a physician if irritation persists.

**Skin:** Wash thoroughly with soap and water.

**Inhalation:** Remove to fresh air. Consult a physician if needed.

### SECTION 5 – FIRE FIGHTING MEASURES

**Flash Point:** N/A **Auto Ignition:** N/A **Flammability Limits:** N/A

**Flammable Properties:** There is no unusual fire and explosion hazard with this alloy. Small chips and dust from processing may ignite readily.

#### Fire/Explosion:

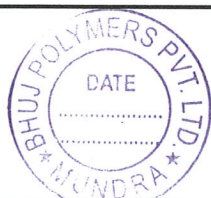
May be a potential hazard under the following conditions:

- ◊ dusts or fines dispersed in the air can be explosive
- ◊ Chips, fines, and dust in contact with water can generate violent reactions. These gases could present an explosion hazard in confined or poorly ventilated spaces
- ◊ Material may react with strong acids or alkaline materials
- ◊ Molten metal in contact with water/moisture or other strong acids or alkalines.

**Extinguishing Media:** Use fire fighting methods and materials that are appropriate for surrounding fire. Never use water as an extinguishing agent around molten metal. Water will react violently with any molten metal.

**Special Fire Fighting Procedures:** Do not use water in fighting fires around molten metal. Do not use halogenated extinguishing agents on small chips or fines. Fire fighters should wear NIOSH approved self-contained breathing apparatus and full protective clothing when appropriate.

Prepared by: BPPL



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10/30/2017



# BHUJ POLYMERS PVT. LTD.

Survey No. 339/1, Paiki-1, Village : Samaghogha, Tal. Mundra, Kutch. Pin. 370415.

E-mail : lokesh@bhujpolymers.com, Mob : +91 93774 74421, 75675 50553

## MATERIAL SAFETY DATA SHEET

### SECTION 6 – ACCIDENTAL RELEASE MEASURES

**Small/Large Spill:** Product is a non-hazardous solid. No special precautions are required for spills of bulk material. Scrap metal can be reclaimed for reuse. Follow Federal, State, and local regulations.

### SECTION 7 – HANDLING AND STORAGE

Product should be kept dry. This product is stable and non-hazardous at room temperature.

### SECTION 8 – EXPOSURE CONTROLS / PERSONAL PROTECTION

**Engineering Controls:** Use with adequate local exhaust ventilation to meet the limits listed in Section 2.

**Respiratory Protection:** Use NIOSH-approved respiratory protection (for dust and fume) if concentrations exceed the limits listed in Section 2.

**Eye Protection:** Use approved goggles for eye protection

**Skin Protection:** Wear gloves to avoid any skin injury.

#### Special Precautions and Comments:

Wet material should never be charged into a molten bath.

Eye protection should be used when cutting, grinding, machining, or buffing product.

Eye protection should also be used with any other process that generates dust, fumes, or chips. Dark glasses should be worn when metalizing.

Wash hands thoroughly after use, especially before eating.

### SECTION 9 – PHYSICAL DATA

<b>Boiling Point (F):</b>	1665°F	<b>Specific Gravity (water=1):</b>	7.14
<b>Melting Point:</b>	788 °F	<b>Vapor Pressure</b>	N/A
<b>Vapor Density (air=1):</b>	N/A	<b>Solubility in Water:</b>	Insoluble
<b>Physical Description:</b>	BluishWhite Wire – No odor	<b>Specific Gravity (water=1):</b>	N/A
<b>Evaporation Rate:</b>	N/A		

### SECTION 10 – STABILITY AND REACTIVITY DATA

**Stability:** Stable under normal conditions of use, storage, and transportation as shipped. Chips, fines, dust and molten metal are considerable more reactive with the following:

- Water: slowly generates flammable/explosive hydrogen gas and heat. Generation rate is greatly increased with smaller particles (e.g., fines and dusts)
- Acids and alkalis: Reacts to generate flammable/explosive hydrogen gas. Generation rate is greatly increased with smaller particles (e.g., fines and dusts).
- Halogenated compounds: Many halogenated hydrocarbons, including halogenated fire extinguishing agents, can react violently with finely divided zinc

### SECTION 11–TOXICOLOGICAL INFORMATION

Not Available

### SECTION 12–ECOLOGICAL INFORMATION

**Ecotoxicity:** data not available. **Environmental Fate:** not available

### SECTION 13–DISPOSAL CONSIDERATIONS

**Waste Disposal Method:** Dispose of according to federal, state, and local regulations.

Collect scrap for remelting and recycling. To maintain metal purity, it may be desirable to segregate this scrap from other alloys.

RCRA Status: characterize in accordance with 40 CFR 261 or state equivalent.

### SECTION 14–TRANSPORTATION INFORMATION

**US DOT:** Not regulated- enter the proper freight classification, MSDS number, and Product name on the shipping paperwork

### SECTION 15 – OTHER INFORMATION

**MSDS LEGEND:** CAS = Chemical Abstracts Service Registry Number

Ceiling Limit = Ceiling Limit (15 minutes).

OSHA = Occupational Safety and Health Administration.

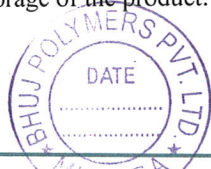
TLV = Threshold Limit Value (ACGIH).

ACGIH = American Conference of Governmental Industrial Hygienists.

The information for this MSDS was obtained from sources we believe are reliable. However, this information is provided without any representation or warranty, expressed or implied, regarding accuracy and correctness. The conditions or methods of handling, storage, use and disposal of the product area beyond our control and may be beyond our knowledge. For this and other reasons we do not assume responsibility and expressly disclaim liability or loss, damage or expense arising from it or in any way connected with the handling, use and storage of the product. Such vendees or users assume all risks associated with the use of the material.

Prepared by: BPPL

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10/30/2017



# PRODUCT DATA SHEET

## COMPANY PROFILE

M/s. Bhuj Polymers Pvt Ltd. was founded year 2012 for the purpose of manufacturing superior quality pure zinc wires.

The location of the plant was selected due to its close proximity to Mundra Port & Serval Ductile Iron Pipes Manufacturers.

We had a humble beginning during which we were manufacturing around 500 MT/ annum, owing to our hard work and dedication we now have an installed capacity of over 6000MT/annum & have the zeal to go further.

Our self-designed & developed rolling process ensures highest quality zinc wire with consistent results. With a team of skilled professional we are able to cater to our clients every need and provide them with customized solutions as well.

## PRODUCTS

Our Zinc wires are manufactured from Special High Grade (SHG) zinc ingots with purity of 99.995 % pure zinc.

We manufacture zinc wires from 1.2mm - 4.76mm as our standard product. Other sizes available on request.

Packaging in fibre drums, steel drums, plastic spool or loose coils as per customer requirement.



## PHYSICAL PROPERTIES

Density : 7.14 g/cm<sup>3</sup>

Melting Point : 419.5°C

## CHEMICAL COMPOSITION

Pb	Cd	Sn	Cu	Fe	Zn
max. 0.005%	max. 0.005%	max. 0.001%	max. 0.002%	max.0.003%	Rest

## MECHANICAL PROPERTIES

We manufacture Zinc Wires conforming to IS 12447 (1988) and ATSM B833-13

Tensile Strength :- 100-120 MPa

Yield Strength :- 40-70 MPa

Elongation:- Minimum 40%



# BHUJ POLYMERS PVT. LTD.

Specializing in Zinc Wires

Factory : S.No. 339/1, Paiki 1, Vill. Samaghogha Taluka Mundra (Gujarat)

Contact : 9377474421, 9416088145 | E-mail : lokesh@bhujpolymers.com

# MATERIAL SAFETY DATA SHEET

## 1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

**Product Name:** Deep Seal Liquid Epoxy Paint

**Chemical Description:** Two pack epoxy paint cured with polyamide

**Manufacturer/ Supplier:** Deep Industries

**Office:** 264, GIDC-II, Dediyaan, Mehsana, Gujarat, India

Phone: +91 2762 224359, Fax: +91 2762 247601

**Plant:** Nr. Adhoi Crossing, NH -15, Samakhiyali, Kutch, Gujarat, India.

Phone: 91 2837 283824-25, Fax 91 2837 283823

## 2. COMPOSITION / INFORMATION ON INGREDIENTS:

Substance Chemical family: Mixture of Epoxy Resin, solvents, polyamides, Pigments and Fillers.

Common name: liquid Epoxy Paint

CAS number: 25068-38-6

## 3. HAZARDS IDENTIFICATION

### EMERGENCY OVERVIEW

**Odor, Color, Grade:** Blue Liquid

**General Physical Form:** Liquid

**Immediate health. Physical, and environmental hazards:** Closed containers Exposed to heat from fire may build pressure and explode. Vapors may travel long distance along the ground or floor to an ignition source and flash back. May cause chemical eye burns. May cause allergic skin reaction. May cause chemical skin burns. May cause chemical gastrointestinal burns. May cause allergic respiratory reaction. Contains a chemical or chemicals, which can cause cancer. May cause target organ effects. Contains a chemical or chemicals, which can cause birth defects or other reproductive harm.

### POTENTIAL HEALTH EFFECTS

**Eye Contact:** Corrosive (Eye Burns): Signs/symptoms may include cloudy appearance of the cornea, chemical burns, severe pain, and blistering, tearing, ulcerations, significantly impaired vision or complete loss of vision.

**Skin Contact:** Corrosive (skin Burns): Signs/symptoms may include localized redness, swelling, blistering, ulcerations, and tissue destruction.

Allergic Skin Reaction (non-photo induced): Signs/symptoms may include redness, swelling, blistering, and itching.

May be harmful if absorbed through skin.

May be absorbed through skin and cause target organ effects.

**Inhalation:** Respiratory Tract Irritation: Signs/symptoms may include Cough, sneezing nasal discharge, headache, hoarseness, and nose and throat pain.

Allergic Respiratory Reaction: Signs/symptoms may include difficulty breathing, wheezing, cough, and tightness of chest. During grinding, scraping, sanding:

Silicosis: Signs/symptoms may include breathlessness, weakness, chest pain,

Persistent cough, increased amounts of sputum, and heart disease.

Pneumoconiosis: Signs/symptoms may include persistent cough, breathlessness,

Chest pain, increased amounts of sputum, and changes in lung function tests.

May be absorbed following inhalation and target organ effects.



**Ingestion:**

Gastrointestinal Corrosion: Signs/symptoms may include server mouth, throat and abdominal pain; nausea; vomiting; and diarrhea; blood in the feces and/or vomit us may also be seen. May be absorbed following inhalation and cause target organ effects.

**Target Organ Effects:**

Central Nervous System (CNS) Depression: Signs/symptoms may include headache, dizziness, drowsiness, in coordination, nausea, slowed reaction time, slurred speech, giddiness, and unconsciousness.

Persons previously sensitized to amines may develop a cross-sensitization reaction to certain other amines.

Prolonged exposure may cause;

Liver Effects: Signs/symptoms may include loss of appetite, weight loss, fatigue, weakness, abdominal tenderness and jaundice.

Blood Effect: Signs/symptoms may include generalized weakness and fatigue, skin pallor; changes in blood clotting time, internal bleeding, and/or Hemoglobinemia.

Kidney/Bladder Effects: Signs/symptoms may include changes in urine production; abdominal or lower back pain, increased protein in urine, increased blood urea nitrogen (BUN), blood in urine, and painful urination.

Contains a chemical or chemicals, which can cause birth defects or other reproductive harm.

**4. FIRST AID MEASURES****FIRST AID PROCEDURES**

The following first aid recommendations are based on an assumption that appropriate personal and industrial hygiene practices are followed.

**Eye Contact:** Immediately flush eyes with large amounts of water for at least 15 minutes. Get immediate medical attention.

**Skin Contact:** Remove contaminated clothing and shoes. Immediately flush skin with large amounts of water for at least 15 minutes. If signs/symptoms develop, get medical attention. Wash contaminated clothing and clean shoes before reuse.

**Inhalation:** Remove person to fresh air. If signs/symptoms develop, get medical attention.

**If Swallowed:** Do not induce vomiting. Give victim two glasses of water. Never give anything by mouth to an unconscious person. Get immediate medical attention.

**5. FIRE FIGHTING MEASURES**

Specific hazards: Not classified, as flammable but will burn. Carbon monoxide may be evolved if incomplete combustion occurs.

Extinguishing media –small fires: Dry chemical powder, carbon dioxide, foam, water spray fog, sand or earth.

Extinguishing media –large fires : Foam, water spray or fog.

Unsuitable extinguishing media : Water in a jet.

Protective equipment : Full protective clothing and self-contained breathing apparatus.

Other information : keep adjacent containers cool by spraying with water.

**PROTECTION OF FIRE FIGHTERS**

**Special Fire Fighting Procedures:** water may not effectively fire, it should be used to keep fire-exposed containers and surfaces cool and prevent explosive rupture. Wear full protective equipment (Bunker Gear) and a self-contained breathing apparatus (SCBA)

**Unusual fire and Explosion Hazards:** Closed containers exposed to heat from fire may build pressure and explode. Vapors may travel long distances along the ground or floor to an ignition and flash back.

Note: See STABILITY AND REACTIVITY (SECTION 10) for hazardous and thermal decomposition information.

## **6. ACCIDENTAL RELEASE MEASURES**

Accidental Release Measures: Observe precautions from other sections. Evacuate unprotected and untrained personnel from hazard area. Qualified personnel should clean up the spill. Ventilate the area with fresh air. For large spill, or spill in confined spaces, provide mechanical ventilation to disperse or exhaust vapors in accordance with good industrial hygiene practice. Warning, a motor could be an ignition source and could cause flammable gases or vapors in the spill area to burn or explode. Contain spill. For larger spills. For larger spills cover drains and build dikes to prevent entry into sewer systems or bodies of water. Workings from around the edges of the spill inward, covers with detonate vermicide, or commercially available inorganic absorbent material. Mix in sufficient absorbent until it appears dry. Clean up residue with an appropriate solvent selected by a qualified and authorized person. Ventilate the area with fresh air. Read and follow safety precautions on the label and MSDS. Collect the resulting residue containing solution. Place

In a closed container approved for transportation authorities. Dispose of collect material as soon as possible.

**In the event of a release of this material, the user should determine if the release qualifies as reportable according to local, state, and federal regulations.**

## **7. HANDLING AND STOREGE**

### **HANDLING**

Do not eat, drink or smoke when using this product. Wash exposed areas thoroughly with soap and water. Keep away from heat, spark, open flame, pilot lights and other sources of ignition. No smoking while handling this material. Avoid breathing of vapors, mists or spray. Avoid breathing of vapors created during cure cycle. Avoid eye contact with vapors, mists, or spray. Avoid breathing of dust created by cutting, sending or machining. Do not breathe vapors. Avoid eye contact with dust or airborne particles. Avoid skin contact. For industrial or professional use only. Keep out of he reach of children.

### **STORAGE**

Store away from heat. Store out of direct sunlight. Keep container tightly closed.

## **8. EXPOSURE CONTROLS/PERSONAL PROTECTION**

### **ENGINEERING CONTROLS**

Provide local exhaust ventilation at transfer points. Provide ventilated enclosure for heat curing. Provide appropriate local exhaust foe cutting, grinding, sending or machining. Curing enclosures must be exhausted to out door or to a suitable emission control device. Do not use in a confined area or areas with little or no air movement. Use general dilution ventilation to control airborne exposures to below occupational exposure limits and/or control mist, vapor, or spray. If ventilation is not adequate, use respiratory protection equipment.

### **PERSONAL PROTECTIVE EQUIPMENT (PPE)**

#### **Eye/Face protection**

Avoid eye contact with vapors, mists, or spray.

#### **Avoid Skin Contact**

Select and use gloves and//or protective clothing to prevent skin contact based in the result of an exposure assessment. Consult with your gloves made from the following material(s) are recommended: Neoprene, Nitrile Rubber.

#### **Respiratory Protection**

Avoid breathing of vapors, mists or spray. Avoid breathing of vapors created during cure cycle. Avoid breathing of dust created by cutting, sanding, grinding or machining. Do not breath vapors.

#### **Prevention of swallowing**

Do not eat, drink or smoke when using this product. Wash exposed areas thoroughly with soap and water.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

Physical state	: Liquid
Colour	: Blue
Mixing ratio	: Base: hardener by volume 3:1
Flash Point	: above 25 <sup>o</sup> C
Consistency	: Smooth and uniform
Finish	: Semi gloss
Water Solubility	: Insoluble.

## 10. STABILITY AND REACTIVITY

Stability: Stable.

Materials and conditions to Avoid: Spark and/or flames; Combustibles; Heat; High shear and high temperature conditions; Strong acids; Strong bases

Hazardous Polymerization: Hazardous polymerization will not occur.

## 11. TOXICOLOGICAL INFORMATION

Basis for assessment : Information given is based on Product data.

Acute toxicity –oral : LD 50 > 1000mg/kg

Acute toxicity –dermal : LD 50 > 1000mg/kg

Eye irritation : Irritant

Skin irritation : Irritant

Respiratory irritation : Not irritating

Skin sensitization : Skin sensitizer

## 12. ECOLOGICAL INFORMATION

Basis for assessment : Incomplete Eco toxicological data are available for the substance.

Mobility : Soluble in water.

Persistence / degradability: Not readily biodegradable.

Bioaccumulation : Has the potential to bioaccumulate.

## 13. DISPOSAL CONSIDERATIONS

Precautions : Disposal must be in accordance with local and national legislation.

Waste disposal : Recover or recycle if possible. Otherwise incineration or dispose of in accordance with all applicable local and national regulations.

Product disposal: Recover or recycle if possible. Otherwise incineration or dispose of in accordance with all applicable local and national regulations.

Container disposal: Drain container thoroughly. Rinse three times with suitable solvent. Treat residue as for product disposal after draining vent in a safe place away from sparks and fire. Otherwise incineration or dispose of in accordance with all applicable local and national regulations.

#### 14. TRANSPORT INFORMATION

DOT CFR 172.101 Data: Environmentally hazardous substance, liquid  
UN proper shipping name: Environmentally hazardous substance, liquid  
UN class : 9  
UN Number : UN3082  
UN packaging group: III  
Classification for Air: Consult current IATA regulations prior to shipping by air.

#### 15. REGULATORY INFORMATION

##### Label information

label name : Epoxy Paint  
Classification : Irritant  
Symbols : X, N  
Risk phrases : Irritating to eyes and skin.  
May causes sensitization by skin contact.

Safety phrases : Avoid contact with skin. In case of contact with eyes rinse immediately with plenty of water and seek medical advice. After contact with skin wash plenty of soap and water Wear suitable gloves and eye/face protection. Avoid release to the environment. Refer to special instruction/safety data Sheets.

#### 16. OTHER INFORMATION

Uses: Recommended for use as paint in interior coating in steel pipes and fitting for the conveyance of non corrosive gas.

The information and recommendations presented in this MSDS are based on sources believed to be accurate. Deep Industries, assumes no liability for the accuracy or completeness of this information. It is the user's responsibility to determine the suitability of the material for their particular purposes. In particular, we make No warranty of Merchantability or any other warranty, with respect to such information and we assume no liability resulting from its use. Users should ensure that any use or disposal of the materials is in accordance federal, state and local laws and regulations.

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## DEEP INDUSTRIES

(Development, manufacture and supply of Construction Chemicals, Resins and Paints)

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## DEEP SEAL LIQUID EPOXY PAINT



### WATER REGULATIONS ADVISORY SCHEME, UK

#### Scope

A two pack high performance anti corrosive self priming food grade liquid epoxy paint having good chemical resistance coupled with decorative appeal. The product possesses good flexibility, adhesion, oil resistance, water resistance, etc. The product meets specification requirements of BS 6920.

#### Uses

Recommended for anti corrosive application on MS Pipeline, DI Pipeline, suitably primed steel structure exposed to chemical and industrial environment in fertilizer, refineries, petrochemicals, paper and pulp plants, LPG tank, food and pharmaceutical, concrete surface & steel plant. It can also be applied directly on bare steel surfaces.

#### Product data

Type	:	Two packs, cured with amine adduct.
Composition	:	Liquid epoxy suitably pigmented along with amine adduct
Mixing Ratio	:	Base: activator: 3:1 by Volume
Pot Life	:	2 Hours.
Application	:	Brush, roller, airless or conventional spray
Recommended DFT	:	80-250 microns per coats as per specification requirements
Theoretical Spreading rate	:	3-5 sqmt/Ltr (depending on surface and required DFT)
Drying time	:	Touch : Within 30 Minutes Hard : Over Night
Shelf life	:	1 year
Full Curing Time	:	7 days
Over coating interval	:	Min: Overnight Max: 5 days
Flash Point	:	above 25°C
Colour	:	Blue, Red, White, Grey
Packing	:	20, 200 Ltr metal drum
Thinner	:	Epoxy Thinner
Finish	:	Smooth and eggshell

### **STORAGE LIFE**

Up to twelve months as long as the sealed containers are kept under cover in a dry place under normal temperature conditions.

### **SURFACE PREPARATION**

Remove grease, oil & other contaminants preferably by using Deep degreasing solvent. Blast cleans to a minimum of SA 2½ Swedish standard SIS 055900 with a surface profile not exceeding 65 microns.

If blasting is not practical, make full use of mechanical tools along with manual chipping and wire brushing to remove loose rust and scale to St. 2 Swedish standard SIS 05 5900. Excessive burnishing of steel is to be avoided. Thoroughly dust down all surfaces. Best results can be achieved if the manually cleaned surface is primed with protect mastic – Self priming surface tolerant coating; otherwise treatment with Deep Metal Conditioning Solution will also produce satisfactory results.

The surface should clean and dry before application of appropriate primer coat.

### **APPLICATION**

Stir base part thoroughly and than mix three parts base and one-part catalyst by volume to uniform consistency.

Brush / Roller: Apply without thinning. However, if required during applications add maximum up to 5 % thinner.

**Conventional Spray:** Add up to 10% epoxy thinner depending on conditions. Use any standard equipment at an atomizing pressure of 3.5-4.2 Kg/cm<sup>2</sup>.

**Airless Spray:** Apply preferably without any thinning. However, upto 10 % thinner may be added if absolutely essential depending on conditions. Use any standard equipment having pump ration 30:1 Tip size 0.33 - 0.38 mm. Tip Pressure 110-140 Kg/cm<sup>2</sup>.

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**CONSULT OUR TECHNICAL SERVICE DEPARTMENT INCASE OF ANY DIFFICULTY OR FOR TECHNICAL ASSISTANCE.**

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