

MILL TEST CERTIFICATE OF STEEL PLATES FOR PRESSURE VESSELS USED AT MODERATE AND LOW TEMPERATURE

Test Certificate No. 0000068495

Date : 09.12.2016

To, **M/s SHAH BROTHERS ISPAT PRIVATE LIMITED CHENNAI**
PRABHAKARAN GODOWN COMPLEX,PLOT NO.1 TO 5,SAKTHIVEL NAGAR,,CHENNAI,PIN-600066Tamil
Nadu

Page 1 of 8

It is certified that the material described below fully conforms to IS 2041:2009. Chemical composition and mechanical properties of the product as tested in accordance with the Scheme of Testing and Inspection contained in the BIS certification marks license No. CM/L0005719579 are as indicated below against each plate number. (Please refer to IS 2041:2009 for specification requirements).Dimensional tolerance conforms to IS/ISO 7452.

TEST RESULTS

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling

Supply Condition:FURNACE NORMALIZED
Deoxidation : Fully Killed

Material Grade : IS2041 R260/ASME SA516 GR70 Plate Dimension -Thickness x Width x Length : 10.00mm x 2500mm x 12000mm																								
Heat No	Plate No	No.of Pcs	Wt. (MT)	Analysis L/P	Chemical Analysis																			
					%C	%Mn	%S	%P	%Si	%Cr	%Ni	%Cu	%Ti	%V	%Nb	%Mo	%Al	N (PPm)	%Ca	%B	Nb+V+T	Cr+Cu+Mo	Al/N	CE **
A63052/09D0		1	2.500	L	0.16	1.46	0.003	0.016	0.31	0.011	0.005	0.005	0.004	0.002	0.023	0.0004	0.027	51	0.0012	0.0006	0.029	0.0164	5.2941	0.40
A63052/09D0				P	0.15	1.44	0.002	0.015	0.30	0.009	0.006	0.006	0.003	0.001	0.025	0.0010	0.025	53	0.0010	0.0005	0.029	0.016	4.717	0.39
Sub Total		1	2.500																					

Mechanical properties:

				Tensile test			Bend Test	Charpy V-notch impact test @-46 °C (Joules)				Elevated Temp Tensile Test	Ultrasonic Test	Hardness
Heat No	Plate No	No.of Pcs.	Wt. MT	Orientation : Transverse ,Tested at ambient temp.			Orientaation : L				@ °C	As per	Unit	
	No			YS (MPa)	UTS (MPa)	%EL *	Mand (1.5 T)	1	2	3	Avg	YS (MPa)	ASME SA-578 L-B	BHN
A63052/09D0		1	2.500	308	532	30	OK	169	178	177	174.66		Satisfactory	158

Material Grade : IS2041 R260/ASME SA516 GR70 Plate Dimension -Thickness x Width x Length : 12.00mm x 2500mm x 12000mm																								
Heat No	Plate No	No.of Pcs	Wt. (MT)	Analysis L/P	Chemical Analysis																			
					%C	%Mn	%S	%P	%Si	%Cr	%Ni	%Cu	%Ti	%V	%Nb	%Mo	%Al	N (PPm)	%Ca	%B	Nb+V+T	Cr+Cu+Mo	Al/N	CE **
A63054/02D0		1	2.980	L	0.15	1.45	0.002	0.014	0.32	0.010	0.005	0.005	0.004	0.002	0.022	0.0010	0.026	54	0.0011	0.0005	0.028	0.016	4.8148	0.39
A63054/02D0				P	0.15	1.43	0.001	0.013	0.30	0.009	0.006	0.006	0.003	0.003	0.021	0.0010	0.025	58	0.0010	0.0004	0.027	0.016	4.3103	0.39
A63054/05A0		1	2.980	L	0.15	1.45	0.002	0.014	0.32	0.010	0.005	0.005	0.004	0.002	0.022	0.0010	0.026	54	0.0011	0.0005	0.028	0.016	4.8148	0.39
A63054/05A0				P	0.15	1.43	0.001	0.013	0.30	0.009	0.006	0.006	0.003	0.003	0.021	0.0010	0.025	58	0.0010	0.0004	0.027	0.016	4.3103	0.39

The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions

Purchase Order No. & Date: 45 01.12.2016
 Despatch Advice No: 61627191
 Truck/Wagon No. ECR62970
 * Gauge Length: REFER REMARKS
 **CE=C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15

Prepared by SANGRAM_APLATE
 Preparation Date :09.12.2016 05:34:33
 Printing Date 09.02.2017 & Time 10:08:10


Authorised Signatory
QA/QC PlateMill

For, JINDAL STEEL & POWER LIMITED

MILL TEST CERTIFICATE OF STEEL PLATES FOR PRESSURE VESSELS USED AT MODERATE AND LOW TEMPERATURE

Test Certificate No. 0000068495

Date : 09.12.2016

To, **M/s SHAH BROTHERS ISPAT PRIVATE LIMITED CHENNAI**
PRABHAKARAN GODOWN COMPLEX,PLOT NO.1 TO 5,SAKTHIVEL NAGAR,,CHENNAI,PIN-600066Tamil
Nadu

Page 2 of 8

It is certified that the material described below fully conforms to IS 2041:2009. Chemical composition and mechanical properties of the product as tested in accordance with the Scheme of Testing and Inspection contained in the BIS certification marks license No. CM/L0005719579 are as indicated below against each plate number. (Please refer to IS 2041:2009 for specification requirements).Dimensional tolerance conforms to IS/ISO 7452.

TEST RESULTS

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling

Supply Condition:FURNACE NORMALIZED
Deoxidation : Fully Killed

Plate No.	Thickness	Width	Length	Orientation	YS (MPa)	UTS (MPa)	%EL	%Mn	%S	%P	%Si	%Cr	%Ni	%Cu	%Ti	%V	%Nb	%Mo	%Al	N (PPm)	%Ca	%B	Nb+V+T	Cr+Cu+Mo	Al/N	CE **	
A63054/05B0	1	2.980	L	0.15	1.45	0.002	0.014	0.32	0.010	0.005	0.005	0.004	0.002	0.022	0.0010	0.026	54	0.0011	0.0005	0.028	0.016	4.8148	0.39				
A63054/05B0			P	0.15	1.43	0.001	0.013	0.30	0.009	0.006	0.006	0.003	0.003	0.021	0.0010	0.025	58	0.0010	0.0004	0.027	0.016	4.3103	0.39				
A63054/08A0	1	2.980	L	0.15	1.45	0.002	0.014	0.32	0.010	0.005	0.005	0.004	0.002	0.022	0.0010	0.026	54	0.0011	0.0005	0.028	0.016	4.8148	0.39				
A63054/08A0			P	0.15	1.43	0.001	0.013	0.30	0.009	0.006	0.006	0.003	0.003	0.021	0.0010	0.025	58	0.0010	0.0004	0.027	0.016	4.3103	0.39				
Sub Total	4	11.920																									

Mechanical properties:

Heat No	Plate No	No.of Pcs.	Wt. MT	Tensile test				Bend Test	Charpy V-notch impact test @-46 °C (Joules)				Elevated Temp Tensile Test @ °C	Ultrasonic Test	Hardness
				Orientation : Transverse ,Tested at ambient temp.					Orientaion : L						
				YS (MPa)	UTS (MPa)	%EL	*	Mand (1.5 T)	1	2	3	Avg	YS (MPa)	ASME SA-578 L-B	BHN
A63054/02D0		1	2.980	312	542	31		OK	182	172	174	176.00		Satisfactory	159
A63054/05A0		1	2.980	316	544	29		OK	189	186	179	184.66		Satisfactory	159
A63054/05B0		1	2.980	316	544	29		OK	189	186	179	184.66		Satisfactory	159
A63054/08A0		1	2.980	316	546	30		OK	186	176	179	180.33		Satisfactory	159

Material Grade : IS2041 R260/ASME SA516 GR70 Plate Dimension -Thickness x Width x Length : 14.00mm x 2500mm x 12000mm

Heat No	Plate No	No.of Pcs	Wt. (MT)	Analysis L/P	Chemical Analysis																				
					%C	%Mn	%S	%P	%Si	%Cr	%Ni	%Cu	%Ti	%V	%Nb	%Mo	%Al	N (PPm)	%Ca	%B	Nb+V+T	Cr+Cu+Mo	Al/N	CE **	
A63051/11B0		1	3.440	L	0.16	1.45	0.002	0.012	0.31	0.014	0.006	0.006	0.004	0.002	0.023	0.0006	0.024	46	0.0015	0.0006	0.029	0.0206	5.2174	0.40	
A63051/11B0				P	0.17	1.47	0.001	0.010	0.30	0.011	0.005	0.005	0.002	0.002	0.021	0.0010	0.026	44	0.0012	0.0005	0.025	0.017	5.9091	0.41	
Sub Total		1	3.440																						

The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions

Purchase Order No. & Date: 45 01.12.2016
 Despatch Advice No: 61627191
 Truck/Wagon No. ECR62970

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 Preparation Date :09.12.2016 05:34:33
 Printing Date 09.02.2017 & Time 10:08:10



For, JINDAL STEEL & POWER LIMITED

* Gauge Length: REFER REMARKS
 **CE=C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15

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Test Certificate No. 0000068495

Date : 09.12.2016

To, **M/s SHAH BROTHERS ISPAT PRIVATE LIMITED CHENNAI**
PRABHAKARAN GODOWN COMPLEX,PLOT NO.1 TO 5,SAKTHIVEL NAGAR,,CHENNAI,PIN-600066Tamil
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TEST RESULTS

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling

Supply Condition:FURNACE NORMALIZED
Deoxidation : Fully Killed

Mechanical properties:

Heat No	Plate No	No.of Pcs.	Wt. MT	Tensile test			Bend Test	Charpy V-notch impact test @-46 °C (Joules)				Elevated Temp Tensile Test	Ultrasonic Test	Hardness
				Orientation : Transverse ,Tested at ambient temp.				Orientaation : L				@ °C	As per	Unit
				YS (MPa)	UTS (MPa)	%EL *	Mand (1.5 T)	1	2	3	Avg	YS (MPa)	ASME SA-578 L-B	BHN
A63051/11B0		1	3.440	320	544	31	OK	154	140	147	147.00		Satisfactory	160

Material Grade : IS2041 R260/ASME SA516 GR70 Plate Dimension -Thickness x Width x Length : 16.00mm x 2000mm x 12000mm

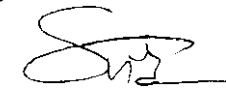
Heat No	Plate No	No.of Pcs	Wt. (MT)	Analysis L/P	Chemical Analysis																			
					%C	%Mn	%S	%P	%Si	%Cr	%Ni	%Cu	%Ti	%V	%Nb	%Mo	%Al	N (PPm)	%Ca	%B	Nb+V+T	Cr+Cu+Mo	Al/N	CE **
A63055/02D0		1	3.170	L	0.16	1.45	0.003	0.015	0.32	0.012	0.007	0.006	0.003	0.001	0.022	0.0004	0.025	55	0.0010	0.0005	0.026	0.0184	4.5455	0.40
A63055/02D0				P	0.15	1.42	0.002	0.016	0.30	0.010	0.006	0.005	0.004	0.002	0.023	0.0010	0.023	58	0.0007	0.0004	0.029	0.016	3.9655	0.39
A63055/03B0		1	3.170	L	0.16	1.45	0.003	0.015	0.32	0.012	0.007	0.006	0.003	0.001	0.022	0.0004	0.025	55	0.0010	0.0005	0.026	0.0184	4.5455	0.40
A63055/03B0				P	0.15	1.42	0.002	0.016	0.30	0.010	0.006	0.005	0.004	0.002	0.023	0.0010	0.023	58	0.0007	0.0004	0.029	0.016	3.9655	0.39
A63055/03D0		1	3.170	L	0.16	1.45	0.003	0.015	0.32	0.012	0.007	0.006	0.003	0.001	0.022	0.0004	0.025	55	0.0010	0.0005	0.026	0.0184	4.5455	0.40
A63055/03D0				P	0.15	1.42	0.002	0.016	0.30	0.010	0.006	0.005	0.004	0.002	0.023	0.0010	0.023	58	0.0007	0.0004	0.029	0.016	3.9655	0.39
Sub Total		3	9.510																					

Mechanical properties:

The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions

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 Truck/Wagon No. ECR62970

Prepared by SANGRAM APLATE
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Authorised Signatory
QA/QC PlateMill
For, JINDAL STEEL & POWER LIMITED

* Gauge Length: REFER REMARKS
 **CE=C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15

Legends: YS:Yield Strength,UTS:Ultimate Tensile Strength,%EL:% Elongation,L:Ladle,P:Product,MPa:Mega Pascal,S0: Original Cross sectionl area,Temp.:Temperature, Wt.:Weight,Pcs.:Pieces,TDC: Technical Delivery Condition,Doc: Document,EAF:Electric arc furnace,LRF: Ladle refining furnace,CCM: Continuous casting machine,RHF: Reheating furnace,VD: Vaccum degassing.

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TEST RESULTS

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling

Supply Condition:FURNACE NORMALIZED
Deoxidation : Fully Killed

		Tensile test					Bend Test	Charpy V-notch impact test @-46 °C (Joules)				Elevated Temp Tensile Test	Ultrasonic Test	Hardness
Heat No	Plate No	No.of Pcs.	Wt. MT	Orientation : Transverse ,Tested at ambient temp.				Orientaiaon : L				@ °C	As per	Unit
				YS (MPa)	UTS (MPa)	%EL *	Mand (1.5 T)	1	2	3	Avg	YS (MPa)	ASME SA-578 L-B	BHN
A63055/02D0		1	3.170	314	544	29	OK	156	165	174	165.00		Satisfactory	162
A63055/03B0		1	3.170	309	539	31	OK	174	166	172	170.66		Satisfactory	162
A63055/03D0		1	3.170	309	539	31	OK	174	166	172	170.66		Satisfactory	162

Material Grade : IS2041 R260/ASME SA516 GR70 Plate Dimension -Thickness x Width x Length : 16.00mm x 2500mm x 12000mm

Heat No	Plate No	No.of Pcs	Wt. (MT)	Analysis L/P	Chemical Analysis																			
					%C	%Mn	%S	%P	%Si	%Cr	%Ni	%Cu	%Ti	%V	%Nb	%Mo	%Al	N (PPm)	%Ca	%B	Nb+V+T	Cr+Cu+Mo	Al/N	CE **
A63054/13A0		1	3.920	L	0.15	1.45	0.002	0.014	0.32	0.010	0.005	0.005	0.004	0.002	0.022	0.0010	0.026	54	0.0011	0.0005	0.028	0.016	4.8148	0.39
A63054/13A0				P	0.15	1.43	0.001	0.013	0.30	0.009	0.006	0.006	0.003	0.003	0.021	0.0010	0.025	58	0.0010	0.0004	0.027	0.016	4.3103	0.39
A63054/15B0		1	3.920	L	0.15	1.45	0.002	0.014	0.32	0.010	0.005	0.005	0.004	0.002	0.022	0.0010	0.026	54	0.0011	0.0005	0.028	0.016	4.8148	0.39
A63054/15B0				P	0.15	1.43	0.001	0.013	0.30	0.009	0.006	0.006	0.003	0.003	0.021	0.0010	0.025	58	0.0010	0.0004	0.027	0.016	4.3103	0.39
A63054/21A0		1	3.920	L	0.15	1.45	0.002	0.014	0.32	0.010	0.005	0.005	0.004	0.002	0.022	0.0010	0.026	54	0.0011	0.0005	0.028	0.016	4.8148	0.39
A63054/21A0				P	0.15	1.43	0.001	0.013	0.30	0.009	0.006	0.006	0.003	0.003	0.021	0.0010	0.025	58	0.0010	0.0004	0.027	0.016	4.3103	0.39
A63054/22A0		1	3.920	L	0.15	1.45	0.002	0.014	0.32	0.010	0.005	0.005	0.004	0.002	0.022	0.0010	0.026	54	0.0011	0.0005	0.028	0.016	4.8148	0.39
A63054/22A0				P	0.15	1.43	0.001	0.013	0.30	0.009	0.006	0.006	0.003	0.003	0.021	0.0010	0.025	58	0.0010	0.0004	0.027	0.016	4.3103	0.39
A63054/23A0		1	3.920	L	0.15	1.45	0.002	0.014	0.32	0.010	0.005	0.005	0.004	0.002	0.022	0.0010	0.026	54	0.0011	0.0005	0.028	0.016	4.8148	0.39
A63054/23A0				P	0.15	1.43	0.001	0.013	0.30	0.009	0.006	0.006	0.003	0.003	0.021	0.0010	0.025	58	0.0010	0.0004	0.027	0.016	4.3103	0.39
A63054/23B0		1	3.920	L	0.15	1.45	0.002	0.014	0.32	0.010	0.005	0.005	0.004	0.002	0.022	0.0010	0.026	54	0.0011	0.0005	0.028	0.016	4.8148	0.39

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 Despatch Advice No: 61627191
 Truck/Wagon No. ECR62970

Prepared by SANGRAM_APLATE
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Authorised Signatory
QA/QC PlateMill

For, JINDAL STEEL & POWER LIMITED

* Gauge Length: REFER REMARKS
 **CE=C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15

Legends: YS:Yield Strength,UTS:Ultimate Tensile Strength,%EL:% Elongation,L:Ladle,P:Product,MPa:Mega Pascal,S0: Original Cross sectionl area,Temp.:Temperature, Wt.:Weight,Pcs.:Pieces,TDC: Technical Delivery Condition,Doc: Document,EAF:Electric arc furnace,LRF: Ladle refining furnace,CCM: Continuous casting machine,RHF: Reheating furnace,VD: Vaccum degassing.

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To, **M/s SHAH BROTHERS ISPAT PRIVATE LIMITED CHENNAI**
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TEST RESULTS

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**Supply Condition:FURNACE NORMALIZED
 Deoxidation : Fully Killed**

A63054/23B0			P	0.15	1.43	0.001	0.013	0.30	0.009	0.006	0.006	0.003	0.003	0.021	0.0010	0.025	58	0.0010	0.0004	0.027	0.016	4.3103	0.39
Sub Total	6	23.520																					

Mechanical properties:

Heat No	Plate No	No.of Pcs.	Wt. MT	Tensile test				Bend Test	Charpy V-notch impact test @-46 °C (Joules)				Elevated Temp Tensile Test	Ultrasonic Test	Hardness
				Orientation : Transverse ,Tested at ambient temp.				Orientation : L	@ °C				As per	Unit	
				YS (MPa)	UTS (MPa)	%EL *	Mand (1.5 T)	1	2	3	Avg	YS (MPa)	ASME SA-578 L-B	BHN	
A63054/13A0		1	3.920	315	541	29	OK	185	174	179	179.33		Satisfactory	159	
A63054/15B0		1	3.920	312	543	31	OK	183	181	179	181.00		Satisfactory	159	
A63054/21A0		1	3.920	312	541	30	OK	145	175	173	164.33		Satisfactory	159	
A63054/22A0		1	3.920	316	542	31	OK	195	175	184	184.66		Satisfactory	159	
A63054/23A0		1	3.920	313	545	31	OK	195	182	184	187.00		Satisfactory	159	
A63054/23B0		1	3.920	313	545	31	OK	195	182	184	187.00		Satisfactory	159	

Material Grade : IS2041 R260/ASME SA516 GR70 Plate Dimension -Thickness x Width x Length : 20.00mm x 2500mm x 12000mm

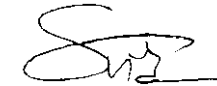
Heat No	Plate No	No.of Pcs	Wt. (MT)	Analysis L/P	Chemical Analysis																			
					%C	%Mn	%S	%P	%Si	%Cr	%Ni	%Cu	%Ti	%V	%Nb	%Mo	%Al	N (PPm)	%Ca	%B	Nb+V+T	Cr+Cu+Mo	Al/N	CE **
A63055/18A0		1	4.850	L	0.16	1.45	0.003	0.015	0.32	0.012	0.007	0.006	0.003	0.001	0.022	0.0004	0.025	55	0.0010	0.0005	0.026	0.0184	4.5455	0.40
A63055/18A0				P	0.15	1.42	0.002	0.016	0.30	0.010	0.006	0.005	0.004	0.002	0.023	0.0010	0.023	58	0.0007	0.0004	0.029	0.016	3.9655	0.39
Sub Total		1	4.850																					

Mechanical properties:

The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions

Purchase Order No. & Date: 45 01.12.2016
 Despatch Advice No: 61627191
 Truck/Wagon No. ECR62970

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 Preparation Date :09.12.2016 05:34:33
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**Authorised Signatory
 QA/QC PlateMill
 For, JINDAL STEEL & POWER LIMITED**

* Gauge Length: REFER REMARKS
 **CE=C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15

Legends: YS:Yield Strength,UTS:Ultimate Tensile Strength,%EL:% Elongation,L:Ladle,P:Product,MPa:Mega Pascal,S0: Original Cross sectionl area,Temp.:Temperature, Wt.:Weight,Pcs.:Pieces,TDC: Technical Delivery Condition,Doc: Document,EAF:Electric arc furnace,LRF: Ladle refining furnace,CCM: Continuous casting machine,RHF: Reheating furnace,VD: Vaccum degassing.

MILL TEST CERTIFICATE OF STEEL PLATES FOR PRESSURE VESSELS USED AT MODERATE AND LOW TEMPERATURE

Test Certificate No. 0000068495

Date : 09.12.2016

To, **M/s SHAH BROTHERS ISPAT PRIVATE LIMITED CHENNAI**
PRABHAKARAN GODOWN COMPLEX,PLOT NO.1 TO 5,SAKTHIVEL NAGAR,,CHENNAI,PIN-600066Tamil
Nadu

Page 6 of 8

It is certified that the material described below fully conforms to IS 2041:2009. Chemical composition and mechanical properties of the product as tested in accordance with the Scheme of Testing and Inspection contained in the BIS certification marks license No. CM/L0005719579 are as indicated below against each plate number. (Please refer to IS 2041:2009 for specification requirements).Dimensional tolerance conforms to IS/ISO 7452.

TEST RESULTS

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling

Supply Condition:FURNACE NORMALIZED
Deoxidation : Fully Killed

		Tensile test				Bend Test		Charpy V-notch impact test @-46 °C (Joules)				Elevated Temp Tensile Test		Ultrasonic Test		Hardness	
Heat No	Plate No	No.of Pcs.	Wt. MT	Orientation : Transverse ,Tested at ambient temp.				Orientaiaon : L				@ °C	As per		Unit		
				YS (MPa)	UTS (MPa)	%EL *	Mand (1.5 T)	1	2	3	Avg	YS (MPa)	ASME SA-578 L-B		BHN		
A63055/18A0		1	4.850	311	543	30	OK	175	179	183	179.00		Satisfactory		162		

Material Grade : IS2041 R260/ASME SA516 GR70 Plate Dimension -Thickness x Width x Length : 8.000mm x 2500mm x 12000mm

Heat No	Plate No	No.of Pcs	Wt. (MT)	Analysis L/P	Chemical Analysis																			
					%C	%Mn	%S	%P	%Si	%Cr	%Ni	%Cu	%Ti	%V	%Nb	%Mo	%Al	N (PPm)	%Ca	%B	Nb+V+T	Cr+Cu+Mo	Al/N	CE **
A63052/17A0		1	2.040	L	0.16	1.46	0.003	0.016	0.31	0.011	0.005	0.005	0.004	0.002	0.023	0.0004	0.027	51	0.0012	0.0006	0.029	0.0164	5.2941	0.40
A63052/17A0				P	0.15	1.44	0.002	0.015	0.30	0.009	0.006	0.006	0.003	0.001	0.025	0.0010	0.025	53	0.0010	0.0005	0.029	0.016	4.717	0.39
A63052/17B0		1	2.040	L	0.16	1.46	0.003	0.016	0.31	0.011	0.005	0.005	0.004	0.002	0.023	0.0004	0.027	51	0.0012	0.0006	0.029	0.0164	5.2941	0.40
A63052/17B0				P	0.15	1.44	0.002	0.015	0.30	0.009	0.006	0.006	0.003	0.001	0.025	0.0010	0.025	53	0.0010	0.0005	0.029	0.016	4.717	0.39
A63052/28B0		1	2.040	L	0.16	1.46	0.003	0.016	0.31	0.011	0.005	0.005	0.004	0.002	0.023	0.0004	0.027	51	0.0012	0.0006	0.029	0.0164	5.2941	0.40
A63052/28B0				P	0.15	1.44	0.002	0.015	0.30	0.009	0.006	0.006	0.003	0.001	0.025	0.0010	0.025	53	0.0010	0.0005	0.029	0.016	4.717	0.39
Sub Total		3	6.120																					

Mechanical properties:

The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions

Purchase Order No. & Date: 45 01.12.2016
 Despatch Advice No: 61627191
 Truck/Wagon No. ECR62970

Prepared by SANGRAM APLATE
 Preparation Date :09.12.2016 05:34:33
 Printing Date 09.02.2017 & Time 10:08:10



Authorised Signatory
QA/QC PlateMill
For, JINDAL STEEL & POWER LIMITED

* Gauge Length: REFER REMARKS
 **CE=C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15

Legends: YS:Yield Strength,UTS:Ultimate Tensile Strength,%EL:% Elongation,L:Ladle,P:Product,MPa:Mega Pascal,S0: Original Cross sectionl area,Temp.:Temperature, Wt.:Weight,Pcs.:Pieces,TDC: Technical Delivery Condition,Doc: Document,EAF:Electric arc furnace,LRF: Ladle refining furnace,CCM: Continuous casting machine,RHF: Reheating furnace,VD: Vaccum degassing.

MILL TEST CERTIFICATE OF STEEL PLATES FOR PRESSURE VESSELS USED AT MODERATE AND LOW TEMPERATURE

Test Certificate No. 0000068495

Date : 09.12.2016

To, **M/s SHAH BROTHERS ISPAT PRIVATE LIMITED CHENNAI**
PRABHAKARAN GODOWN COMPLEX,PLOT NO.1 TO 5,SAKTHIVEL NAGAR,,CHENNAI,PIN-600066Tamil
Nadu

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It is certified that the material described below fully conforms to IS 2041:2009. Chemical composition and mechanical properties of the product as tested in accordance with the Scheme of Testing and Inspection contained in the BIS certification marks license No. CM/L0005719579 are as indicated below against each plate number. (Please refer to IS 2041:2009 for specification requirements).Dimensional tolerance conforms to IS/ISO 7452.

TEST RESULTS

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling

Supply Condition:FURNACE NORMALIZED
Deoxidation : Fully Killed

				Tensile test			Bend Test	Charpy V-notch impact test @-46 °C (Joules)				Elevated Temp Tensile Test	Ultrasonic Test	Hardness
Heat No	Plate No	No.of Pcs.	Wt. MT	Orientation : Transverse ,Tested at ambient temp.			Mand (1.5 T)	Orientaion : L				@ °C	As per	Unit
				YS (MPa)	UTS (MPa)	%EL *		1	2	3	Avg	YS (MPa)	ASME SA-578 L-B	BHN
A63052/17A0		1	2.040	312	542	30	OK	152	162	172	162.00		Satisfactory	158
A63052/17B0		1	2.040	312	542	30	OK	152	162	172	162.00		Satisfactory	158
A63052/28B0		1	2.040	313	533	29	OK	171	166	175	170.66		Satisfactory	158

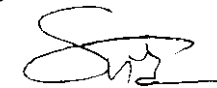
Remarks :

1. Test Certificate as per EN 10204, 2004 Type 3. 1
2. The above material conforms to ASME SA516 Gr. 70 of ASME Sec. II, Part A (Edition- 2015)
3. Material also conforms to TDC Doc. No: JSPL/ANGUL/TDC/-199 A, Rev.06, Dtd.07.04.2016
4. Supply Condition: Furnace Normalized at 900 ± 20°C, cycle time: 1.4 minutes per mm thickness + 10 minutes Soaking.
5. Yield strength is calculated by 0.2% offset method.
6. Impact sample size:
 - A. Plate Thickness Greater than 10MM:(10*10*55)MM
 - B. Plate Thickness Greater than 8MM to Less than or equal to 10MM:(7.5*10*55)MM
 - C. Plate Thickness Less than or equal to 8MM:(5*10*55)MM.
7. Repairing by welding not carried out

The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions

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Authorised Signatory
QA/QC PlateMill
For, JINDAL STEEL & POWER LIMITED

* Gauge Length: REFER REMARKS
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TEST RESULTS

Process of Manufacture : EAF->LRF->VD->CCM->RHF->Hot rolling


Supply Condition:FURNACE NORMALIZED
Deoxidation : Fully Killed

8. Reduction ratio of cast slab to plate is > 3 : 1
9. Gauge Length up to 25 mm Thk : 200 mm, Greater than 25 mm Thk : 50 mm
10. Columns under mechanical properties will appear blank, if those tests are not opted for
11. If the percentage concentration of any element is less than 0.001, the column for the respective element will appear blank and in that case it may please be read as less than 0.001%
12. Orientation of Sample: Tensile and Bend is Transverse & Impact is Longitudinal to rolling direction
13. Dimensional tolerance: Found satisfactory as per SA-20 & also found satisfactory in positive tolerance
14. Surface Inspection: As per EN10163-2 Class A Subclass 3
15. Identification of plates: For identification purpose only plates marked as follows in Paint Marking & Hard Stamping: Manufacturer, Specification & Grade, Heat No. / Plate No., Size, UT, MT & LTV
16. Flatness satisfactory as per EN 10029 Table 4 Class N
17. Grain size as per ASTM E112
Heat No Grain Size
A63052 8.5
A63054 10
A63055 9.5
A63051 9.5
- 18.For details, refer IBR Form-IV
- 19.Chemical and Mechanical Property of the above plates conforms to IS2041 R220:2009/ASME SA516 Gr. 60, Edition 2015 also.

The above material supplied conforms to the specified dimensions and tolerances as per specifications and as per mutually agreed Technical Delivery Conditions

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