COOLING TOWER FOR ESP BUILDING

a	Dimension of Basin	LxBxh	1650 x 1350 x 250
b	Maximum, minimum and normal Water Level from bottom of Basin	mm	250
c	Thickness of Basin		5mm
2.18.6	Packing Type		uPVC Film Pack, Honey Comb
2.18.7	Drift Eliminator Type		PVC
a	No. of Passes		Single
b	Gross Area per Pass	ft2	20
c	Type		Cellular
d	Material		PVC
e	Thickness	mm	0.3
2.19	Casing		FRP
2.20	Internal Frame Work		MSHDG
2.21	Minimum Level of water maintain in basin	mm	100
2.22	Nut, Bolt & Washers		SS304
2.23	Bird Screen on Cooling Tower		25 mm square made of GI/SS wire mesh of 16 G
2.24	Louvers		FRP
a	Louver Height and angle with horizontal	mm & (Deg)	455 & 45
b	Louver Support Distance	m	N/A
2.25	Ladder		MS HDG
2.26	Height of Fan Stack	mm	305
2.27	Dry Weight		200
2.28	Operating weight		600
2.29	Fill Type		Honey Comb
2.30.1	Fill Materials		Non Combustible PVC
2.30.2	Fill Thickness	mm	0.19
2.31.1	Wind Pressure	Kg/cm2	60
2.31.2	Wind velocity (Design)	Km/hr	150
2.32	Fan		Axial Type
2.32.1	Fan Model No.		FTA900-6F
2.32.2	Type of Fan		Direct Drive
2.32.3	No. of Fans per Cooling Tower		1
2.32.4	Diameter of Fan	mm	870

2.32.5	Material		Cast Aluminium Alloy Hub with FRP Blades
2.32.6	Blade		FRP
2.32.7	Hub		Aluminium Alloy
2.32.8	No. Of Blade		6
2.32.9	Blade Angle (Fixed or variable)		Variable
2.32.10	Blade Pitch Angle (if variable)		Adjustable Pitch
2.32.11	Fan Speed		1440
2.32.12	Absorbed Power at fan shaft	BKW	1.35
2.32.13	Air Fan Delivery	cfm	9500
2.32.14	Total Static Pressure	mmWC	19
3.0	Type of Drive		Direct Driven
3.1	Motor		Continuous Energy Efficient IE03
3.2	No. of Motor		1 Nos. One Per Cell
3.3	Rating	KW	2.2
3.4	Type		TEFC
3.5	Enclosure		IP-55, Weatherproof
3.6	Full Load Speed	RPM	1440
3.7	Power Supply		415V(+/- 10%), 50Hz (+) 3% /(-) 5%), combined Voltage and Frequency variation: 10 & (absolute sum), 3Ph, 4 Wire Supply
3.8	Cable Size (BHEL scope) recommended		
3.9	Weight of each motor	KG	Less than 30
3.10	Make		As per approved make list
3.11	Full Load Current	Amp	3
3.12	Power Factor		
3.13	Class of Insulation		Class ‘F’ insulation subject to temperature rise of Class ‘B’ insulation
4.1	Distribution System		
4.2	Type		Gravity System, header and Branch Arm System
4.3	Header		PVC

4.4	Sub header		PVC
4.5	Piping Inlet Size materials & size	mm	FRP - 50 X 2 nos.
4.6	Outlet size materials & Size	mm	FRP - 50 X 2 nos.
4.7	Drain materials & Size	mm	FRP - 50
4.8	Overflow materials & size	mm	FRP - 50
4.9	Make-up GI socket with float valve	mm	20
4.10	Quick Fill GI Socket	mm	20
4.11	Strainer at water outlet		Plate strainer made of GI /SS wire mesh of 16 gauge
4.12	Access Door in Fan Deck and louver		Provided
4.13	Coolin Tower GA	mm	Enclosed with Datasheet
4.14	Inspection and Testing	mm	As per Approved QAP
5	Painting		
5.1	Galvanized Part		Min. 40 Microns Deposition
5.2	Non Galvanized MS Part		Prime Coat: Two layers of Zinc Phosphate Epoxy. Total Prime Coat DFT: 75 Microns Finish Coat: Two Coat of Chlorinated Rubber Paint. Total Finish Coat DFT: 60 to 80 Microns

COOLING TOWER FOR ADMIN BUILDING

TECHNICAL DETAILS FOR INDUCED DRAFT COUNTER FLOW COOLING TOWER			
Sno.	**Description**	**Unit**	**Details**
1.1	**Project**		**2X660 MW ENNORE TPS**
1.2	**Customer**		**TANGEDCO**
1.3	**Consultant**		**DESEIN**
1.4	**EPC Contractor**		**BHEL**
1.5	**AC Supplier**		
1.6	**Location of Cooling Tower**		**Admin Building**
2.1	Nos. Of CoolingTower	Nos.	2
2.2	Cooling Tower Make		FlowTech
2.3	Model of Cooling Tower		RE1010-2L-ID
2.4	Type of Cooling Tower		Counter Flow Type Cooling Tower
2.5	Structure		FRP
2.6	Water Flow Rate	CMH	150
2.7	Designed Water Flow Rate	CMH	165
2.8	Inlet Water Temperature	Deg. C	36
2.9	Outlet Water Temperature	Deg. C	32
2.10	Design Wet bulb Temperature	Deg. C	28
2.11	Design Approach	Deg. C	4
2.12	Heat Rejection Capacity	Kcal/hr	658627
2.13	Maximum Drift Loss	% (CMH)	0.02
2.14	Evaporation Loss	% (CMH)	0.7
2.15	Blow-down Loss (Assuming COC 3)	% (CMH)	0.36
2.16	Make-up Water Quantity	% (CMH)	1.08
2.17	No. of Cell per Tower	No.	1
	Required Pumping Head Including all losses measured at normal water level of basin	MWC	
2.18	Tower Size		3170 x 3170 x 3750
2.18.1	Length	mm	3170
2.18.2	Width	mm	3170
2.18.3	Overall Height	mm	3750
2.18.4	Static Height up to centerline of water inlet header	mm	2250
2.18.5	Basin Working Volume	cum	2.3

COOLING TOWER FOR ADMIN BUILDING

a	Dimension of Basin	LxBxh	3170 x 3170 x 250
b	Maximum, minimum and normal Water Level from bottom of Basin	mm	250
c	Thickness of Basin		5mm
2.18.6	Packing Type		uPVC Film Pack, Honey Comb
2.18.7	Drift Eliminator Type		PVC
a	No. of Passes		Single
b	Gross Area per Pass	ft2	100
c	Type		Cellular
d	Material		PVC
e	Thickness	mm	0.3
2.19	Casing		FRP
2.20	Internal Frame Work		MSHDG
2.21	Minimum Level of water maintain in basin	mm	100
2.22	Nut, Bolt & Washers		SS304
2.23	Bird Screen on Cooling Tower		25 mm square made of GI/SS wire mesh of 16 G
2.24	Louvers		FRP
a	Louver Height and angle with horizontal	mm & (Deg)	661 & 45
b	Louver Support Distance	m	N/A
2.25	Ladder		MS HDG
2.26	Height of Fan Stack	mm	534
2.27	Dry Weight		1000
2.28	Operating weight		3000
2.29	Fill Type		Honey Comb
2.30.1	Fill Materials		Non Combustible PVC
2.30.2	Fill Thickness	mm	0.19
2.31.1	Wind Pressure	Kg/cm2	60
2.31.2	Wind velocity (Design)	Km/hr	150
2.32	Fan		Axial Type
2.32.1	Fan Model No.		FTA1500-6F
2.32.2	Type of Fan		Direct Drive
2.32.3	No. of Fans per Cooling Tower		1
2.32.4	Diameter of Fan	mm	1470

2.32.5	Material		Cast Aluminium Alloy Hub with FRP Blades
2.32.6	Blade		FRP
2.32.7	Hub		Aluminium Alloy
2.32.8	No. Of Blade		6
2.32.9	Blade Angle (Fixed or variable)		Variable
2.32.10	Blade Pitch Angle (if variable)		Adjustable Pitch
2.32.11	Fan Speed		960
2.32.12	Absorbed Power at fan shaft	BKW	6.7
2.32.13	Air Fan Delivery	cfm	42000
2.32.14	Total Static Pressure	mmWC	19
3.0	Type of Drive		Direct Driven
3.1	Motor		Continuous Energy Efficient IE03
3.2	No. of Motor		1 Nos.
3.3	Rating	KW	7.5
3.4	Type		TEFC
3.5	Enclosure		IP-55, Weatherproof
3.6	Full Load Speed	RPM	960
3.7	Power Supply		415V(+/- 10%), 50Hz (+) 3% /(-) 5%), combined Voltage and Frequency variation: 10 & (absolute sum), 3Ph, 4 Wire Supply
3.8	Cable Size (BHEL scope) recommended		
3.9	Weight of each motor	KG	Less than 150
3.10	Make		As per approved make list
3.11	Full Load Current	Amp	16
3.12	Power Factor		
3.13	Class of Insulation		Class ‘F’ insulation subject to temperature rise of Class ‘B’ insulation
4.1	Distribution System		
4.2	Type		Gravity System, header and Branch Arm System
4.3	Header		PVC

COOLING TOWER FOR ADMIN BUILDING

4.4	Sub header		PVC
4.5	Piping Inlet Size materials & size	mm	FRP - 150 X 2 nos.
4.6	Outlet size materials & Size	mm	FRP - 150 X 2 nos.
4.7	Drain materials & Size	mm	FRP - 50
4.8	Overflow materials & size	mm	FRP - 50
4.9	Make-up GI socket with float valve	mm	25
4.10	Quick Fill GI Socket	mm	25
4.11	Strainer at water outlet		Plate strainer made of GI /SS wire mesh of 16 gauge
4.12	Access Door in Fan Deck and louver		Provided
4.13	Coolin Tower GA	mm	Enclosed with Datasheet
4.14	Inspection and Testing	mm	As per Approved QAP
5	Painting		
5.1	Galvanized Part		Min. 40 Microns Deposition
5.2	Non Galvanized MS Part		Prime Coat: Two layers of Zinc Phosphate Epoxy. Total Prime Coat DFT: 75 Microns Finish Coat: Two Coat of Chlorinated Rubber Paint. Total Finish Coat DFT: 60 to 80 Microns

TECHNICAL DETAILS FOR INDUCED DRAFT COUNTER FLOW COOLING TOWER			
Sno.	**Description**	**Unit**	**Details**
1.1	**Project**		**2X660 MW ENNORE TPS**
1.2	**Customer**		**TANGEDCO**
1.3	**Consultant**		**DESEIN**
1.4	**EPC Contractor**		**BHEL**
1.5	**AC Supplier**		
1.6	**Location of Cooling Tower**		**Service Building**
2.1	Nos. Of CoolingTower	Nos.	2
2.2	Cooling Tower Make		FlowTech
2.3	Model of Cooling Tower		RE1416-2L-ID
2.4	Type of Cooling Tower		Counter Flow Type Cooling Tower
2.5	Structure		FRP
2.6	Water Flow Rate	CMH	350
2.7	Designed Water Flow Rate	CMH	385
2.8	Inlet Water Temperature	Deg. C	36
2.9	Outlet Water Temperature	Deg. C	32
2.10	Design Wet bulb Temperature	Deg. C	28
2.11	Design Approach	Deg. C	4
2.12	Heat Rejection Capacity	Kcal/hr	1536800
2.13	Maximum Drift Loss	% (CMH)	0.02
2.14	Evaporation Loss	% (CMH)	0.7
2.15	Blow-down Loss (Assuming COC 3)	% (CMH)	0.36
2.16	Make-up Water Quantity	% (CMH)	1.08
2.17	No. of Cell per Tower	No.	1
	Required Pumping Head Including all losses measured at normal water level of basin	MWC	
2.18	Tower Size		5000 x 4390 x 4150
2.18.1	Length	mm	5000
2.18.2	Width	mm	4390
2.18.3	Overall Height	mm	4150
2.18.4	Static Height up to centerline of water inlet header	mm	2750
2.18.5	Basin Working Volume	cum	5.2

COOLING TOWER FOR SERVICE BUILDING

a	Dimension of Basin	LxBxh	5000 x 4390 x 250
b	Maximum, minimum and normal Water Level from bottom of Basin	mm	250
c	Thickness of Basin		5mm
2.18.6	Packing Type		uPVC Film Pack, Honey Comb
2.18.7	Drift Eliminator Type		PVC
a	No. of Passes		Single
b	Gross Area per Pass	ft2	224
c	Type		Cellular
d	Material		PVC
e	Thickness	mm	0.3
2.19	Casing		FRP
2.20	Internal Frame Work		MSHDG
2.21	Minimum Level of water maintain in basin	mm	100
2.22	Nut, Bolt & Washers		SS304
2.23	Bird Screen on Cooling Tower		25 mm square made of GI/SS wire mesh of 16 G
2.24	Louvers		FRP
a	Louver Height and angle with horizontal	mm & (Deg)	1067 & 45
b	Louver Support Distance	m	N/A
2.25	Ladder		MS HDG
2.26	Height of Fan Stack	mm	534
2.27	Dry Weight		2240
2.28	Operating weight		6720
2.29	Fill Type		Honey Comb
2.30.1	Fill Materials		Non Combustible PVC
2.30.2	Fill Thickness	mm	0.19
2.31.1	Wind Pressure	Kg/cm2	60
2.31.2	Wind velocity (Design)	Km/hr	150
2.32	Fan		Axial Type
2.32.1	Fan Model No.		FTA1800-4F
2.32.2	Type of Fan		Direct Drive
2.32.3	No. of Fans per Cooling Tower		2
2.32.4	Diameter of Fan	mm	1470

2.32.5	Material		Cast Aluminium Alloy Hub with FRP Blades
2.32.6	Blade		FRP
2.32.7	Hub		Aluminium Alloy
2.32.8	No. Of Blade		4
2.32.9	Blade Angle (Fixed or variable)		Variable
2.32.10	Blade Pitch Angle (if variable)		Adjustable Pitch
2.32.11	Fan Speed		720
2.32.12	Absorbed Power at fan shaft	BKW	6.75
2.32.13	Air Fan Delivery	cfm	55000
2.32.14	Total Static Pressure	mmWC	19
3.0	Type of Drive		Direct Driven
3.1	Motor		Continuous Energy Efficient IE03
3.2	No. of Motor		2 Nos
3.3	Rating	KW	7.5
3.4	Type		TEFC
3.5	Enclosure		IP-55, Weatherproof
3.6	Full Load Speed	RPM	720
3.7	Power Supply		415V(+/- 10%), 50Hz (+) 3% /(-) 5%), combined Voltage and Frequency variation: 10 & (absolute sum), 3Ph, 4 Wire Supply
3.8	Cable Size (BHEL scope) recommended		
3.9	Weight of each motor	KG	less than 150
3.10	Make		As per approved make list
3.11	Full Load Current	Amp	
3.12	Power Factor		
3.13	Class of Insulation		Class ‘F’ insulation subject to temperature rise of Class ‘B’ insulation
4.1	Distribution System		
4.2	Type		Gravity System, header and Branch Arm System
4.3	Header		PVC

4.4	Sub header		PVC
4.5	Piping Inlet Size materials & size	mm	FRP - 200 X 2 nos.
4.6	Outlet size materials & Size	mm	FRP - 200 X 2 nos.
4.7	Drain materials & Size	mm	FRP - 100
4.8	Overflow materials & size	mm	FRP - 100
4.9	Make-up GI socket with float valve	mm	25
4.10	Quick Fill GI Socket	mm	25
4.11	Strainer at water outlet		Plate strainer made of GI /SS wire mesh of 16 gauge
4.12	Access Door in Fan Deck and louver		Provided
4.13	Coolin Tower GA	mm	Enclosed with Datasheet
4.14	Inspection and Testing	mm	As per Approved QAP
5	Painting		
5.1	Galvanized Part		Min. 40 Microns Deposition
5.2	Non Galvanized MS Part		Prime Coat: Two layers of Zinc Phosphate Epoxy. Total Prime Coat DFT: 75 Microns Finish Coat: Two Coat of Chlorinated Rubber Paint. Total Finish Coat DFT: 60 to 80 Microns

COOLING TOWER FOR MAIN POWER HOUSE

TECHNICAL DETAILS FOR INDUCED DRAFT COUNTER FLOW COOLING TOWER			
Sno.	**Description**	**Unit**	**Details**
1.1	**Project**		**2X660 MW ENNORE TPS**
1.2	**Customer**		**TANGEDCO**
1.3	**Consultant**		**DESEIN**
1.4	**EPC Contractor**		**BHEL**
1.5	**AC Supplier**		
1.6	**Location of Cooling Tower**		**TG Hall Roof**
2.1	Nos. Of CoolingTower	Nos.	2
2.2	Cooling Tower Make		FlowTech
2.3	Model of Cooling Tower		RE1414-2L-ID
2.4	Type of Cooling Tower		Counter Flow Type Cooling Tower
2.5	Structure		FRP
2.6	Water Flow Rate	CMH	307
2.7	Designed Water Flow Rate	CMH	337
2.8	Inlet Water Temperature	Deg. C	36
2.9	Outlet Water Temperature	Deg. C	32
2.10	Design Wet bulb Temperature	Deg. C	28
2.11	Design Approach	Deg. C	4
2.12	Heat Rejection Capacity	Kcal/hr	1348100
2.13	Maximum Drift Loss	% (CMH)	0.02
2.14	Evaporation Loss	% (CMH)	0.7
2.15	Blow-down Loss (Assuming COC 3)	% (CMH)	0.36
2.16	Make-up Water Quantity	% (CMH)	1.18
2.17	No. of Cell per Tower	No.	1
	Required Pumping Head Including all losses measured at normal water level of basin	MWC	
2.18	Tower Size		4390 x 4390 x 4150
2.18.1	Length	mm	4394
2.18.2	Width	mm	4394
2.18.3	Overall Height	mm	4150
2.18.4	Static Height up to centerline of water inlet header	mm	2750
2.18.5	Basin Working Volume	cum	4.6

COOLING TOWER FOR MAIN POWER HOUSE

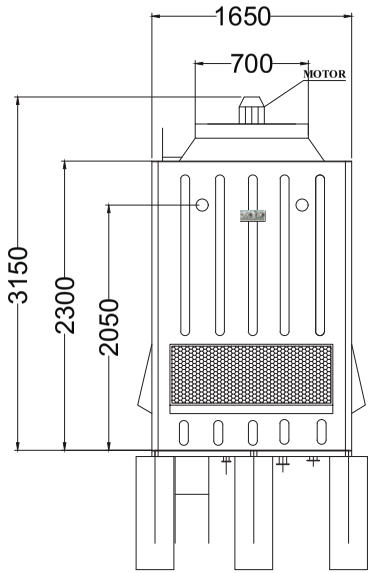
a	Dimension of Basin	LxBxh	4390 x 4390 x 250
b	Maximum, minimum and normal Water Level from bottom of Basin	mm	250
c	Thickness of Basin		5mm
2.18.6	Packing Type		uPVC Film Pack, Honey Comb
2.18.7	Drift Eliminator Type		PVC
a	No. of Passes		Single
b	Gross Area per Pass	ft2	196
c	Type		Cellular
d	Material		PVC
e	Thickness	mm	0.3
2.19	Casing		FRP
2.20	Internal Frame Work		MSHDG
2.21	Minimum Level of water maintain in basin	mm	100
2.22	Nut, Bolt & Washers		SS304
2.23	Bird Screen on Cooling Tower		25 mm square made of GI/SS wire mesh of 16 G
2.24	Louvers		FRP
a	Louver Height and angle with horizontal	mm & (Deg)	1067 & 45
b	Louver Support Distance	m	N/A
2.25	Ladder		MS HDG
2.26	Height of Fan Stack	mm	534
2.27	Dry Weight		1960
2.28	Operating weight		5880
2.29	Fill Type		Honey Comb
2.30.1	Fill Materials		Non Combustible PVC
2.30.2	Fill Thickness	mm	0.19
2.31.1	Wind Pressure	Kg/cm2	60
2.31.2	Wind velocity (Design)	Km/hr	150
2.32	Fan		Axial Type
2.32.1	Fan Model No.		FTA1500-6F
2.32.2	Type of Fan		Direct Drive
2.32.3	No. of Fans per Cooling Tower		2
2.32.4	Diameter of Fan	mm	1470

2.32.5	Material		Cast Aluminium Alloy Hub with FRP Blades
2.32.6	Blade		FRP
2.32.7	Hub		Aluminium Alloy
2.32.8	No. Of Blade		6
2.32.9	Blade Angle (Fixed or variable)		Variable
2.32.10	Blade Pitch Angle (if variable)		Adjustable Pitch
2.32.11	Fan Speed		960
2.32.12	Absorbed Power at fan shaft	BKW	4.95
2.32.13	Air Fan Delivery	cfm	48000
2.32.14	Total Static Pressure	mmWC	19
3.0	Type of Drive		Direct Driven
3.1	Motor		Continuous Energy Efficient IE03
3.2	No. of Motor		2 Nos.
3.3	Rating	KW	7.5
3.4	Type		TEFC
3.5	Enclosure		IP-55, Weatherproof
3.6	Full Load Speed	RPM	960
3.7	Power Supply		415V(+/- 10%), 50Hz (+) 3% /(-) 5%), combined Voltage and Frequency variation: 10 & (absolute sum), 3Ph, 4 Wire Supply
3.8	Cable Size (BHEL scope) recommended		
3.9	Weight of each motor	KG	less than 100
3.10	Make		As per approved make list
3.11	Full Load Current	Amp	12.5
3.12	Power Factor		
3.13	Class of Insulation		Class ‘F’ insulation subject to temperature rise of Class ‘B’ insulation
4.1	Distribution System		
4.2	Type		Gravity System, header and Branch Arm System
4.3	Header		PVC

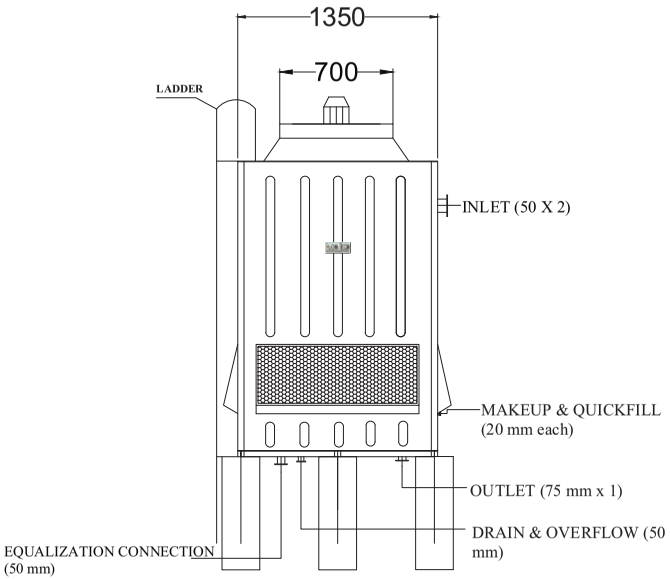
COOLING TOWER FOR MAIN POWER HOUSE

4.4	Sub header		PVC
4.5	Piping Inlet Size materials & size	mm	FRP - 200 X 2 nos.
4.6	Outlet size materials & Size	mm	FRP - 200 X 2 nos.
4.7	Drain materials & Size	mm	FRP - 100
4.8	Overflow materials & size	mm	FRP - 100
4.9	Make-up GI socket with float valve	mm	25
4.10	Quick Fill GI Socket	mm	25
4.11	Strainer at water outlet		Plate strainer made of GI /SS wire mesh of 16 gauge
4.12	Access Door in Fan Deck and louver		Provided
4.13	Coolin Tower GA	mm	Enclosed with Datasheet
4.14	Inspection and Testing	mm	As per Approved QAP
5	Painting		
5.1	Galvanized Part		Min. 40 Microns Deposition
5.2	Non Galvanized MS Part		Prime Coat: Two layers of Zinc Phosphate Epoxy. Total Prime Coat DFT: 75 Microns Finish Coat: Two Coat of Chlorinated Rubber Paint. Total Finish Coat DFT: 60 to 80 Microns

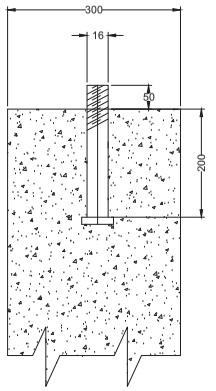
COOLING TOWER FOR ESP BUILDING, QTY - 2 NOS.



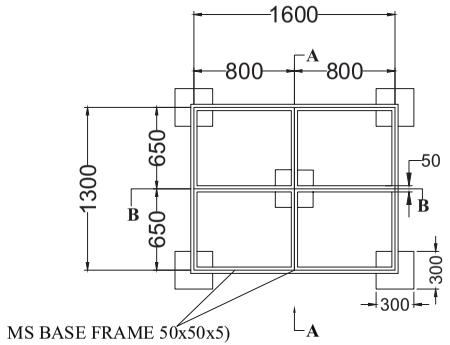
FRONT VIEW



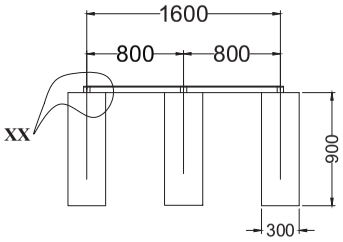
SIDE VIEW



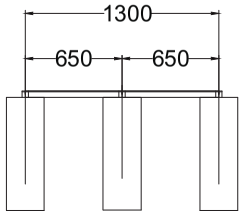
DETAIL XX



FOUNDATION PLAN



SECTION BB



SECTION AA

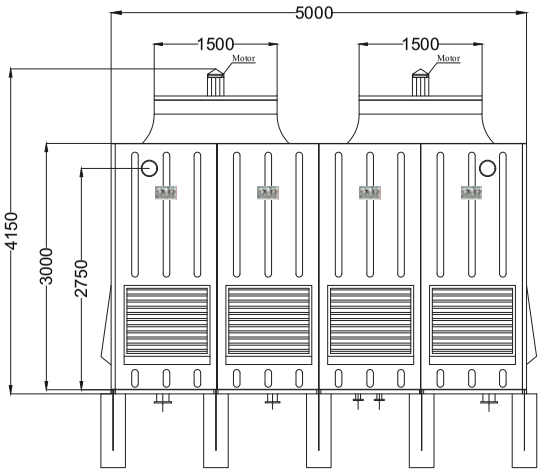
NOTE:

1. Operating Wt.600 Kg.
2. All pillers shown in the drawing are RCC.
3. Holding down grouting bolts of 250mm long and 16mm dia. to be provided on each pillars by client.
4. Inlet, Outlet, Drain & Overflow pipes to be provided with FRP flange connection.
5. Electric connections to be carried out with proper gland to avoid any water entrain.
6. Drain & Overflow connections are 50mm each.
7. Equalization connection of 50 mm with FRP flange connection to be provided.
8. All dimensions are in mm unless otherwise stated.

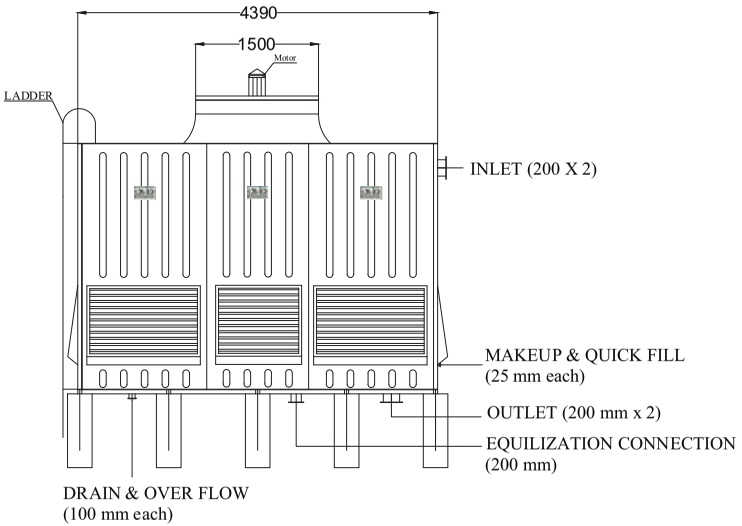
	INITIAL	DATE	
DRAWN	R	28.09.18	QUOTATION NO.: CTQ-0291-18-19-R3
CHECKED	S	28.09.18	TITLE: GA & FOUNDATION DRAWING
APPROVED	SD		DRG. NO.: RE/CTQ-0291-R3/24/18-19
SCALE	NTS		MODEL NO.: RE0504-2L-ID
REVISION	00		

FLOW TECH AIR. PVT. LTD.

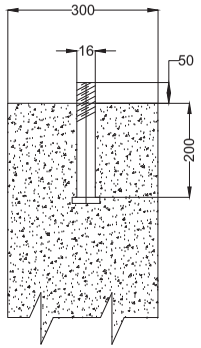
COOLING TOWER FOR SERVICE BUILDING, QTY - 2 NOS.



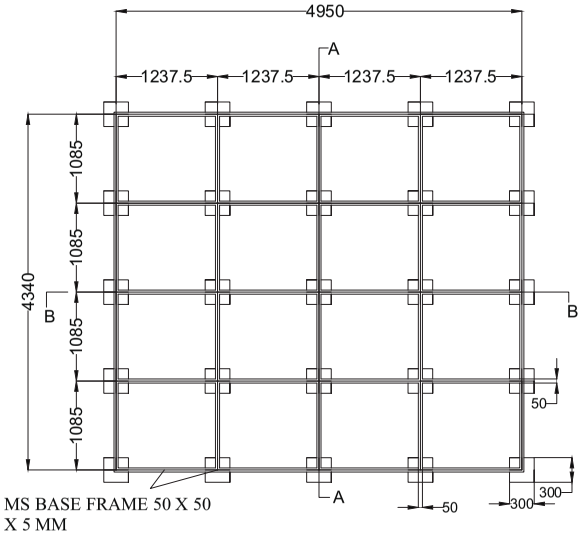
FRONT VIEW



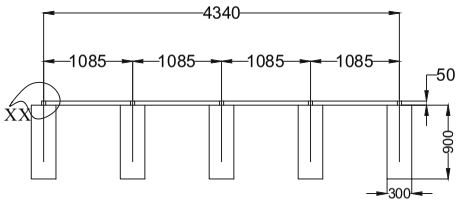
SIDE VIEW



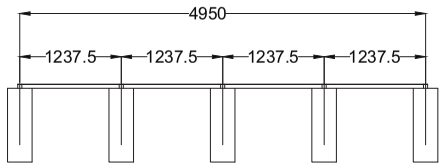
DETAIL XX



FOUNDATION PLAN



SECTION AA



SECTION BB

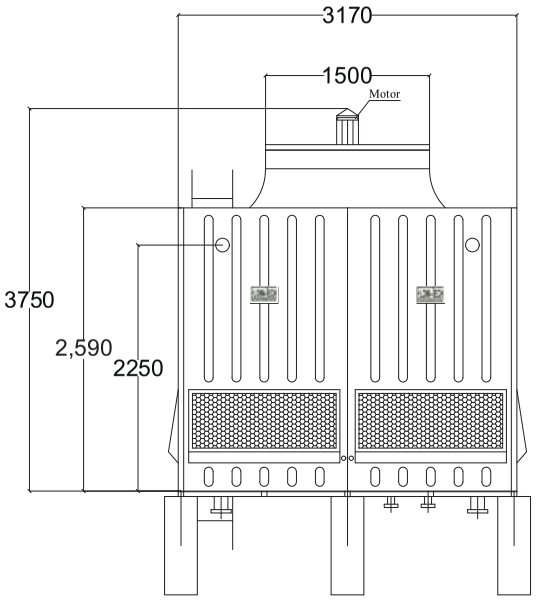
NOTE:

1. Operating Wt. 6720. Kg
2. All pillers shown in the drawing are RCC.
3. Holding down grouting bolts of 250mm long and 16mm dia. to be provided on each pillars by client.
4. Inlet, Outlet, Drain & Overflow pipes to be provided with FRP flange connection.
5. Electric connections to be carried out with proper gland to avoid any water entrain.
6. Drain & Overflow connections are 100 mm each.
7. Equilisation connection connection of 200 mm with FRP flange connection to be provided.
8. All dimensions are in mm unless otherwise stated.

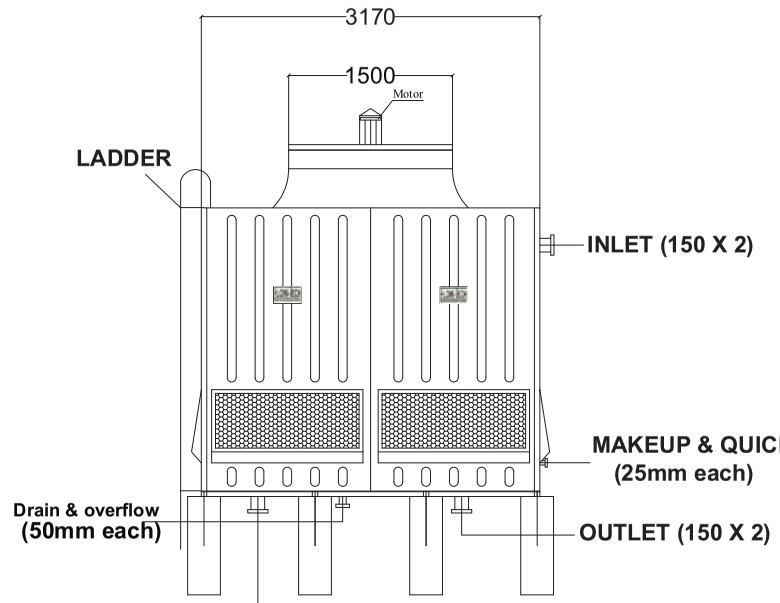
	INITIAL	DATE	
DRAWN	S	28.09.18	QUOTATION NO.:CTQ-0291-18-19-R3
CHECKED	R	28.09.18	TITLE: GA & FOUNDATION DRAWING
APPROVED	SD		DRG. NO.: RE/CTQ-0291-R3/25/18-19
SCALE	NTS		MODEL NO.: RE1416-2L-ID
REVISION	00		

FLOW TECH AIR. PVT. LTD.

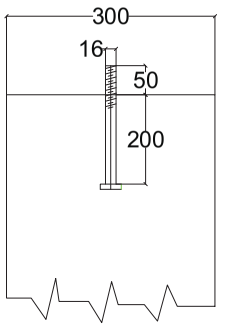
COOLING TOWER FOR ADMIN BUILDING, QTY - 2 NOS.



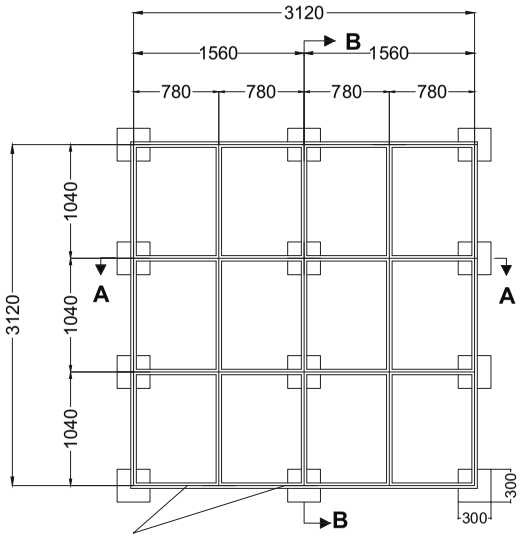
FRONT VIEW



SIDE VIEW

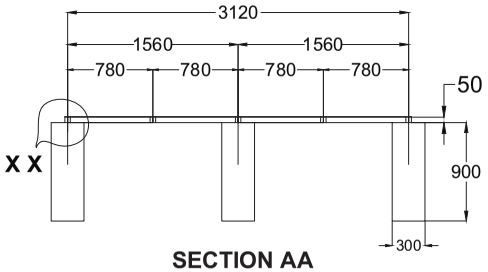


DETAIL X X

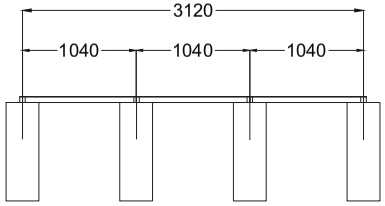


MS BASE FRAME(50X50X5)

FOUNDATION PLAN



SECTION AA



SECTION BB

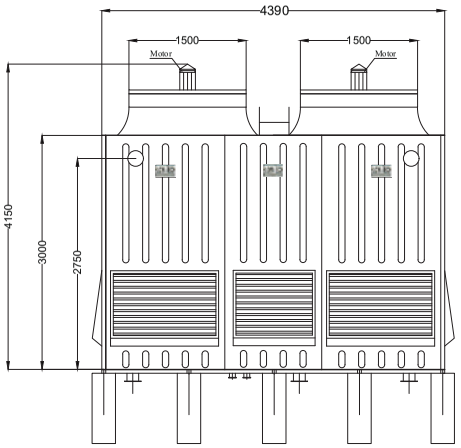
NOTE:

1. Operating Wt.3000 Kg .
2. All pillers shown in the drawing are RCC.
3. Holding down grouting bolts of 250mm long and 16mm dia. to be provided on each pillars by client.
4. Inlet, Outlet, Drain & Overflow pipes to be provided with FRP flange connection.
5. Electric connections to be carried out with proper gland to avoid any water entrain.
6. Drain & Overflow connections are 50mm each.
7. Equilisation connection connection of 125 mm with FRP flange connection to be provided.
8. All dimensions are in mm unless otherwise stated.

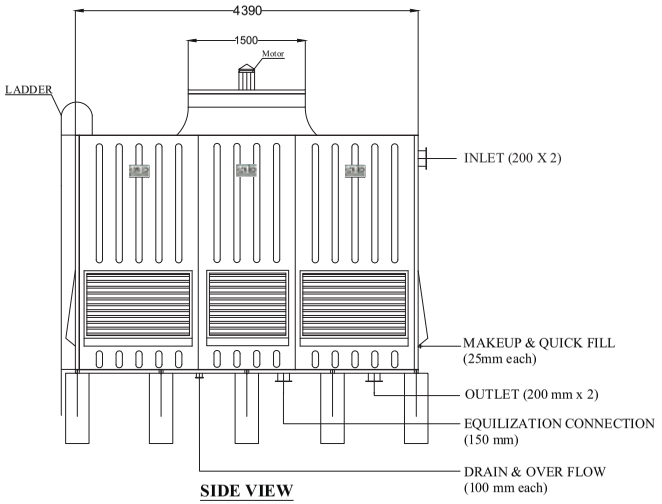
	INITIAL	DATE	
DRAWN	R	28.09.18	QUOTATION NO.: CTQ-0291-18-19-R3
CHECKED	S	28.09.18	TITLE: GA & FOUNDATION DRAWING
APPROVED	SD		DRG. NO.: RE/CTQ-0291-R3/26/18-19
SCALE	NTS		MODEL NO.: RE1010-2L-ID
REVISION	00		

FLOW TECH AIR. PVT. LTD.

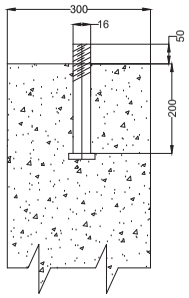
COOLING TOWER FOR MAIN POWER HOUSE, QTY - 2 NOS.



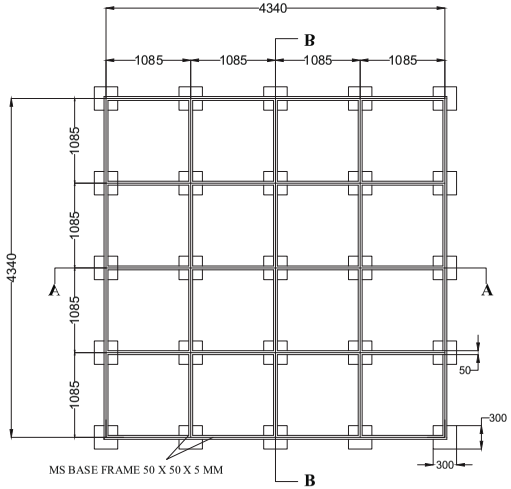
FRONT VIEW



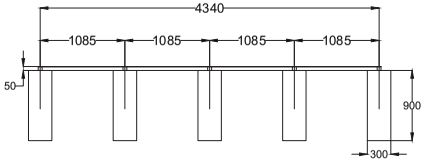
SIDE VIEW



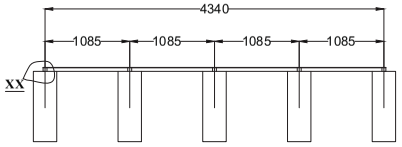
DETAIL XX



FOUNDATION PLAN



SECTION-BB



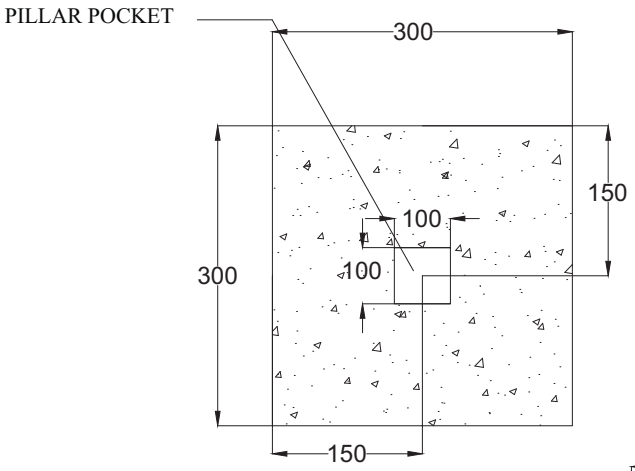
SECTION-AA

NOTE:

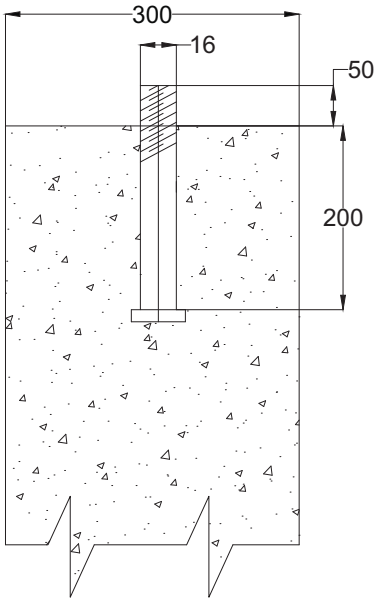
1. Operating Wt.5880 Kg
2. All pillers shown in the drawing are RCC.
3. Holding down grouting bolts of 250mm long and 16mm dia. to be provided on each pillars by client.
4. Inlet, Outlet, Drain & Overflow pipes to be provided with FRP flange connection.
5. Electric connections to be carried out with proper gland to avoid any water entrain.
6. Drain & Overflow connections are 100 mm each.
7. Equalization connection connection of 150 mm with FRP flange connection.
8. All dimensions are in mm unless otherwise stated.

	INITIAL	DATE	
DRAWN	S	28/09/18	QUOTATION NO.:CTQ-0291-18-19-R3
CHECKED	R	28/09/18	TITLE: GA & FOUNDATION DRAWING
APPROVED	SD		DRG. NO.: RE/CTQ-0291-R3/23/18-19
SCALE	NTS		MODEL NO.: RE1414-2L-ID
REVISION	00		

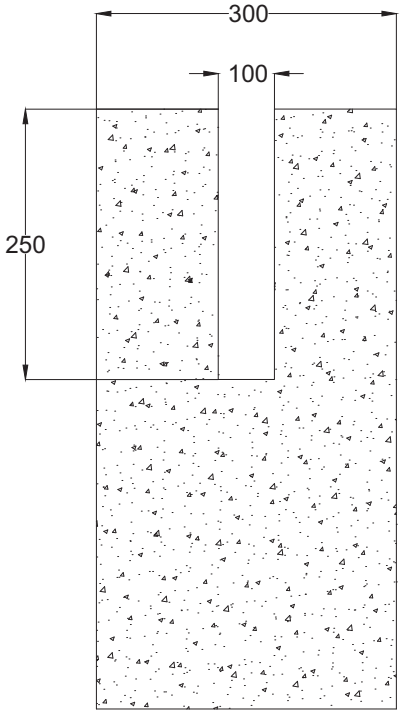
FLOW TECH AIR. PVT. LTD.



DETAIL - XX-1



DETAIL XX



RCC PILLAR POCKET DETAIL

REASON FOR RESUBMISSION: NO COMMENTS FROM TANGEDCO / DESEIN RECEIVED ON REV. 0 DOCUMENT. ADDITIONAL DETAILS ARE INCLUDED IN THE DOCUMENT. SUBMITTED FOR APPROVAL PLEASE.

DOC MENT IS APPRO ED IDE TANGEDCO LETTER NO. SE/E/TH&H P/EE-7/M/AEE/M/F.EN SE STPP/D.794 /19 DT. 15/02/2019

BHARAT HEAVY ELECTRICALS LIMITED
PROJECT ENGINEERING MANAGEMENT
(MECHANICAL AUXILIARY)

This approval status shall be interpreted as laid down in the contract and it shall not relieve the contractor from his contractual obligation.

APPROVAL CATEGORY AWARED = I

CAT I - Approved
CAT II - Approved with Comments as Noted
CAT III - Not Approved
CAT IV - Reference Drawing

Name: VIPIN NAUNI
Signature:

VIPIN NAUNI
Reviewed by BHEL and found in order. Submitted for TANGEDCO / Desein Approval.
2019.01.18 19:42:52 +05'30'

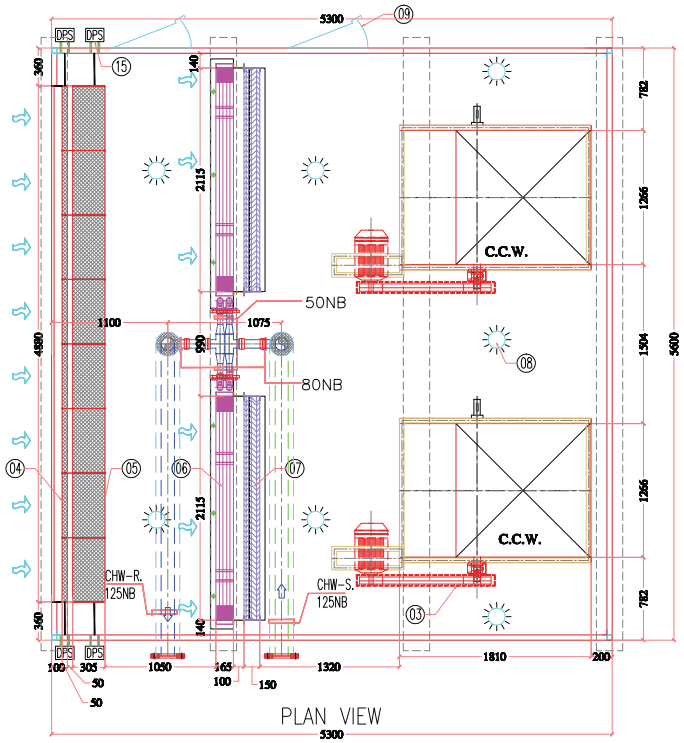
15/01/2019	**01**	As per BHEL Comments	ALAM	SALIM	SKT
06/12/2018	**0A**	As per BHEL Comments	ALAM	SALIM	SKT
27/11/2018	**00**	As per BHEL Comments	ALAM	SALIM	SKT
28/09/2018	**A**	FIRST SUBMISSION	ALAM	SALIM	PC
Date	Rev	Description of Revision	ALT	CHD	APPD

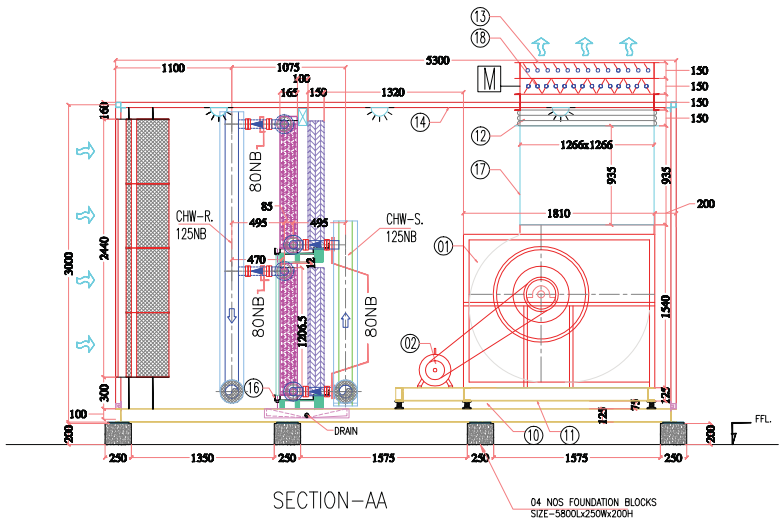
PROJECT	2x660 MW ENNORE SEZ COAL BASED STPP AT ASH DYKE OF NCTPS, CHENNAI
	CUSTOMER TAMILNADU GENERATION AND DISTRIBUTION CORPORATION LIMITED (TANGEDCO)
	CONSULTANT **DESEIN PRIVATE LIMITED** **DESEIN HOUSE, GREATER KAILASH-II, NEW DELHI**
	EPC CONTRACTOR BHARAT HEAVY ELECTRICALS LTD PS-PEM, PPEI-BUILDING, SECTOR-16A, PLOT NO. 25, NOIDA-201301

STATUS	**CONTRACT**	**DOC. NO: PE-V0-412-553-A019**	Rev:**01**
PACKAGE		**AIR CONDITIONING SYSTEM**	
TITLE		**TDS & GA of Air handling Units (AHU)along with foundation details**	

TECHNICAL DATA SHEET OF AIR HANDLING UNIT					
S. No.	**DESCRIPTION**	**SPECIFICATION**	**SPECIFICATION**	**SPECIFICATION**	**SPECIFICATION**
A.	**GENERAL**				
1	Item	Air Handling Unit	Air Handling Unit	Air Handling Unit (DX -Type)	Air Handling Unit (DX -Type)
2	**Air Quantity (Each AHU)**	**54,200 CFM**	**31,700 CFM**	**10,000 CFM**	**10,000 CFM**
3	**Refrigeration Capacity (Each AHU)**	**111.00 TR**	**60.0 TR**	**30.0 TR**	**30.0 TR**
4	Quantity	4 Nos. (2W + 2S)	2 Nos. (1W + 1S)	2 Nos. (1W + 1S)	2 Nos. (1W + 1S)
5	No. of Fan Per AHU	2	1	1	1
6	Type of AHU	Floor Mounted	Floor Mounted	Floor Mounted	Floor Mounted
7	**Make**				
8	**Model No.**				
10	Name of Building	Power House Building(Main Building)	Power House Building(Main Building)	ESP-1	ESP-2
11	Serving Area	AC Area at EL (+) 17.00 m LVL	AC Area at EL (+) 8.5 m LVL	Switch Gear Room at EL (+) 4.00 m LVL	Switch Gear Room at EL (+) 4.00 m LVL
12	Location of AHU	EL (+) 24.00 m LVL	EL (+) 8.5 m LVL	EL (+) 4.00 m LVL	EL (+) 4.00 m LVL
13	Power Supply	3 Phase, 415V±10%, 50 Hz±5%	3 Phase, 415V±10%, 50 Hz±5%	3 Phase, 415V±10%, 50 Hz±5%	3 Phase, 415V±10%, 50 Hz±5%
14	Overall Dimension (L x W x H) MM	5300 x 5600 x 3000	4400 x3000 x 3000	3350 x 2100 x 1580	3350 x 2100 x 1580
15	Static Weight With Fan & Motor (Approx.)	4000	3200	1500	1500
16	Dynamic Weight With Fan & Motor (Approx.) (Kg)	6400	5200	2400	2400
B.	**MATERIAL OF CONSTRUCTION**				
1	**Casing**				
1.1	Type of Casing	Double Skin	Double Skin	Double Skin	Double Skin
1.2	Inner Skin	0.8 MM PLAIN G.S.S	0.8 MM PLAIN G.S.S	0.8 MM PLAIN G.S.S	0.8 MM PLAIN G.S.S
1.3	Outer Skin	0.8 MM PRE COATED G.S.S	0.8 MM PRE COATED G.S.S	0.8 MM PRE COATED G.S.S	0.8 MM PRE COATED G.S.S
2	**Double Skin Panel**				
2.1	Type of Insulation	PUF	PUF	PUF	PUF
2.2	Thickness	50 mm ± 2%	50 mm ± 2%	50 mm ± 2%	50 mm ± 2%
2.3	Density	40 ±2 Kg /m^3	40 ±2 Kg /m^3	40 ±2 Kg /m^3	40 ±2 Kg /m^3
3	**Frame**				
3.1	Material	Aluminium	Aluminium	Aluminium	Aluminium
3.2	Unit Base Material	G.S.S.	G.S.S.	G.S.S.	G.S.S.
3.3	Fan & Motor Base Frame	G.S.S.	G.S.S.	G.S.S.	G.S.S.
4	**Condensate Drain Pan**				
4.1	Material	SS-304	SS-304	SS-304	SS-304
4.2	Thickness	18 G	18 G	18 G	18 G
C.	**CENTRIGUGAL FAN**				
1	Air Quantity (Each Fan)	**27,100 CFM**	**31,700 CFM**	**10,000 CFM**	**10,000 CFM**
1a	Make/Model	**Nicotra/RDH 1000 K**	**Nicotra/RDH 1000 K**	**Nicotra/RDH 560 K**	**Nicotra/RDH 560 K**
2	Type of Fan	DIDW,Centrifugal	DIDW,Centrifugal	DIDW,Centrifugal	DIDW,Centrifugal
3	Type of Blade	Backward Curved	Backward Curved	Backward Curved	Backward Curved
4	Fan Diameter	1000 mm	1000 mm	560 mm	560 mm
5	Outlet Velocity	8.0 m/s	9.3 m/s (Max)	9.2 m/s (Max)	9.2 m/s (Max)
7	Design Temperature	20.0 °C	20.0 °C	20.0 °C	20.0 °C
8	Static Pressure	120 mm WG	120 mm WG	120 mm WG	120 mm WG
10	Rated Speed	966 RPM	994 RPM	1571RPM	1571RPM
13	Fan absorbed power(BKW)	19.206	22.26	7.249	7.249
	Motor Rating (KW)	22.00	30.00	11.00	11.00
14	Total Efficiency	80.90%	82.60%	80.00%	80.00%
15	Static Efficiency	78.40%	79.1.%	76.60%	76.60%
16	Type of Drive	Belt Driven	Belt Driven	Belt Driven	Belt Driven
19	Impeller Static & Dynamic Balancing	Statically & Dynamically Balanced	Statically & Dynamically Balanced	Statically & Dynamically Balanced	Statically & Dynamically Balanced
22	Performance Curve	Enclosed	Enclosed	Enclosed	Enclosed
23	**Material of Construction**				
23.1	Casing	Galvanized Steel Sheet	Galvanized Steel Sheet	Galvanized Steel Sheet	Galvanized Steel Sheet
23.2	Impeller	MS	MS	MS	MS
23.3	Shaft	MS	MS	MS	MS
25	**Fan Pulley**				
25.1	MOC	MS	MS	MS	MS
26	**Motor Pulley**				
26.1	MOC	MS	MS	MS	MS
27	**Vibration Isolator**				
27.1	Type of Isolator	Cushy Foot	Cushy Foot	Cushy Foot	Cushy Foot
27.2	MOC	Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel
28	**Damper**				
28.1	SA MVCD	Yes, Provided	Yes, Provided	Yes, Provided	Yes, Provided
28.2	SA BDD	Yes, Provided	Yes, Provided	Yes, Provided	Yes, Provided
D	**OTHER DETAILS**				
1	**Painting**				
1.1	Casing	Galvanized (Minimum 40 Micron)	Galvanized (Minimum 40 Micron)	Galvanized (Minimum 40 Micron)	Galvanized (Minimum 40 Micron)
1.2	Impeller	Galvanized (Minimum 40 Micron)	Galvanized (Minimum 40 Micron)	Galvanized (Minimum 40 Micron)	Galvanized (Minimum 40 Micron)
1.3	Common Base Frame	Galvanized (Minimum 40 Micron)	Galvanized (Minimum 40 Micron)	Galvanized (Minimum 40 Micron)	Galvanized (Minimum 40 Micron)
2	**Accessories**				
2.1	Motor & Fan Pulley	Yes Provided	Yes Provided	Yes Provided	Yes Provided
2.2	V-Belt Drive	Yes Provided	Yes Provided	Yes Provided	Yes Provided
2.4	Flexible Connection	Yes Provided	Yes Provided	Yes Provided	Yes Provided
3	**Reference Document/Drawing**				
3.1	General Arrangement Drawing of AHU	Enclosed	Enclosed	Enclosed	Enclosed
E.	**COOLING COIL**	**REFER ATTACHED GA & COIL SELECTION**	**REFER ATTACHED GA & COIL SELECTION**	**REFER ATTACHED GA & COIL SELECTION**	**REFER ATTACHED GA & COIL SELECTION**
F	**FILTER**	**AS PER APPROVED DOCUMENT OF FILTER (DOC NO:PE-V0-412-553-A035)**	**AS PER APPROVED DOCUMENT OF FILTER (DOC NO:PE-V0-412-553-A035)**	**AS PER APPROVED DOCUMENT OF FILTER (DOC NO:PE-V0-412-553-A035)**	**AS PER APPROVED DOCUMENT OF FILTER (DOC NO:PE-V0-412-553-A035)**
G	**TECHNICAL DATA SHEET OF MOTOR**	**AS PER SUBMITTED DOCUMENT OF MOTOR (DOC NO:PE-V0-412-553-A022)**	**AS PER SUBMITTED DOCUMENT OF MOTOR (DOC NO:PE-V0-412-553-A022)**	**AS PER SUBMITTED DOCUMENT OF MOTOR (DOC NO:PE-V0-412-553-A022)**	**AS PER SUBMITTED DOCUMENT OF MOTOR (DOC NO:PE-V0-412-553-A022)**

REVIEWED
By VIPIN NAUNI at 7:41 pm, Jan 18, 2019





SCHEDUL OF PIPE CONNECTION			
S.NO.	CHW IN	CHW OUT	DRAIN PIPE
1.	125 NB	125 NB	40 NB

BILL OF MATERIAL

S.NO.	DESCRIPTION	SIZE	MAKE	QTY.
01	SUPPLY AIR CENTRIFUGAL DIDW, 2 NOS UP BLAST BACKWARD CURVED FAN, CAPACITY- 27,100 CFM, STATIC PRESSURE-120mmwg	RDH-1000K	AS PER APP. MAKE	02
02	SUPPLY AIR FAN MOTOR	22KW , 4 POLE	AS PER APP. MAKE	02
03	DRIVE SET WITH BELT GUARD EACH SET COMPRISING.	--------	AS PER APP. MAKE	02 SET
	FAN PULLEY		AS PER APP. MAKE	02 SET
	MOTOR PULLEY		AS PER APP. MAKE	02 SET
	WEDGE BELT		AS PER APP. MAKE	02 SET
04	PRE-FILTERS , CASSETTE TYPE, HDPE WASHABLE (90% DOWN TO 10 MICRONS) AL.	610 X 610 X 50THK	THERMODYNE / ANFILCO	32
05	FINE-FILTERS , CASSETTE TYPE, HDPE WASHABLE (99% DOWN TO 05 MICRONS) AL.	610 X 610 X 305THK	THERMODYNE / ANFILCO	32
06	COOLING COIL (4 ROWS) CAPACITY OF EACH COIL : 27.75 TR.	2115 X 1206.5 (H)	AS PER APP. MAKE	04
07	4- BEND PVC MISTELIMINATOR WITH SS DRIP TRAY & GSS HOLDING FRAME	2115(W) X 1204(H)1500	AS PER APP. MAKE	04
08	MARINE LIGHT WITH COMMON ON/OFF SWITCH & CABLING	8 WATT CFL		07
09	AIR TIGHT DOOR WITH TOUGHENED GLASS VIEW WINDOW	750(W)X1750(H)		02
10	VIBRATION ISOLATORS FOR SUPPLY AIR FAN & MOTOR	--------		LOT
11	COMMON BASE FRAME FOR FAN & MOTOR	ISMC-125	AS F	02 SET
12	DOULE FOLD FLEXIBLE CANVAS CONNECTION AT AT SUPPLY AIR FAN	1266 X 1266 X 150		02SET
13	BACK DRAFT DAMPER AT SUPPLY AIR FAN OUTLET	1266 X 1266 X 150		02SET
14	DOUBLE SKIN CASING OF AHU	5600(W)x3025(H)x5300(L)	RCS	01
15	DIFFERENTIAL PRESSURE SWITCH	---	AS PER APPROVED MAKE	04SET
16	DRAIN PAN (SS-304) 18G THK WITH NITRILE RUBBER LINING WITH DRAIN BELOW COOLING COILS	AS PER COOLING COIL G.A.		04SET
17	DUCT CONNECTION PIC.	1266 X 1266, L=935		01
18	MOTORIZED VOLUME CONTROL DAMPER AT SUPPLY AIR FAN OUTLET	1266 X 1266 X 150		02SET

DRAWING NO.	TITLE	BY

REFERENCE DRAWINGS

FOR APPROVAL

REV	REVISION DESCRIPTION	DRAWN	CHECK	DATE
02	THIRD SUBMISSION	UDAY	SALIM	15.01.2019
01	SECOND SUBMISSION	UDAY	SALIM	01.11.2018
00	FIRST SUBMISSION	UDAY	SALIM	28.09.2018

REVISIONS

PROJECT:	2x660 MW ENNORE SEZ COAL BASED STPP AT ASH DYKE OF NCTPS, CHENNAI
CUSTOMER	TAMILNADU GENERATION AND DISTRIBUTION CORPORATION LIMITED (TANGEDCO)
CONSULTANT	DESEIN PRIVATE LIMITED DESEIN HOUSE, GREATER KAILASH-II, NEW DELHI
EPC CONTRACTOR:	भारत हेवी इलेक्ट्रिकल्स लिमिटेड Bharat Heavy Electricals Limited POWER SECTOR PROJECT ENGINEERING MANAGEMENT NOIDA
BHEL DRAWING NO.	PE-V0-412-553-A019

DRAWING TITLE

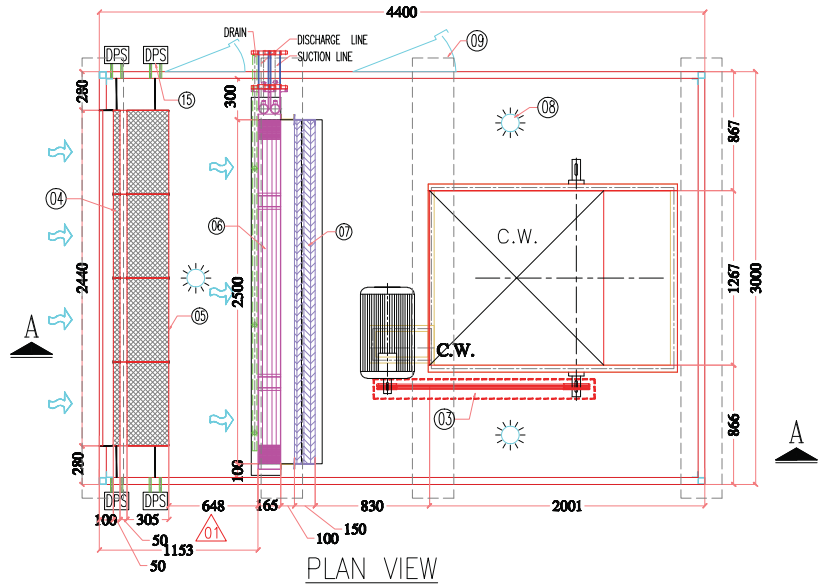
GA OF AIR HANDLING UNIT, CAP.-54,200 CFM ALONG WITH FOUNDATION DETAILS

AHU ROOM AT EL.+24.00M.

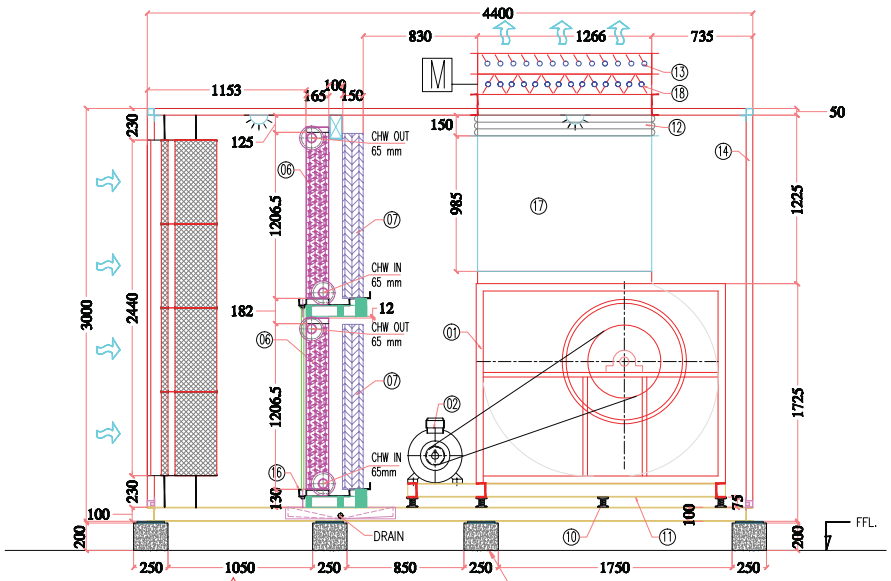
REVIEWED
By VIPIN NAUNI at 7:38 pm, Jan 18, 2019

NOTE:
1. ALL DIMENSION ARE IN MM UNLESS OTHERWISE INDICATED.
2. ALL CIVIL AND MASONRY WORK TO BE DONE BY BHEL.

FIRST ANGLE PROJECTION
ALL DIMENSIONS ARE IN MM
DRAWING NO. PE-V0-412-553-A019
FORMAT SIZE A3



PLAN VIEW



SECTION–AA

04 NOS FOUNDATION BLOCKS
SIZE–3190Lx250Wx200H

SPECIAL NOTE:–

AHU NO.–01
DOOR – LEFT SIDE
COOLING COIL – RIGHT SIDE

AHU NO.–02
DOOR – RIGHT SIDE
COOLING COIL – LEFT SIDE

SCHEDUL OF PIPE CONNECTION

S.NO.	CHW IN	CHW OUT	DRAIN PIPE
1.	65 NB	65 NB	32 NB

NOTE:
1. ALL DIMENSION ARE IN MM UNLESS OTHERWISE INDICATED.
2. ALL CIVIL AND MASONRY WORK TO BE DONE BY BHEL.

BILL OF MATERIAL

S.NO.	DESCRIPTION	SIZE	MAKE	QTY.
01	SUPPLY AIR CENTRIFUGAL DIDW, UP BLAST BACKWARD CURVED FAN, CAPACITY–31,700 CFM, STATIC PRESSURE 120mmwg	RDH-1000K	AS PER APP. MAKE	01
02	SUPPLY AIR FAN MOTOR	30KW , 4 POLE	AS PER APP. MAKE	01
03	DRIVE SET WITH BELT GUARD EACH SET COMPRISING.	--------	AS PER APP. MAKE	01 SET
	FAN PULLEY		AS PER APP. MAKE	01 SET
	MOTOR PULLEY		AS PER APP. MAKE	01 SET
	WEDGE BELT		AS PER APP. MAKE	01 SET
04	PRE–FILTERS , CASSETTE TYPE, HDPE WASHABLE (90% DOWN TO 10 MICRONS) AL.	610 X 610 X 50THK	THERMODYNE / ANFILCO	16
05	FINE–FILTERS , CASSETTE TYPE, HDPE WASHABLE (99% DOWN TO 05 MICRONS) AL.	610 X 610 X 305THK	THERMODYNE / ANFILCO	16
06	COOLING COIL (4 ROWS) CAPACITY OF EACH COIL= 30 TR	2500 X 1206.5(H) X 165 DEPTH	AS PER APP. MAKE	02
07	4– BEND PVC MISTELIMINATOR WITH SS DRIP TRAY & GSS HOLDING FRAME	2500(W) X 1200(H)1500	AS PER APP. MAKE	02
08	MARINE LIGHT WITH COMMON ON/OFF SWITCH & CABLING	8 WATT CFL	HAVELLS	03
09	AIR TIGHT DOOR WITH TOUGHENED GLASS VIEW WINDOW	750(W)X1750(H)	---	01
	AIR TIGHT DOOR WITHOUT TOUGHENED GLASS VIEW WINDOW	500(W)X1750(H)		01
10	VIBRATION ISOLATORS FOR SUPPLY AIR FAN & MOTOR	--------		LOT
11	COMMON BASE FRAME FOR FAN & MOTOR	ISMC-100	AS PER APP. MAKE	01 SET
12	DOULE FOLD FLEXIBLE CANVAS CONNECTION AT AT SUPPLY AIR FAN	1266 X 1266 X 150		01SET
13	BACK DRAFT DAMPER AT SUPPLY AIR FAN OUTLET	1266 X 1266 X 150		01SET
14	DOUBLE SKIN CASING OF AHU	3000(W)x3000(H)x4400(L)		01
15	DIFFERENTIAL PRESSURE SWITCH	15NB	AS PER APPROVED MAKE	04SET
16	DRAIN PAN (SS–304) 18G THK WITH NITRILE RUBBER LINING WITH DRAIN BELOW COOLING COILS	AS PER COOLING COIL G.A.		02SET
17	DUCT CONNECTION PIC.	1266 X 1266, L=985		01
18	MOTORIZED VOLUME CONTROL DAMPER AT SUPPLY AIR FAN OUTLET	1266 X 1266, L=985		01

DRAWING NO.	TITLE	BY

REFERENCE DRAWINGS

FOR APPROVAL

REVISIONS

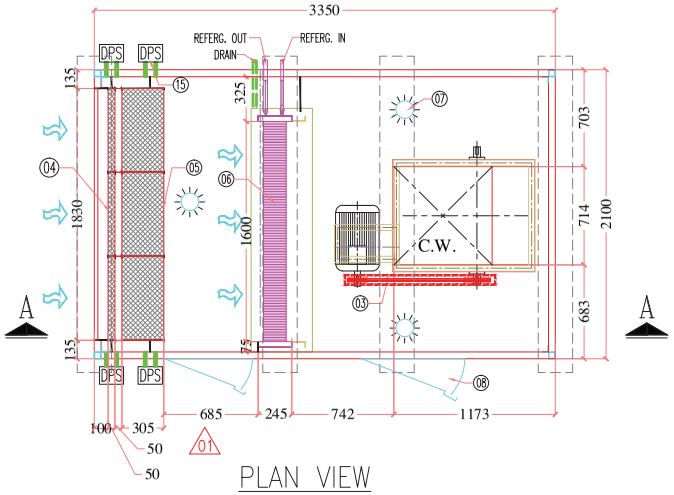
REV	REVISION DESCRIPTION	DRAWN	CHECK	DATE
02	THIRD SUBMISSION	DHARMENDER	SALIM	15.01.2019
01	SECOND SUBMISSION	DHARMENDER	SALIM	01.11.2018
00	FIRST SUBMISSION	DHARMENDER	SALIM	28.09.2018

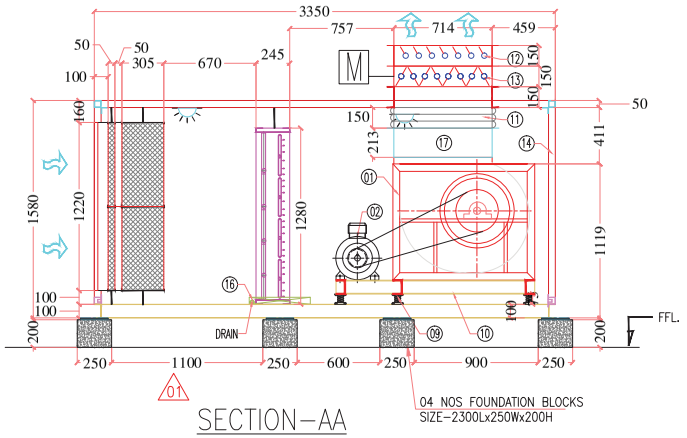
PROJECT:	2x660 MW ENNORE SEZ COAL BASED STPP AT ASH DYKE OF NCTPS, CHENNAI
CUSTOMER	TAMILNADU GENERATION AND DISTRIBUTION CORPORATION LIMITED (TANGEDCO)
CONSULTANT	DESEIN PRIVATE LIMITED DESEIN HOUSE, GREATER KAILASH–II, NEW DELHI
EPC CONTRACTOR: भारत हेवी इलेक्ट्रिकल्स लिमिटेड Bharat Heavy Electricals Limited POWER SECTOR PROJECT ENGINEERING MANAGEMENT NOIDA	BHEL DRAWING NO. PE-V0-412-553-A019

DRAWING TITLE

GA OF AIR HANDLING UNIT, CAP.-31700 CFM FOR UPS ROOM EL.-8.5 (QTY.-2NOS.)

REVIEWED
By VIPIN NAUNI at 7:38 pm, Jan 18, 2019





SCHEDUL OF PIPE CONNECTION			
S.NO.	LIQUID LINE	GAS LINE	DRAIN PIPE
1.	54 NB	35 NB	25 NB

SPECIAL NOTE:–

AHU NO.–01
DOOR – LEFT SIDE
COOLING COIL – RIGHT SIDE

AHU NO.–02
DOOR – RIGHT SIDE
COOLING COIL – LEFT SIDE

SPECIAL NOTE:
1. DOOR LOCATION CHANGED TO SUIT THE SITE REQUIREMENT.

NOTE:
1. ALL DIMENSION ARE IN MM UNLESS OTHERWISE INDICATED.
2. ALL CIVIL AND MASONRY WORK TO BE DONE BY BHEL.

BILL OF MATERIAL

S.NO.	DESCRIPTION	SIZE	MAKE	QTY.
02	SUPPLY AIR CENTRIFUGAL DIDW, UP BLAST BACKWARD CURVED FAN, CAPACITY–1,0000CFM, STATIC PRESSURE 120mmwg	RDH–560K	AS PER APP. MAKE	01
02	SUPPLY AIR FAN MOTOR	11KW , 4 POLE	AS PER APP. MAKE	01
03	DRIVE SET WITH BELT GUARD EACH SET COMPRISING.	--------	AS PER APP. MAKE	01 SET
	FAN PULLEY		AS PER APP. MAKE	01 SET
	MOTOR PULLEY		AS PER APP. MAKE	01 SET
	WEDGE BELT		AS PER APP. MAKE	01 SET
04	PRE–FILTERS , CASSETTE TYPE, HDPE WASHABLE (90% DOWN TO 10 MICRONS) AL.	610 X 610 X 50THK	THERMODYNE / ANFILCO	6
05	FINE–FILTERS , CASSETTE TYPE, HDPE WASHABLE (99% DOWN TO 05 MICRONS) AL.	610 X 610 X 305THK	THERMODYNE / ANFILCO	6
06	COOLING COIL (6 ROWS), CAPACITY OF COIL = 30 TR	1600 X 1219(H) X 245 DEPTH	AS PER APP. MAKE	01
07	MARINE LIGHT WITH COMMON ON/OFF SWITCH & CABLING	8 WATT CFL	HAVELLS	03
08	AIR TIGHT DOOR WITH TOUGHENED GLASS VIEW WINDOW AIR TIGHT DOOR WITHOUT TOUGHENED GLASS VIEW WINDOW	750(W)X1000(H) 500(W)X1000(H)		01 01
09	VIBRATION ISOLATORS FOR SUPPLY AIR FAN & MOTOR	--------		LOT
10	COMMON BASE FRAME FOR FAN & MOTOR	ISMC–100	AS PER APP. MAKE	01 SET
11	DOULE FOLD FLEXIBLE CANVAS CONNECTION AT AT SUPPLY AIR FAN	714 X 714 X 150		01SET
12	BACK DRAFT DAMPER AT SUPPLY AIR FAN OUTLET	714 X 714 X 150		01SET
13	MOTORIZED VOLUME CONTROL DAMPER AT SUPPLY AIR FAN OUTLET	714 X 714 X 150		01SET
14	DOUBLE SKIN CASING OF AHU	2100(W)x1580(H)x3350(L)		01
15	DIFFERENTIAL PRESSURE SWITCH	15NB	AS PER APPROVED MAKE	04SET
16	DRAIN PAN (SS–304) 18G THK WITH DRAIN BELOW COOLING COILS	AS PER COOLING COIL GA		01SET
17	DUCT CONNECTION PIC.	714 X 714, L=213		01

DRAWING NO.	TITLE	BY
	REFERENCE DRAWINGS	
	FOR APPROVAL	

REV	REVISION DESCRIPTION	DRAWN	CHECK	DATE
02	THIRD SUBMISSION	DHARMENDER	SALIM	15.01.2019
01	SECOND SUBMISSION	DHARMENDER	SALIM	01.11.2018
00	FIRST SUBMISSION	DHARMENDER	SALIM	28.09.2018

REVISIONS

PROJECT:	2x660 MW ENNORE SEZ COAL BASED STPP AT ASH DYKE OF NCTPS, CHENNAI
CUSTOMER	TAMILNADU GENERATION AND DISTRIBUTION CORPORATION LIMITED (TANGEDCO)
CONSULTANT	DESEIN PRIVATE LIMITED DESEIN HOUSE, GREATER KAILASH–II, NEW DELHI
EPC CONTRACTOR:	BHEL DRAWING NO. PE-V0-412-553-A019

BHEL – भारत हेवी इलेक्ट्रिकल्स लिमिटेड Bharat Heavy Electricals Limited
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NOIDA

DRAWING TITLE

GA OF AIR HANDLING UNITS (DX TYPE), CAP.-10,000CFM
ALONG WITH FOUNDATION DETAILS (QTY.-4NOS.) (ESP BLDG.)

DRAWING NO. PE–V0–412–653–A019

FIRST ANGLE PROJECTION | ALL DIMENSIONS ARE IN MM | FORMAT SIZE A3

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Website:www.nicotra-gebhardt.com
Email:info@nicotra-gebhardt.com

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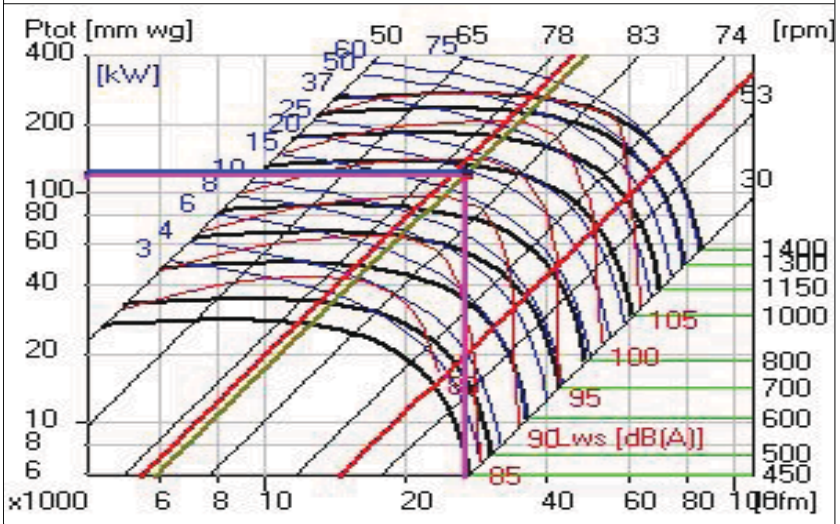
542 24

RDH 1000 K
Single Unit - Ducted Outlet



Nicotra Gebhardt S.p.A. certifies that the fan shown herein is licensed to bear the AMCA Seal. The AMCA Certified Ratings Seal applies to air performance ratings only. Performance certified is for installation type B: free inlet, ducted outlet. Performance ratings do not include the effects of appurtenances (accessories). Power rating (watts, kW, or bhp) does not include transmission losses.

Working Point Data

Total EFFICIENCY	80.9	%
Static Efficiency	78.4	%
Static Pressure	120	mm wg
Velocity Pressure	4	mm wg
Total Pressure	124	mm wg
Fan Power	19.206	kW
Motor Power	21.127	kW
Volume Flow	27100	cfm
Air Velocity	8	m/s
Fan Speed	966	rpm
Temperature	20.	°C
Altitude	11.	m
Density	1.201	kg/m³
Motor Efficiency	93	%
Specific Fan Power	1.615	kW/(m³/s)
FEG	85	

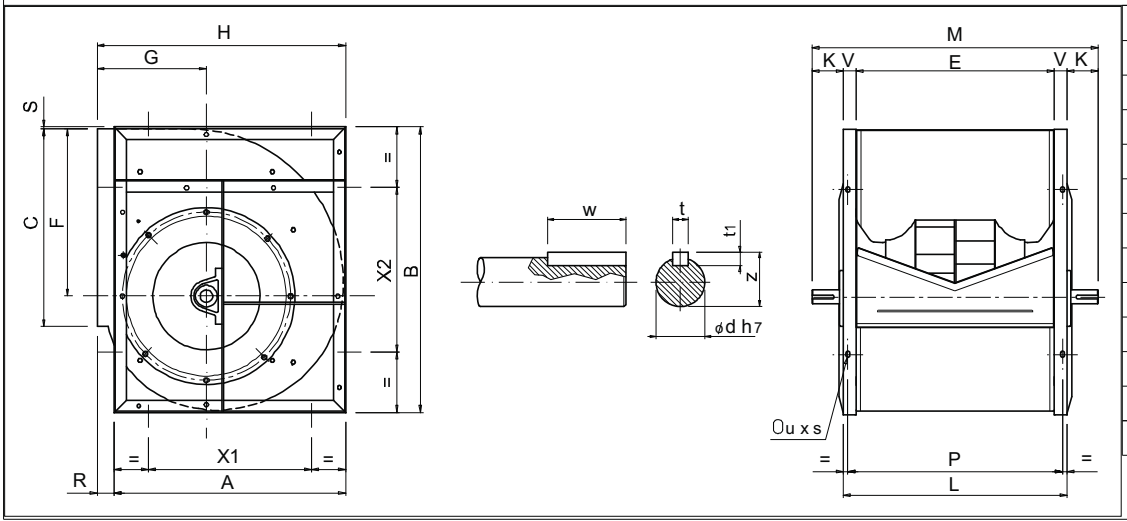
Operational Limits

Max. Power	37	kW
Max. Fan Speed	1000	rpm
Min. Temperature	-20	°C
Max. Temperature	100	°C

Version 3.3.0 - May 2, 2016 - printed 12/13/2018 at 4:40:33 PM

	Sound Power Level [dB]								Lw-tot		LwA-tot	
Hz	63	125	250	500	1000	2000	4000	8000				
Inlet side External - Lwi	98.3	97.8	96.9	89.1	86.8	82.7	78.1	74.6	102.9	dB	93.3	dBA
Outlet side in-duct - Lwo	105.1	100	97.9	94.2	90.6	84.1	78.6	74.2	107.2	dB	96.2	dBA
Outlet side Ext. - Lwom	101.2	98.6	97.5	94.1	90.5	84	78.6	74.2	104.8	dB	95.9	dBA

Notes



A	1451	S	10
B	1810	V	50
C	1267	K	147
E	1267	X1	900
F	1066	X2	900
G	657	X3	0
H	1541	X4	0
L	1367	t	18
M	1660	t1	11
P	1217	w	90
Q	0	z	64
R	90	Ød	60
UxS		17x22	

All dimensions in [mm]

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Email:info@nicotra-gebhardt.com

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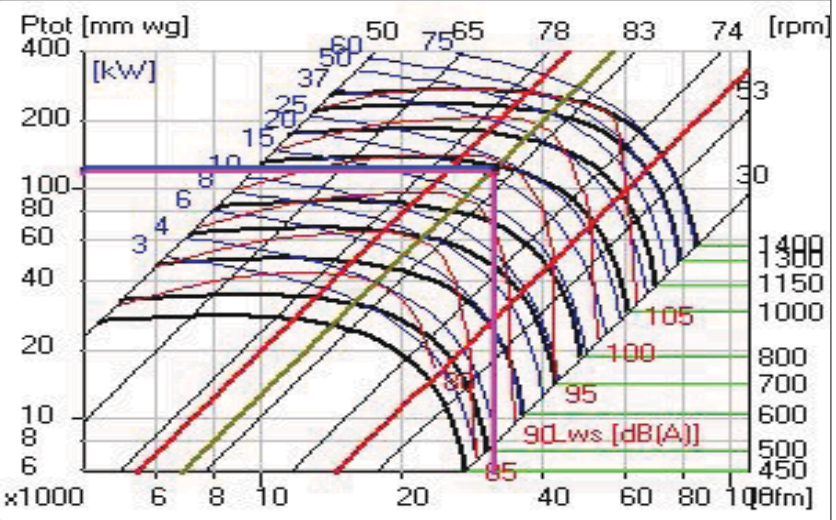
317 5

RDH 1000 K
Single Unit - Ducted Outlet



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Working Point Data

Total EFFICIENCY	82.6	%
Static Efficiency	79.1	%
Static Pressure	120	mm wg
Velocity Pressure	5	mm wg
Total Pressure	125	mm wg
Fan Power	22.26	kW
Motor Power	24.486	kW
Volume Flow	31700	cfm
Air Velocity	9.3	m/s
Fan Speed	994	rpm
Temperature	20.	°C
Altitude	11.	m
Density	1.201	kg/m³
Motor Efficiency	93	%
Specific Fan Power	1.6	kW/(m³/s)
FEG	85	

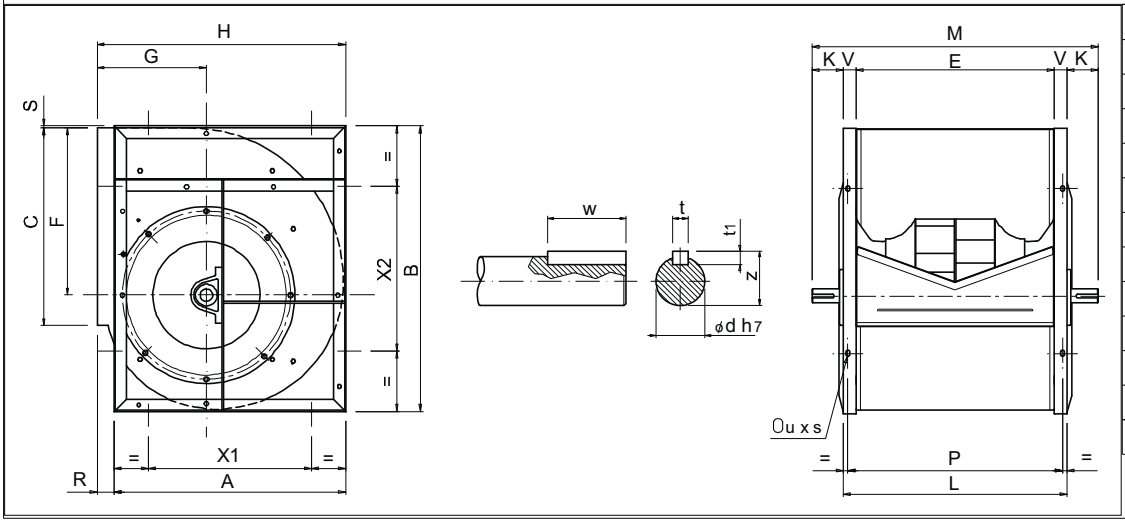
Operational Limits

Max. Power	37	kW
Max. Fan Speed	1000	rpm
Min. Temperature	-20	°C
Max. Temperature	100	°C

Version 3.3.0 - May 2, 2016 - printed 12/13/2018 at 4:18:53 PM

	Sound Power Level [dB]								Lw-tot		LwA-tot	
Hz	63	125	250	500	1000	2000	4000	8000				
Inlet side External - Lwi	97.3	97.6	97.8	90.5	87.9	84	79	74.9	102.8	dB	94.2	dBA
Outlet side in-duct - Lwo	103.9	99.6	98	95.6	92	85.3	79.6	74.7	106.6	dB	97.2	dBA
Outlet side Ext. - Lwom	100.1	98.1	97.6	95.5	91.9	85.3	79.6	74.7	104.5	dB	96.9	dBA

Notes



A	1451	S	10
B	1810	V	50
C	1267	K	147
E	1267	X1	900
F	1066	X2	900
G	657	X3	0
H	1541	X4	0
L	1367	t	18
M	1660	t1	11
P	1217	w	90
Q	0	z	64
R	90	Ød	60
UxS		17x22	

All dimensions in [mm]

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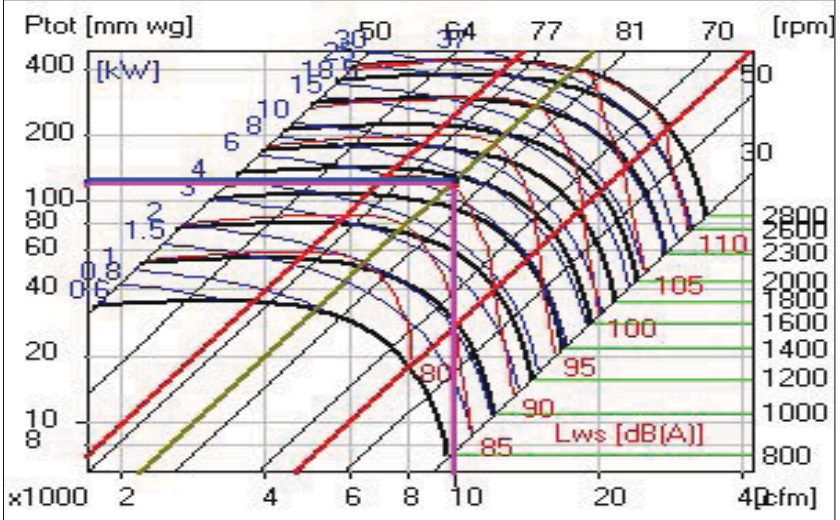
RDH 560 K
Single Unit - Ducted Outlet



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Working Point Data

Total EFFICIENCY	80	%
Static Efficiency	76.6	%
Static Pressure	120	mm wg
Velocity Pressure	5	mm wg
Total Pressure	125	mm wg
Fan Power	7.249	kW
Motor Power	7.974	kW
Volume Flow	10000	cfm
Air Velocity	9.2	m/s
Fan Speed	1571	rpm
Temperature	20.	°C
Altitude	11.	m
Density	1.201	kg/m³
Motor Efficiency	91	%
Specific Fan Power	1.688	kW/(m³/s)
FEG	85	

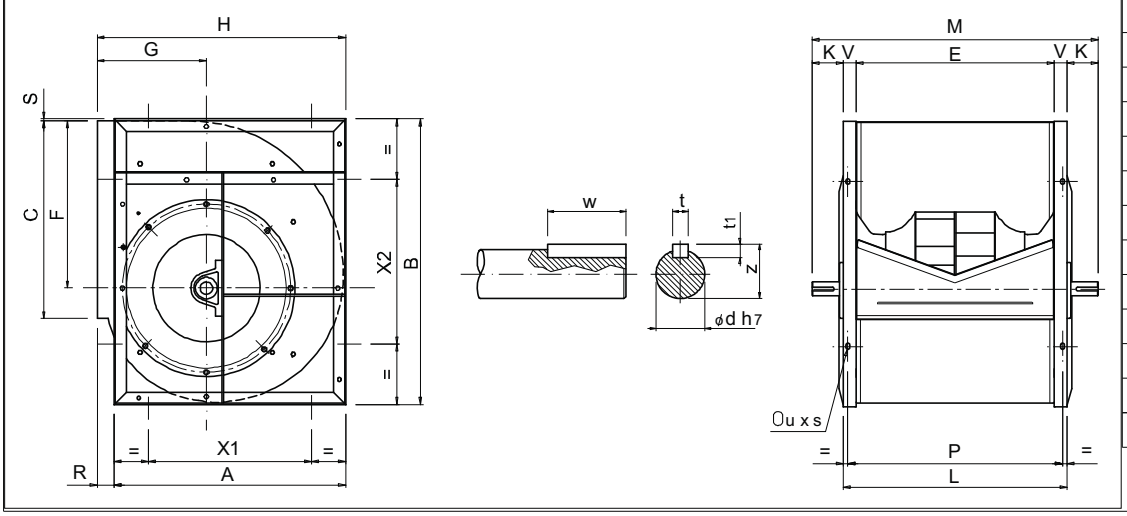
Operational Limits

Max. Power	18.5	kW
Max. Fan Speed	2100	rpm
Min. Temperature	-20	°C
Max. Temperature	100	°C

Version 3.3.0 - May 2, 2016 - printed 12/13/2018 at 4:23:00 PM

	Sound Power Level [dB]								Lw-tot		LwA-tot	
Hz	63	125	250	500	1000	2000	4000	8000				
Inlet side External - Lwi	88.6	92.5	92.2	87.9	83.3	81.5	80	75.4	97.2	dB	90.6	dBA
Outlet side in-duct - Lwo	99.3	98.1	92.5	90.1	88.9	84.3	81.1	75.8	102.8	dB	93.6	dBA
Outlet side Ext. - Lwom	92.1	94.7	91.3	89.8	88.8	84.3	81.1	75.8	99.1	dB	93.1	dBA

Notes



A	839	S	8
B	1030	V	50
C	715	K	127
E	715	X1	530
F	603	X2	530
G	390	X3	0
H	893	X4	0
L	815	t	14
M	1070	t1	9
P	765	w	90
Q	0	z	53.5
R	54	Ød	50
UxS		13x18	

All dimensions in [mm]

RAVI AIRCON
comfort with a difference

An ISO 9001:2008 Company

Corporate Office:
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A-134, Chander Vihar, Nilothi Extn. New Delhi=110041
Email: raviairconsales@gmail.com, sonia@raviaircon.com

Cooling - Technical Data

Customer	
Date	**20 Dec 2018**
Model	**31.75x27.50 38T 4R 2115A 2.10P 38**
Model	**NC 31,75x27,5 - 1/2"**

Total capacity	**27.86**	**ton(ref.)**
Sensible capacity	**21.50**	**ton(ref.)**
Latent capacity	**6.37**	**ton(ref.)**
Sensible/total capacity ratio	**0.7714**	
Quantity of produced water	**32.36**	**kg/h**
Exchange surface	**238.2**	**m2**
Global exchange coefficient	**48.53**	**W/(m2 K)**
Theoric DTML	**8.47**	**°C**
Fins material	**Aluminium**	
Tubes material	**Copper**	
Fin thickness	**0.1500**	**mm**
Coil internal volume	**39.33**	**L**
Tubes external diameter	**13.30**	**mm**
Tubes internal diameter	**12.48**	**mm**

Air side

Atmospheric pressure	**1.01**	**bar**
Air flow	**13550**	**cft/min**
Face velocity on the coil	**493.1**	**ft/min**
Density calculated at inlet temperature	**1.19**	**kg/m3**
Dry bulb inlet temperature	**22.40**	**°C**
Relative inlet temperature	**53.70**	**%**
Inlet specific humidity	**9.03**	**g/kg**
Inlet enthalpy	**45.17**	**kJ/kg**
Dry bulb outlet temperature	**12.66**	**°C**
Relative outlet humidity	**86.37**	**%**
Outlet specific humidity	**7.85**	**g/kg**
Outlet enthalpy	**32.26**	**kJ/kg**
Air pressure drop	**86.02**	**Pa**
Partial exchange coefficient air side	**68.40**	**W/(m2 K)**
Air side fouling factor	**0**	**m2 K/W**

Fluid side

Fluid inside tubes	**WATER**	
Fluid flow	**85.40**	**Gal/min**
Fluid velocity	**1.16**	**m/s**
Inlet temperature	**6.60**	**°C**
Outlet temperature	**10.94**	**°C**
Fluid pressure drop	**3.23**	**psi**
Header pressure drops	**0.8547**	**psi**
Total pressure drops fluid side	**4.0847**	**psi**
Partial exchange coefficient fluid side	**4670**	**W/(m2 K)**
Fluid side fouling factor	**0**	**m2 K/W**

RAVI AIRCON
comfort with a difference

An ISO 9001:2008 Company

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Cooling - Technical Data

Customer	
Date	**19 Dec 2018**
Model	**31.75x27.50 38T 4R 2500A 2.10P 38 NC**
Model	**31,75x27,5 - 1/2"**

Total capacity	**33.35**	**ton(ref.)**
Sensible capacity	**25.64**	**ton(ref.)**
Latent capacity	**7.71**	**ton(ref.)**
Sensible/total capacity ratio	**0.7688**	
Quantity of produced water	**39.18**	**kg/h**
Exchange surface	**281.6**	**m2**
Global exchange coefficient	**50.23**	**W/(m2 K)**
Theoric DTML	**8.29**	**°C**
Fins material	**Aluminium**	
Tubes material	**Copper**	
Fin thickness	**0.1500**	**mm**
Coil internal volume	**46.48**	**L**
Tubes external diameter	**13.30**	**mm**
Tubes internal diameter	**12.48**	**mm**

Air side

Atmospheric pressure	**1.01**	**bar**
Air flow	**15850**	**cft/min**
Face velocity on the coil	**488.0**	**ft/min**
Density calculated at inlet temperature	**1.19**	**kg/m3**
Dry bulb inlet temperature	**22.40**	**°C**
Relative inlet temperature	**53.70**	**%**
Inlet specific humidity	**9.03**	**g/kg**
Inlet enthalpy	**45.17**	**kJ/kg**
Dry bulb outlet temperature	**12.46**	**°C**
Relative outlet humidity	**86.99**	**%**
Outlet specific humidity	**7.80**	**g/kg**
Outlet enthalpy	**31.97**	**kJ/kg**
Air pressure drop	**84.71**	**Pa**
Partial exchange coefficient air side	**67.96**	**W/(m2 K)**
Air side fouling factor	**0**	**m2 K/W**

Fluid side

Fluid inside tubes	**WATER**	
Fluid flow	**98.52**	**Gal/min**
Fluid velocity	**1.34**	**m/s**
Inlet temperature	**6.60**	**°C**
Outlet temperature	**11.10**	**°C**
Fluid pressure drop	**4.84**	**psi**
Header pressure drops	**1.13**	**psi**
Total pressure drops fluid side	**5.97**	**psi**
Partial exchange coefficient fluid side	**5316**	**W/(m2 K)**
Fluid side fouling factor	**0**	**m2 K/W**

RAVI AIRCON
comfort with a difference

An ISO 9001:2008 Company

Corporate Office:
Tel.: 011-28361129, 28 Cell: 9911868461
A-134, Chander Vihar, Nilothi Extn. New Delhi=110041 E-mail : raviairconsales@gmail.com, sonia@raviaircon.com

Direct Expansion - Technical Data

Customer
Date **19 Dec 2018**
Model **25.40x22.00 47T 6R 1600A 2.10P 20 NC**
Model **25,4x22 - 3/8"**

Total capacity	**30.0**	**ton(ref.)**
Sensible capacity	**20.58**	**ton(ref.)**
Latent capacity	**9.06**	**ton(ref.)**
Sensible/total capacity ratio	**0.6943**	
Quantity of produced water	**45.96**	**kg/h**
Exchange surface	**218.9**	**m2**
Global exchange coefficient	**65.14**	**W/(m2 K)**
Medium logarithmic deltat	**7.31**	**°C**
Fins material	**Aluminium**	
Tubes material	**Copper**	
Fin thickness	**0.1500**	**mm**
Coil internal volume	**32.66**	**L**
Tubes external diameter	**10.30**	**mm**
Tubes internal diameter	**9.60**	**mm**

Air side

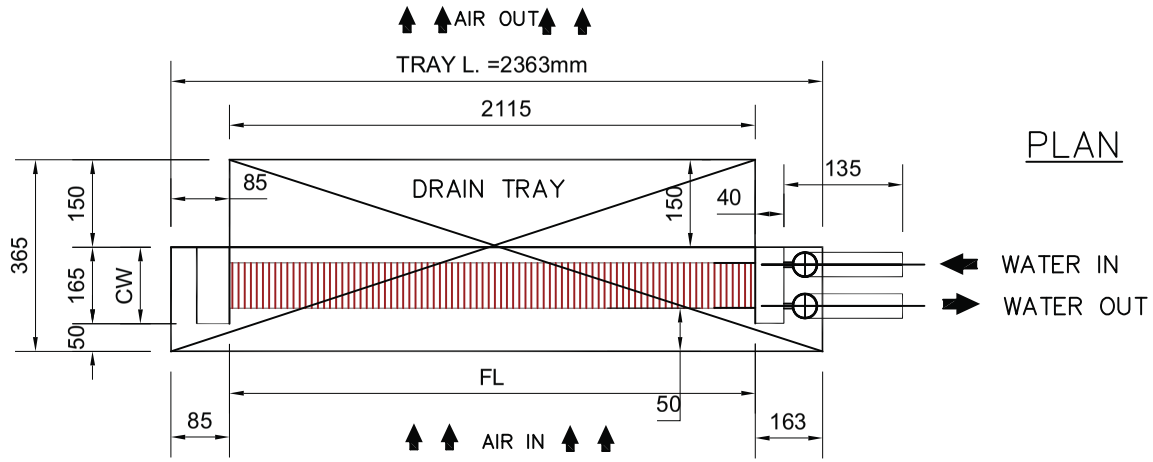
Atmospheric pressure	**1.01**	**bar**
Air flow	**10000**	**cft/min**
Face velocity on the coil	**486.3**	**ft/min**
Density calculated at inlet temperature	**1.16**	**kg/m3**
Dry bulb inlet temperature	**28.00**	**°C**
Relative inlet temperature	**55.00**	**%**
Inlet specific humidity	**12.97**	**g/kg**
Inlet enthalpy	**60.81**	**kJ/kg**
Dry bulb outlet temperature	**15.18**	**°C**
Relative outlet humidity	**100.0**	**%**
Outlet specific humidity	**10.64**	**g/kg**
Outlet enthalpy	**41.81**	**kJ/kg**
Air pressure drop	**133.3**	**Pa**
Partial exchange coefficient air side	**66.86**	**W/(m2 K)**
Air side fouling factor	**0**	**m2 K/W**

Refrigerant side

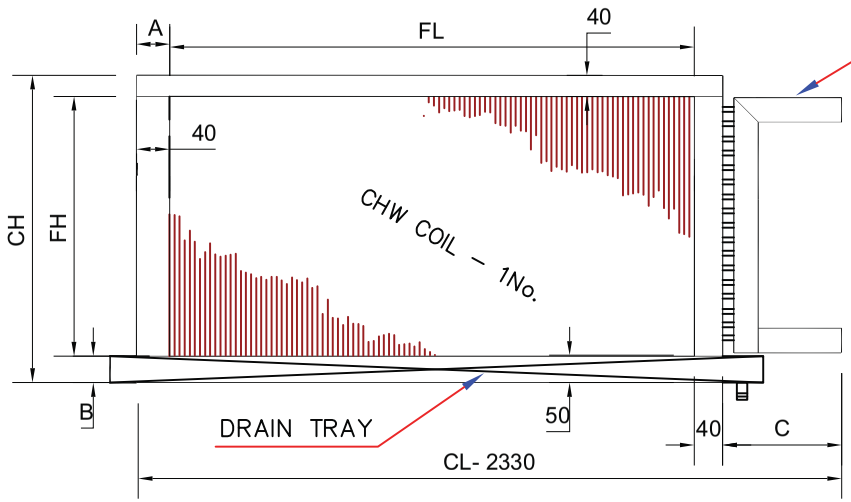
Fluid inside tubes	**R22**	
Refrigerant flow	**8.33**	**Gal/min**
Fluid velocity (Gaseous phase)	**3063**	**ft/min**
Fluid velocity (Liquid phase)	**0.3632**	**m/s**
Overheating degrees	**6.00**	**°C**
Subcooling degrees	**10.00**	**°C**
Evaporation temperature	**10.00**	**°C**
Condensing temperature	**52.00**	**°C**
Fluid pressure drop	**17.46**	**psi**
Header pressure drops	**0.9431**	**psi**
Total pressure drops fluid side	**18.4031**	**psi**
Pressure drop in degrees	**5.52**	**°C**
Partial exchange coefficient fluid side	**3761**	**W/(m2 K)**
Fluid side fouling factor	**0**	**m2 K/W**

CUSTOMER: TANGEDCO, CONSULTANT: DESEIN
EPC CONTRACTOR: BHEL, AC SUPPLIER:
PROJECT: 2X660 MW ENNORE TPS
DOCUMENT NO: PE-V0-412-553-A019
ITEM - COOLING COIL FOR 24.0 M TG BUILDING, 54,200 CFM AHU

ALL DIMENSIONS ARE IN MM



TYPE	COIL	DRAIN
A	RHS	RHS
B	LHS	LHS
COIL QTY. - 04 Nos. (2A+2B)		



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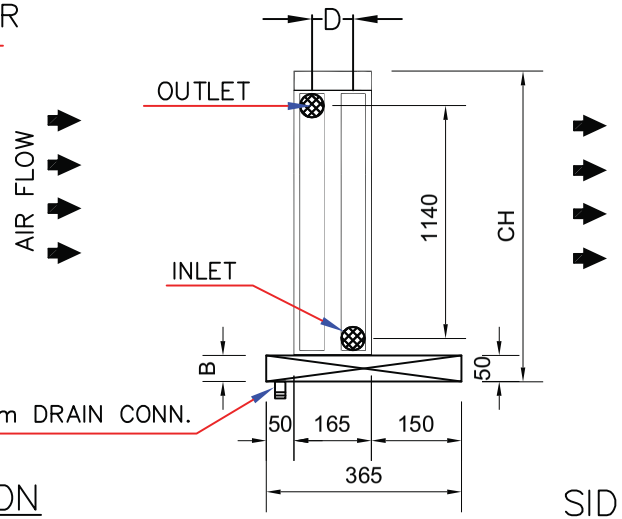

SIDE

MODEL	FPI	RD	No.OF SEC.	No.OF COIL	CFM	FH	FL	CH	CL	A	B	C	D	CW	HEADER SIZE
RA ø 1/2"	12	4	1	4	27100	1206.5	2115	1287	2330	40	40	135	85	165	2" (50MM)

ITEM : **CHILLED WATER COOLING COIL**

CLIENT :

JOB :

REV.	DESCRIPTION	DATE	REV. BY	DWG. No.	RA–1388–02B
A	AS PER COMMENTS	5.1.2019	NSK.	DATED	20.12.2018
B	AS PER COMMENTS	11.1.2019	NSK.	DRN BY	NSK.

SPECIAL NOTES:-

1. COIL CASING MATERIAL - G.I.
2. FIN MATERIAL:- ALUMINIUM
3. HEADER MATERIAL:- MS
4. TUBE MATERIAL:- COPPER
5. DRAIN PAN- 18G.-SS-304
6. COIL TRAY SIZE

L. 2363 x W. 365 x H. 50 mm

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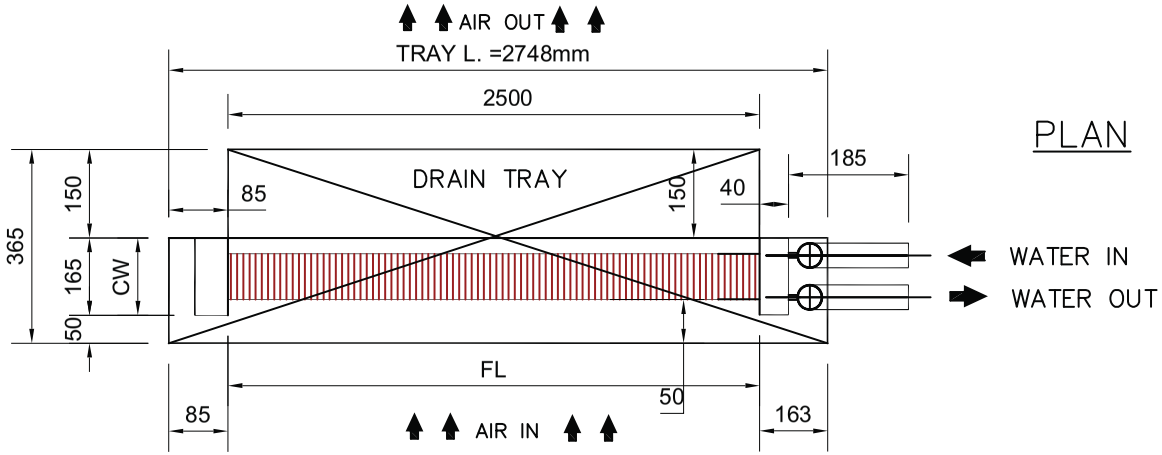
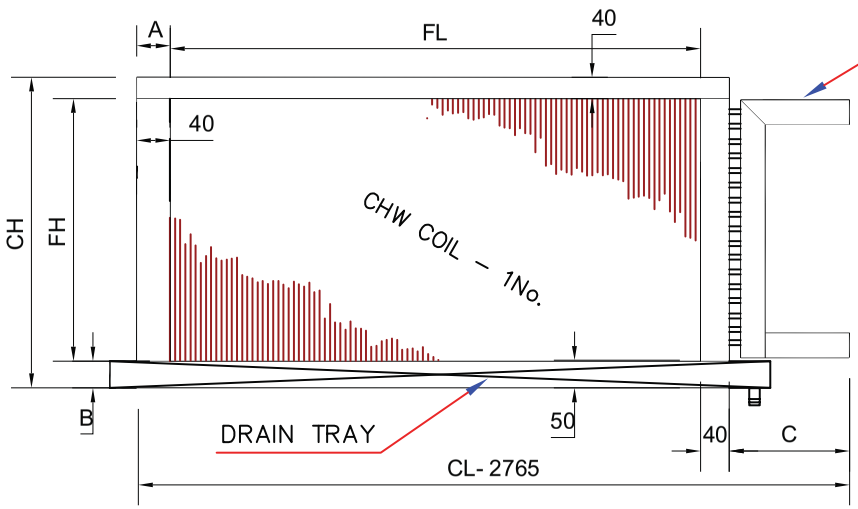
RAVI AIRCON PVT. LTD.
WORKS H-1/1388, RIICO INDUSTRIAL AREA, PH-V, BHIWADI
DISTRICT ALWAR, RAJASTHAN- PIN CODE -301019
OFFICE: A,134,CHANDER VIHAR, NILOTHI EXTN.N.D-110041
PH:#:011-28361129, Mob. 09911868461
EMAIL: raviairconsales@gmail.com,
sonia@raviaircon.com, website:www.raviaircon.com

ALL DIMENSIONS ARE IN MM

CUSTOMER: TANGEDCO,
CONSULTANT: DESEIN
EPC CONTRACTOR: BHEL,
AC SUPPLIER:
PROJECT: 2X660 MW ENNORE TPS
DOCUMENT NO: PE-V0-412-553-A019
ITEM - COOLING COIL FOR 8.5 M TG BUILDING, 31,700 CFM AHU



PLAN



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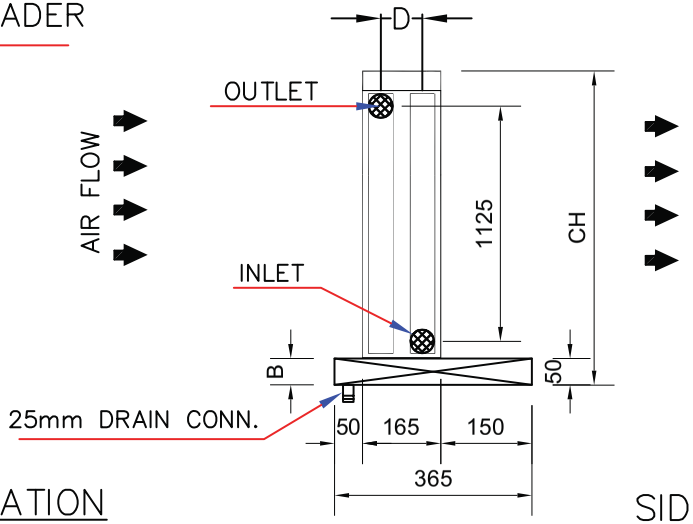

SIDE

MODEL	FPI	RD	No.OF SEC.	No.OF COIL	CFM	FH	FL	CH	CL	A	B	C	D	CW	HEADER SIZE
RA ø 1/2"	12	4	1	2	31700	1206.5	2500	1287	2765	40	40	185	85	165	2 1/2" (64MM)

ITEM : CHILLED WATER COOLING COIL

CLIENT

JOB :

REV.	DESCRIPTION	DATE	REV. BY	DWG. No.	RA–1388–01A
A	AS PER COMMENTS	5.1.2019	NSK.	DATED	20.12.2018
B	AS PER COMMENTS	11.1.2019	NSK.	DRN BY	NSK.

SPECIAL NOTES:-

1.COIL CASING MATERIAL - G.I.
2.FIN MATERIAL:- ALUMINIUM
3.HEADER MATERIAL:- MS
4.TUBE MATERIAL:- COPPER
5. DRAIN PAN- 18G.-SS-304
6. COIL TRAY SIZE

L. 2748 x W. 365 x H. 50 mm

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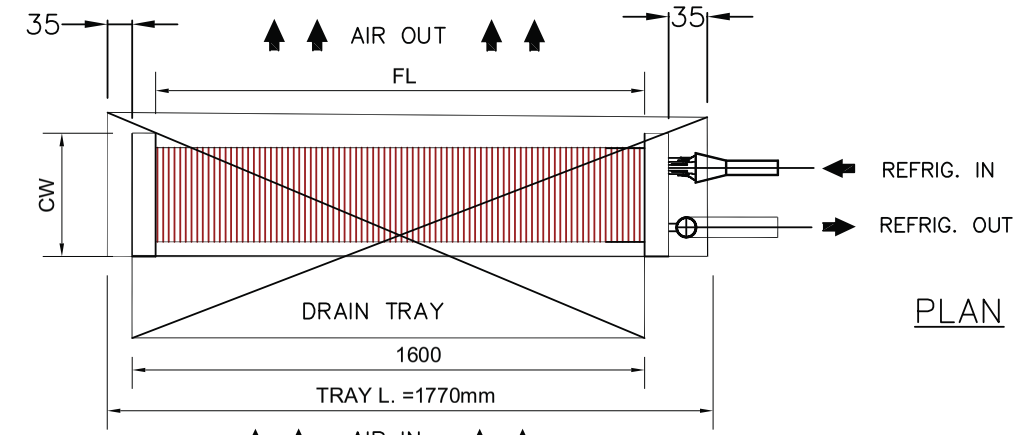
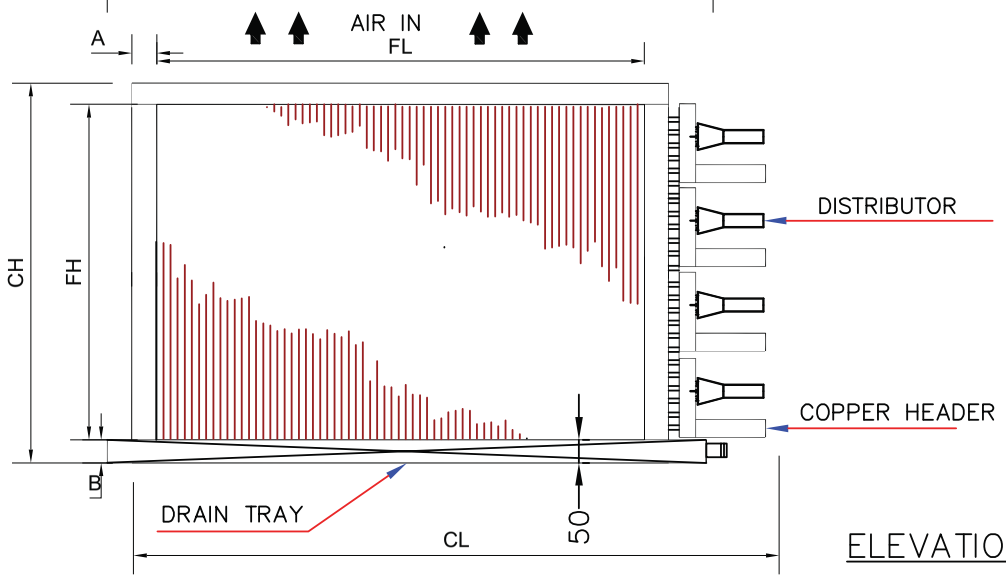
RAVI AIRCON PVT. LTD.
WORKS H-1/1388, RIICO INDUSTRIAL AREA, PH-V, BHIWADI
DISTRICT ALWAR, RAJASTHAN- PIN CODE -301019
OFFICE: A,134,CHANDER VIHAR, NILOTHI EXTN.N.D-110041
PH:#:011-28361129, Mob. 09911868461
EMAIL: raviairconsales@gmail.com,
sonia@raviaircon.com, website:www.raviaircon.com

ALL DIMENSIONS ARE IN MM

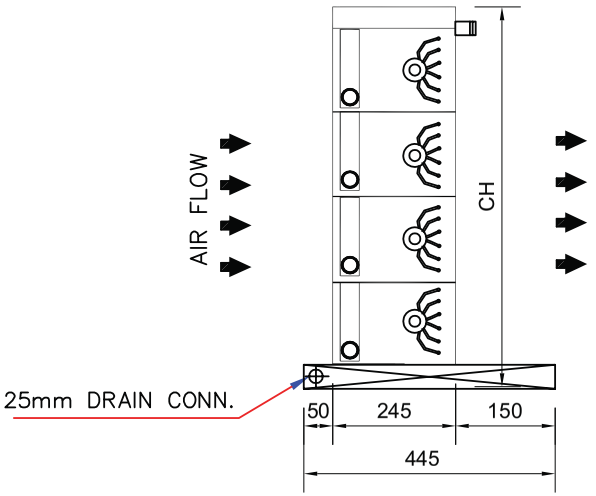


PLAN

CUSTOMER: TANGEDCO,
CONSULTANT: DESEIN
EPC CONTRACTOR: BHEL,
AC SUPPLIER:
PROJECT: 2X660 MW ENNORE TPS
DOCUMENT NO: PE-V0-412-553-A019
ITEM - COOLING COIL FOR DX UNIT IN ESP BUILDING, 10,700 CFM AHU



ELEVATION



SIDE

DRG. NO.	CFM	FPI	RD	No.OF SECTION	No.OF COIL	CASING	FH	FL	CH	CL	A	B	C	CW	DRAIN PAN	DISTRIBUTOR SIZE	HEADER Ø
RA-1388-03A Tube Ø3/8"	10000	12	6	1	1	G.I.	1219.6	1600	1280	1935	40	30	253	245	18G. SS-304	3/4"	1-1/8"

ITEM : DX COOLING COIL	REV.	DESCRIPTION	DATE	CHKD.	DRN. BY	NSK
CLIENT :	A	AS PER COMM.	5.1.2019		CHKD. BY	
					SCALE	N.T.S.
					DATED	20.12.2018

SPECIAL NOTES:-

1. COIL CASING MATERIAL - G.I.
2. FIN MATERIAL:- ALUMINIUM
3. HEADER MATERIAL:- COPPER
4. TUBE MATERIAL:- COPPER

5. DRAIN PAN- 18G.-SS-304

6. COIL TRAY SIZE

L. 1770 x W. 445 x H. 50 mm

RAVI AIRCON PVT. LTD.
WORKS H-1/1388, RIICO INDUSTRIAL AREA, PH-V, BHIWADI
DISTRICT ALWAR, RAJASTHAN- PIN CODE -301019
OFFICE: A,134,CHANDER VIHAR, NILOTHI EXTN.N.D-110041
PH:#:011-28361129, Mob. 09911868461
EMAIL: raviairconsales@gmail.com,
sonia@raviaircon.com, website:www.raviaircon.com

BHARAT HEAVY ELECTRICALS LIMITED
PROJECT ENGINEERING MANAGEMENT
(MECHANICAL AUXILIARY)

This approval status shall be interpreted as laid down in the contract and it shall not relieve the contractor from his contractual obligation.

APPROVAL CATEGORY AWARED = I

CAT I - Approved
CAT II - Approved with Comments as Noted
CAT III - Not Approved
CAT IV - Reference Drawing

Name: VIPIN NAUNI
Signature:

VIPIN NAUNI
Document is reviewed by BHEL and found in order. Submitted for customer approval.
2020.02.13 12:51:17 +05'30'

Date	Rev	Description of Revision	ALT	CHD	APPD
24/10/2019	02	Document is approved by TANGEDCO vide their letter no. SE/E/Th&HyP/EE-7/M/AEE/M/F.En SEZ STPP/D.747 /18 dt.26.12.2018. Due to internal issue of AC Supplier with the Pump manufacturer (M/s M&P), make of pump is changed to M/s Flowmore (Approved Make). BHEL has reviewed the revised document and assures that the pump parameters / civil input is same. Submitted for approval please.	NAYAB	NAYAB	RK
15/12/2018	01	Revised as per TANGEDCO / DESEIN comments. Compliance sheet enclosed.	ALAM	SALIM	PC
28/09/2017	00	First Submission for approval	ALAM	SALIM	PC

PROJECT	**2x660 MW ENNORE SEZ COAL BASED STPP AT ASH DYKE OF NCTPS, CHENNAI**
	CUSTOMER **TAMILNADU GENERATION AND DISTRIBUTION CORPORATION LIMITED (TANGEDCO)**
	CONSULTANT **DESEIN PRIVATE LIMITED** **DESEIN HOUSE, GREATER KAILASH-II, NEW DELHI**
	EPC CONTRACTOR **BHARAT HEAVY ELECTRICALS LTD** PS-PEM, PPEI-BUILDING, SECTOR-16A, PLOT NO. 25, NOIDA-201301

STATUS	**CONTRACT**	**DOC. NO: PE-V0-410-553-A020**	Rev: **02**
PACKAGE		**AIR CONDITIONING SYSTEM**	
TITLE		**TDS & GA OF CONDENSER & CHILLED WATER PUMP ALONG WITH FOUNDATION DETAILS**	

	TECHNICAL DATA SHEET	SALE19084223-10	Rev. 01
FLOWMORE PUMPS	C STOMER: TANDGEDCO CONS LTANT: DESEIN EPC CONTRACTOR: BHEL AC S PPLIER: PROJECT : 2 660 M ENNORE TPS	DOC NO. PE- 0-412-553-A020, R02 TAG NO: CH P MP - TG HALL APPLICATION : CHILLED ATER S PPL Q ANTIT : 2 NOS LOCATION - TG B ILDING, AC PLANT ROOM	

S. No	Description	
General Information:		
1.	Application	Centrifugal Water Pump
2.	Duty	Continuous
3.	Quantity	02 Nos.
4.	Liquid	WATER
5.	Specific Gravity of Liquid	1.0
6.	Temperature (Deg. C)	Ambient
Specifications:		
7.	Pump Make	FLOWMORE
8.	Pump Type	Horizontal End Suction Pump
9.	Pump Model / Size	5625 / 150 x 125 mm
10.	No. of Stage	Single
11.	Full Load Speed of Motor	1475 rpm
12.	Capacity (M^3/Hr.)	215 M^3/Hr.
13.	Total Differential Head (Mtr.)	32 M
14.	Shut Off Head (Mtr.)	36.5 Mtr.
15.	Pump Efficiency	79.5 %
16.	Pump Input (BKW)	23.57 KW
17.	Motor Rating	30 KW / 4P
18.	Motor Type	TEFC / Horizontal Induction Motor /IE-3
19.	Type of Bearing Lubrication	Grease
20.	Type of Impeller / Rated Dia (mm)	Enclosed / 318 mm (Approx.)
21.	Type of Pump Motor Coupling	Flexible (Spacer Type)
22.	Flange Drilling Standard	ANSI B 16.5, 150 LBS
23.	NPSHR (At duty point)	2.0 Mtr.
24.	Noise Level	85 dBA at 1 M
25.	Vibration Level	75 Microns
26.	Bearing No. (DE/NDE)	6310Z-C3
27.	Bearing Life (Hrs)	20000
28.	Bearing Type / Make	Antifriction (SKF / FAG)
29.	Max. power consumption in entire range of operation	25.10 kw
30.	Direction of Rotation	CCW from DE
31.	Type of coupling	Spacer

32.	Painting Details	i) 2 Layers of Zinc Phosphate epoxy primer, DFT-75 Microns. ii) 2 Coat of Chlorinated Rubber paint, Total DFT 60-80 microns iii) Color shade : IS-5 Shade 217 (Sea Green)
Material of Construction		
33.	Casing	2 % Ni CI (IS 210 FG-260)
34.	Impeller	Bronze (IS 318 LTB-II)
35.	Casing Wearing Ring	Bronze (IS 318 LTB-V)
36.	Pump Shaft	SS-410 (ASTM A276)
37.	Shaft Sleeve	SS-316 (ASTM A276)
38.	Mechanical Seal	Provided, Faces Carbon v/s Si C.
39.	Gland	CI (IS 210 FG-260)
40.	Fasteners	MS (IS-1367,Gr-4.6)
41.	Base Plate	MS Fab (IS 2062)

NOTE:

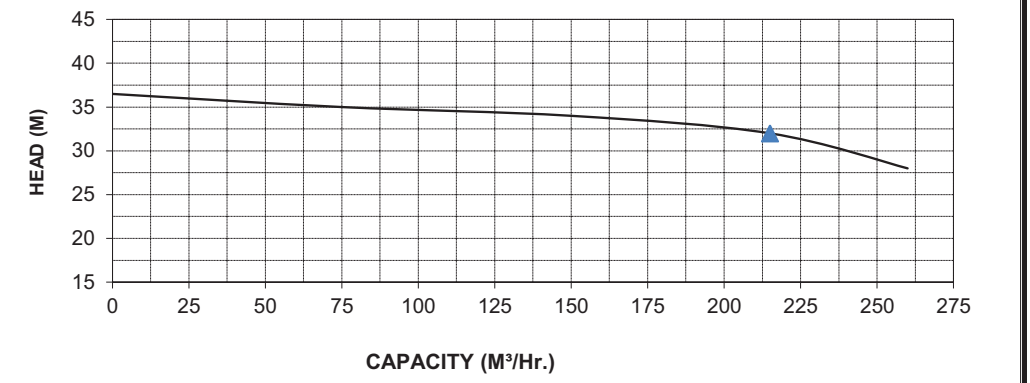
1) Inspection & Testing shall be as per approved QAP.

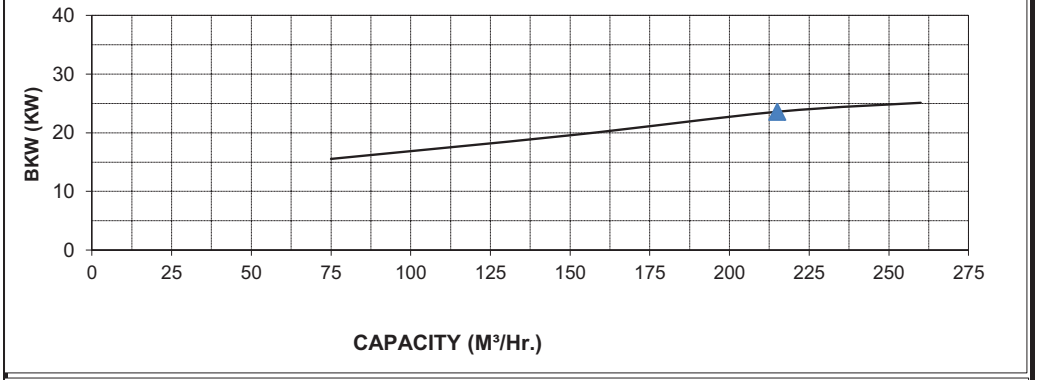
FLOWMORE LIMITED

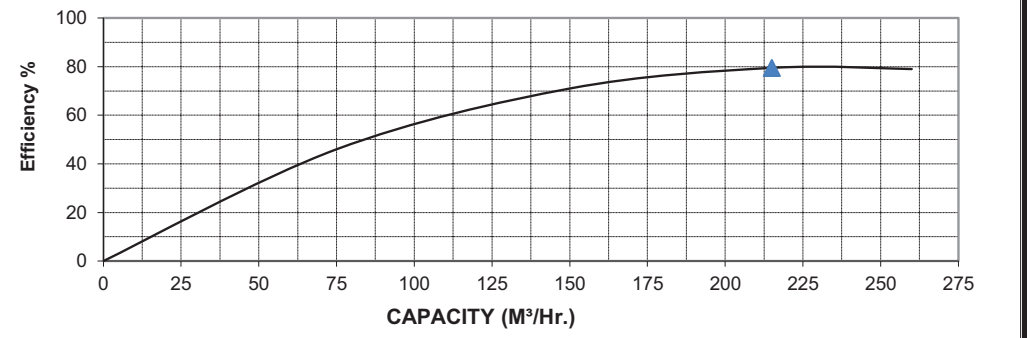
PERFORMANCE CURVE

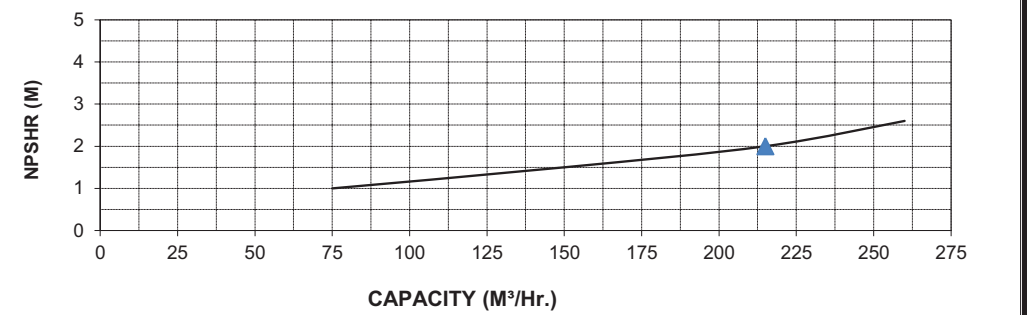
C STOMER: TANDGEDCO
CONS LTANT: DESEIN
EPC CONTRACTOR: BHEL
AC S PPLIER:
PROJECT : 2 660 M ENNORE TPS

DOC NO. PE- 0-412-553-A020, R02
TAG NO: CH P MP - TG HALL
APPLICATION : CHILLED ATER S PPL
Q ANTIT : 2 NOS
LOCATION - TG B ILDING, AC PLANT ROOM

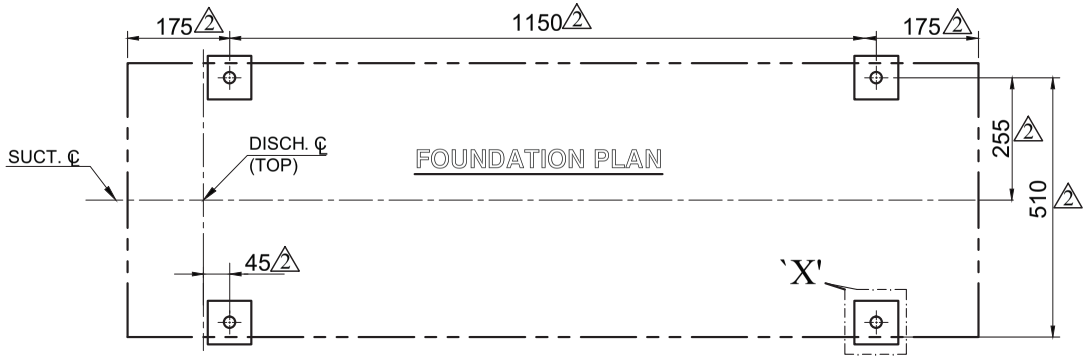


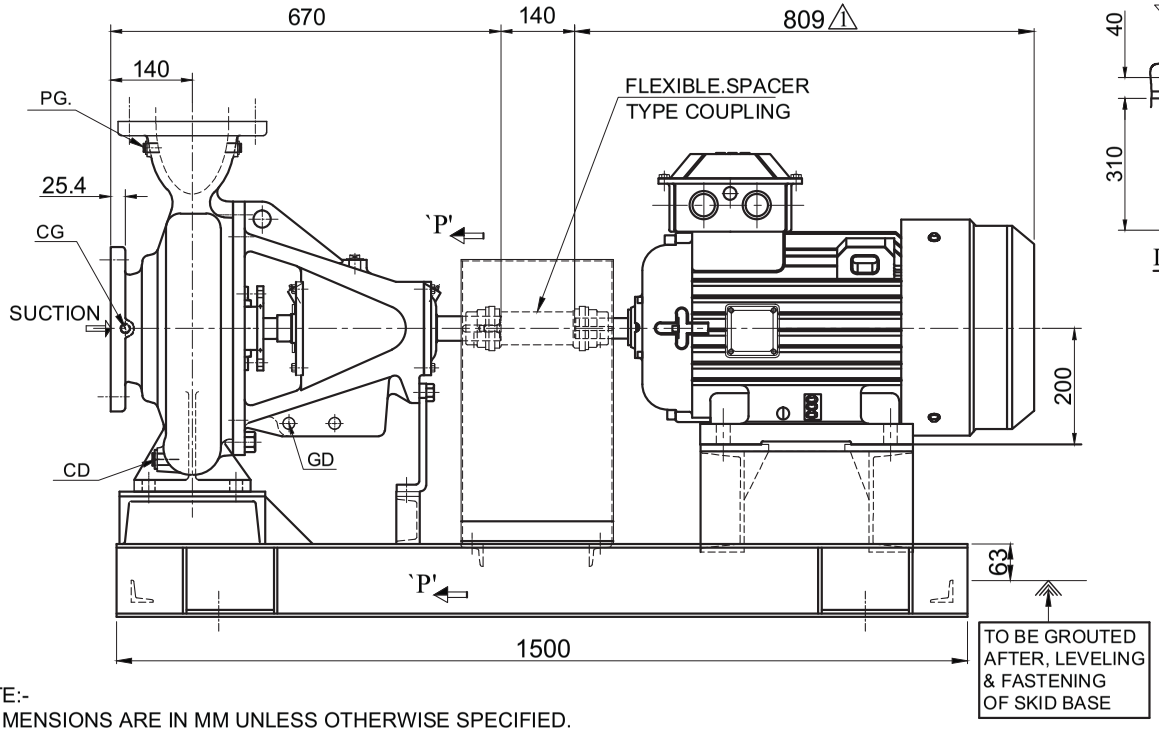


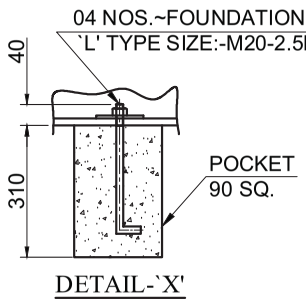


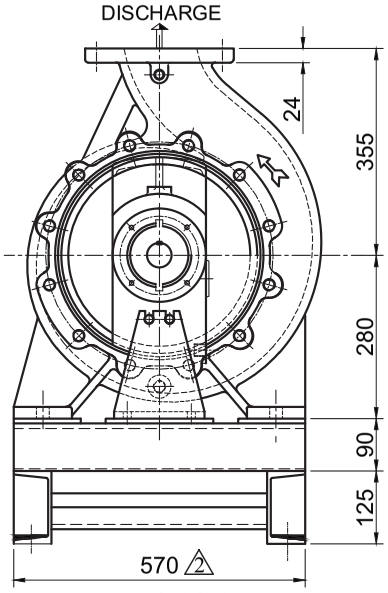


Client : - M/S			D	Description : CHW Pump,CCR			
Project : - TANGEDCO-ENNORE STPP				Model	5625-150X125		
CAPACITY	215	M³/Hr.		Pump Input	23.57 KW		
HEAD	32	Mtrs		NRPS R	2.0 Mtr	Sp Gr	1
SOH	36.5	Mtrs		Speed	1475 rpm		
Efficiency	79.5	%		RATING	30 KW/4P		









FLANGE DETAIL AS PER ANSI B16.5, 150 LBS.			
SUCTION:------	150 N.B.	DISCHARGE:----	125 N.B.
FLANGE O.D.:---	279	FLANGE O.D.:---	254
P.C.D.:---------	241.3	P.C.D.:---------	215.9
NO. OF. HOLES:-	8	NO. OF. HOLES:-	8
DIA OF BOLTS:-	M20	DIA OF BOLTS:-	M20

CD	CASING DRAIN	1/2" B.S.P.
GD	GLAND DRAIN	1/2" B.S.P.
CG	COMPOUND GAUGE	3/8" B.S.P.
PG	PRESSURE GAUGE	3/8" B.S.P.

NOTE:-
1. DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED.
2. DIRECTION OF PUMP ROTATION:- ***COUNTER CLOCK WISE*** WHEN LOOKING FROM DRIVING END.
3. STATIC LOAD (PUMP SET WITH MOTOR) = 610 KGS. (Approx) 1
4. DYNAMIC LOAD (PUMP SET WITH MOTOR) = 760 KGS. (Approx) 1

MOTOR PARTICULARS		PUMP PARTICULARS (QTY.:- 02 Nos.)	
MAKE	-- ABB 1	FIG.	-- 5625
FRAME	-- M2BAX 200MLA4 1	SIZE	-- 150x125 (6"x5")
POWER	-- 30 K.W.	STAGE	-- SINGLE
SPEED	-- 1480 R.P.M. 1	SPEED	-- 1480 R.P.M. 1
VOLTS	-- 415±10%	CAPACITY	-- 215 Cu. M/hr.
PHASES	-- THREE	HEAD	-- 32 Mtrs.
FREQUENCY	-- 50 Hz.	PUMP INPUT (Sp. Gr. 1.0)	-- 23.57 K.W.
TYPE OF CONS.	-- H.S.S.	EFFICIENCY	-- 79.5%

Rev.No.	REVISION	SIGN	DATE
2	CHANGE AS PER COMMENTS	SUNIL	22.10.2019
1	MOTOR CHANGES AS MARKS	HEM	07.10.2019

C STOMER: TANDGEDCO
CONS LTANT: DESEIN
EPC CONTRACTOR: BHEL
AC S PPLIER:
PROJECT : 2 660 M ENNORE TPS

DOC NO. PE- 0-412-553-A020, R02
TAG NO: CH P MP - TG HALL
APPLICATION : CHILLED ATER S PPL
Q ANTIT : 2 NOS
LOCATION - TG B ILDING, AC PLANT ROOM

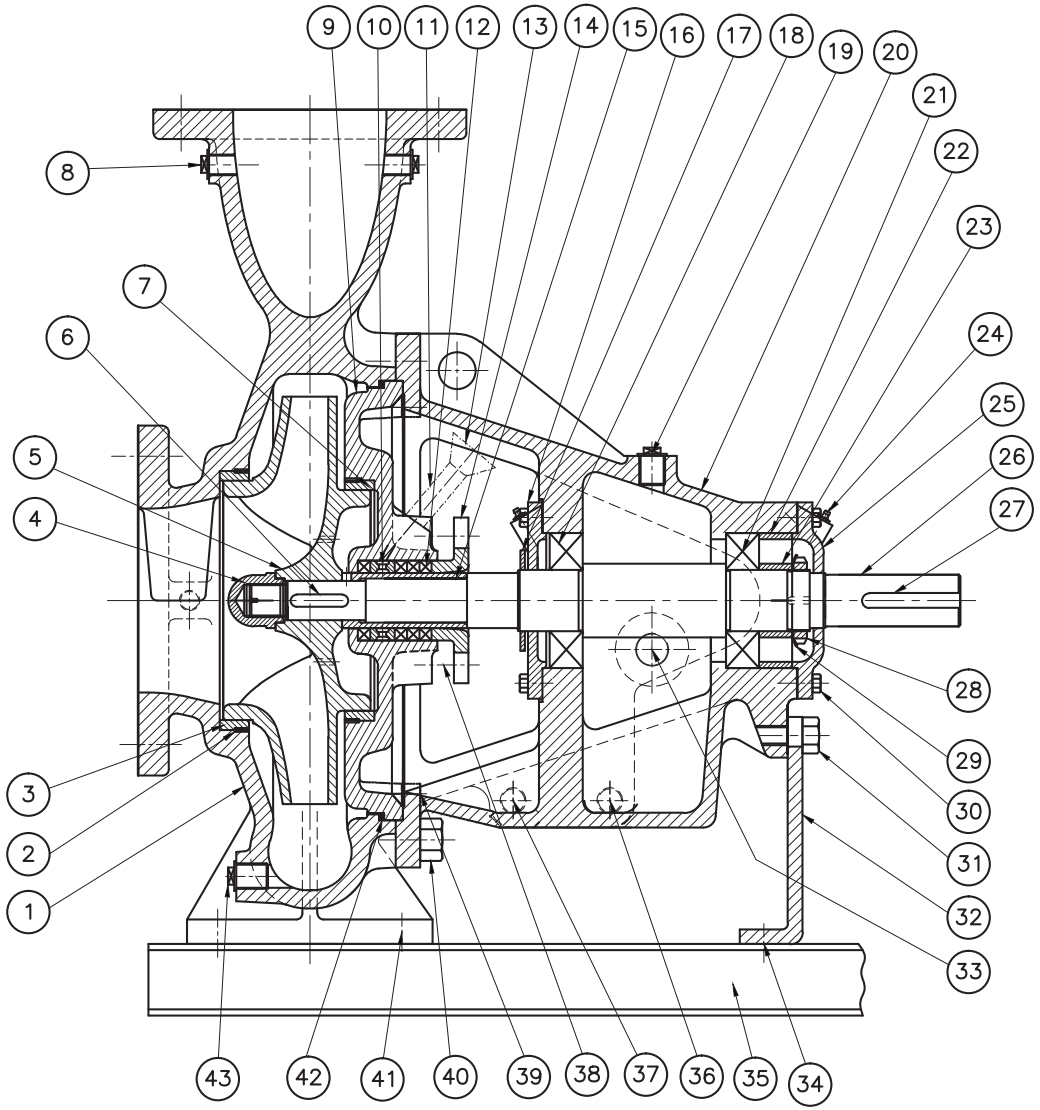
GENERAL ARRANGEMENT DRAWING FOR HORIZONTAL END SUCTION PUMP

		NAME	DATE
DRN.		HEM	05.09.2019
SCALE N.T.S.	CHD.	D.K.S.	05.09.2019
	APPD.	P.K.S.	05.09.2019

FLOWMORE LIMITED
NEW DELHI

DRAWING NO. GA-SALE19084223 10

REV. 02



S.NO.	DESCRIPTION	QTY.	MATERIAL
✻ 45	COUPLING GURAD	01	M.S. (Fab.)
44	FLEXIBLE COUPLING (SPACER TYPE)	01	C.I.
43	PIPE PLUG	01	M.I.
42	`O' RING	01	NITRILE RUBBER
41	HEX. HD. BOLT WITH NUT & WASHER	04	M.S. (IS-1367, Gr.-4.6)
40	HEX. HD. CAP SCREW	12	M.S. (IS-1367, Gr.-4.6)
39	STUD BOLT WITH NUT	02	M.S. (IS-1367, Gr.-4.6)
38	STUD BOLT WITH NUT	02	S.S.-316
37	PIPE NIPPLE	01	STEEL
36	PIPE PLUG	01	M.I.
35	SKID BASE (BASE PLATE)	01	M.S. (Fab) (IS-2062)
34	HEX. HD. BOLT WITH NUT & WASHER	02	M.S. (IS-1367, Gr.-4.6)
33	PIPE PLUG	01	M.I.
32	SUPPORT FOOT	01	M.S. (Plate)
31	HEX. HD. CAP SCREW WITH SPR. WASHER	02	M.S. (IS-1367, Gr.-4.6)
30	HEX. HD. CAP SCREW	08	M.S. (IS-1367, Gr.-4.6)
29	BRG. LOCK WASHER	01	STEEL
28	BRG. LOCK NUT	01	STEEL
27	KEY FOR COUPLING	01	EN-8
26	PUMP SHAFT	01	S.S.-410 (ASTM A276)
25	BEARING COVER (D.E.)	01	C.I. (IS-210, FG 260)
24	GREASE RELEASE FITTING	02	STEEL
23	BEARING SPACER (Inner)	01	STEEL
22	BEARING SPACER (Outer)	01	STEEL
21	ANTI FRICTION BEARING (N.D.E.) (6310 Z-C3)	01	BRG. STEEL (SKF/FAG)
20	FRAME/BEARING HOUSING	01	C.I. (IS-210, FG 260)
19	PIPE PLUG	01	M.I.
18	ANTI FRICTION BEARING (N.D.E.) (6310 Z-C3)	01	BRG. STEEL (SKF/FAG)
17	WATER SLINGER	01	RUBBER
16	BEARING COVER (N.D.E.)	01	C.I. (IS-210, FG 260)
15	SHAFT SLEEVE	01	S.S.-316(ASTM A276)
14	GLAND ASSY	01	C.I. (IS-210, FG 260)
13	GREASE CUP WITH N.R.V.	01	STEEL
12	,MECHANICAL SEAL	04	FACES CARBON VS SI C
11	PIPE NIPPLE WITH COUPLING	01	G.I.
10	WATER SEAL RING	01	BRONZE (IS-318, LTB-II)
09	BACK HEAD / BACK COVER	01	2% Ni.C.I. (IS-210, FG 260)
08	PIPE PLUG	02	M.I.
07	WEARING RING CASING (Back Side)	01	BRONZE (IS-318, LTB-V)
06	KEY FOR IMPELLER	01	En-8
05	IMPELLER	01	BRONZE (IS-318, LTB-II)
04	IMPELLER NUT	01	STEEL
03	WEARING RING CASING (Front Side)	01	BRONZE (IS-318, LTB-V)
02	DOWEL PIN (For Volute)	04	En-8/En-9
01	CASING (VOLUTE)	01	2% Ni.C.I. (IS-210, FG 260)

NOTE:-
DIRECTION OF PUMP ROTATION:- ***COUNTER CLOCKWISE***, WHEN LOOKING FROM DRIVING END.

✻ THESE ITEM ARE NOT SHOWN IN THIS DRAWING.

PUMP PARTICULARS (QTY.:-02 Nos.)		
FIG.	--	5625
SIZE	--	150x125 (6"x5")
STAGE	--	SINGLE
LUB	--	GREASE

C STOMER: TANDGEDCO
CONS LTANT: DESEIN
EPC CONTRACTOR: BHEL
AC S PPLIER:
PROJECT : 2 660 M ENNORE TPS

DOC NO. PE- 0-412-553-A020, R02
TAG NO: CH P MP - TG HALL
APPLICATION : CHILLED ATER S PPL
Q ANTIT : 2 NOS
LOCATION - TG B ILDING. AC PLANT ROOM

CROSS SECTIONAL DRAWING FOR HORIZONTAL END SUCTION PUMP

SCALE N.T.S.

	NAME	DATE
DRN.	HEM	05.09.2019
CHD.	D.K.S.	05.09.2019
APPD.	P.K.S.	05.09.2019

FLOWMORE LIMITED
NEW DELHI

DRAWING NO. CSD-SALE19084223 10

REV. 0

	TECHNICAL DATA SHEET	SALE19084223-20	Rev. 01
FLOWMORE PUMPS	C STOMER: TANDGEDCO CONS LTANT: DESEIN EPC CONTRACTOR: BHEL AC S PPLIER: PROJECT : 2 660 M ENNORE TPS	DOC NO. PE- 0-412-553-A020, R02 TAG NO: CD P MP - TG HALL APPLICATION : CONDENSER ATER S PPL Q ANTIT : 2 NOS LOCATION - TG B ILDING, AC PLANT ROOM	

S. No	Description	
General Information:		
1.	Application	Centrifugal Water Pump
2.	Duty	Continuous
3.	Quantity	02 Nos.
4.	Liquid	WATER
5.	Specific Gravity of Liquid	1.0
6.	Temperature (Deg. C)	Ambient
Specifications:		
7.	Pump Make	FLOWMORE
8.	Pump Type	Horizontal End Suction Pump
9.	Pump Model / Size	5625 / 200 x 150 mm
10.	No. of Stage	Single
11.	Full Load Speed of Motor	1475 rpm
12.	Capacity (M^3/Hr.)	307 M^3/Hr.
13.	Total Differential Head (Mtr.)	35 M
14.	Shut Off Head (Mtr.)	39.5 Mtr.
15.	Pump Efficiency	80.5 %
16.	Pump Input (BKW)	36.35 KW
17.	Motor Rating	45 KW / 4P
18.	Motor Type	TEFC / Horizontal Induction Motor /IE-3
19.	Type of Bearing Lubrication	Grease
20.	Type of Impeller / Rated Dia (mm)	Enclosed / 328 mm (Approx.)
21.	Type of Pump Motor Coupling	Flexible (Spacer Type)
22.	Flange Drilling Standard	ANSI B 16.5, 150 LBS
23.	NPSHR (At duty point)	2.0 Mtr.
24.	Noise Level	85 dBA at 1 M
25.	Vibration Level	75 Microns
26.	Bearing No. (DE/NDE)	6313Z-C3
27.	Bearing Life (Hrs)	20000
28.	Bearing Type / Make	Antifriction (SKF / FAG)
29.	Max. power consumption in entire range of operation	40.05 kw
30.	Direction of Rotation	CCW from DE
31.	Type of coupling	Spacer

32.	Painting Details	i) 2 Layers of Zinc Phosphate epoxy primer, DFT-75 Microns. ii) 2 Coat of Chlorinated Rubber paint, Total DFT 60-80 microns iii) Color shade : IS-5 Shade 217 (Sea Green)
Material of Construction		
33.	Casing	2 % Ni CI (IS 210 FG-260)
34.	Impeller	Bronze (IS 318 LTB-II)
35.	Casing Wearing Ring	Bronze (IS 318 LTB-V)
36.	Pump Shaft	SS-410 (ASTM A276)
37.	Shaft Sleeve	SS-316 (ASTM A276)
38.	Mechanical Seal	Provided, Faces Carbon v/s Si C.
39.	Gland	CI (IS 210 FG-260)
40.	Fasteners	MS (IS-1367,Gr-4.6)
41.	Base Plate	MS Fab (IS 2062)

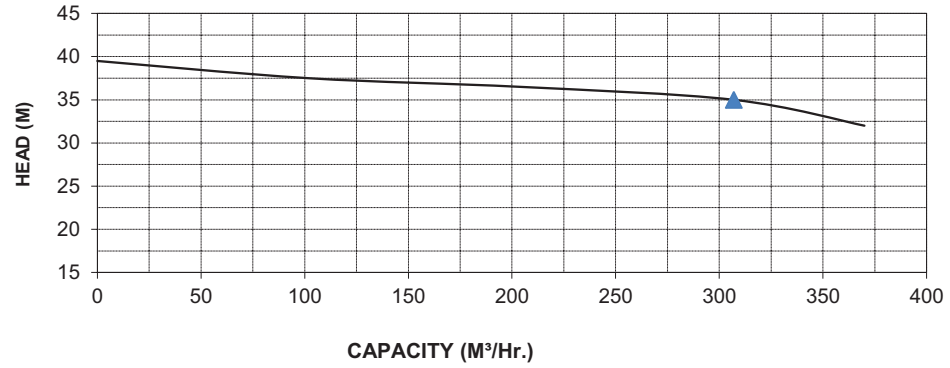
NOTE:

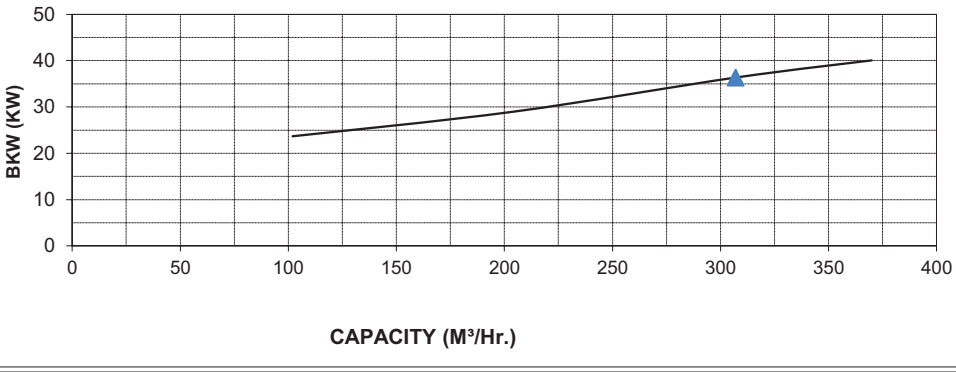
1) Inspection & Testing shall be as per approved QAP.

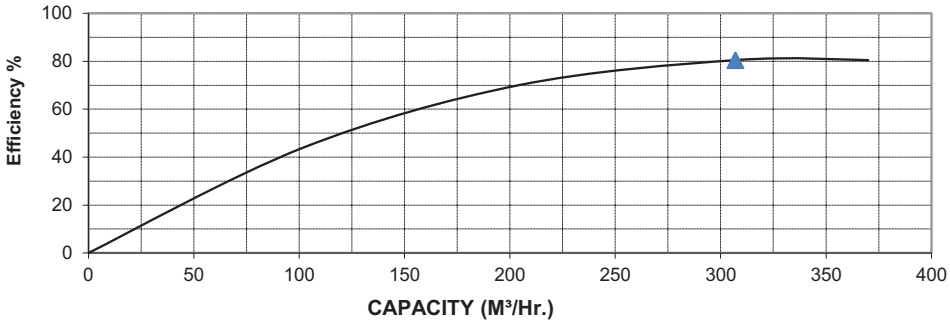
PERFORMANCE CURVE

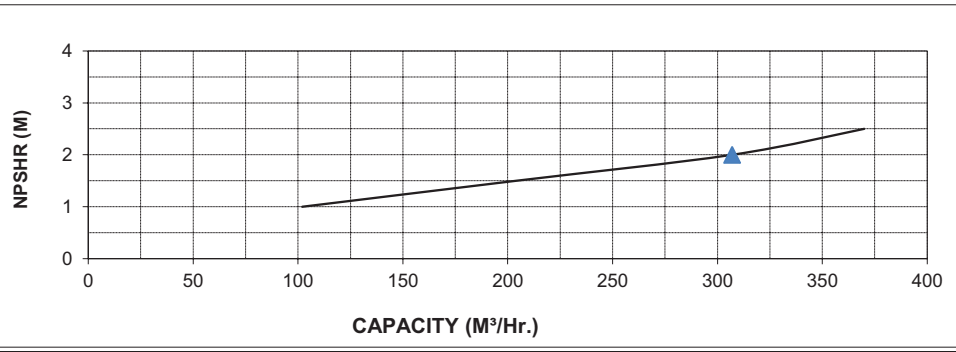
C STOMER: TANDGEDCO
CONS LTANT: DESEIN
EPC CONTRACTOR: BHEL
AC S PPLIER:
PROJECT : 2 660 M ENNORE TPS

DOC NO. PE- 0-412-553-A020, R02
TAG NO: CD P MP - TG HALL
APPLICATION : CONDENSER ATER S PPL
Q ANTIT : 2 NOS
LOCATION - TG B ILDING, AC PLANT ROOM

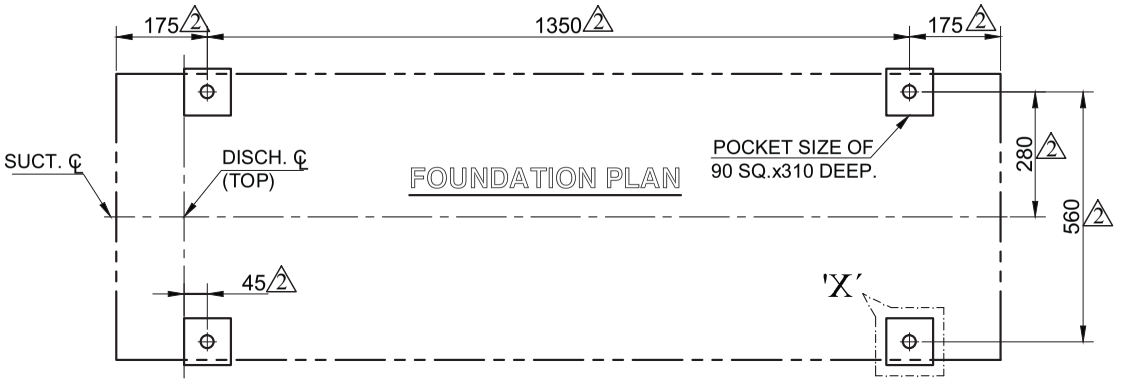


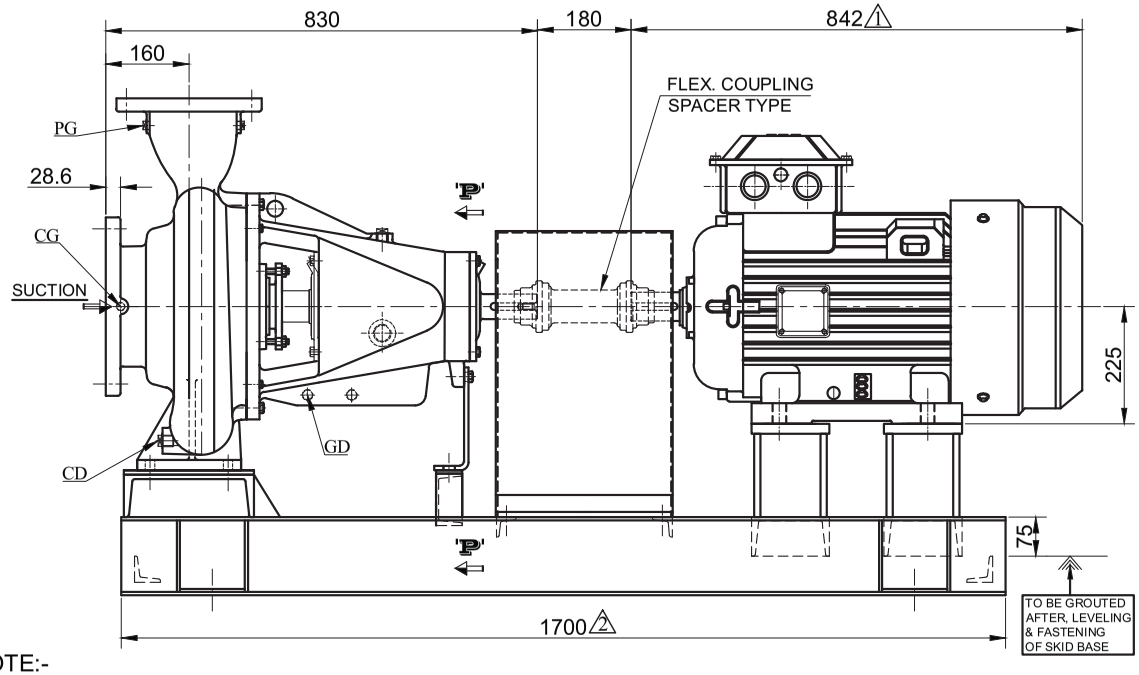






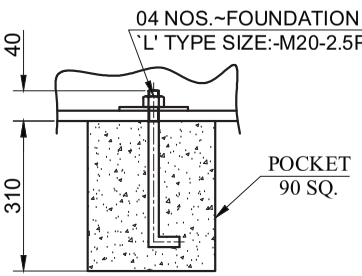
Client :				Description : CDW Pump,CCR			
Project : - TANGEDCO-ENNORE STPP				Model	5625-200X150		
CAPACITY	307	M³/Hr.		Pump Input	36.35 KW		
HEAD	35	Mtrs		NRPS R	2.0 Mtr	Sp Gr	1
SOH	39.5	Mtrs		Speed	1475 rpm		
Efficiency	80.5	%		RATING	45 KW/4P		



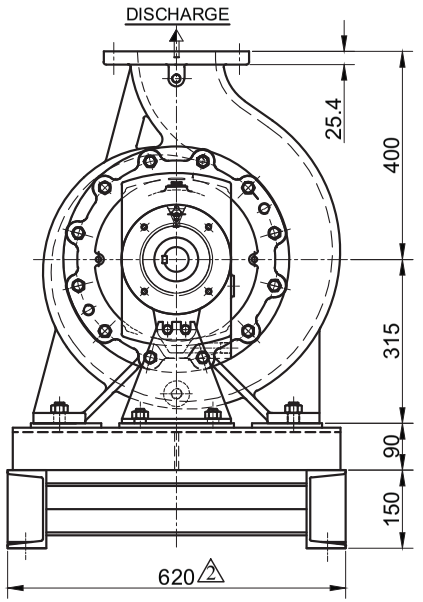


FLANGE DETAIL AS PER ANSI B16.5, 150 LBS.			
SUCTION:------	200 N.B.	DISCHARGE:----	150 N.B.
FLANGE O.D.:---	343	FLANGE O.D.:---	279.4
P.C.D.:---------	298.4	P.C.D.:---------	241.3
NO. OF. HOLES:-	8	NO. OF. HOLES:-	8
DIA OF BOLTS:-	M20	DIA OF BOLTS:-	M20

PG	PRESSURE GAUGE	3/8" B.S.P
CG	COMPOUND GAUGE	3/8" B.S.P
CD	CASING DRAIN	3/4" B.S.P
GD	GLAND DRAIN	1/2" B.S.P



DETAIL-`X'



VIEW -'P'-'P'

NOTE:-
1. DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED.
2. DIRECTION OF PUMP ROTATION:-***COUNTER CLOCKWISE*** WHEN LOOKING FROM DRIVING END.
3. STATIC LOAD (Pump Set With Motor) = 790 Kgs. (Approx.),⚠
4. DYNMIC LOAD (Pump Set With Motor) = 990 Kgs. (Approx.) ⚠

MOTOR PARTICULARS		PUMP PARTICULARS (QTY.:- 02 Nos)	
MAKE	-- ABB⚠	FIG.	-- 5625
FRAME	-- M2BAX 225SMB4⚠	SIZE	-- 200 x150 (8"x6")
POWER	-- 45 K.W.	STAGE	-- SINGLE
SPEED	-- 1480 R.P.M.⚠	SPEED	-- 1480 R.P.M. ⚠
VOLTS	-- 415±10%	CAPACITY	-- 307 Cu M /Hr.
PHASES	-- THREE	HEAD	-- 35 Mtrs.
FREQUENCY	-- 50 Hz.	PUMP INPUT (Sp. Gr. 1.0)	-- 36.35 K.W.
TYPE OF CONS.	-- H.S.S.	EFFICIENCY	-- 80.5 %

Rev.No.	REVISION	SIGN	DATE
2	CHANGE AS PER COMMENTS	SUNIL	22.10.2019
1	MOTOR CHANGES AS MARKS	HEM	07.10.2019

C STOMER: TANDGEDCO
CONS LTANT: DESEIN
EPC CONTRACTOR: BHEL
AC S PPLIER:
PROJECT : 2 660 M ENNORE TPS

DOC NO. PE- 0-412-553-A020, R02
TAG NO: CD P MP - TG HALL
APPLICATION : CONDENSER ATER
Q ANTIT : 2 NOS
LOCATION - TG B ILD., AC PLANT ROOM

GENERAL ARRANGEMENT DRG.
FOR
HORIZONTAL END SUCTION PUMP

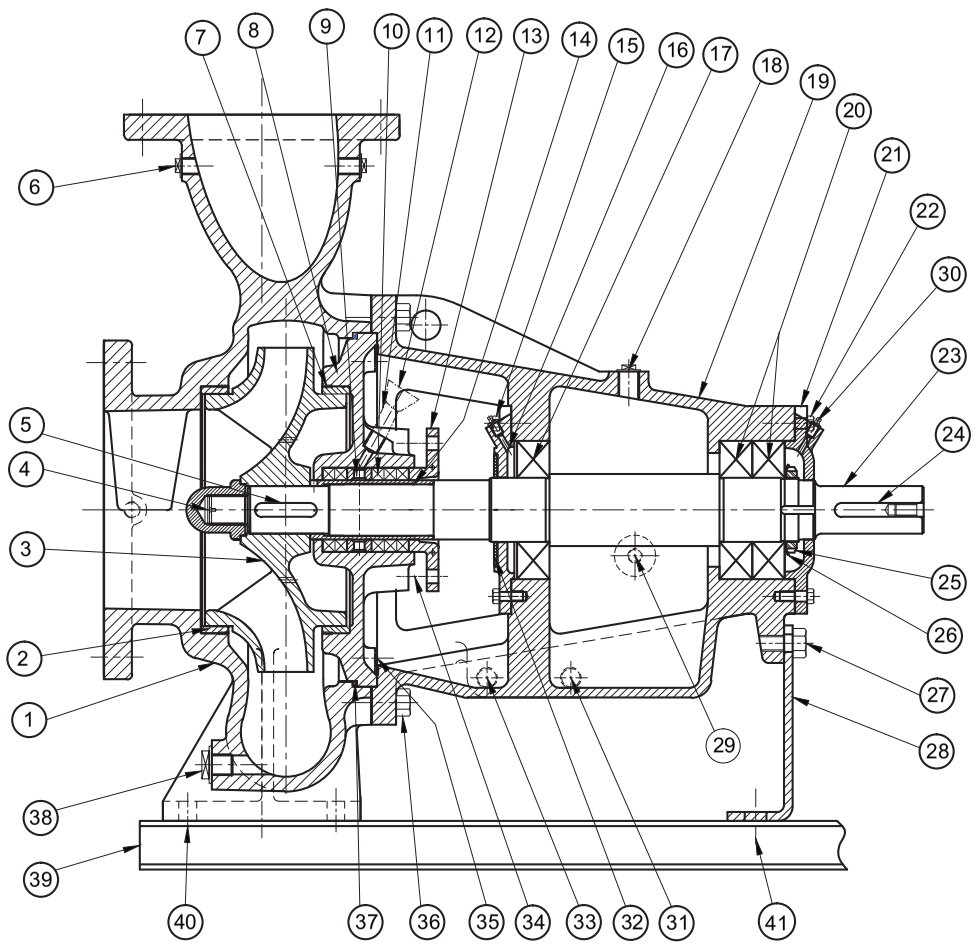
SCALE N.T.S.

	NAME	DATE
DRN.	HEM	05.09.2019
CHD.	D.K.S.	05.09.2019
APPD.	P.K.S.	05.09.2019

FLOWMORE LIMITED
NEW DELHI

DRAWING NO. GA-SALE19084223 20

REV. 02



S. NO.	DESCRIPTION	QTY.	MATERIAL
✻ 43	COUPLING GUARD	01	M.S. (FAB.)
42	FLEXIBLE COUPLING (SPACER TYPE)	01	C.I.
41	HEX. HD. BOLT WITH NUT & WASHER	02	M.S. (IS.-1367,Gr.-4.6)
40	HEX. HD. BOLT WITH NUT & WASHER	04	M.S. (IS.-1367,Gr.-4.6)
39	SKID BASE	01	M.S. (Fab.)(IS-2062)
38	PIPE PLUG	01	M.I.
37	`O' RING	01	NITRILE RUBBER
36	HEX. HD. CAP SCREW	12	M.S. (IS.-1367,Gr.-4.6)
35	STUD BOLT WITH NUT	02	M.S. (IS.-1367,Gr.-4.6)
34	STUD BOLT WITH NUT	02	S.S.-316
33	PIPE NIPPLE (Gland Drain)	01	STEEL
32	WATER SLINGER	01	RUBBER
31	PIPE PLUG	01	M.I.
30	GREASE RELEASE FITTING	02	STEEL
29	PIPE PLUG	01	M.I.
28	SUPPORT FOOT	01	M.S. (Plate)
27	HEX. HD. CAP SCREW WITH WASHER	02	M.S. (IS.-1367,Gr.-4.6)
26	BRG. LOCK WASHER	01	STEEL
25	BRG. LOCK NUT	01	STEEL
24	KEY FOR COUPLING	01	EN-8
23	PUMP SHAFT	01	ASTM A276, S.S.-410
22	HEX. HD. CAP SCREW	04	M.S. (IS.-1367,Gr.-4.6)
21	BEARING COVER (D.E.)	01	C.I. (IS-210, FG 260)
20	ANTIFRICTION BEARING (D.E.) (6313 Z-C3)	02	BRG. STEEL (SKF /FAG)
19	FRAME/BEARING HOUSING	01	C.I. (IS-210, FG 260)
18	PIPE PLUG	01	M.I.
17	ANTIFRICTION BEARING (N.D.E.) (6313 Z-C3)	01	BRG. STEEL (SKF/ FAG)
16	BEARING COVER (N.D.E.)	01	C.I. (IS-210, FG 260)
15	HEX. HD. CAP SCREW	04	M.S. (IS.-1367,Gr.-4.6)
14	SHAFT SLEEVE	01	ASTM A276, S.S.-316
13	GLAND HALF	02	CI.(IS-210, FG-260)
12	GREASE CUP WITH N.R.V.	01	STEEL
11	PIPE NIPPLE WITH COUPLING	01	G.I.
10	,MECHANICAL SEAL	05	FACES CARBON VS SI C
09	WATER SEAL RING	01	BRONZE (IS-318, LTB-II)
08	BACK COVER/BACK HEAD	01	2% NI.CI.(IS-210, FG-260)
07	DOWEL PIN (W/Ring to Casing / Back cover)	04	En-8/En-9
06	PIPE PLUG	04	M.I.
05	KEY FOR IMPELLER	01	EN-8
04	IMPELLER NUT	01	STEEL
03	IMPELLER	01	BRONZE (IS-318, LTB-II)
02	WEARING RING CASING (Front & Back Side)	02	BRONZE (IS-318, LTB-V)
01	CASING (VOLUTE)	01	2% NI.CI.(IS-210, FG-260)

C STOMER: TANDGEDCO
CONS LTANT: DESEIN
EPC CONTRACTOR: BHEL
AC S PPLIER:
PROJECT : 2 660 M ENNORE TPS

DOC NO. PE- 0-412-553-A020, R02
TAG NO: CD P MP - TG HALL
APPLICATION : CONDENSER ATER S PPL
Q ANTIT : 2 NOS
LOCATION - TG B ILDING, AC PLANT ROOM

NOTE:-
DIRECTION OF PUMP ROTATION:- ***COUNTER CLOCK WISE*** WHEN LOOKING FROM DRIVING END.

✻ THESE ITEM ARE NOT SHOWN IN THIS DRAWING.

PUMP PARTICULARS (QTY.:-02 Nos).		
FIG.	--	5625
SIZE	--	200x150 (8"x6")
STAGE	--	SINGLE
LUB.	--	GREASE

CROSS SECTIONAL DRAWING
FOR
HORIZONTAL END SUCTION PUMP

		NAME	DATE
DRN.	HEM		05.09.2019
CHD.	D.K.S.		05.09.2019
APPD.	P.K.S.		05.09.2019

SCALE N.T.S.

FLOWMORE LIMITED
NEW DELHI

DRAWING NO. CSD-SALE19084223 20

REV. 0

	TECHNICAL DATA SHEET	SALE19084223-30	Rev. 01
FLOWMORE PUMPS	C STOMER: TANDGEDCO CONS LTANT: DESEIN EPC CONTRACTOR: BHEL AC S PPLIER: PROJECT : 2 660 M ENNORE TPS	DOC NO. PE- 0-412-553-A020, R02 TAG NO: CD P MP - SER ICE B ILDING APPLICATION : CONDENSER ATER S PPL Q ANTIT : 2 NOS LOCATION - SER ICE B ILDING ROOF	

S. No	Description	
General Information:		
1.	Application	Centrifugal Water Pump
2.	Duty	Continuous
3.	Quantity	02 Nos.
4.	Liquid	WATER
5.	Specific Gravity of Liquid	1.0
6.	Temperature (Deg. C)	Ambient
Specifications:		
7.	Pump Make	FLOWMORE
8.	Pump Type	Horizontal End Suction Pump
9.	Pump Model / Size	5625 / 200 x 150 mm
10.	No. of Stage	Single
11.	Full Load Speed of Motor	1475 rpm
12.	Capacity (M^3/Hr.)	350 M^3/Hr.
13.	Total Differential Head (Mtr.)	32 M
14.	Shut Off Head (Mtr.)	37 Mtr.
15.	Pump Efficiency	83.5 %
16.	Pump Input (BKW)	36.35 KW
17.	Motor Rating	45 KW / 4P
18.	Motor Type	TEFC / Horizontal Induction Motor /IE-3
19.	Type of Bearing Lubrication	Grease
20.	Type of Impeller / Rated Dia (mm)	Enclosed / 320 mm (Approx.)
21.	Type of Pump Motor Coupling	Flexible (Spacer Type)
22.	Flange Drilling Standard	ANSI B 16.5, 150 LBS
23.	NPSHR (At duty point)	2.2 Mtr.
24.	Noise Level	85 dBA at 1 M
25.	Vibration Level	75 Microns
26.	Bearing No. (DE/NDE)	6313Z-C3
27.	Bearing Life (Hrs)	20000
28.	Bearing Type / Make	Antifriction (SKF / FAG)
29.	Max. power consumption in entire range of operation	38.59 kw
30.	Direction of Rotation	CCW from DE
31.	Type of coupling	Spacer

32.	Painting Details	i) 2 Layers of Zinc Phosphate epoxy primer, DFT-75 Microns. ii) 2 Coat of Chlorinated Rubber paint, Total DFT 60-80 microns iii) Color shade : IS-5 Shade 217 (Sea Green)
Material of Construction		
33.	Casing	2 % Ni CI (IS 210 FG-260)
34.	Impeller	Bronze (IS 318 LTB-II)
35.	Casing Wearing Ring	Bronze (IS 318 LTB-V)
36.	Pump Shaft	SS-410 (ASTM A276)
37.	Shaft Sleeve	SS-316 (ASTM A276)
38.	Mechanical Seal	Provided, Faces Carbon v/s Si C.
39.	Gland	CI (IS 210 FG-260)
40.	Fasteners	MS (IS-1367,Gr-4.6)
41.	Base Plate	MS Fab (IS 2062)

NOTE:

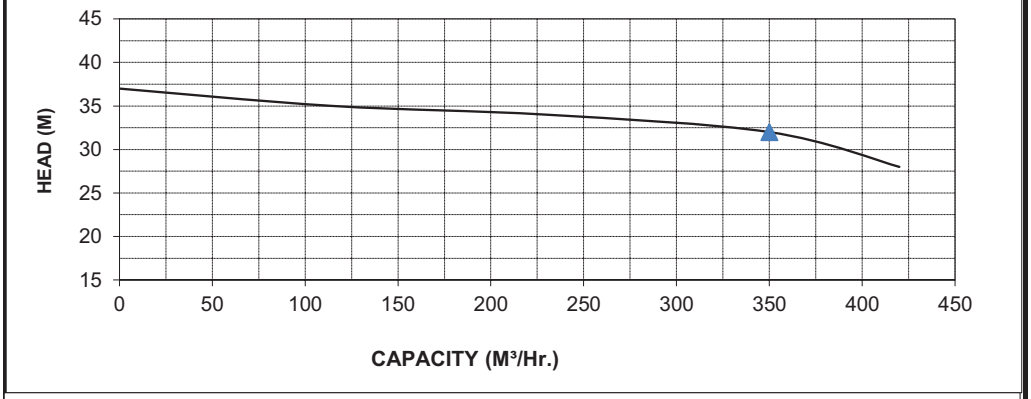
1) Inspection & Testing shall be as per approved QAP.

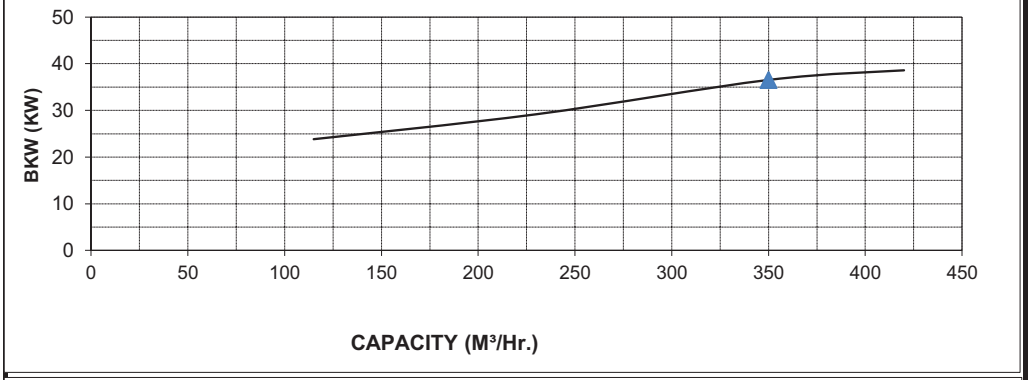
FLOWMORE LIMITED

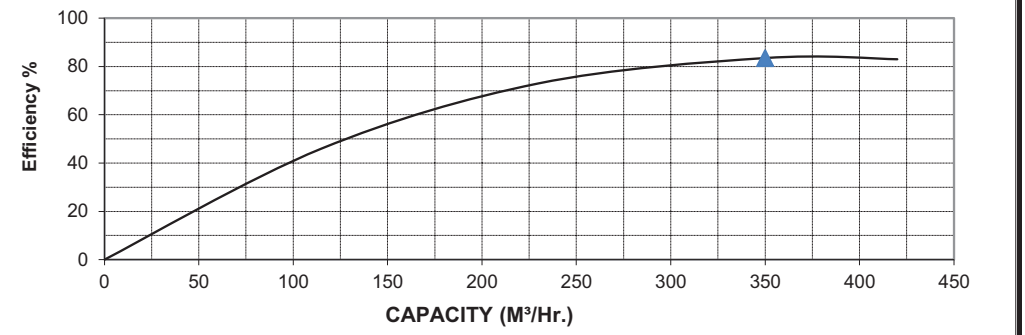
PERFORMANCE CURVE

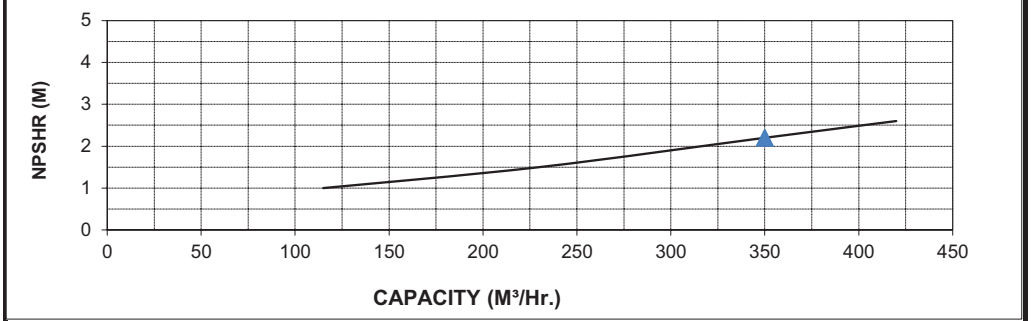
C STOMER: TANDGEDCO
CONS LTANT: DESEIN
EPC CONTRACTOR: BHEL
AC S PPLIER:
PROJECT : 2 660 M ENNORE TPS

DOC NO. PE- 0-412-553-A020, R02
TAG NO: CD P MP - SER ICE B ILDING
APPLICATION : CONDENSER ATER S PPL
Q ANTIT : 2 NOS
LOCATION - SER ICE B ILDING ROOF

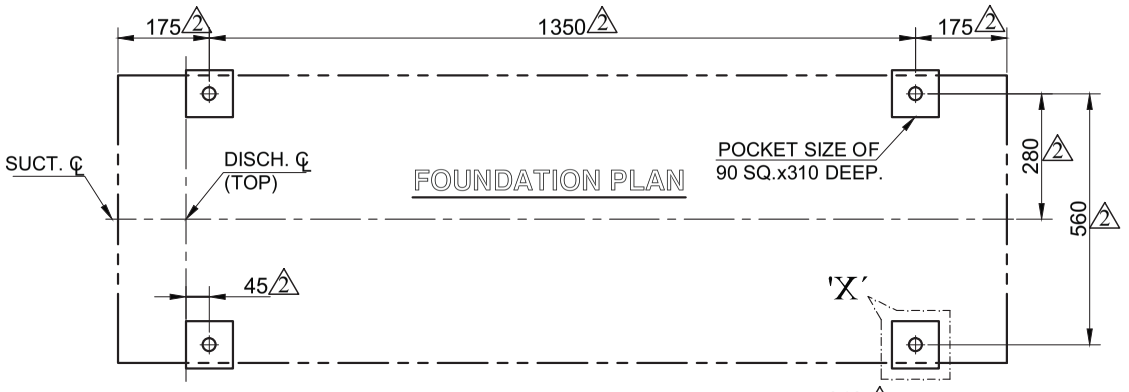


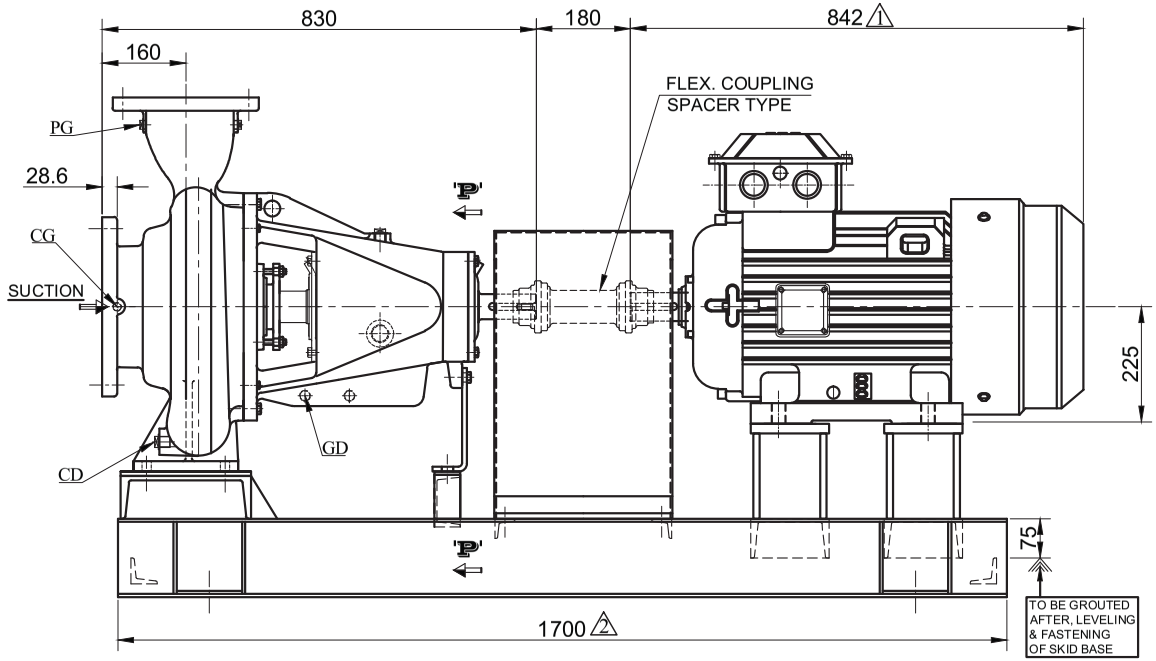


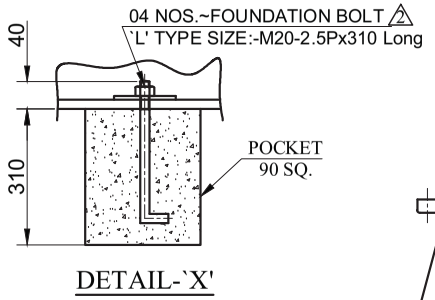




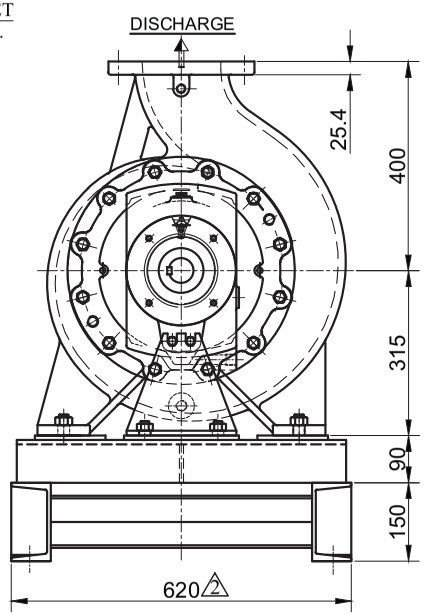
Client : -				Description : CDW Pump,Service Building			
Project : - TANGEDCO-ENNORE STPP				Model	5625-200X150		
CAPACITY	350	M³/Hr.		Pump Input	36.53 KW		
HEAD	32	Mtrs		NRPS R	2.2 Mtr	Sp Gr	1
SOH	37	Mtrs		Speed	1475 rpm		
Efficiency	83.5	%		RATING	45 KW/4P		







DETAIL-`X'



VIEW -'P'-'P'

FLANGE DETAIL AS PER ANSI B16.5, 150 LBS.

SUCTION:------	200 N.B.	DISCHARGE:----	150 N.B.
FLANGE O.D.:---	343	FLANGE O.D.:---	279.4
P.C.D.:---------	298.4	P.C.D.:---------	241.3
NO. OF. HOLES:-	8	NO. OF. HOLES:-	8
DIA OF BOLTS:-	M20	DIA OF BOLTS:-	M20

PG	PRESSURE GAUGE	3/8" B.S.P
CG	COMPOUND GAUGE	3/8" B.S.P
CD	CASING DRAIN	3/4" B.S.P
GD	GLAND DRAIN	1/2" B.S.P

NOTE:-
1. DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED.
2. DIRECTION OF PUMP ROTATION:-***COUNTER CLOCKWISE*** WHEN LOOKING FROM DRIVING END.
3. STATIC LOAD (Pump Set With Motor) = 790 Kgs. (Approx.), ⚠
4. DYNMIC LOAD (Pump Set With Motor) = 990 Kgs. (Approx.) ⚠

MOTOR PARTICULARS		PUMP PARTICULARS (QTY.:- 02 Nos)	
MAKE	-- ABB⚠	FIG.	-- 5625
FRAME	-- M2BAX 225SMB4⚠	SIZE	-- 200 x150 (8"x6")
POWER	-- 45 K.W.	STAGE	-- SINGLE
SPEED	-- 1480 R.P.M.⚠	SPEED	-- 1480 R.P.M. ⚠
VOLTS	-- 415±10%	CAPACITY	-- 350 Cu M /Hr.
PHASES	-- THREE	HEAD	-- 32 Mtrs.
FREQUENCY	-- 50 Hz.	PUMP INPUT (Sp. Gr. 1.0)	-- 36.53 K.W.
TYPE OF CONS.	-- H.S.S.	EFFICIENCY	-- 83.5 %

Rev.No.	REVISION	SIGN	DATE
2	CHANGE AS PER COMMENTS	SUNIL	22.10.2019
1	MOTOR CHANGES AS MARKS	HEM	07.10.2019

C STOMER: TANDGEDCO
CONS LTANT: DESEIN
EPC CONTRACTOR: BHEL
AC S PPLIER:
PROJECT : 2 660 M ENNORE TPS

DOC NO. PE- 0-412-553-A020, R02
TAG NO: CD P MP - SER ICE B ILDING
APPLICATION : CONDENSER ATER
Q ANTIT : 2 NOS
LOCATION - SER ICE B ILDING ROOF

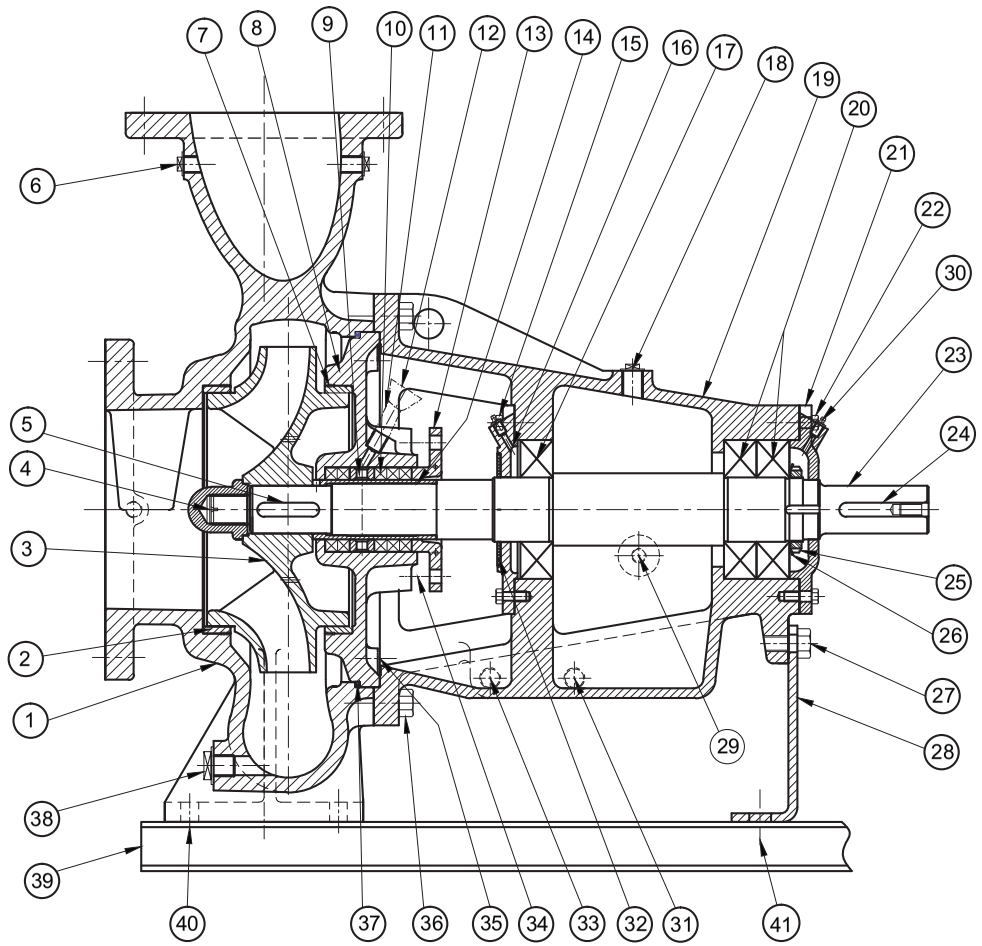
GENERAL ARRANGEMENT DRG.
FOR
HORIZONTAL END SUCTION PUMP

		NAME	DATE
SCALE N.T.S.	DRN.	HEM	05.09.2019
	CHD.	D.K.S.	05.09.2019
	APPD.	P.K.S.	05.09.2019

FLOWMORE LIMITED
NEW DELHI

DRAWING NO. GA-SALE19084223 30

REV. 02



S. NO.	DESCRIPTION	QTY.	MATERIAL
✻ 43	COUPLING GUARD	01	M.S. (FAB.)
42	FLEXIBLE COUPLING (SPACER TYPE)	01	C.I.
41	HEX. HD. BOLT WITH NUT & WASHER	02	M.S. (IS.-1367,Gr.-4.6)
40	HEX. HD. BOLT WITH NUT & WASHER	04	M.S. (IS.-1367,Gr.-4.6)
39	SKID BASE	01	M.S. (Fab.)(IS-2062)
38	PIPE PLUG	01	M.I.
37	`O' RING	01	NITRILE RUBBER
36	HEX. HD. CAP SCREW	12	M.S. (IS.-1367,Gr.-4.6)
35	STUD BOLT WITH NUT	02	M.S. (IS.-1367,Gr.-4.6)
34	STUD BOLT WITH NUT	02	S.S.-316
33	PIPE NIPPLE (Gland Drain)	01	STEEL
32	WATER SLINGER	01	RUBBER
31	PIPE PLUG	01	M.I.
30	GREASE RELEASE FITTING	02	STEEL
29	PIPE PLUG	01	M.I.
28	SUPPORT FOOT	01	M.S. (Plate)
27	HEX. HD. CAP SCREW WITH WASHER	02	M.S. (IS.-1367,Gr.-4.6)
26	BRG. LOCK WASHER	01	STEEL
25	BRG. LOCK NUT	01	STEEL
24	KEY FOR COUPLING	01	EN-8
23	PUMP SHAFT	01	ASTM A276, S.S.-410
22	HEX. HD. CAP SCREW	04	M.S. (IS.-1367,Gr.-4.6)
21	BEARING COVER (D.E.)	01	C.I. (IS-210, FG 260)
20	ANTIFRICTION BEARING (D.E.) (6313 Z-C3)	02	BRG. STEEL (SKF /FAG)
19	FRAME/BEARING HOUSING	01	C.I. (IS-210, FG 260)
18	PIPE PLUG	01	M.I.
17	ANTIFRICTION BEARING (N.D.E.) (6313 Z-C3)	01	BRG. STEEL (SKF/ FAG)
16	BEARING COVER (N.D.E.)	01	C.I. (IS-210, FG 260)
15	HEX. HD. CAP SCREW	04	M.S. (IS.-1367,Gr.-4.6)
14	SHAFT SLEEVE	01	ASTM A276, S.S.-316
13	GLAND HALF	02	CI.(IS-210, FG-260)
12	GREASE CUP WITH N.R.V.	01	STEEL
11	PIPE NIPPLE WITH COUPLING	01	G.I.
10	,MECHANICAL SEAL	05	FACES CARBON VS SI C
09	WATER SEAL RING	01	BRONZE (IS-318, LTB-II)
08	BACK COVER/BACK HEAD	01	2% NI.CI.(IS-210, FG-260)
07	DOWEL PIN (W/Ring to Casing / Back cover)	04	En-8/En-9
06	PIPE PLUG	04	M.I.
05	KEY FOR IMPELLER	01	EN-8
04	IMPELLER NUT	01	STEEL
03	IMPELLER	01	BRONZE (IS-318, LTB-II)
02	WEARING RING CASING (Front & Back Side)	02	BRONZE (IS-318, LTB-V)
01	CASING (VOLUTE)	01	2% NI.CI.(IS-210, FG-260)

C STOMER: TANDGEDCO
CONS LTANT: DESEIN
EPC CONTRACTOR: BHEL
AC S PPLIER:
PROJECT : 2 660 M ENNORE TPS

DOC NO. PE- 0-412-553-A020, R02
TAG NO: CD P MP - SB
APPLICATION : CONDENSER ATER S PPL
Q ANTIT : 2 NOS
LOCATION - SER ICE B ILDING, ROOF

NOTE:-
DIRECTION OF PUMP ROTATION:- ***COUNTER CLOCK WISE*** WHEN LOOKING FROM DRIVING END.

✻ THESE ITEM ARE NOT SHOWN IN THIS DRAWING.

PUMP PARTICULARS (QTY.:-02 Nos).		
FIG.	--	5625
SIZE	--	200x150 (8"x6")
STAGE	--	SINGLE
LUB.	--	GREASE

CROSS SECTIONAL DRAWING
FOR
HORIZONTAL END SUCTION PUMP

		NAME	DATE
SCALE N.T.S.	DRN.	HEM	05.09.2019
	CHD.	D.K.S.	05.09.2019
	APPD.	P.K.S.	05.09.2019

FLOWMORE LIMITED
NEW DELHI

DRAWING NO. CSD-SALE19084223 30

REV. 0

	TECHNICAL DATA SHEET	SALE19084223-40	Rev. 01
FLOWMORE PUMPS	C STOMER: TANDGEDCO CONS LTANT: DESEIN EPC CONTRACTOR: BHEL AC S PPLIER: PROJECT : 2 660 M ENNORE TPS	DOC NO. PE- 0-412-553-A020, R02 TAG NO: CD P MP - ADMIN B ILDING APPLICATION : CONDENSER ATER S PPL Q ANTIT : 2 NOS LOCATION - ADMIN B ILDING ROOF	

S. No	Description	
General Information:		
1.	Application	Centrifugal Water Pump
2.	Duty	Continuous
3.	Quantity	02 Nos.
4.	Liquid	WATER
5.	Specific Gravity of Liquid	1.0
6.	Temperature (Deg. C)	Ambient
Specifications:		
7.	Pump Make	FLOWMORE
8.	Pump Type	Horizontal End Suction Pump
9.	Pump Model / Size	5625A / 125 x 100 mm
10.	No. of Stage	Single
11.	Full Load Speed of Motor	1470 rpm
12.	Capacity (M^3/Hr.)	150 M^3/Hr.
13.	Total Differential Head (Mtr.)	30 M
14.	Shut Off Head (Mtr.)	34.5 Mtr.
15.	Pump Efficiency	78.5 %
16.	Pump Input (BKW)	15.61 KW
17.	Motor Rating	22 KW / 4P
18.	Motor Type	TEFC / Horizontal Induction Motor /IE-3
19.	Type of Bearing Lubrication	Grease
20.	Type of Impeller / Rated Dia (mm)	Enclosed / 307 mm (Approx.)
21.	Type of Pump Motor Coupling	Flexible (Spacer Type)
22.	Flange Drilling Standard	ANSI B 16.5, 150 LBS
23.	NPSHR (At duty point)	2.2 Mtr.
24.	Noise Level	85 dBA at 1 M
25.	Vibration Level	75 Microns
26.	Bearing No. (DE/NDE)	6310Z-C3
27.	Bearing Life (Hrs)	20000
28.	Bearing Type / Make	Antifriction (SKF / FAG)
29.	Max. power consumption in entire range of operation	16.77 kw
30.	Direction of Rotation	CCW from DE
31.	Type of coupling	Spacer

32.	Painting Details	i) 2 Layers of Zinc Phosphate epoxy primer, DFT-75 Microns. ii) 2 Coat of Chlorinated Rubber paint, Total DFT 60-80 microns iii) Color shade : IS-5 Shade 217 (Sea Green)
Material of Construction		
33.	Casing	2 % Ni CI (IS 210 FG-260)
34.	Impeller	Bronze (IS 318 LTB-II)
35.	Casing Wearing Ring	Bronze (IS 318 LTB-V)
36.	Pump Shaft	SS-410 (ASTM A276)
37.	Shaft Sleeve	SS-316 (ASTM A276)
38.	Mechanical Seal	Provided, Faces Carbon v/s Si C.
39.	Gland	CI (IS 210 FG-260)
40.	Fasteners	MS (IS-1367,Gr-4.6)
41.	Base Plate	MS Fab (IS 2062)

NOTE:

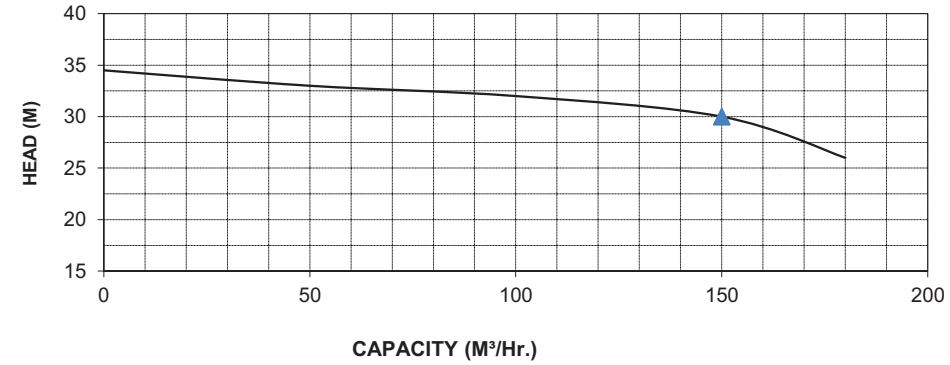
1) **Inspection & Testing shall be as per approved QAP.**

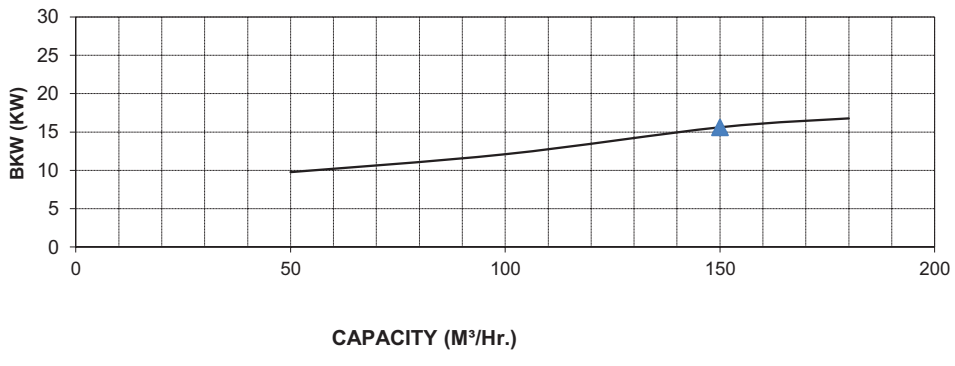
FLOWMORE LIMITED

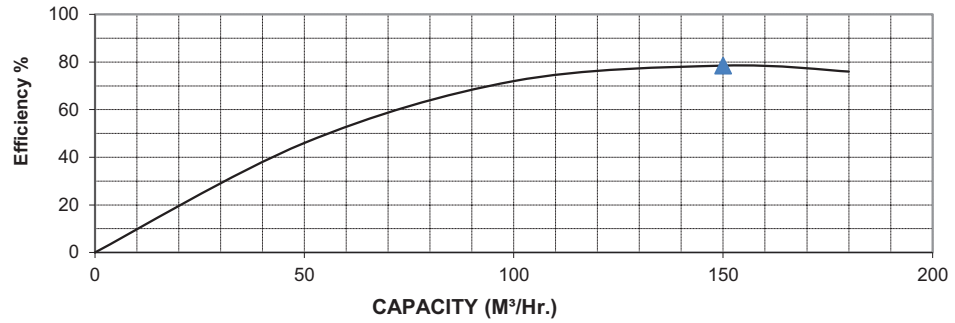
PERFORMANCE CURVE

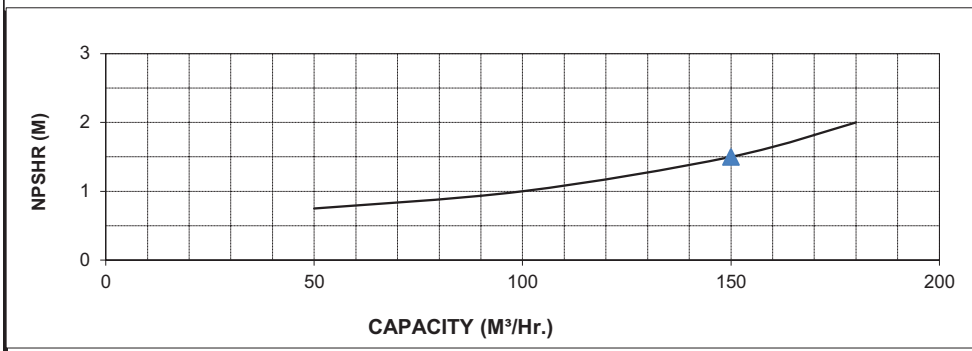
C STOMER: TANDGEDCO
CONS LTANT: DESEIN
EPC CONTRACTOR: BHEL
AC S PPLIER
PROJECT : 2 660 M ENNORE TPS

DOC NO. PE- 0-412-553-A020, R02
TAG NO: CD P MP - ADMIN B ILDING
APPLICATION : CONDENSER ATER S PPL
Q ANTIT : 2 NOS
LOCATION - ADMIN B ILDING ROOF

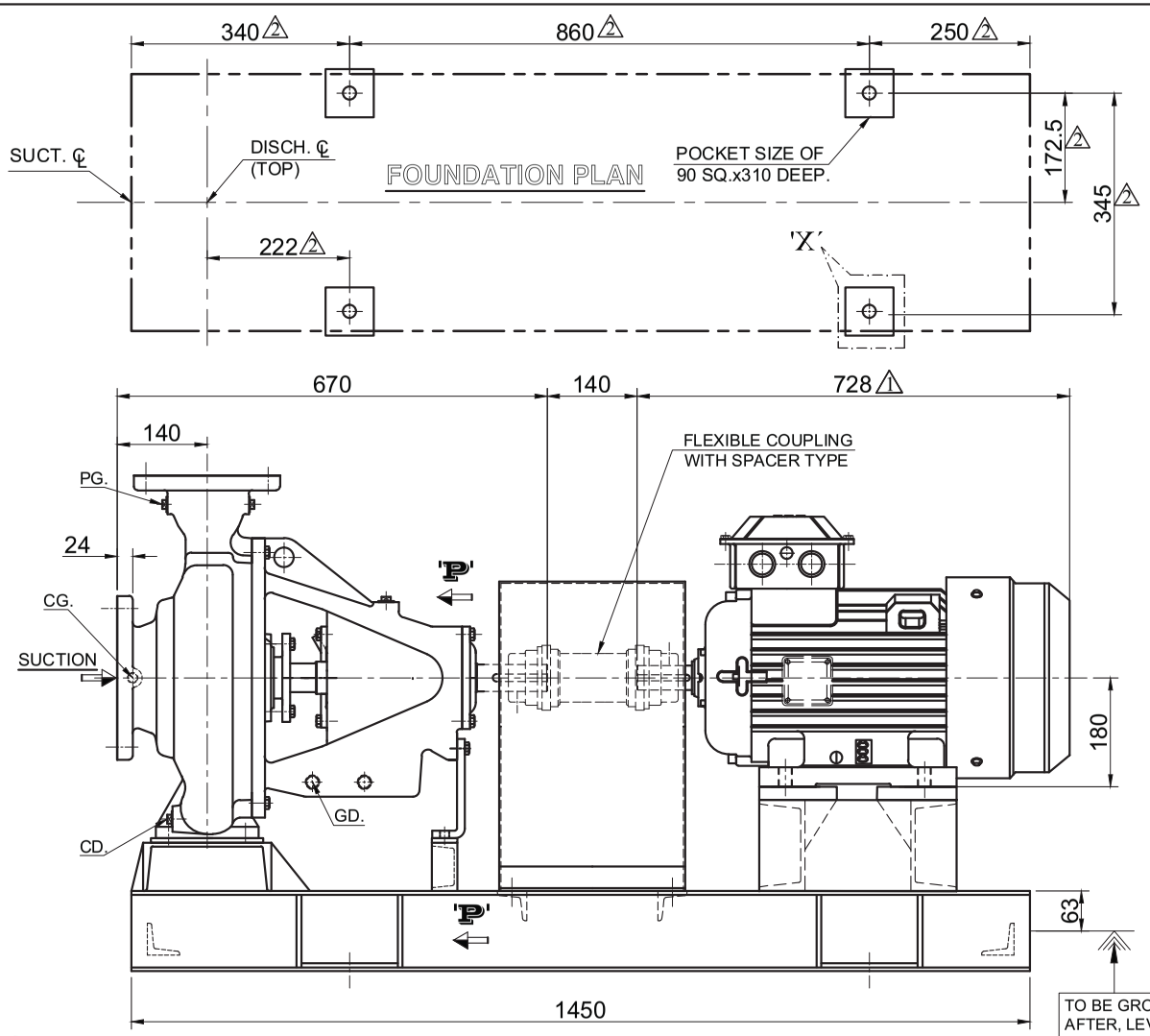


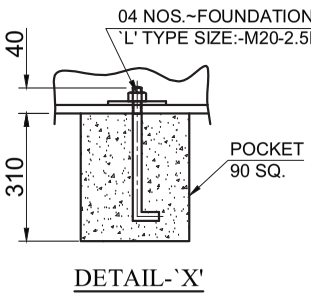




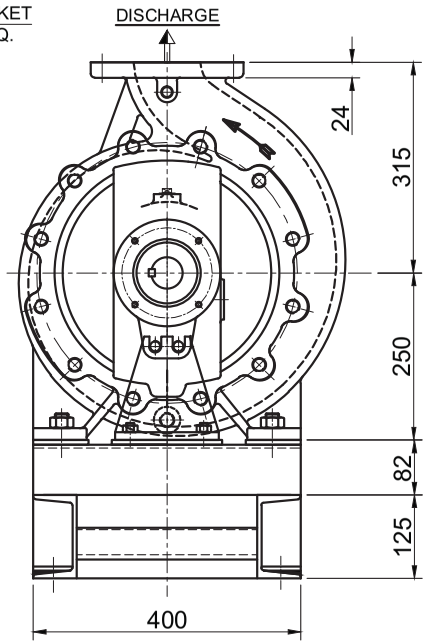


Client :				Description : CDW Pump,Admin Building			
Project : - TANGEDCO-ENNORE STPP				Model	5625A-125X100		
CAPACITY	150	M³/Hr.		Pump Input	15.61 KW		
HEAD	30	Mtrs		NRPS R	1.5 Mtr	Sp Gr	1
SOH	34.5	Mtrs		Speed	1470 rpm		
Efficiency	78.5	%		RATING	22 KW/4P		





DETAIL-`X'



VIEW -'P'-'P'

FLANGE DETAIL AS PER ANSI B16.5, 150 LBS,			
SUCTION:------	125 N.B.	DISCHARGE:----	100 N.B.
FLANGE O.D.:---	254	FLANGE O.D.:---	228.6
P.C.D.:--------	215.9	P.C.D.:--------	190.5
NO. OF. HOLES:-	8	NO. OF. HOLES:-	8
DIA OF BOLTS:-	M20	DIA OF BOLTS:-	M16

PG	PRESSURE GAUGE	3/8" B.S.P
CG	COMPOUND GAUGE	3/8" B.S.P
CD	CASING DRAIN	1/2" B.S.P
GD	GLAND DRAIN	1/2" B.S.P

NOTE:-
1. DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED.
2. DIRECTION OF PUMP ROTATION:-***COUNTER CLOCKWISE*** WHEN LOOKING FROM DRIVING END.
3. STATIC LOAD (Pump Set With Motor) = 470 Kgs. (Approx.),⚠
4. DYNMIC LOAD (Pump Set With Motor) = 600 Kgs. (Approx.),⚠

MOTOR PARTICULARS			PUMP PARTICULARS (QTY.:- 02 Nos.)		
MAKE	--	ABB⚠	FIG.	--	5625 A
FRAME	--	M2BAX 180MLB4⚠	SIZE	--	125x100 (5"x4")
POWER	--	22 K.W.	STAGE	--	SINGLE
SPEED	--	1475 R.P.M.⚠	SPEED	--	1475 R.P.M. ⚠
VOLTS	--	415±10%	CAPACITY	--	150 Cu. M/hr.
PHASES	--	THREE	HEAD	--	30 Mtrs.
FREQUENCY	--	50 Hz.	PUMP INPUT		15.61 K.W.
TYPE OF CONS.	--	H.S.S.	(Sp. Gr. 1.0)		
			EFFICIENCY		78.5%

Rev.No.	REVISION	SIGN	DATE
⚠2	CHANGE AS PER COMMENTS	SUNI	22.10.2019
⚠	MOTOR CHANGES AS MARKS	HEM	07.10.2019

C STOMER: TANDGEDCO
CONS LTANT: DESEIN
EPC CONTRACTOR: BHEL
AC S PPLIER: [illegible]
PROJECT : 2 660 M ENNORE TPS

DOC NO. PE- 0-412-553-A020, R02
TAG NO: CD P MP - ADMIN B ILDING
APPLICATION : CONDENSER ATER
Q ANTIT : 2 NOS
LOCATION - ADMIN B ILDING ROOF

GENERAL ARRANGEMENT DRAWING FOR HORIZONTAL END SUCTION PUMP

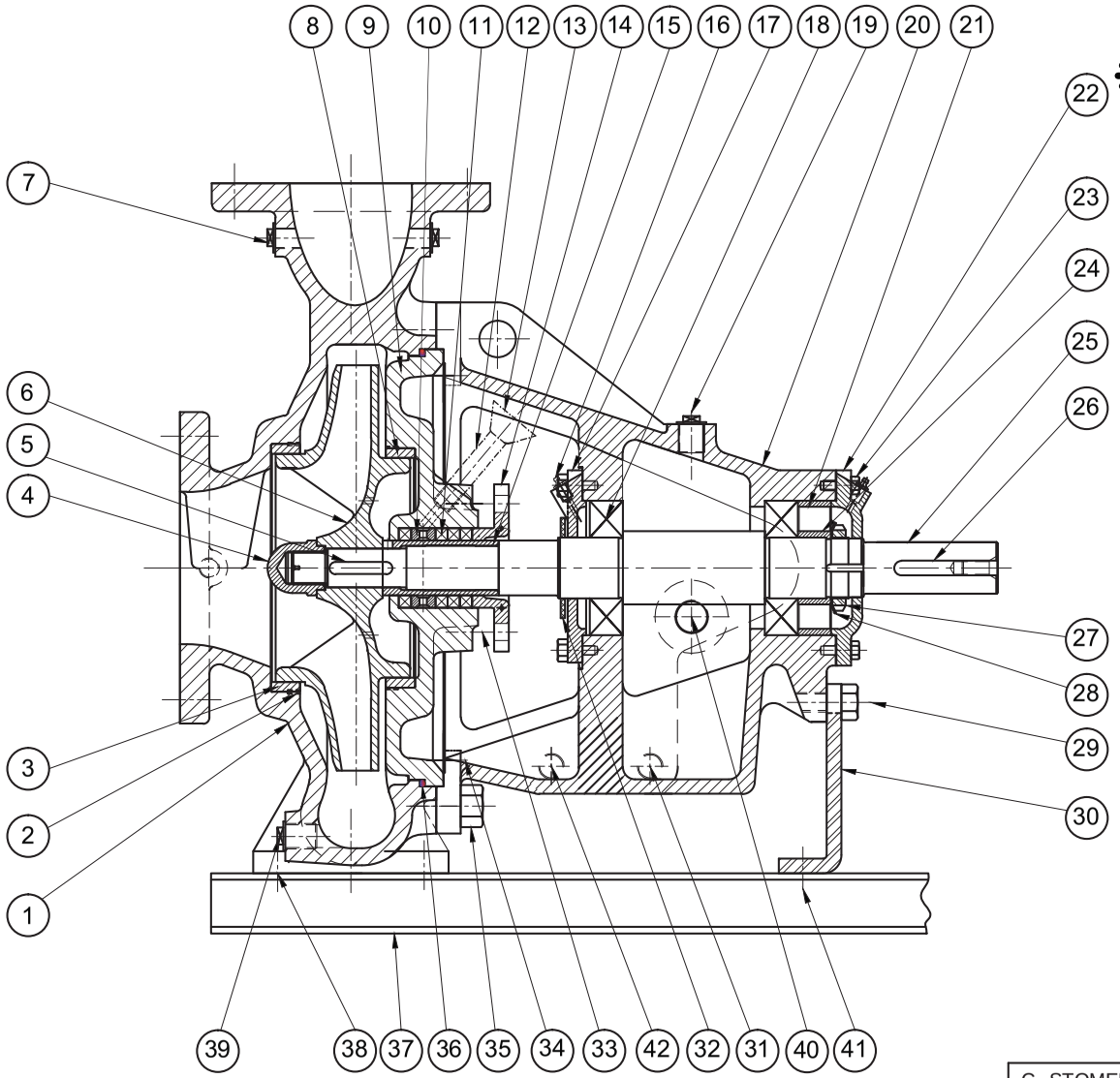
SCALE N.T.S.

	NAME	DATE
DRN.	HEM	05.09.2019
CHD.	D.K.S.	05.09.2019
APPD.	P.K.S.	05.09.2019

FLOWMORE LIMITED
NEW DELHI

DRAWING NO. GA-SALE19084223 40

REV. 02



S. NO.	DESCRIPTION	QTY.	MATERIAL
✻ 44	COUPLING GURAD	01	M.S. (Fab.)
43	FLEXIBLE COUPLING (Spacer Type)	01	C.I.
42	PIPE NIPPLE	01	STEEL
41	HEX. HD. BOLT WITH NUT & WASHER	02	M.S.- (IS.-1367, Gr.-4.6)
40	PIPE PLUG	01	M.I.
39	PIPE PLUG	01	M.I.
38	HEX. HD. BOLT WITH NUT & WASHER	04	M.S.- (IS.-1367, Gr.-4.6)
37	SKID BASE (BASE PLATE)	01	M.S. (Fab.) (IS-2062)
36	`O'- RING	01	NITRILE RUBBER
35	HEX. HD. CAP SCREW	12	M.S.- (IS.-1367, Gr.-4.6)
34	STUD BOLT WITH NUT	02	M.S.- (IS.-1367, Gr.-4.6)
33	STUD BOLT WITH NUT	02	S.S.-316
32	WATER SLINGER	01	RUBBER
31	PIPE PLUG	02	M.I.
30	SUPPORT FOOT	01	M.S. (Plate)
29	HEX. HD. CAP SCREW WITH WASHER	02	M.S.- (IS.-1367, Gr.-4.6)
28	BRG. LOCK WASHER	01	STEEL
27	BRG. LOCK NUT	01	STEEL
26	KEY FOR COUPLING	01	EN-8
25	PUMP SHAFT	01	ASTM A 276 (S.S.-410)
24	SPACER (INNER)	01	STEEL
23	HEX. HD. CAP SCREW	08	M.S.- (IS.-1367, Gr.-4.6)
22	BEARING COVER	01	C.I. (IS-210, FG 260)
21	SPACER (OUTER)	01	STEEL
20	FRAME/BEARING HOUSING	01	C.I. (IS-210, FG 260)
19	PIPE PLUG	01	M.I.
18	ANTI FRICTION BEARING (D.E. & N.D.E.) (6310Z- C3)	02	BRG. STEEL (SKF/FAG)
17	BEARING COVER	01	C.I. (IS-210, FG 260)
16	GREASE RELEASE FITTING	02	STEEL
15	SHAFT SLEEVE	01	ASTM A 276 (S.S.-316)
14	GLAND HALF	02	C.I. (IS-210, FG 260)
13	GREASE CUP WITH N.R.V.	01	STEEL
12	PIPE NIPPLE WITH COUPLING	01	G.I.
11	,MECHANICAL SEAL)	04	FACES CARBON VS SI C
10	WATER SEAL RING	01	BRONZE (IS-318, LTB-II)
09	BACK COVER/BACK HEAD	01	2 % Ni.C.I. (IS-210, FG 260)
08	WEARING RING CASING (Back Side)	01	BRONZE (IS-318, LTB-V)
07	PIPE PLUG	02	M.I.
06	IMPELLER	01	BRONZE (IS-318, LTB-II)
05	KEY FOR IMPELLER	01	EN-8
04	IMPELLER NUT	01	STEEL
03	WEARING RING CASING (Front Side)	01	BRONZE (IS-318, LTB-V)
02	DOWEL PIN	04	En-8/En-9
01	CASING (VOLUTE)	01	2 % Ni.C.I. (IS-210, FG 260)

NOTE:-
DIRECTION OF PUMP ROTATION:- ***COUNTER CLOCK WISE***, WHEN LOOKING FROM DRIVING END.

✻ THESE ITEM ARE NOT SHOWN IN THIS DRAWING.

C STOMER: TANDGEDCO
CONS LTANT: DESEIN
EPC CONTRACTOR: BHEL
AC S PPLIER:
PROJECT : 2 660 M ENNORE TPS

DOC NO. PE- 0-412-553-A020, R02
TAG NO: CD P MP - ADMIN B ILDING
APPLICATION : CONDENSER ATER S PPL
Q ANTIT : 2 NOS
LOCATION - ADMIN B ILDING, ROOF

PUMP PARTICULARS (QTY.:- 02 Nos.)		
FIG.	--	5625A
SIZE	--	125x100 (5"x4")
STAGE	--	SINGLE
LUB.	--	GREASE

CROSS SECTIONAL DRAWING
FOR
HORIZONTAL END SUCTION PUMP

SCALE N.T.S.

	NAME	DATE
DRN.	HEM	05.09.2019
CHD.	D.K.S.	05.09.2019
APPD.	P.K.S.	05.09.2019

FLOWMORE LIMITED
NEW DELHI

DRAWING NO. CSD-SALE19084223 40

REV. 0

	TECHNICAL DATA SHEET	SALE19084223-50	Rev. 01
FLOWMORE PUMPS	C STOMER: TANDGEDCO CONS LTANT: DESEIN EPC CONTRACTOR: BHEL AC S PPLIER: PROJECT : 2 660 M ENNORE TPS	DOC NO. PE- 0-412-553-A020, R02 TAG NO: CD P MP - ESP B ILDING APPLICATION : CONDENSER ATER S PPL Q ANTIT : 2 NOS LOCATION - ESP B ILDING, AC PLANT ROOM	

S. No	Description	
General Information:		
1.	Application	Centrifugal Water Pump
2.	Duty	Continuous
3.	Quantity	04 Nos.
4.	Liquid	WATER
5.	Specific Gravity of Liquid	1.0
6.	Temperature (Deg. C)	Ambient
Specifications:		
7.	Pump Make	FLOWMORE
8.	Pump Type	Horizontal End Suction Pump
9.	Pump Model / Size	5625 / 65 x 40 mm
10.	No. of Stage	Single
11.	Full Load Speed of Motor	1450 rpm
12.	Capacity (M^3/Hr.)	30 M^3/Hr.
13.	Total Differential Head (Mtr.)	25 M
14.	Shut Off Head (Mtr.)	30 Mtr.
15.	Pump Efficiency	50 %
16.	Pump Input (BKW)	4.08 KW
17.	Motor Rating	5.5 KW / 4P
18.	Motor Type	TEFC / Horizontal Induction Motor /IE-3
19.	Type of Bearing Lubrication	Grease
20.	Type of Impeller / Rated Dia (mm)	Enclosed / 240 mm (Approx.)
21.	Type of Pump Motor Coupling	Flexible (Spacer Type)
22.	Flange Drilling Standard	ANSI B 16.5, 150 LBS
23.	NPSHR (At duty point)	2.5 Mtr.
24.	Noise Level	85 dBA at 1 M
25.	Vibration Level	75 Microns
26.	Bearing No. (DE/NDE)	6310Z-C3
27.	Bearing Life (Hrs)	20000
28.	Bearing Type / Make	Antifriction (SKF / FAG)
29.	Max. power consumption in entire range of operation	4.17 kw
30.	Direction of Rotation	CCW from DE
31.	Type of coupling	Spacer

32.	Painting Details	i) 2 Layers of Zinc Phosphate epoxy primer, DFT-75 Microns. ii) 2 Coat of Chlorinated Rubber paint, Total DFT 60-80 microns iii) Color shade : IS-5 Shade 217 (Sea Green)
Material of Construction		
33.	Casing	2 % Ni CI (IS 210 FG-260)
34.	Impeller	Bronze (IS 318 LTB-II)
35.	Casing Wearing Ring	Bronze (IS 318 LTB-V)
36.	Pump Shaft	SS-410 (ASTM A276)
37.	Shaft Sleeve	SS-316 (ASTM A276)
38.	Mechanical Seal	Provided, Faces Carbon v/s Si C.
39.	Gland	CI (IS 210 FG-260)
40.	Fasteners	MS (IS-1367,Gr-4.6)
41.	Base Plate	MS Fab (IS 2062)

NOTE:

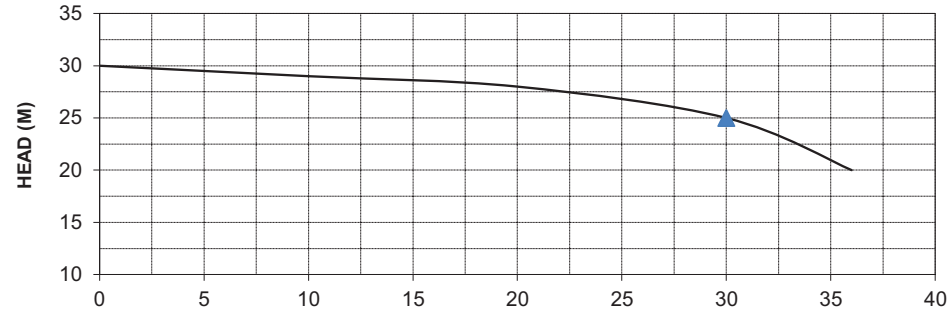
1) Inspection & Testing shall be as per approved QAP.

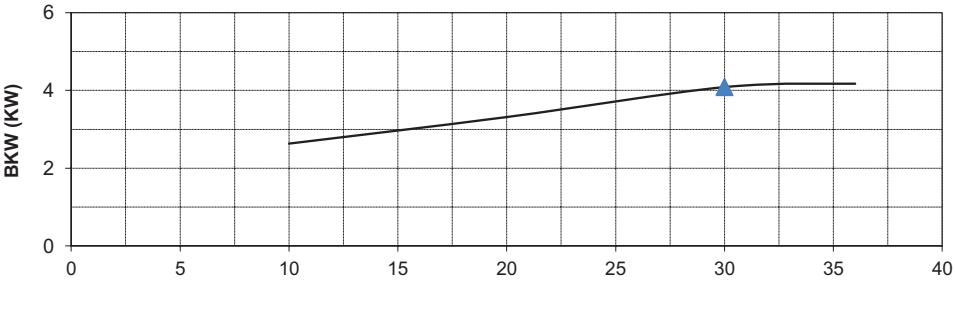
FLOWMORE LIMITED

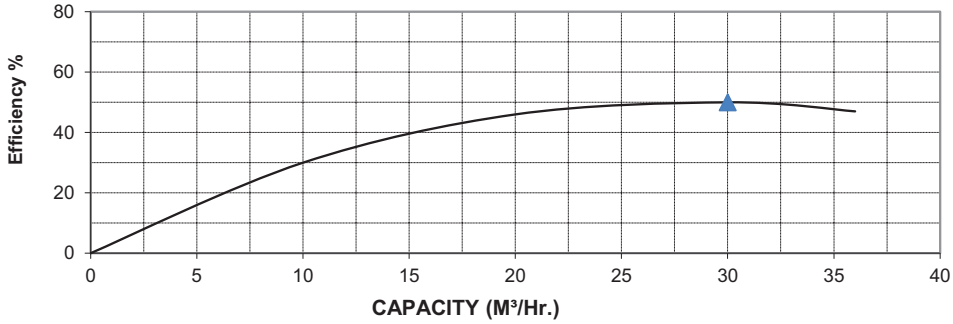
PERFORMANCE CURVE

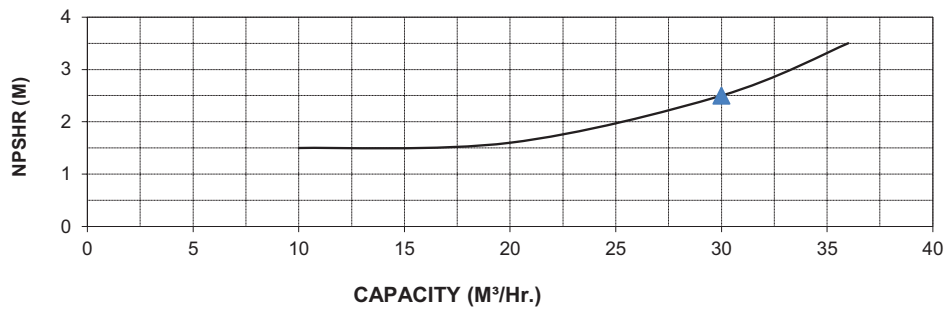
C STOMER: TANDGEDCO
CONS LTANT: DESEIN
EPC CONTRAC[illegible]
AC S PPLIER:
PROJECT : 2 660 M ENNORE TPS

DOC NO. PE- 0-412-553-A020, R02
TAG NO: CD P MP - ESP B ILDING
APPLICATION : CONDENSER ATER S PPL
Q ANTIT : 2 NOS
LOCATION - ESP B ILDING, AC PLANT ROOM

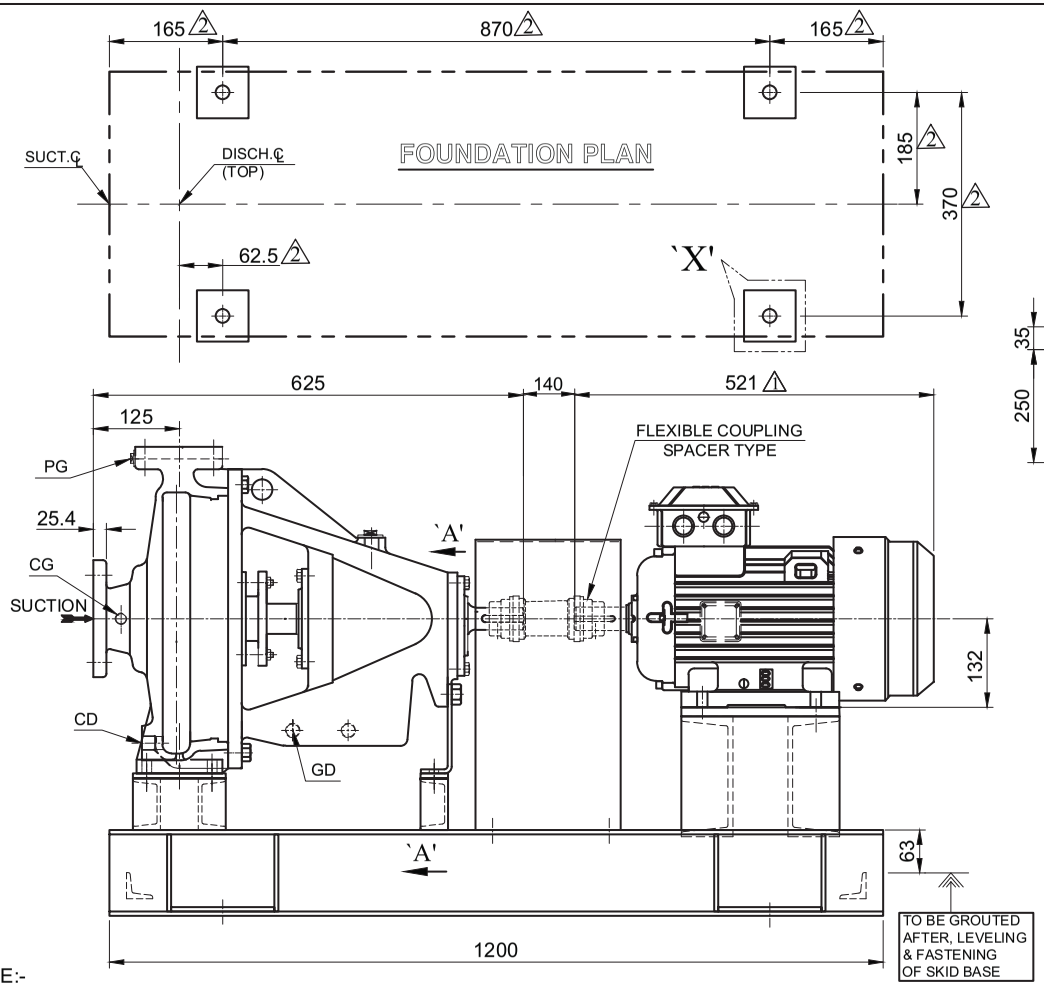


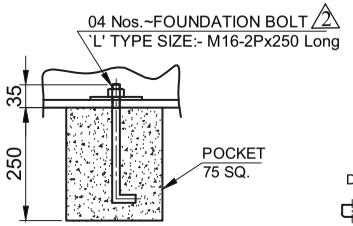




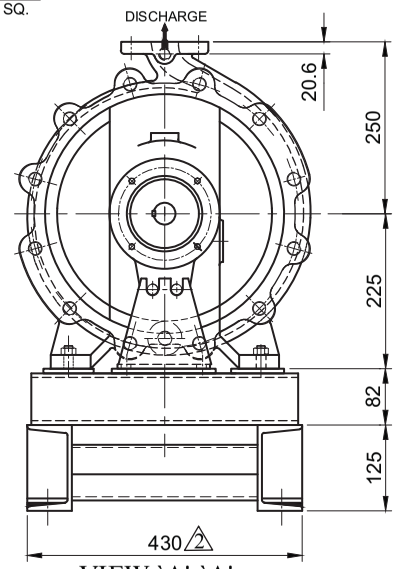


Client : -				Description : CDW Pump,ESP Building			
Project : - TANGEDCO-ENNORE STPP				Model	5625-65X40		
CAPACITY	30	M³/Hr.		Pump Input	4.08 KW		
HEAD	25	Mtrs		NRPS R	2.5 Mtr	Sp Gr	1
SOH	30	Mtrs		Speed	1450 rpm		
Efficiency	50	%		RATING	5.5 KW/4P		





DETAIL-`X'



VIEW `A'-`A'

FLANGE DETAIL AS PER ANSI B16.5,150 LBS			
SUCTION:------	65 N.B.	DISCHARGE:----	40 N.B.
FLANGE O.D.:---	177.8	FLANGE O.D.:---	127
P.C.D.:---------	139.7	P.C.D.:---------	98.4
NO. OF HOLES:-	4	NO. OF HOLES:-	4
DIA OF BOLTS:-	M16	DIA OF BOLTS:-	M12

CD	CASING DRAIN	1/2" B.S.P.
GD	GLAND DRAIN	1/2" B.S.P.
CG	COMPOUND GAUGE	3/8" B.S.P.
PG	PRESSURE GAUGE	3/8" B.S.P.

NOTE:-
1. DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED.
2. DIRECTION OF PUMP ROTATION:- ***COUNTER CLOCKWISE*** WHEN LOOKING FROM DRIVING END.
3. STATIC LOAD (PUMP SET WITH MOTOR) = 320 KGS. (APPROX).1
4. DYNAMIC LOAD (PUMP SET WITH MOTOR) = 420 KGS. (APPROX).1

MOTOR PARTICULARS		PUMP PARTICULARS (QTY.:-04 Nos.)	
MAKE	-- ABB1	FIG.	-- 5625
FRAME	-- M2BAX 132SMA41	SIZE	-- 65x40 (2-1/2"x1-1/2")
POWER	-- 5.5 KW	STAGE	-- SINGLE
SPEED	-- 1460 R.P.M.1	SPEED	-- 1460 R.P.M. 1
VOLTS	-- 415±10%	CAPACITY	-- 30 Cu. M/hr.
PHASES	-- THREE	HEAD	-- 25 Mtrs.
FREQUENCY	-- 50 Hz.	PUMP INPUT (Sp. Gr. 1.0)	-- 4.08 K.W.
TYPE OF CONS.	-- H.S.S.	EFFICIENCY	-- 50%

Rev.No.	REVISION	SIGN	DATE
2	CHANGE AS PER COMMENTS	HEM	22.10.2019
1	MOTOR CHANGES AS MARKS	HEM	03.10.2019

C STOMER: TANDGEDCO
CONS LTANT: DESEIN
EPC CONTRACTOR: BHEL
AC S PPLIER:
PROJECT : 2 660 M ENNORE TPS

DOC NO. PE- 0-412-553-A020, R02
TAG NO: CD P MP - ESP B ILDING
APPLICATION : CONDENSER ATER
Q ANTIT : 2 NOS
LOCATION - ESP B ILDING, AC PLANT ROOM

GENERAL ARRANGEMENT DRG. FOR HORIZONTAL END SUCTION PUMP

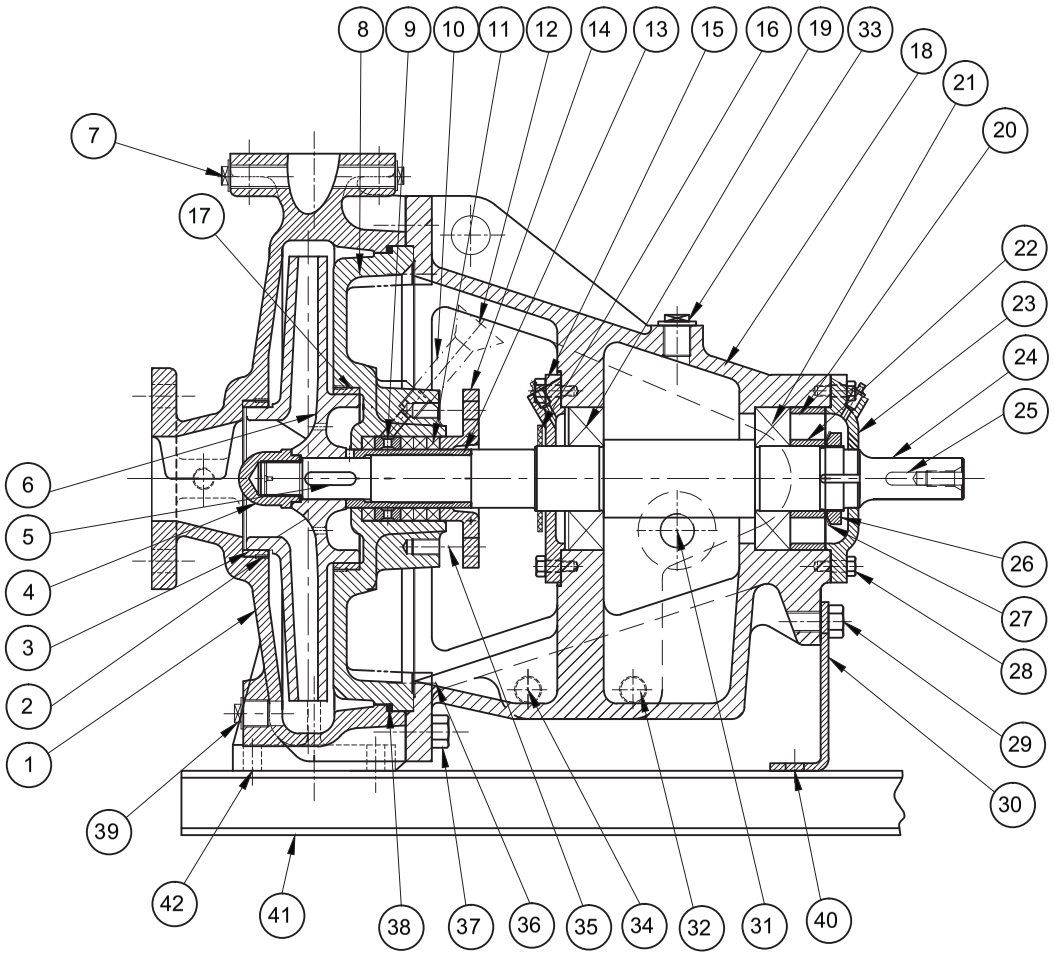
	NAME	DATE
DRN.	HEM	05.09.2019
CHD.	D.K.P.	05.09.2019
APPD.	P.K.P.	05.09.2019

SCALE N.T.S.

FLOWMORE LIMITED
NEW DELHI

DRAWING NO. GA-SALE19084223 50

REV. 02



S. NO.	DESCRIPTION	QTY.	MATERIAL
✻ 44	COUPLING GURAD	01	M.S. (Fab.)
43	FLEXIBLE COUPLING (SPACER TYPE)	01	C.I.
42	HEX. HD. BOLT WITH NUT & WASHER	04	M.S. (IS.-1367, Gr- 4.6)
41	SKID BASE (BASE PLATE)	01	M.S. (Fab.) (IS.-2062)
40	HEX. HD. BOLT WITH NUT & WASHER	02	M.S. (IS.-1367, Gr- 4.6)
39	PIPE PLUG	01	M.I.
38	`O' RING	01	NITRILE RUBBER
37	HEX. HD. CAP SCREW	12	M.S. (IS.-1367, Gr- 4.6)
36	STUD BOLT WITH NUT	02	M.S. (IS.-1367, Gr- 4.6)
35	STUD BOLT WITH NUT	02	S.S.-316
34	PIPE NIPPLE (Gland Drain)	01	STEEL
33	PIPE PLUG	01	M.I.
32	PIPE PLUG	01	M.I.
31	PIPE PLUG	01	M.I.
30	SUPPORT FOOT	01	M.S. (Plate)
29	HEX. HD. CAP SCREW WITH WASHER	02	M.S. (IS.-1367, Gr- 4.6)
28	HEX. HD. CAP SCREW	08	M.S. (IS.-1367, Gr- 4.6)
27	BRG. LOCK WASHER	01	STEEL
26	BRG. LOCK NUT	01	STEEL
25	KEY FOR COUPLING	01	EN-8
24	PUMP SHAFT	01	S.S.-410 (ASTM A276)
23	BEARING COVER (D.E.)	01	C.I. (IS-210, FG 260)
22	SPACER (INNER)	01	STEEL
21	A/F BEARING (D.E.) (6310 Z-C3)	01	BRG. STEEL (SKF/FAG)
20	SPACER (OUTER)	01	STEEL
19	A/F BEARING (N.D.E.) (6310 Z-C3)	01	BRG. STEEL (SKF/FAG)
18	FRAME/BEARING HOUSING	01	C.I. (IS-210, FG 260)
17	WEARING RING CASING (Back Side)	01	BRONZE (IS:318,-LTB-V)
16	WATER SLINGER	01	RUBBER
15	BEARING COVER (N.D.E.)	01	C.I. (IS-210, FG 260)
14	GLAND HALF.	02	C.I. (IS-210, FG 260)
13	SHAFT SLEEVE	01	S.S.-316 (ASTM A276)
12	GREASE CUP WITH N.R.V.	01	STEEL
11	,MECHANICAL SEAL	04	FACES CARBON VS SI C
10	PIPE NIPPLE WITH COUPLING	01	G.I.
09	WATER SEAL RING	01	BRONZE (IS:318,-LTB-II)
08	BACK HEAD / BACK COVER	01	2% Ni.C.I. (IS-210, FG 260)
07	PIPE PLUG	02	M.I.
06	IMPELLER	01	BRONZE (IS:318,-LTB-II)
05	KEY FOR IMPELLER	01	EN-8
04	IMPELLER NUT	01	STEEL
03	WEARING RING CASING (Front Side)	01	BRONZE (IS:318,-LTB-V)
02	DOWEL PIN	04	En-8/En-9
01	CASING (VOLUTE)	01	2% Ni.C.I. (IS-210, FG 260)

NOTE:-
DIRECTION OF PUMP ROTATION:- ***COUNTER CLOCK WISE***, WHEN LOOKING FROM DRIVING END.

✻ THESE ITEM ARE NOT SHOWN IN THIS DRAWING.

PUMP PARTICULARS (QTY.:- 04 Nos.)		
FIG.	--	5625
SIZE	--	65x40 (2-1/2"x1-1/2")
STAGE	--	SINGLE
LUB.	--	GREASE

C STOMER: TANDGEDCO
CONS LTANT: DESEIN
EPC CONTRACTOR: BHEL
AC S PPLIER
PROJECT : 2 660 M ENNORE TPS

DOC NO. PE- 0-412-553-A020, R02
TAG NO: CD P MP - ESP B ILDING
APPLICATION : CONDENSER ATER
Q ANTIT : 2 NOS
LOCATION - ESP B ILDING, AC PLANT ROOM

CROSS SECTIONAL DRAWING
FOR
HORIZONTAL END SUCTION PUMP

		NAME	DATE
DRN.		HEM	05.09.2019
CHD.		D.K.S.	05.09.2019
APPD.		P.K.S.	05.09.2019

SCALE N.T.S.

FLOWMORE LIMITED
NEW DELHI

DRAWING NO. CSD-SALE19084223 50

REV. 0

DOCUMENT IS APPROVED VIDE TANGEDCO LETTER NO. SE/E/T&H(P)/EE-6/E/AEE/E/F.En SEZ DRG APPL./D.157 /19 dt.14.06.2019

BHARAT HEAVY ELECTRICALS LIMITED
PROJECT ENGINEERING MANAGEMENT
(MECHANICAL AUXILIARY)

This approval status shall be interpreted as laid down in the contract and it shall not relieve the contractor from his contractual obligation.

APPROVAL CATEGORY AWARED = I

CAT I - Approved
CAT II - Approved with Comments as Noted
CAT III - Not Approved
CAT IV - Reference Drawing

Name: VIPIN NAUNI
Signature:

VIPIN NAUNI
Reviewed by BHEL and found in order.
Submitted for TANGEDCO / FI Approval.
2019.02.06 21:19:11 +05'30'

Date	Rev	Description of Revision	ALT	CHD	APPD
18/12/2018	00	As per BHEL Comments	ALAM	SALIM	SKT
27/11/2018	A	FIRST SUBMISSION	ALAM	SALIM	PC

PROJECT	2x660 MW ENNORE SEZ COAL BASED STPP AT ASH DYKE OF NCTPS, CHENNAI
	CUSTOMER TAMILNADU GENERATION AND DISTRIBUTION CORPORATION LIMITED (TANGEDCO)
	CONSULTANT **DESEIN PRIVATE LIMITED** **DESEIN HOUSE, GREATER KAILASH-II, NEW DELHI**
	EPC CONTRACTOR BHARAT HEAVY ELECTRICALS LTD PS-PEM, PPEI-BUILDING, SECTOR-16A, PLOT NO. 25, NOIDA-201301

PACKAGE	**AIR CONDITIONING SYSTEM**
TITLE	**TDS OF MOTOR FOR AC SYSTEM**

INDEX

PROJECT NAME	2X660 MW ENNORE TPS
CUSTOMER	TAMIL NADU GENERATION & DISTRIBUTION CORPORATION LTD. (TANGEDCO)
CONSULTANT	DESEIN
EPC CONTRACTOR	BHARAT HEAVY ELECTRICALS LTD.
SUPPLIER	
PACKAGE	AIR CONDITIONING SYSTEM
DOCUMENT NO	PE-V0-412-553-A022
DOCUMENT	DATASHEET FOR MOTOR OF AC SYSTEM
TOTAL NO. OF PAGES	62

TDS OF MOTOR FOR AHU

S. No.	Description		Data to be filled by successful bidder
A.	**General**		
1	Manufacturer & country of origin		LHPL INDIA
2	Motor type		SQIM
3	Type of starting		DOL
4	Name of the equipment driven by motor & Quantity		AHU FAN -10000CFM.
5	Maximum Power requirement of driven equipment		7.24kW
6	Rated speed of Driven Equipment		1571
7	Design ambient temperature		50°C
B.	**Design and Performance Data**		
1	Frame size & type designation		160M
2	Type of duty		CONTINUOUS (S1)
3	Rated Voltage		415V
4	Permissible variation for		
5	a	Voltage	±10%
6	b	Frequency	+3 to -5%
7	c)	Combined voltage & frequency	10%(ABSOLUTE)
8	Rated output at design ambient temp (by resistance method)		11Kw
9	Synchronous speed & Rated slip		1500 & 0.02
10	Minimum permissible starting voltage		353V(85%)
11	Starting time in sec with mechanism coupled		
12	a) At rated voltage		2
13	b) At min starting voltage		3
14	Locked rotor current as percentage of FLC (including IS tolerance)		750%
15	Torque		
	a) Starting		215%
	b) Maximum		280%
16	Permissible temp rise at rated output over ambient temp & method		70°C BY RESISTANCE METHOD
17	Noise level at 1.0 m (dB		AS PER I.S.-12065
18	Amplitude of vibration		AS PER I.S.-12075
19	Rated current at rated voltage & frequency in Amp.		20.2 Amp
20	Efficiency & P.F. at rated voltage & frequency		IE3
	a) At 100% load		91.4% & 0.83
	c) At 75% load		90.7% & 0.78

S. No.	Description	Data to be filled by successful bidder
	c) At starting	N.A & 0.4
C.	**Constructional Features**	
1	Method of connection of motor driven equipment	PULLEY & V BELT.
2	Applicable Standard	IS/IEC 60034-1
3	DOP of Enclosure	I.P.-55
4	Method of cooling	TEFC
5	Class of insulation	F CLASS TEMP RISE LIMITED TO CLASS B
6	Main terminal box	
	a) Type	IP:55
	b) Power Cable details (Conductor, size, armour/unarmour)	3CX10 SQ mm
	c) Cable Gland & lugs details (Size, type & material)	Brass DCCG & refer GAD
	d) Permissible Fault level (kArms & duration in sec)	50KA FOR 0.25 SEC with HRC Fuse
7	Space heater details (Voltage & watts)	NA
8	Flame proof motor details (if applicable)	
	a) Enclosure	NA
	b) suitability for hazardous area	
	i Zone	N.A.
	ii Group	N.A.
9	No. of Stator winding	6 LEAD
10	Winding connection	DELTA
11	Kind of rotor winding	SQIM
12	Kind of bearings	Roller / Ball @DE & NDE
13	Direction of rotation when viewed from NDE	Bidirectional
14	Paint Shade & type	RAL 7032 SIEMENS GRAY
15	Net weight of motor	155KG APPROX
16	Outline mounting drawing No (To be enclosed as annexure)	Enclosed
D.	**Characteristic curves/ drawings** (To be enclosed for motors of rating 1.5KW)	
	a) Torque speed characteristic	ENCLOSED
	b) Thermal withstand characteristic	ENCLOSED
	c) Current vs time	ENCLOSED
	d) Speed vs time	ENCLOSED

NOTE : 1. ALL PERFORMANCE FIGURES ARE SUBJECT TO IEC 60034-1 TOLERANCES.

MKTG Ref No.: D6PP18111	LAXMI HYDRAULICS PVT LTD. , B-11- MIDC CHINCHOLI , SOLAPUR.	

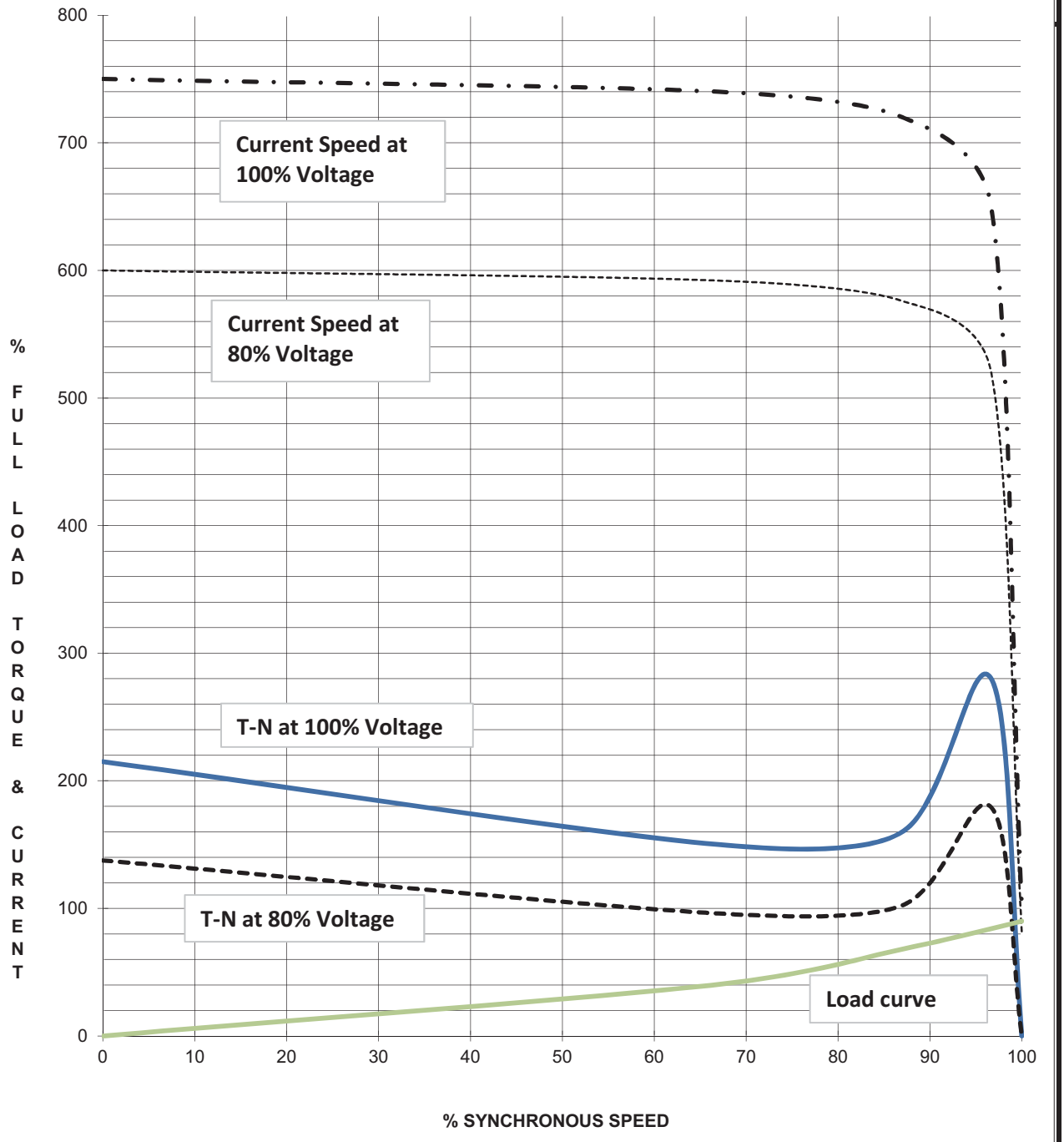
SPEED Vs T0RQUE & CURRENT CHARACTERISTICS

CUSTOMER :

W.O. NO.: D6PP1811126 SAP NO: -

kW : 11 POLE : 4 VOLTS : 415 QTY : 1

IE-3



NO	REVISION	SIGN		SIGN	DATE
2				SSG	17-12-18
1				SG	17-12-18

MKTG Ref No.: D6PP1807236	LAXMI HYDRAULICS PVT LTD. , B-11- MIDC CHINCHOLI , SOLAPUR.	

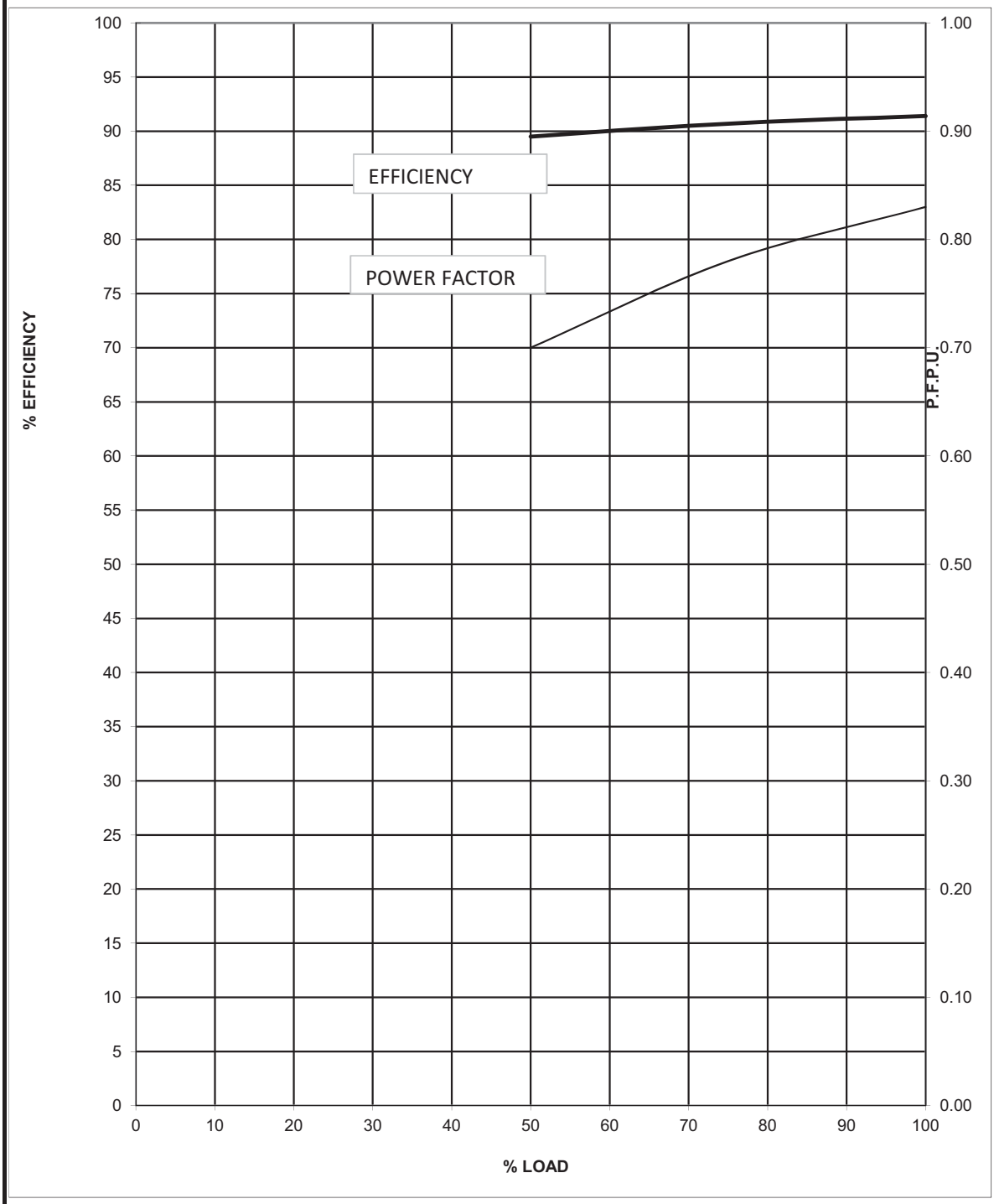
LOAD Vs EFF., P.F.,

CUSTOMER :

W.O. NO. D6PP1811126 SAP NO: -

IE-3

kW : 11 POLE : 4 VOLTS : 415 QTY : 1



NO	REVISION	SIGN			DATE
2			PREP	SSG	17-12-18
1			APPD	SG	17-12-18

MKTG Ref No.: D6PP1807236	LAXMI HYDRAULICS PVT LTD. , B-11- MIDC CHINCHOLI , SOLAPUR.	

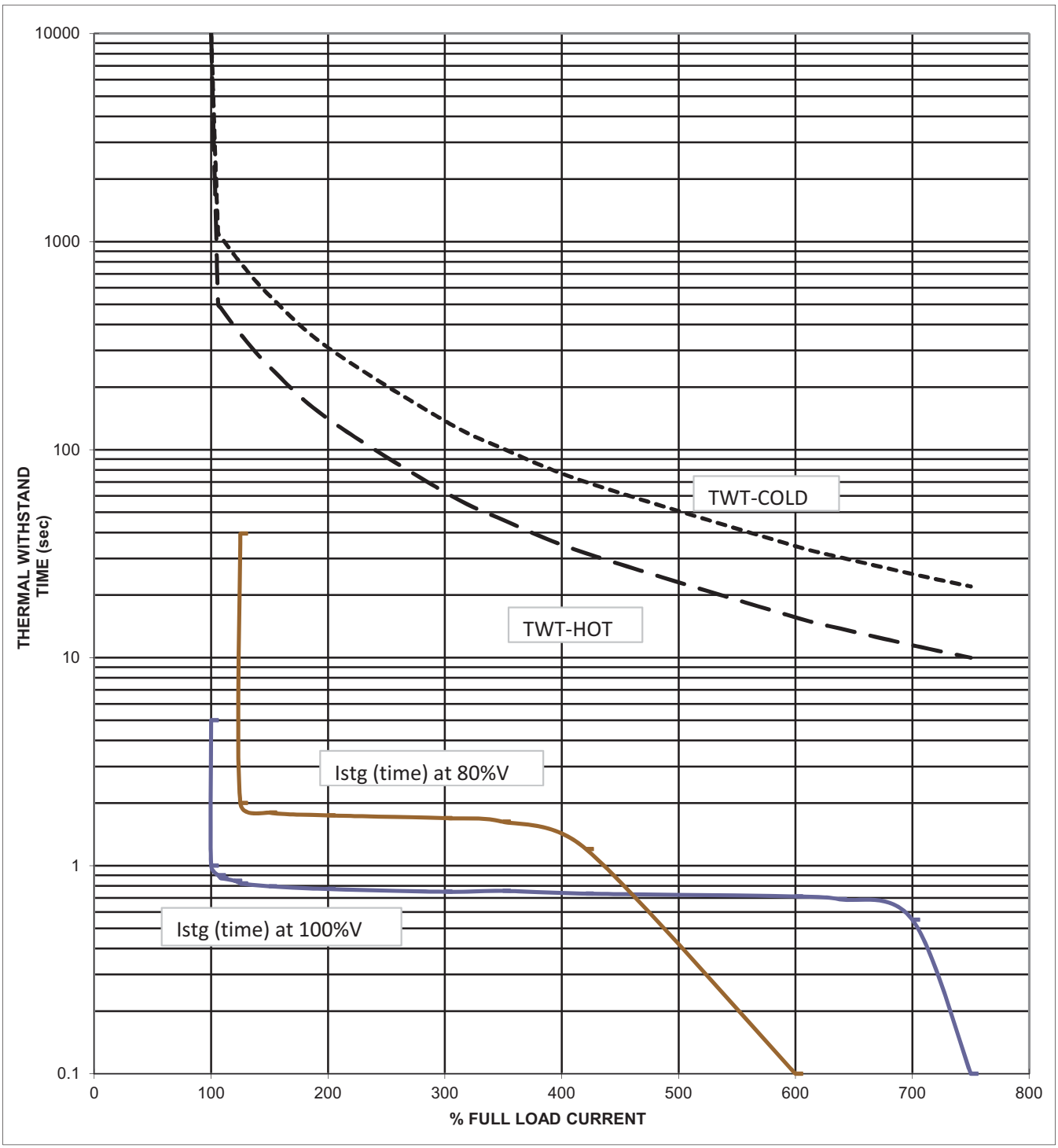
STARTING CURRENT VS STARTING TIME AND THERMAL WITHSTAND TIME.

CUSTOMER : I

IE-3

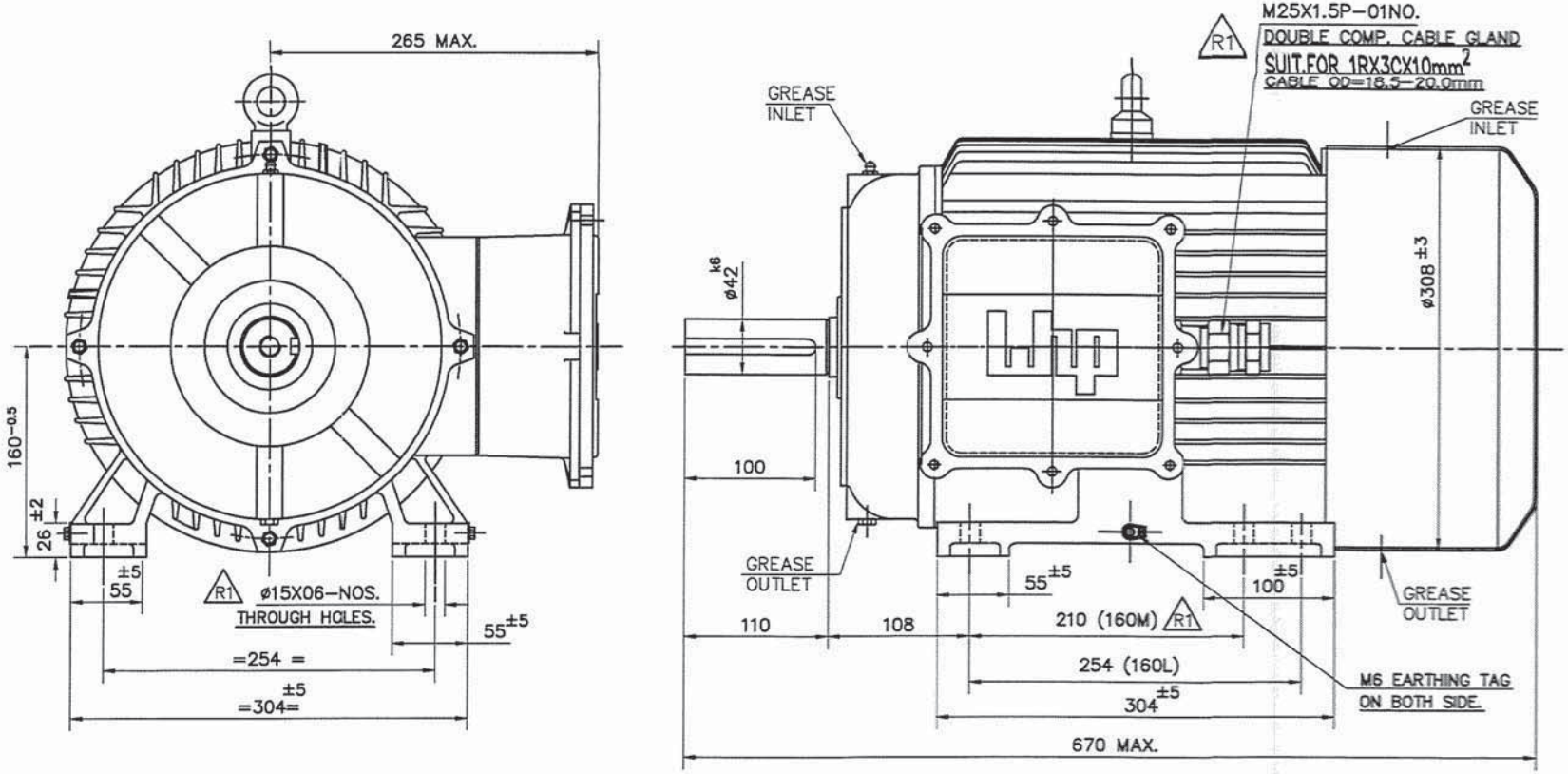
W.O. NO. : D6PP1811126 SAP NO: -

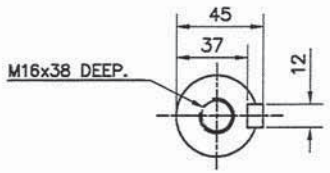
kW : 11 POLE : 4 VOLTS : 415 QTY : 1



L. R.CURRENT at 100% voltage :	750	% OF FLA	THERMAL WITHSTAND TIME(sec):	
Starting time at 100% voltage=	1	sec	AT100% RATED VOLTAGE (HOT)	10
Starting time at 80% voltage=	2	sec	AT100% RATED VOLTAGE (COLD)	22

NO	REVISION	SIGN			SIGN	DATE
2					SSG	17-12-18
1					SG	17-12-18





SHAFT END DETAIL

SPECIFICATION:-

kW/HP	11/15
POLE	4
BEARING DE SIDE	NU309
BEARING NDE SIDE	6209

R1

MATERIAL OF CONSTRUCTION:-

FRAME	CAST IRON
END COVER (DE)	CAST IRON
END COVER (NDE)	CAST IRON
T. BOX	ALUIMINIUM
T. BOX COVER	
SHAFT	CARBON STEEL

REV. NO	DETAILS OF CHANGE	DATE	INTL.
1	NU.BRG.ADDED AT DE SIDE & CABLE SIZE ADDED & FRAME SIZE 160M ADDED & GR.ARR.ADDED.	17.12.18	SAP

UNMENTIONED TOLERANCES ARE AS PER IS-2102-V ISO 2768-1									
	LINEAR DIMNS.	OVER & UPTO	0.5-3	3-6	6-30	30-120	120-400	400-1000	1000-2000
		TOLERANCE	±0.2	±0.3	±0.5	±0.8	±1.2	±2	±3
	ANGULAR DIMNS.	PERMISSIBLE DEVIATIONS FOR LENGTHS OF THE SHORTER SIDE OF THE ANGLE.							
		OVER & UPTO	0-10	10-50	50-120	120-400	400		
		TOLERANCE	±1°	±0°30'	±0°20'	±0°10'	±0°5'		

	NAME.	DATE.
DGN.		
DRN.	SAP	24.11.18
CHD.		24.11.18
APPD.		24.11.18

SCALE :- 1:1

SHRRT NO - 01 OF 01

TITLE *GENERAL ARRANGEMENT. DRG. FOR 160M/L FRAME FOOT MOUNTED MOTOR (DCCG)*

Laxmi Hydraulics Pvt.Ltd. SOLAPUR
Website : www.lhp.co.in

UNLESS OTHERWISE SPECIFIED ALL DIMNS. ARE IN MM. | DO NOT SCALE THE DRAWING.

DRG. NO. *MGAN160A0625*

ISSUE NO. 01 | REV.NO. 01

S. No.	Description		Data to be filled by successful bidder
A.	**General**		
1	Manufacturer & country of origin		LHPL INDIA
2	Motor type		SQIM
3	Type of starting		DOL
4	Name of the equipment driven by motor & Quantity		AHU FAN-27100 CFM
5	Maximum Power requirement of driven equipment		19.208 kW
6	Rated speed of Driven Equipment		859
7	Design ambient temperature		50°C
B.	**Design and Performance Data**		
1	Frame size & type designation		180L
2	Type of duty		CONTINUOUS (S1)
3	Rated Voltage		415V
4	Permissible variation for		
5	a	Voltage	±10%
6	b	Frequency	+3 to -5%
7	c)	Combined voltage & frequency	10%(ABSOLUTE)
8	Rated output at design ambient temp (by resistance method)		22 Kw
9	Synchronous speed & Rated slip		1500 & 0.021
10	Minimum permissible starting voltage		353V(85%)
11	Starting time in sec with mechanism coupled		
12	a) At rated voltage		2
13	b) At min starting voltage		3
14	Locked rotor current as percentage of FLC (including IS tolerance)		750%
15	Torque		
	a) Starting		215%
	b) Maximum		280%
16	Permissible temp rise at rated output over ambient temp & method		70°C BY RESISTANCE METHOD
17	Noise level at 1.0 m (dB		AS PER I.S.-12065
18	Amplitude of vibration		AS PER I.S.-12075
19	Rated current at rated voltage & frequency in Amp.		38.7 Amp
20	Efficiency & P.F. at rated voltage & frequency		IE3
	a) At 100% load		93.0% & 0.85
	c) At 75% load		92.1% & 0.82

S. No.	Description	Data to be filled by successful bidder
	c) At starting	N.A & 0.45
C.	**Constructional Features**	
1	Method of connection of motor driven equipment	PULLEY & V BELT
2	Applicable Standard	IS/IEC 60034-1
3	DOP of Enclosure	I.P.-55
4	Method of cooling	TEFC
5	Class of insulation	F CLASS TEMP RISE LIMITED TO CLASS B
6	Main terminal box	
	a) Type	IP:55
	b) Power Cable details (Conductor, size, armour/unarmour)	3CX25 SQ.mm
	c) Cable Gland & lugs details (Size, type & material)	SUITABLE FOR CABLE SIZE
	d) Permissible Fault level (kArms & duration in sec)	50KA FOR 0.25 SEC with HRC Fuse
7	Space heater details (Voltage & watts)	NA
8	Flame proof motor details (if applicable)	
	a) Enclosure	NA
	b) suitability for hazardous area	
	i Zone	N.A.
	ii Group	N.A.
9	No. of Stator winding	6 LEAD
10	Winding connection	DELTA
11	Kind of rotor winding	SQIM
12	Kind of bearings	ROLLER / BALL @DE / NDE
13	Direction of rotation when viewed from NDE	BIDIRECTIONAL
14	Paint Shade & type	RAL 7032
15	Net weight of motor	231 KG APPROX
16	Outline mounting drawing No (To be enclosed as annexure)	ENCLOSED
D.	**Characteristic curves/ drawings** (To be enclosed for motors of rating 1.5KW)	
	a) Torque speed characteristic	ENCLOSED
	b) Thermal withstand characteristic	ENCLOSED
	c) Current vs time	ENCLOSED
	d) Speed vs time	ENCLOSED

NOTE : 1. ALL PERFORMANCE FIGURES ARE SUBJECT TO IEC 60034-1 TOLERANCES.

MKTG Ref No.: D6PP18111	LAXMI HYDRAULICS PVT LTD. , B-11- MIDC CHINCHOLI , SOLAPUR.	LHP MOTORS DRIVES Driven by Commitment

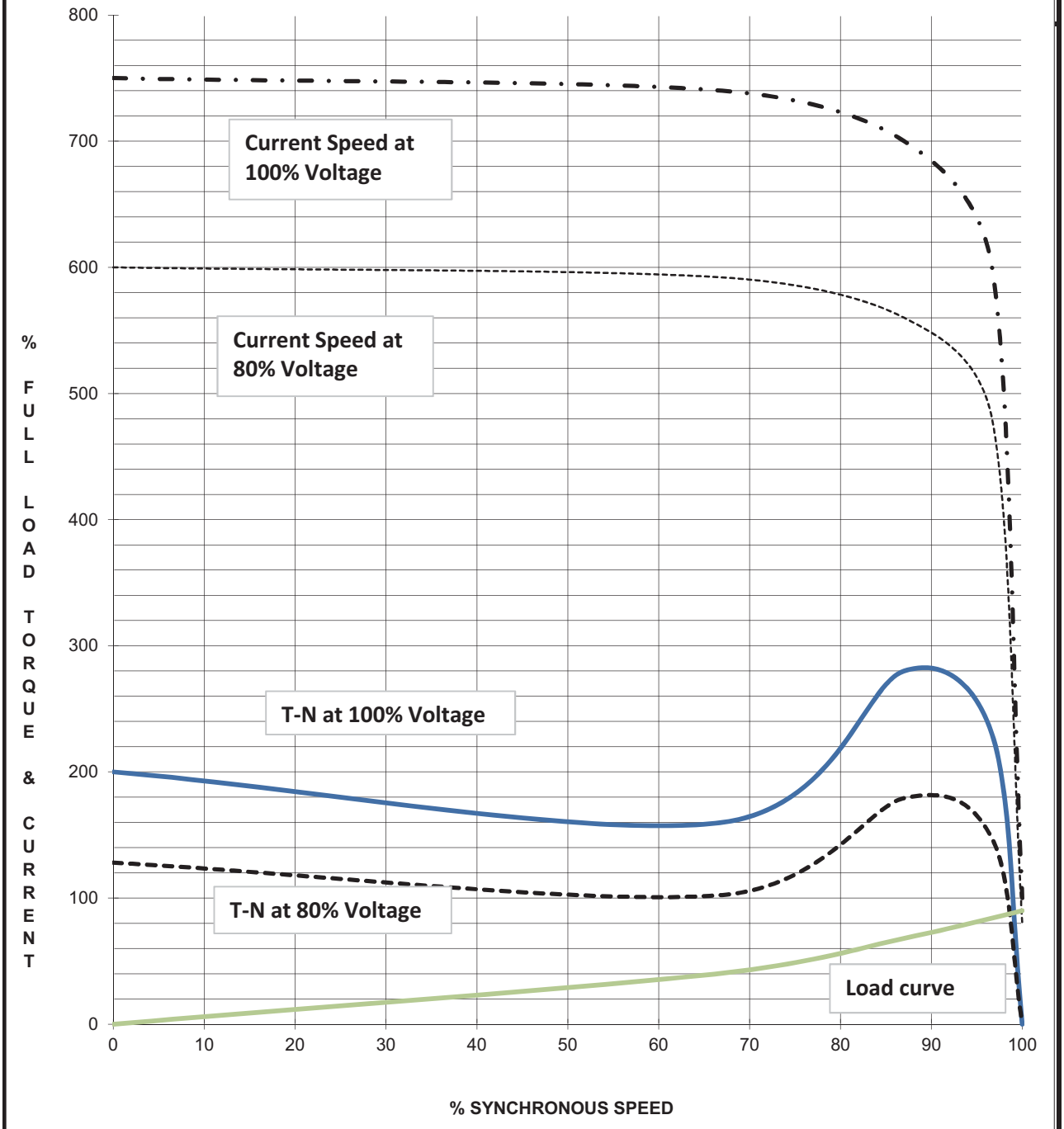
SPEED Vs T0RQUE & CURRENT CHARACTERISTICS

CUSTOMER :

W.O. NO.: D6PP1811126 SAP NO: -

kW : 22 POLE : 4 VOLTS : 415 QTY : 1

IE-3



NO	REVISION	SIGN		SIGN	DATE
2				SSG	17-12-18
1				SG	17-12-18

MKTG Ref No.: D6PP1811126	LAXMI HYDRAULICS PVT LTD. , B-11- MIDC CHINCHOLI , SOLAPUR.	LHP MOTORS DRIVES Driven by Commitment

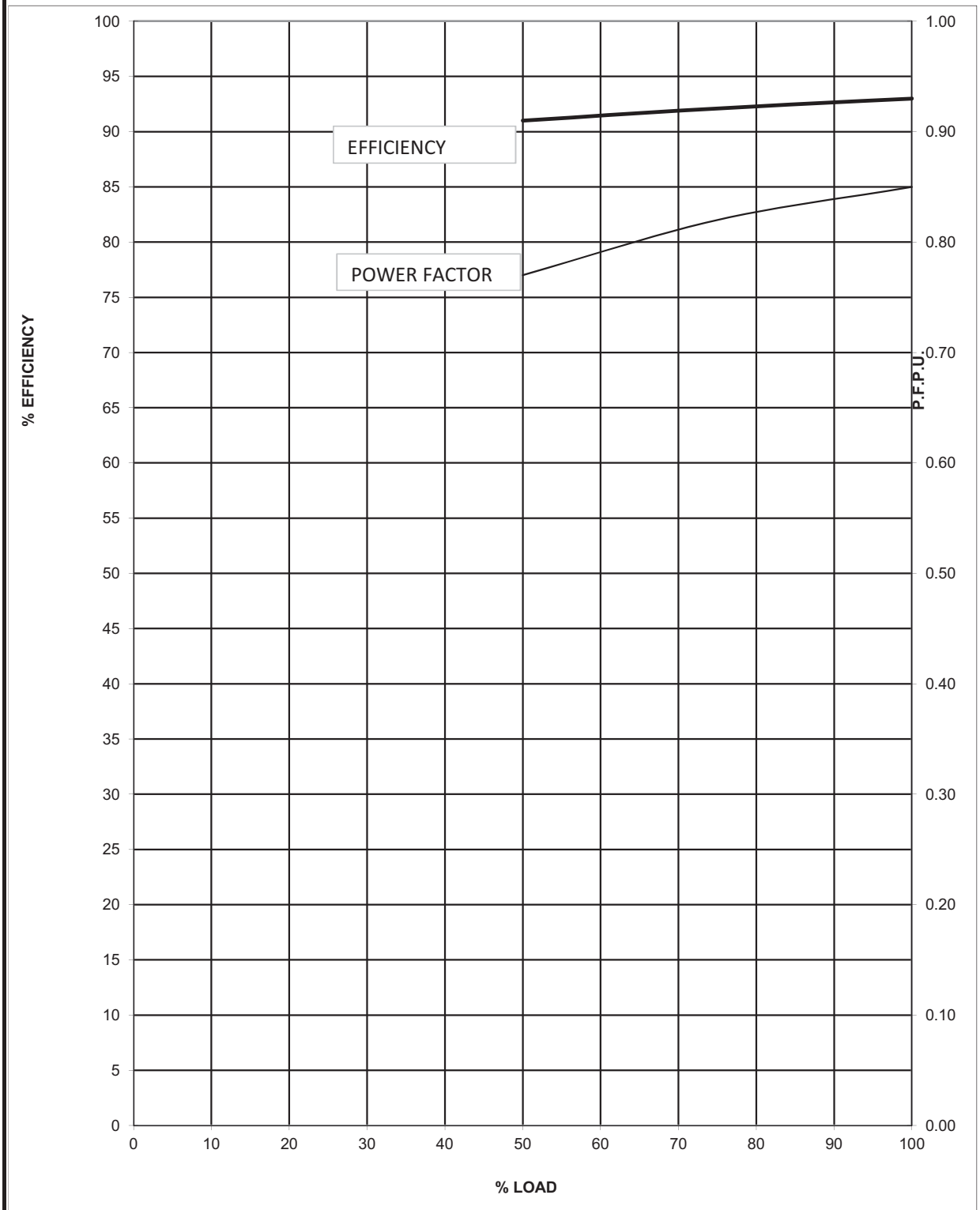
LOAD Vs EFF., P.F.,

CUSTOMER :

W.O. NO. D6PP1811126 SAP NO: -

IE-3

kW : 22 POLE : 4 VOLTS : 415 QTY : 1



NO	REVISION	SIGN			DATE
2			PREP	SSG	17-12-18
1			APPD	SG	17-12-18

MKTG Ref No.: D6PP1811126	LAXMI HYDRAULICS PVT LTD. , B-11- MIDC CHINCHOLI , SOLAPUR.	

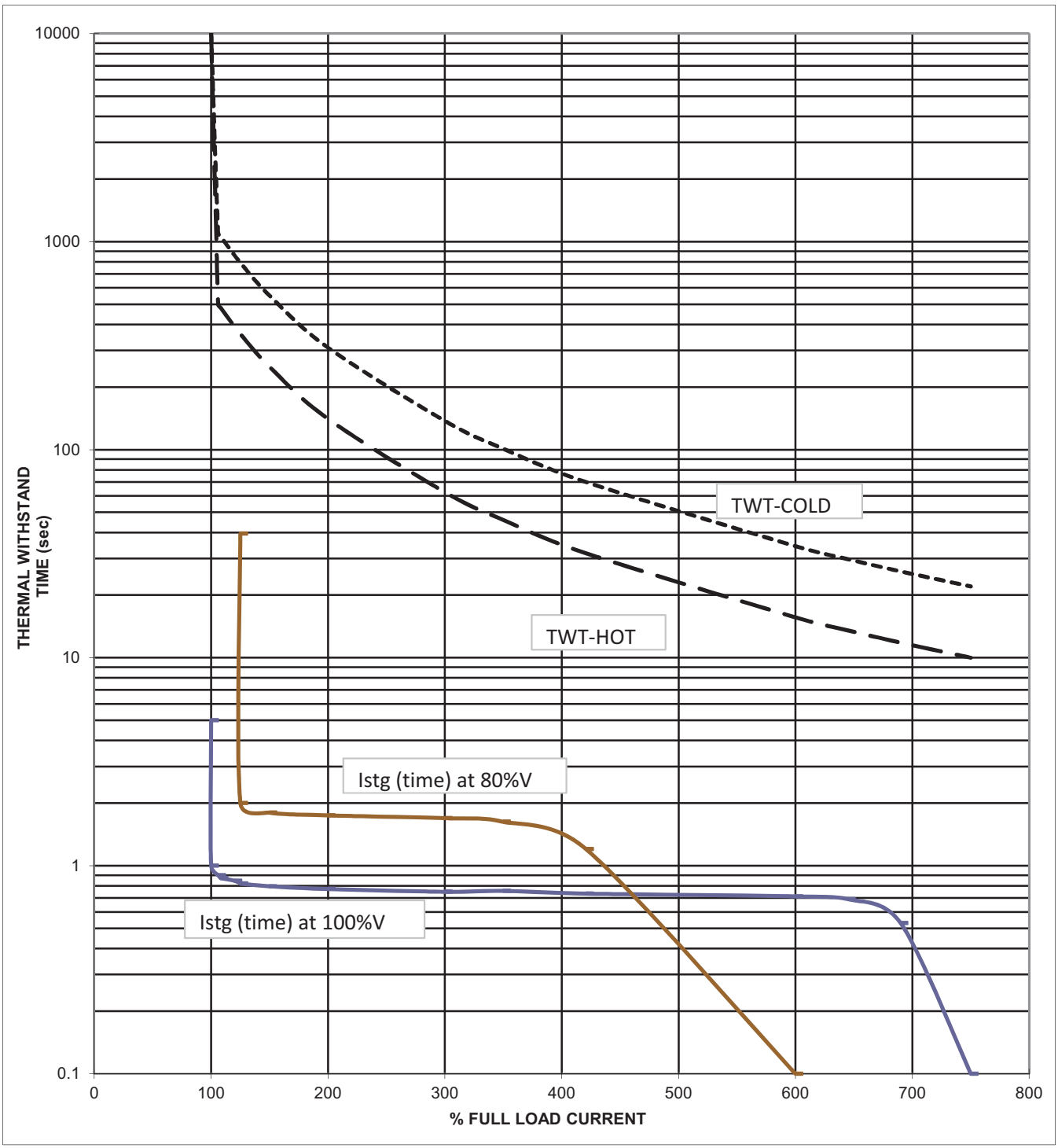
STARTING CURRENT VS STARTING TIME AND THERMAL WITHSTAND TIME.

CUSTOMER :

IE-3

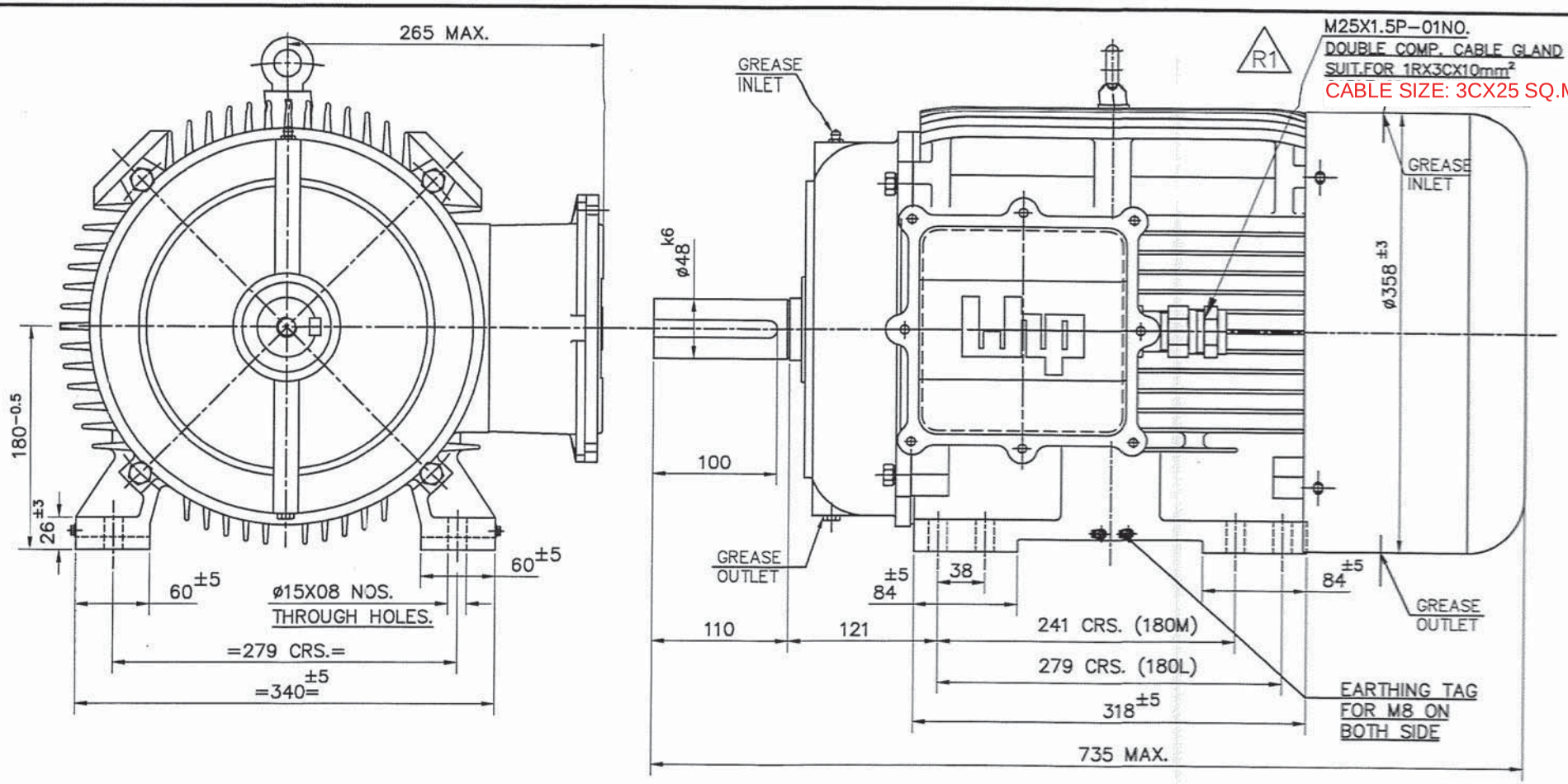
W.O. NO. : D6PP1811126 SAP NO: -

kW : 22 POLE : 4 VOLTS : 415 QTY : 1



L. R.CURRENT at 100% voltage :	750	% OF FLA	THERMAL WITHSTAND TIME(sec):	
Starting time at 100% voltage=	1	sec	AT100% RATED VOLTAGE (HOT)	10
Starting time at 80% voltage=	2	sec	AT100% RATED VOLTAGE (COLD)	22

NO	REVISION	SIGN			SIGN	DATE
2					TAS	17-12-18
1					DDG	17-12-18



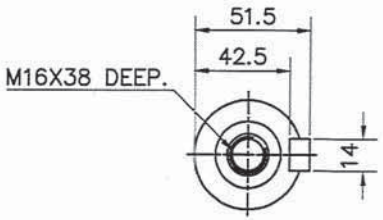
SPECIFICATION:-

kW/HP	22/30
POLE	4
BEARING DE SIDE	NU310
BEARING NDE SIDE	6210

R1

MATERIAL OF CONSTRUCTION:-

FRAME	CAST IRON
END COVER (DE)	CAST IRON
END COVER (NDE)	CAST IRON
T. BOX	ALUMINIUM
T. BOX COVER	
SHAFT	CARBON STEEL



SHAFT END DETAILS

REV. NO	DETAILS OF CHANGE	DATE	INTL.
1	NU.BRG.ADDED AT DE SIDE & CABLE SIZE ADDED & GR.ARR.ADDED	17.12.18	SAP

UNMENTIONED TOLERANCES ARE AS PER IS:2102-V ISO 2768-1

LINEAR DIMNS.	OVER & UPTO	0.5–3	3–6	6–30	30–120	120–400	400–1000	1000–2500
	TOLERANCE	±0.2	±0.3	±0.5	±0.8	±1.2	±2	±3
ANGULAR DIMNS.	PERMISSIBLE DEVIATIONS FOR LENGTHS OF THE SHORTER SIDE OF THE ANGLE							
	OVER & UPTO	0–10	10–50	50–120	120–400	400–		
	TOLERANCE	±1°	±0°30'	±0°20'	±0°10'	±0°5'		

	NAME.	DATE.
DGN.		
DRN.	SAP	24.11.18
CHD.		24.11.18
APPD.		24.11.18

TITLE

GENERAL ARRANGEMENT. DRG. FOR 180M/L FRAME FOOT MOUNTED MOTOR(DCCG)

Laxmi Hydraulics Pvt.Ltd. SOLAPUR
Website : www.lhp.co.in

UNLESS OTHERWISE SPECIFIED ALL DIMNS. ARE IN MM. DO NOT SCALE THE DRAWING.

SCALE :–
SHEET:- 01 OF 01
DRG. NO. MGAN180A0348
ISSUE NO. 01 REV.NO. 01

S. No.	Description	Data to be filled by successful bidder
A.	**General**	
1	Manufacturer & country of origin	LHPL INDIA
2	Motor type	SQIM
3	Type of starting	DOL
4	Name of the equipment driven by motor & Quantity	AHU FAN -31700 CFM
5	Maximum Power requirement of driven equipment	22.26kW
6	Rated speed of Driven Equipment	884
7	Design ambient temperature	50°C
B.	**Design and Performance Data**	
1	Frame size & type designation	200L
2	Type of duty	CONTINUOUS (S1)
3	Rated Voltage	415V
4	Permissible variation for	
5	a Voltage	±10%
6	b Frequency	+3 to -5%
7	c) Combined voltage & frequency	10%(ABSOLUTE)
8	Rated output at design ambient temp (by resistance method)	30 Kw
9	Synchronous speed & Rated slip	1500 & 0.023
10	Minimum permissible starting voltage	353V(85%)
11	Starting time in sec with mechanism coupled	
12	a) At rated voltage	2
13	b) At min starting voltage	3
14	Locked rotor current as percentage of FLC (including IS tolerance)	750%
15	Torque	
	a) Starting	235%
	b) Maximum	300%
16	Permissible temp rise at rated output over ambient temp & method	70°C BY RESISTANCE METHOD
17	Noise level at 1.0 m (dB	AS PER I.S.-12065
18	Amplitude of vibration	AS PER I.S.-12075
19	Rated current at rated voltage & frequency in Amp.	52.5 Amp
20	Efficiency & P.F. at rated voltage & frequency	IE3
	a) At 100% load	93.6% & 0.85
	c) At 75% load	92.8% & 0.78

S. No.	Description	Data to be filled by successful bidder
	c) At starting	N.A & 0.5
C.	**Constructional Features**	
1	Method of connection of motor driven equipment	PULLEY & V BELT
2	Applicable Standard	IS/IEC 60034-1
3	DOP of Enclosure	I.P.-55
4	Method of cooling	TEFC
5	Class of insulation	F CLASS TEMP RISE LIMITED TO CLASS B
6	Main terminal box	
	a) Type	IP:55
	b) Power Cable details (Conductor, size, armour/unarmour)	3CX50 SQ.MM, AL, ARMOURED
	c) Cable Gland & lugs details (Size, type & material)	SUITABLE FOR ABOVE CABLE SIZE
	d) Permissible Fault level (kArms & duration in sec)	50KA FOR 0.25 SEC with HRC Fuse
7	Space heater details (Voltage & watts)	240V-50W
8	Flame proof motor details (if applicable)	
	a) Enclosure	NA
	b) suitability for hazardous area	
	i Zone	N.A.
	ii Group	N.A.
9	No. of Stator winding	6 LEAD
10	Winding connection	DELTA
11	Kind of rotor winding	SQIM
12	Kind of bearings	ROLLER / BALL @BE / NDE
13	Direction of rotation when viewed from NDE	BIDIRECTIONAL
14	Paint Shade & type	RAL 7032
15	Net weight of motor	275 KG
16	Outline mounting drawing No (To be enclosed as annexure)	ENCLOSED
D.	**Characteristic curves/ drawings** (To be enclosed for motors of rating 1.5KW)	
	a) Torque speed characteristic	ENCLOSED
	b) Thermal withstand characteristic	ENCLOSED
	c) Current vs time	ENCLOSED
	d) Speed vs time	ENCLOSED

NOTE : 1. ALL PERFORMANCE FIGURES ARE SUBJECT TO IEC 60034-1 TOLERANCES.

MKTG Ref No.: D6PP18111	LAXMI HYDRAULICS PVT LTD. , B-11- MIDC CHINCHOLI , SOLAPUR.	

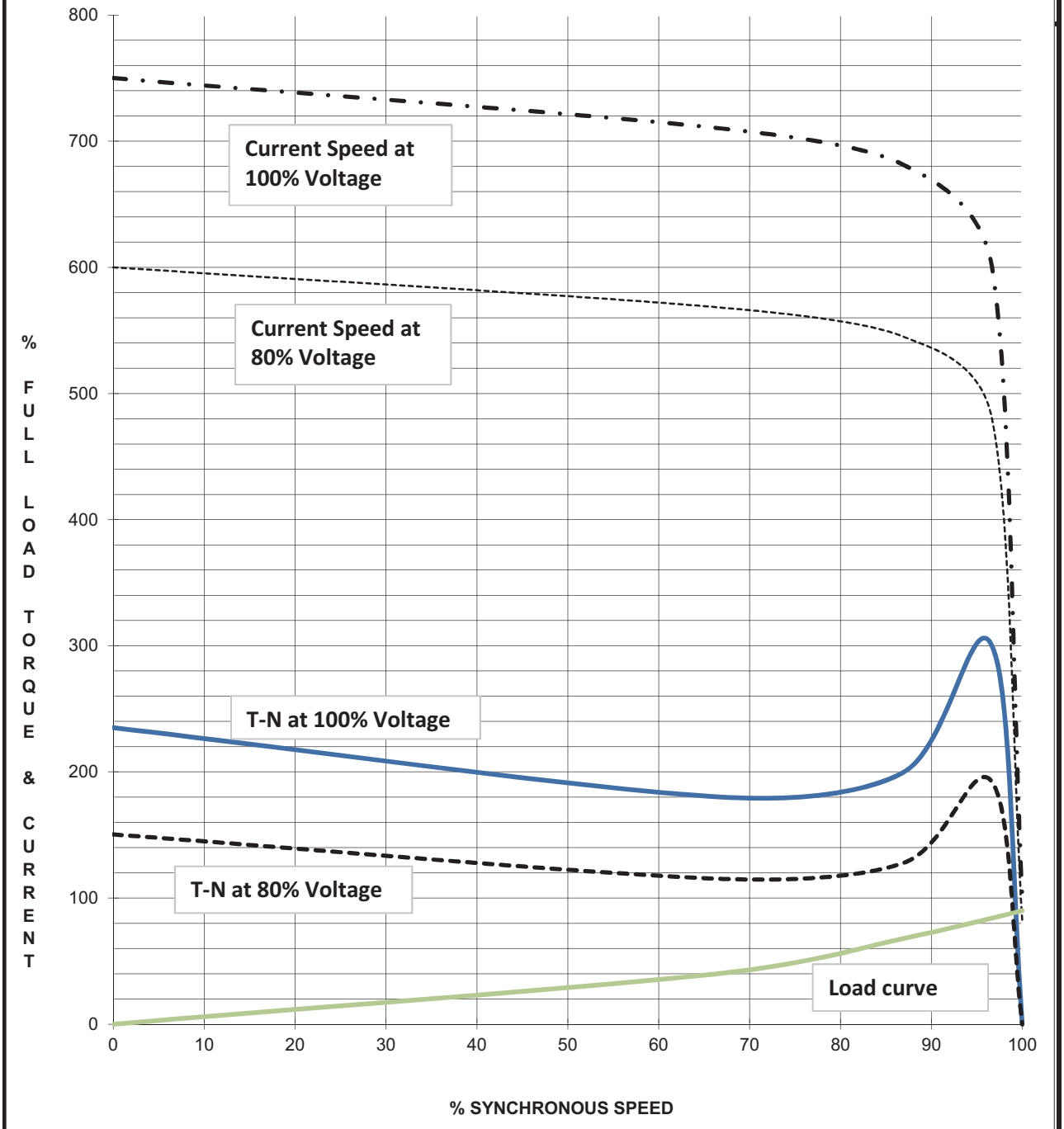
SPEED Vs T0RQUE & CURRENT CHARACTERISTICS

CUSTOMER :

W.O. NO.: D6PP1811126 SAP NO: -

kW : 30 POLE : 4 VOLTS : 415 QTY : 1

IE-3



NO	REVISION	SIGN		SIGN	DATE
2				SSG	17-12-18
1				SG	17-12-18

MKTG Ref No.: D6PP1811126	LAXMI HYDRAULICS PVT LTD. , B-11- MIDC CHINCHOLI , SOLAPUR.	MOTORS DRIVES Driven by Commitment

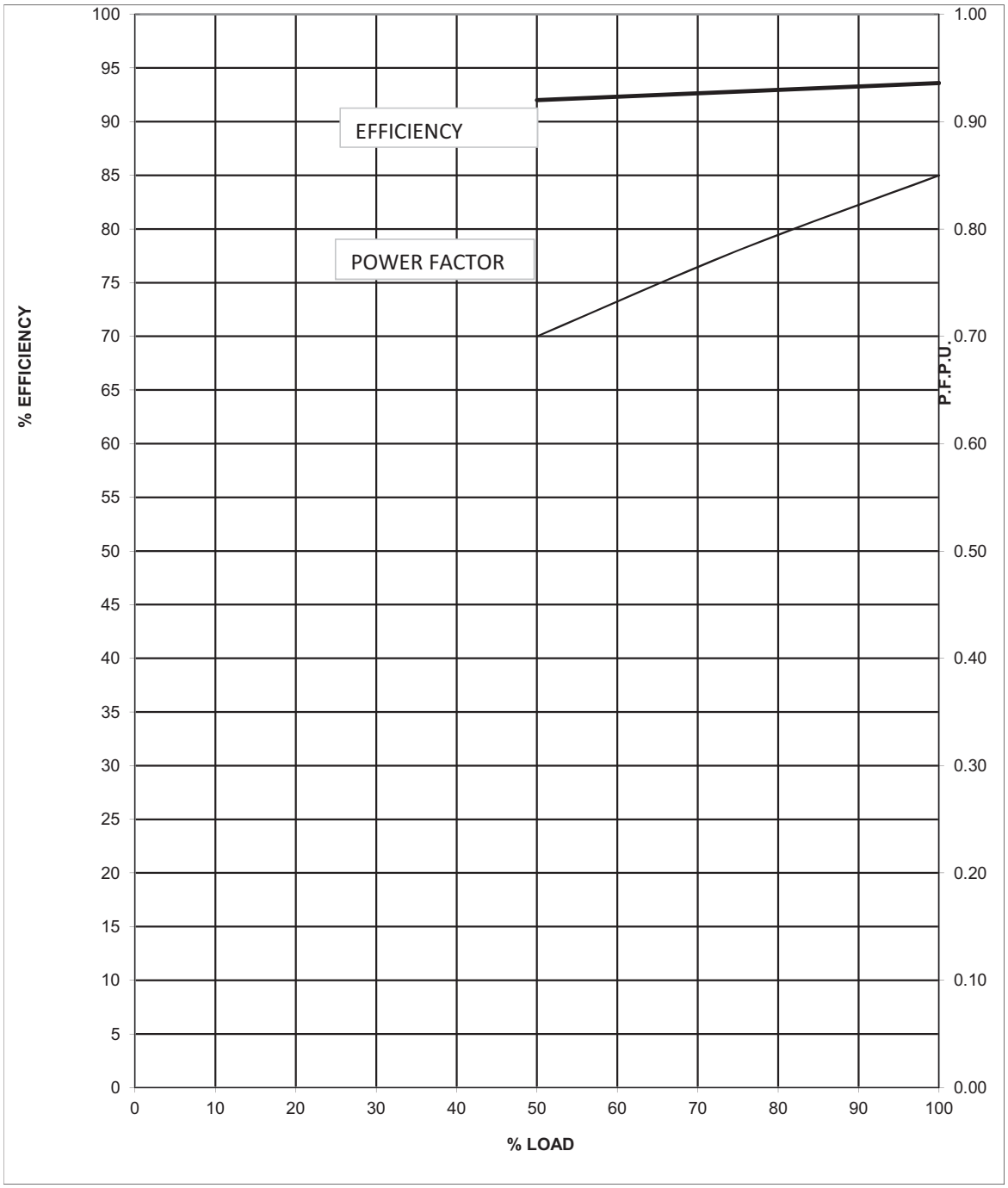
LOAD Vs EFF., P.F.,

CUSTOMER :

W.O. NO. D6PP1811126 SAP NO: -

kW : 30 POLE : 4 VOLTS : 415 QTY :

IE-3



NO	REVISION	SIGN			DATE
2			PREP	SSG	17-12-18
1			APPD	SG	17-12-18

MKTG Ref No.: D6PP1811126	LAXMI HYDRAULICS PVT LTD. , B-11- MIDC CHINCHOLI , SOLAPUR.	

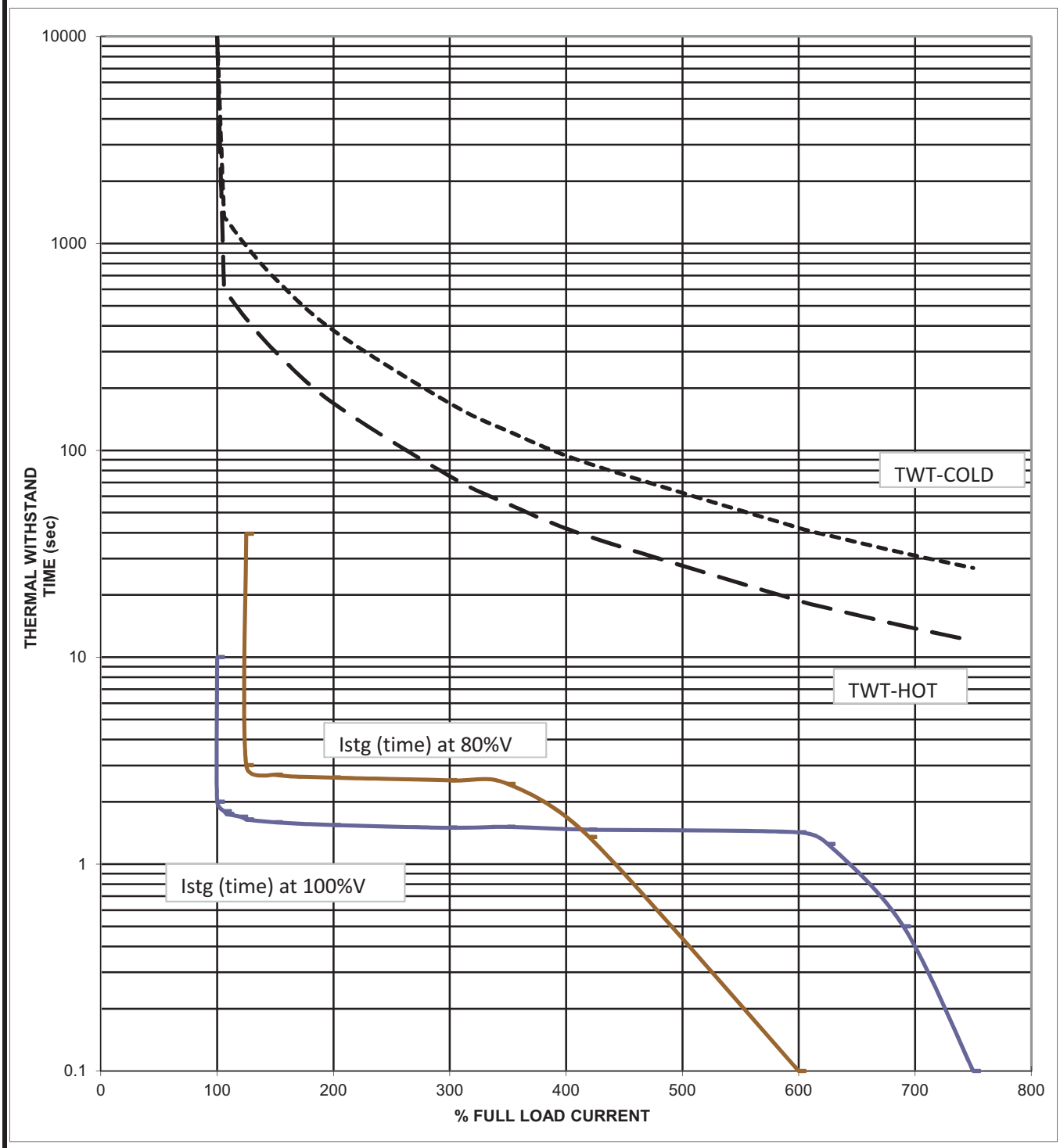
STARTING CURRENT VS STARTING TIME AND THERMAL WITHSTAND TIME.

CUSTOMER :

IE-3

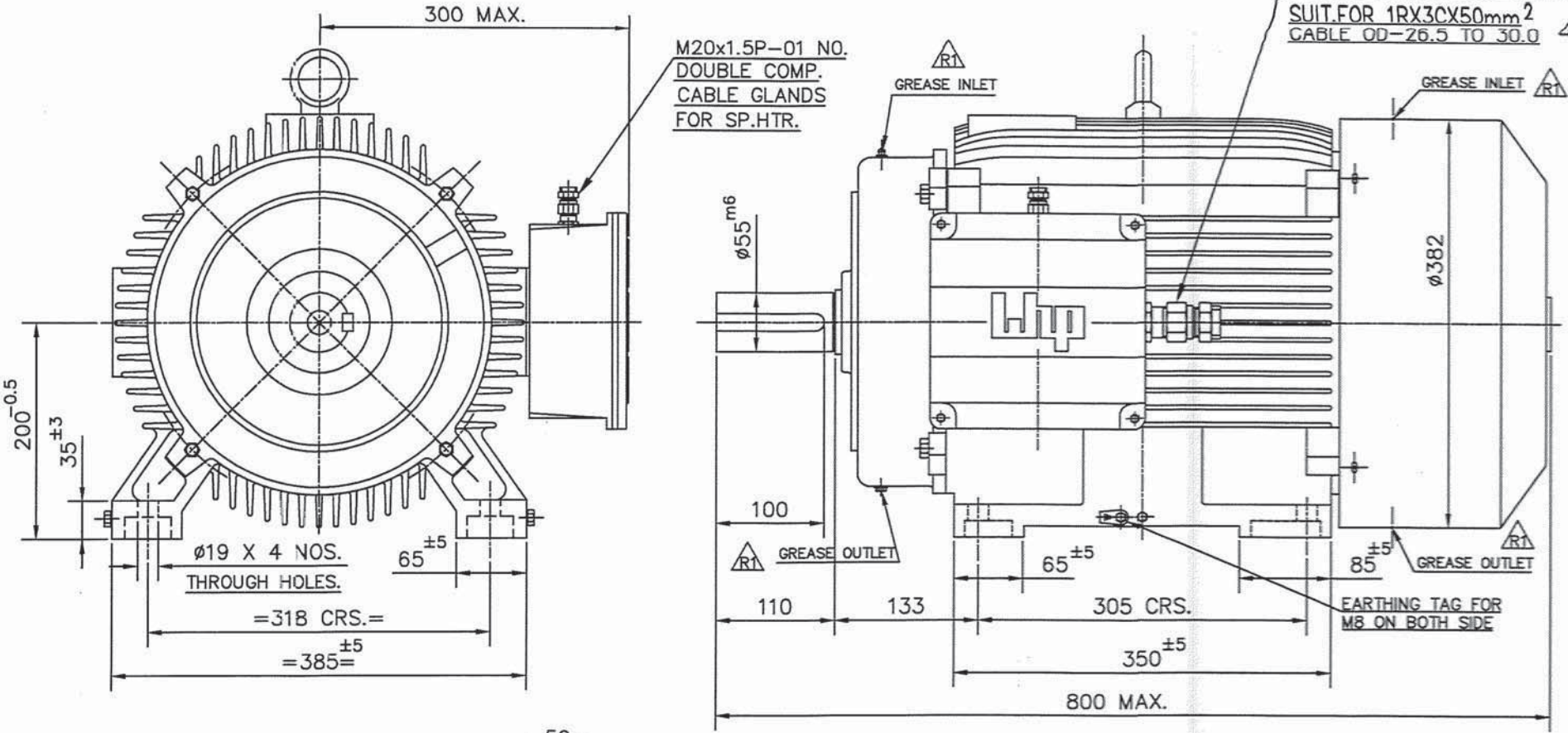
W.O. NO. : D6PP1811126 SAP NO: -

kW : 30 POLE : 4 VOLTS : 415 QTY : 1



L. R.CURRENT at 100% voltage :	750	% OF FLA	THERMAL WITHSTAND TIME(sec):	
Starting time at 100% voltage=	2	sec	AT100% RATED VOLTAGE (HOT)	12
Starting time at 80% voltage=	3	sec	AT100% RATED VOLTAGE (COLD)	27

NO	REVISION	SIGN			SIGN	DATE
2					SSG	17-12-18
1					SG	17-12-18



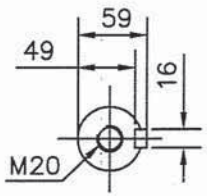
BEARING DETAILS

KW/HP	30/40
POLE	4
BEARING DE SIDE	NU312
BEARING NDE SIDE	6312

R1

MATERIAL OF CONSTRUCTION:-

FRAME	CAST IRON
END COVER (DE)	CAST IRON
END COVER (NDE)	CAST IRON
T. BOX	CAST IRON
T. BOX COVER	CAST IRON
SHAFT	CARBON STEEL



SHAFT END DETAILS

REV. NO	DETAILS OF CHANGE	DATE	INTL.
2			
1	1) CABLE SIZE & OD ADDED. 2) DE SIDE NU BRG.ADDED.	15.12.18	SVK

UNMENTIONED TOLERANCES ARE AS PER IS:2102-1/ ISO 2768-1									
LINEAR DIMS.	OVER & UPTO	0.5–3	3–6	6–30	30–120	120–400	400–1000	1000–2000	
	TOLERANCE	±0.2	±0.3	±0.5	±0.8	±1.2	±2	±3	
ANGULAR DIMS.	PERMISSIBLE DEVIATIONS FOR LENGTHS OF THE SHORTER SIDE OF THE ANGLE.								
	OVER & UPTO	0–10	10–50	50–120	120–400	400–			
	TOLERANCE	±1°	±0°30'	±0°20'	±0°10'	±0°5'			

	NAME.	DATE.
DGN.		
DRN.	KENDE	24.11.18
CHD.		24.11.18
APPD.		24.11.18

TITLE *GENERAL ARRANGEMENT. DRG. FOR 200L FR. FOOT MOUNTED (B3) RHTB MOTOR (WITH SP.HTR.,DE SIDE NU BRG.& DCCG)*

Laxmi Hydraulics Pvt.Ltd. SOLAPUR
Website : www.lhp.co.in

UNLESS OTHERWISE SPECIFIED ALL DIMNS. ARE IN MM. DO NOT SCALE THE DRAWING.

SCALE :—1:1
SHEET NO:- 01 OF 01
DRG. NO. MGAN200A0345
ISSUE NO. 01 REV.NO. 01

\\Ppk\d\LHPL DRAWING FILES\DRGS 3\G.A.DWG\MGAN\200\B3\MGAN200A0345.dwg

TDS OF MOTOR FOR PUMPS

CG Power and Industrial Solutions Limited

LT Motors Division
Ahmednagar

CUSTOMER : TANGEDCO Project: 2X660 MW ENNORE TPS

MOTOR DATA SHEET (BHEL)

SrNo	Particulars	VALUE
1	Application	CONDENSER WATER PUMP, ESP BUILDING
2	Quantity	2 + 2
3	Make	**CG Power and Industrial Solutions Limited**
4	Frame Size	NG132S
5	Application Standards	IS/IEC 60034,
6	Type of Motor	3 PHASE AC SQUIRREL CAGE INDUCTION MOTOR IE3
7	Service	CONTINUOUS
8	Harzardous Area Classification if any	TEFC Safe Area
9	Duty Cycle/Designation	S1
10	Rated Output at 40 deg Ambient kW	5.98
11	Rated Output at 50 deg Ambient kW	5.50
12	Rates Speed (RPM)	1450
13	Rated Voltage & % Variation	415/+-10% (Combined V&F variation +/-10%)
14	Rated Frequency & % Variation	50/+3-5%
15	Full Load Current (A)	11
16	No load current (Approx.) (A)	5.0/5.7
17	Rated Power Factor	0.78
18	Efficiency at rated voltage and frequency : %	
19	Full Load	89.6
20	3/4 Load	89.6
21	1/2 Load	87.4
22	Method of starting	Direct On Line
23	Starting current at rated Voltage (% of FLC)	600
24	Starting Torque at rated voltage	225
25	Pull out Torque at rated Voltage	275
26	Starting time at 80% 100% for fans motors and 90% 100% for mill motors : sec	
27	With Load	0.11372690982072 / 0.0857676867122541
28	Without Load	less than 2 seconds.
29	Safe Stall time at 110% rated voltage	
30	HOT Condition	7
31	COLD Condition	13
32	Safe stall time at 100% / 80% rated V for fans	
33	HOT	8/12.5
34	COLD	16/25
35	Thermal Time Constant	
36	Heating	30
37	Cooling	60
38	Starts	
39	Equally spread/Hour	4 for load GD2 = motor GD2
40	Successive cold	3 for load gd2=motor gd2
41	Successive hot	2 for load gd2=motor gd2
42	Noise level	As Per IS:12065
43	Vibration level	As per IS:12075
44	Degree of protection of enclosure	IP55
45	Method of cooling	FAN COOLED (IC 0141)
46	Insulation class	F (Temp. rise limited to class 'B')
47	Temperature rise over 50 deg ambient (by resistance)	70
48	Tropicalised	NO
49	Winding connection	Delta
50	Bearing	6208ZZ-C3/6305ZZ-C
51	Make	SKF / FAG / NTN / EQUIVALENT
52	Type DE/NDE	BALL/BALL
53	Recommended lubricant	Greased for life
54	Motor Terminal Box	
55	Type, phase segregated	CAST IRON, NON PHASE SEGREGATED
56	Location as seen from DE	RHS From DE
57	Fault withstand	
58	Current	50 kA
59	Time	0.25 second

CG Power and Industrial Solutions Limited

LT Motors Division
Ahmednagar

CUSTOMER : TANGENCO

Project: 2X660 MW ENNORE TPS

MOTOR DATA SHEET (BHEL)

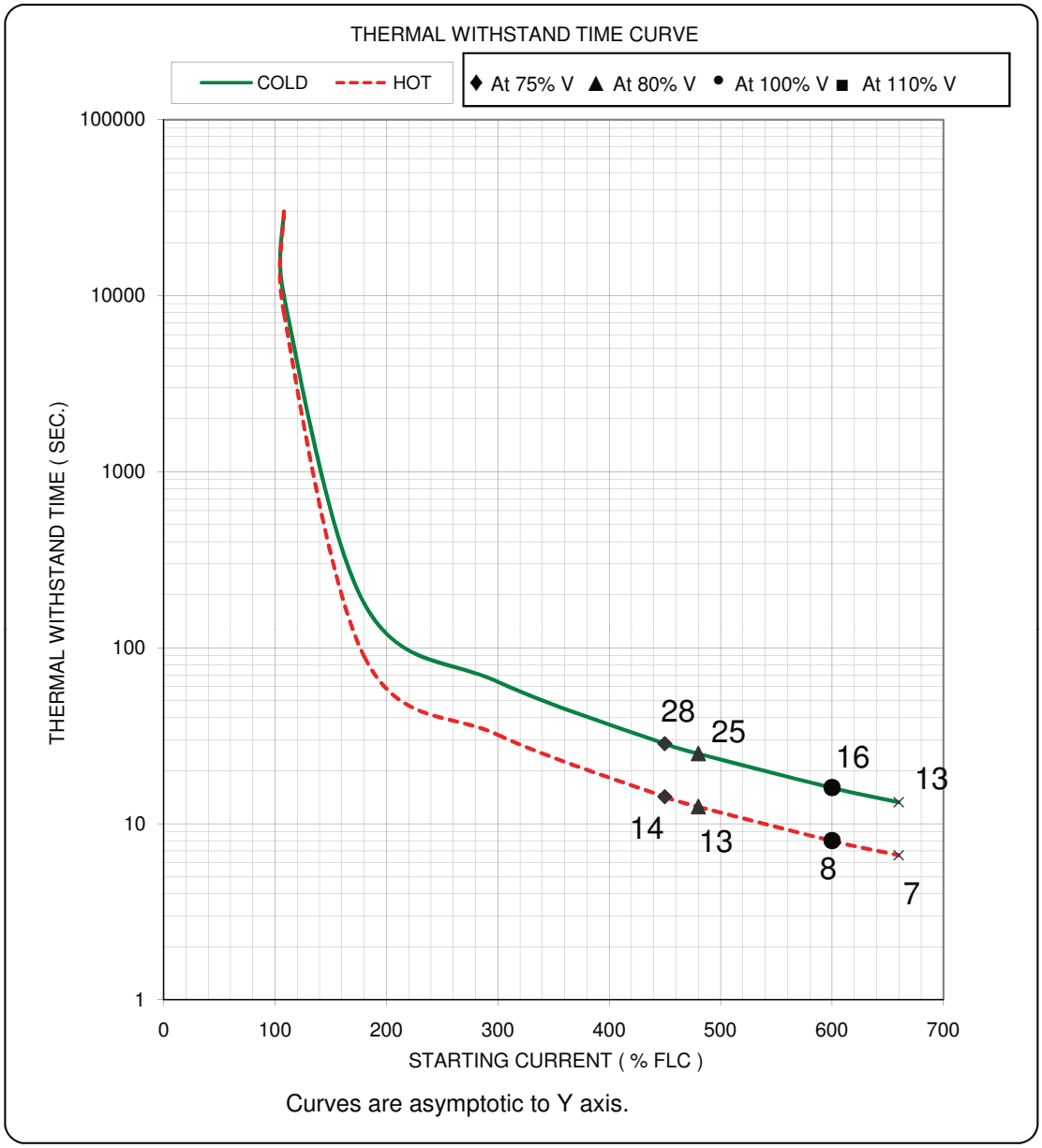
SrNo	Particulars	VALUE
60	Cable lugs and Glands furnished	Cable Gla d & L g S iable f Cable i e
61	Type and Range/size of cable	1 * 3C,10-MM²
62	Space Heaters	
63	No. x Watt(Total)	N.A
64	Volts, Phase, Frequency	240V,1PH, 50 HZ
65	Separate terminal box	AS PER TB DRAWING
66	Winding Temperature Detector	NO
67	Type	N.A.
68	Nos. and locations where provided	N.A.
69	Resistance at 0°	N.A.
70	Bearing Temperature Indicator	NO
71	Type	N.A.
72	Nos. furnished	N.A.
73	Resistance at 0°	N.A.
74	Temperature Indicators	NOT APPLICABLE
75	Type	--
76	No provided	--
77	Locations	--
78	Temperature Alarm Contacts	NOT APPLICABLE
79	Nos. provided	--
80	Locations	--
81	Contact Rating	--
82	Flow Switch	NOT APPLICABLE
83	Nos. provided	--
84	Locations	--
85	Contact Rating	--
86	Current Transformer for Differential Protection	NOT APPLICABLE
87	Nos. provided	--
88	Locations	--
89	Contact Rating	--
90	Accessory Terminal Box	
91	Nos. provided	AS PER TB DRAWING
92	Cable Glands/lugs furnished	Onldy DCG in CG scope
93	Type and Range/size of cable	AS PER TB DRAWING
94	Number of grounding pads provided	
95	On Motor Body	2
96	On Terminal Box	1
97	Type of Mounting	B3
98	Overall Dimensions	AS PER GENERAL ARRANGEMENT DRAWING
99	Moment of Inertia GD2 IN KG-M2	
100	Driven Equipment	0.13
101	Rotor	0.13
102	Total	0.26
103	Weight kg	
104	Stator with winding kg	47
105	Rotor(with winding) kg	23
106	Total kg	78

NOTEs:

All performance data is subject to tolerance as per IEC 60034
All performance shall be measured on sinusoidal supply
Temp rise test shall be carried at rated kW & voltage for 1 hour other than S1 duty

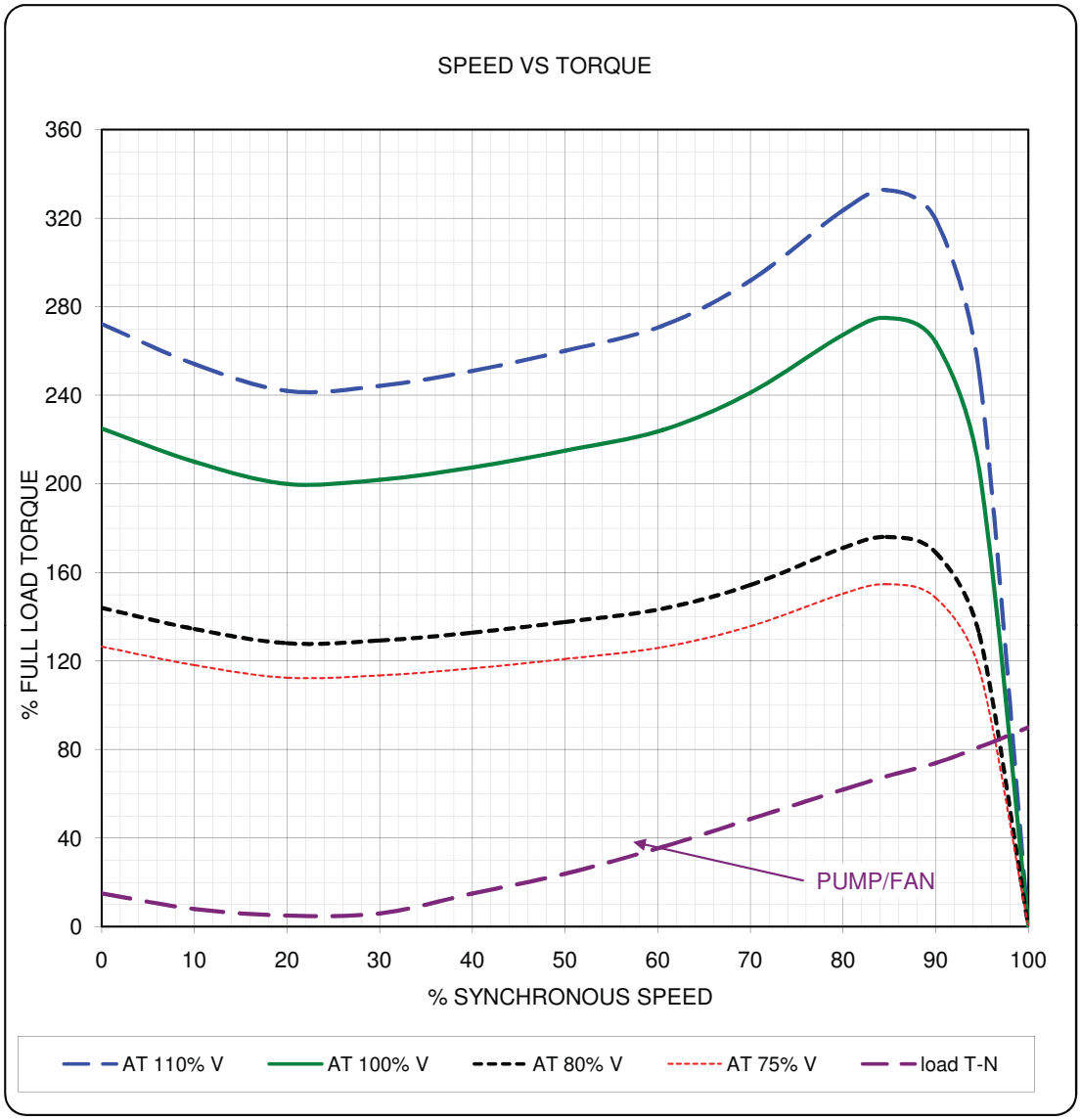
Customer specific paint shade and paint thickness will not be applicable on powder coated components.

ISSUED BY :	Md Shuaib Timmapure
	LT MOTORS DIVISION ,
	A-6/2 MIDC , AHMEDNAGAR



CUSTOMER	TANGENCO			RATED O/P kW	5.5
P.O.NO				NO OF POLES	4
IND.NO:	NMCI811287/300			FRAME	NG132S
CLIENT:	TANGENCO			TAG NO.	0
PROJECT:	2 X 660 MW ENNORE TPS				
	NAME	DATE	TITLE		
DRN	PLP	6-Dec-18	THERMAL WITHSTAND TIME CURVE		
CHD	PLP	6-Dec-18			
APPROVED	RGV	6-Dec-18	SC8/16/600		

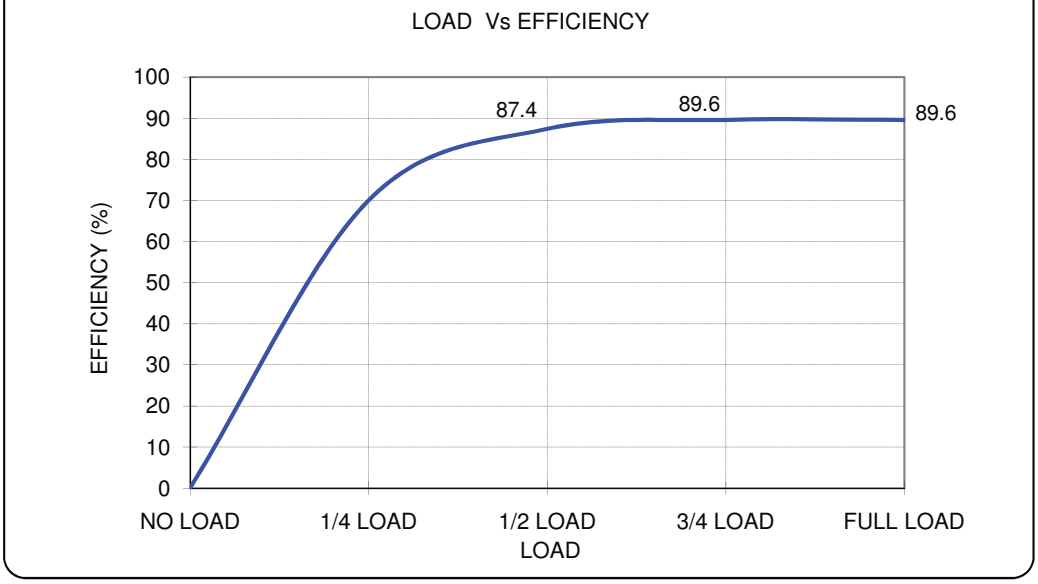
CG Power and Industrial Solutions Limited
LT Motors Division
Ahmednagar

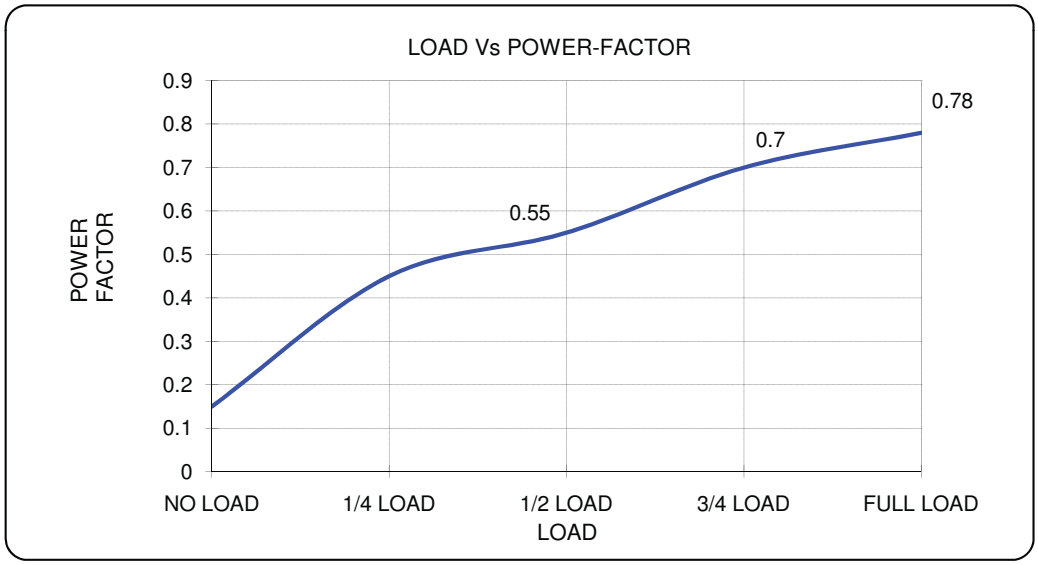


CUSTOMER	TANGENCO	RATED O/P kW	5.5
P.O.NO		NO OF POLES	4
IND.NO:	NMCI811287/300	FRAME	NG132S
CLIENT:	TANGENCO	TAG NO.	0
PROJECT:	2 X 660 MW ENNORE TPS		

	NAME	DATE	TITLE
DRN	PLP	6-Dec-18	SUPERIMPOSED TORQUE SPEED CURVE
CHD	PLP	6-Dec-18	
APPROVED	RGV	6-Dec-18	SC225/600

CG Power and Industrial Solutions Limited
LT Motors Division
Ahmednagar

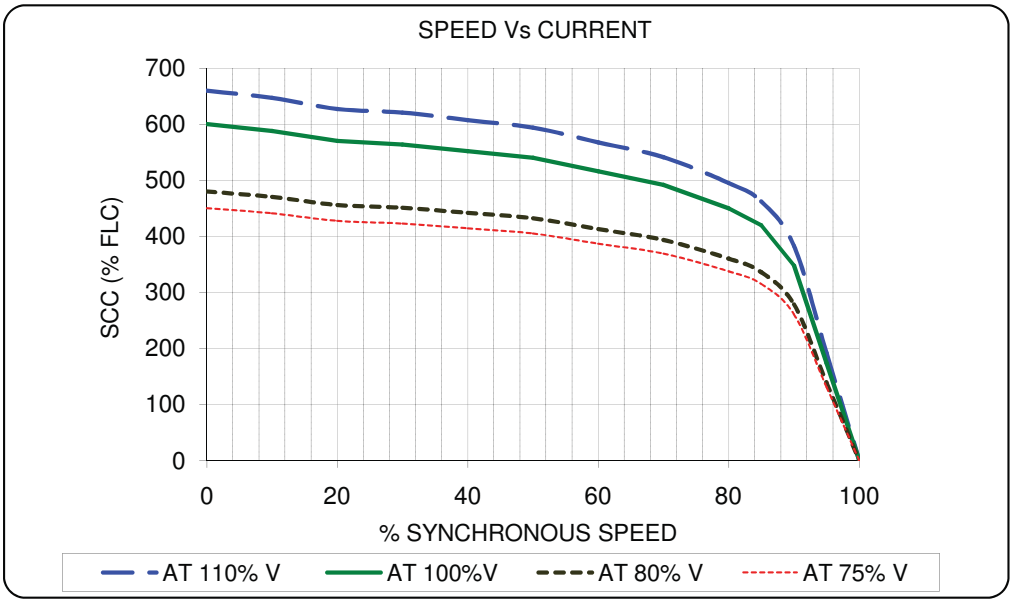


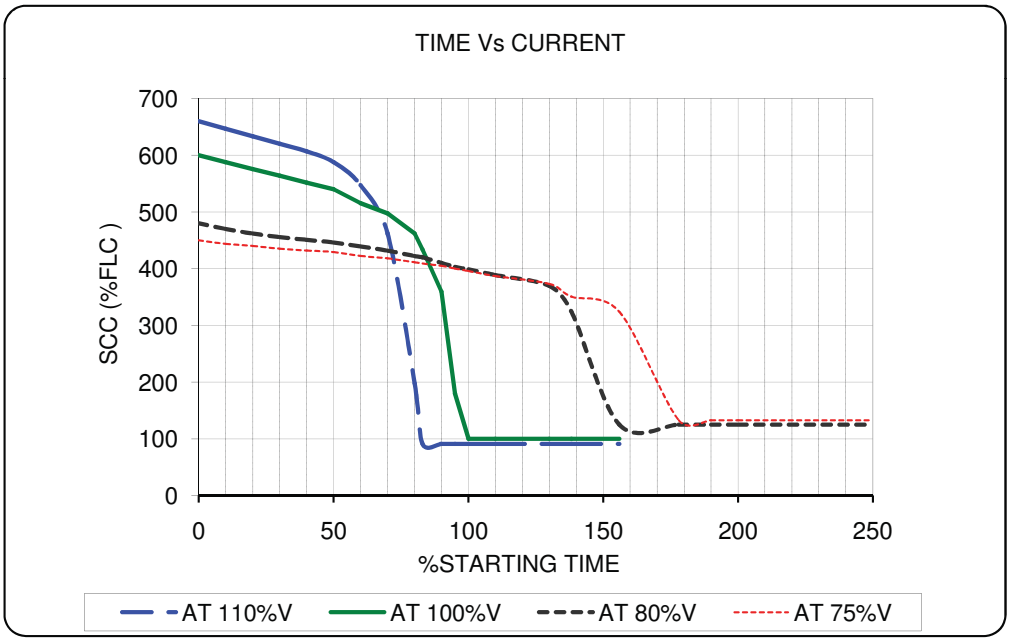


CUSTOMER.	TANGENCO	RATED O/P kW	5.5
P.O.NO		NO OF POLES	4
IND.NO:	NMCI811287/300	FRAME	NG132S
CLIENT:	TANGENCO	TAG NO.	0
PROJECT:	2 X 660 MW ENNORE TPS		

	NAME	DATE	TITLE
DRN	PLP	6-Dec-18	LOAD Vs EFFICIENCY & POWER FACTOR CURVE
CHD	PLP	6-Dec-18	
APPROVED	RGV	6-Dec-18	SC89.60/0.78

CG Power and Industrial Solutions Limited
LT Motors Division
Ahmednagar

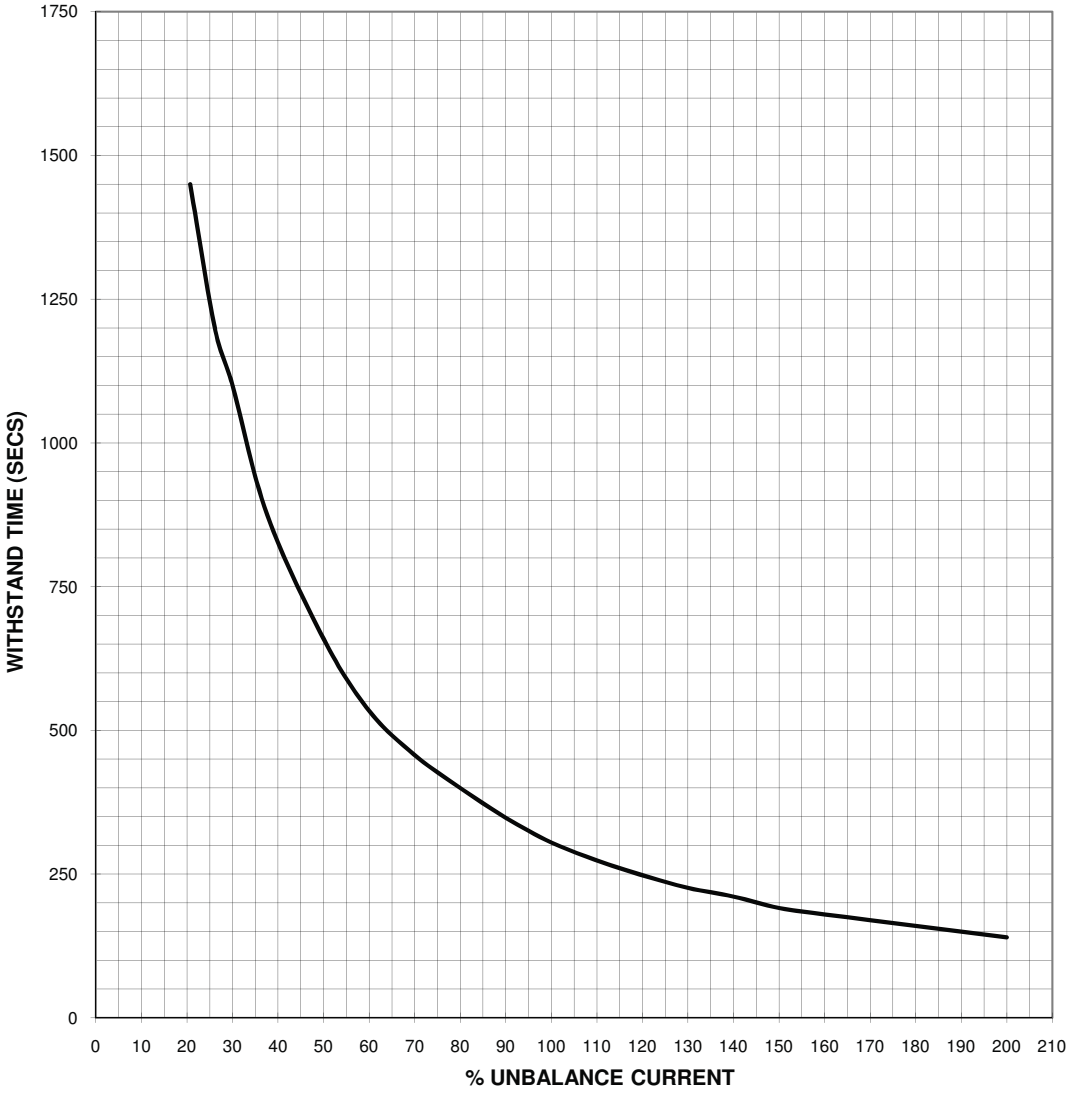




CUSTOMER	TANGENCO			RATED O/P kW	5.5
P.O.NO				NO OF POLES	4
IND.NO:	NMCI811287/300			FRAME	NG132S
CLIENT:	TANGENCO			TAG NO.	0
PROJECT:	2 X 660 MW ENNORE TPS				
	NAME	DATE	TITLE		
DRN	PLP	6-Dec-18	CURRENT SPEED & CURRENT TIME CURVE		
CHD	PLP	6-Dec-18			
APPROVED	RGV	6-Dec-18	SC1450/100		

CG Power and Industrial Solutions Limited
LT Motors Division
Ahmednagar

NEGATIVE SEQUENCE CHARACTERISTICS



CUSTOMER	TANGENCO	RATED O/P kW	5.5
P.O.NO		NO OF POLES	4
IND.NO:	NMCI811287/300	FRAME	NG132S
CLIENT:	TANGENCO	TAG NO.	0
PROJECT:	2 X 660 MW ENNORE TPS		

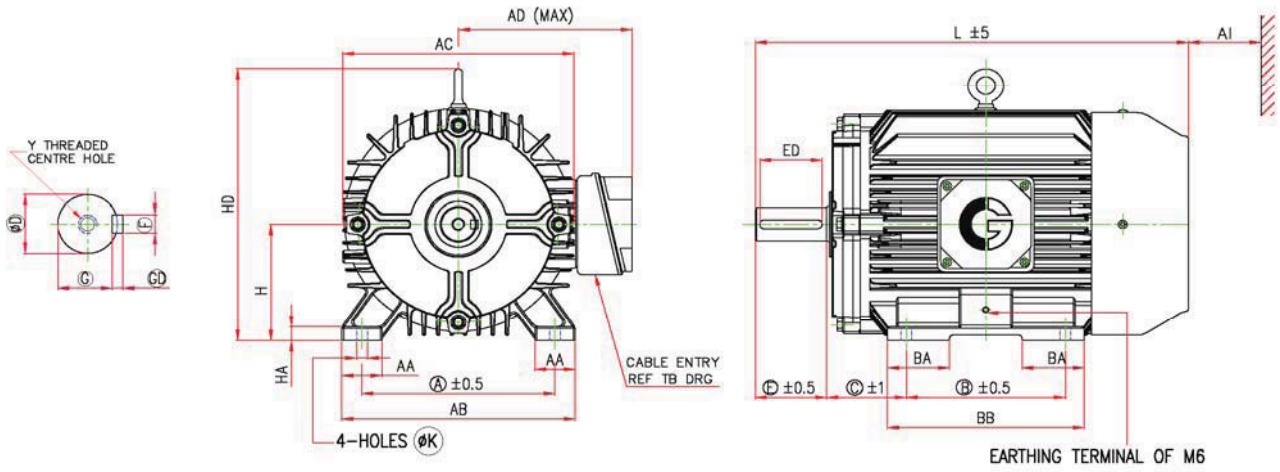
	NAME	DATE	TITLE
DRN	PLP	6-Dec-18	NEGATIVE SEQUENCE CHARACTERISTICS
CHD	PLP	6-Dec-18	
APPROVED	RGV	6-Dec-18	

CG Power and Industrial Solutions Limited
LT Motors Division
Ahmednagar

DIMENSION DRAWING OF 3 PH SQUIRREL CAGE TEFC FOOT MOUNTED TB ON RHS (FROM DE) INDUCTION MOTOR

PROJ.

DO NOT SCALE | PLEASE ASK, IF IN DOUBT



FRAME	FOOT FIXING										OVER ALL					MOTOR wt (kg)	AI**
	A	B	B1	C	H TOL	AA	AB	BA	BB	K TOL	AD	AC	L	HD	HA		
NG132S	216	140		89	132.0/131.7	47	255	68	182	12.0 / 12.5	190	275	460	315	12	78	80

D END SHAFT EXTENSION AND KEY						
D TOL	E	ED	F TOL	GD TOL	G	Y
38.018 / 38.002	80	70	10.00 / 9.964	8.0 / 7.9	33.0 / 32.8	M12X28

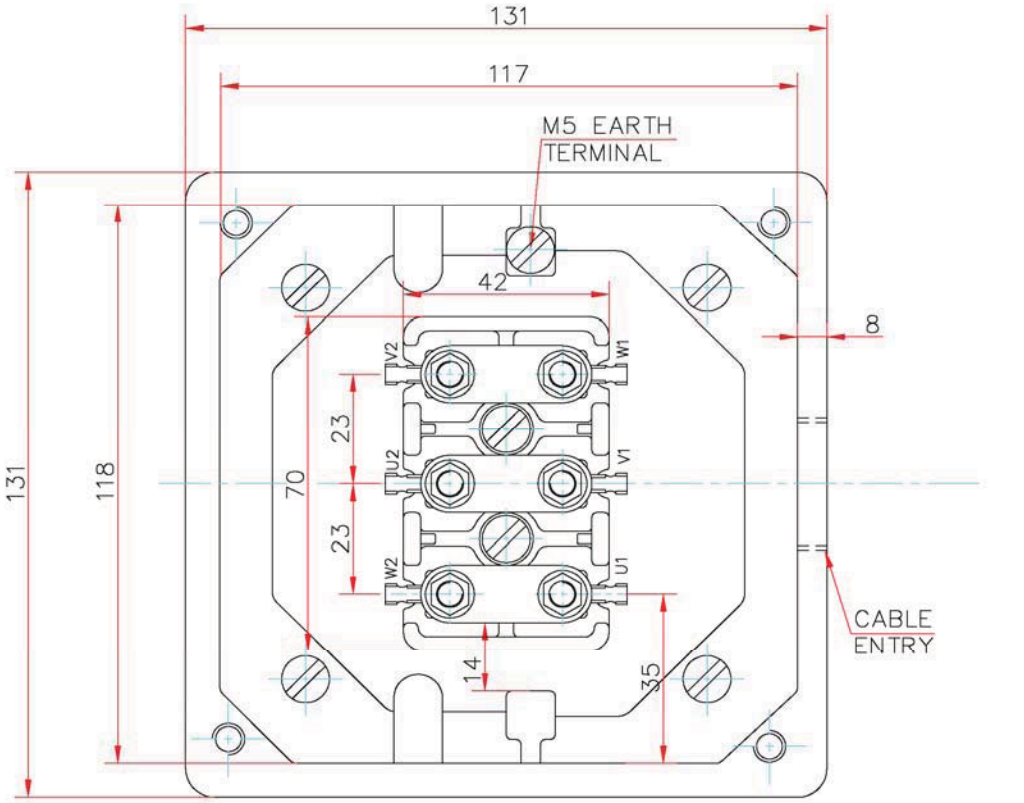
NOTES TERMINAL BOX CAN BE ROTATED IN 360 DEG @90 DEG.
ONE EARTHING TERMINAL IS PROVIDED INSIDE MAIN TERMINAL BOX.
MOTOR MAY HAVE ADDITIONAL FOOT HOLES FOR CUSTOMER/SITE FLEXIBILITY
**MINIMUM DISTANCE FOR EFFICIENT COOLING OF MOTOR TO BE MAINTAINED BY USER

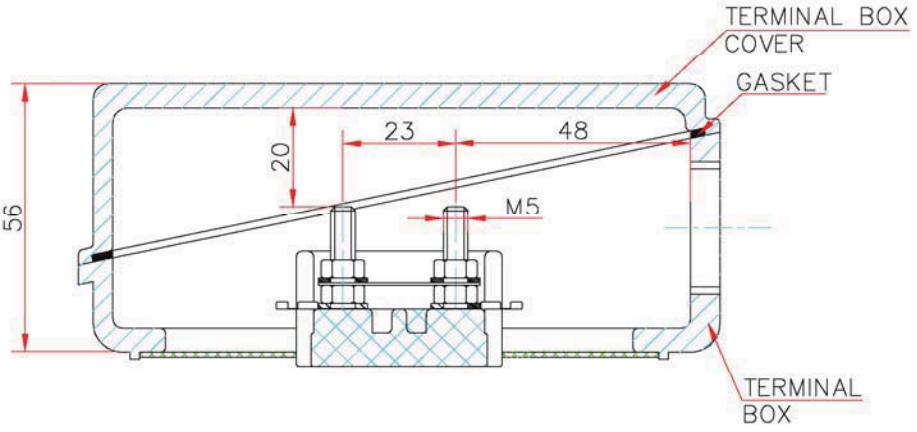
ALL DIMENSIONS ARE IN mm
RINGED DIMENSIONS ARE AS PER IS:1231/IEC60072

CUSTOMER	TANGENCO		RATED O/P kW	5.5	
P.O. NO.			NO OF POLES	4	
IND. NO.	NMCI811287/300		FRAME	NG132S	MOUNTING B3
CLIENT	TANGENCO		TAG NO.		
PROJECT	2X660 MW ENNORE TPS				
	NAME	DATE	REMARKS	TITLE	
DRN	SBK	6-Dec-18			
CHD	SBK	6-Dec-18	**Proceed with new stator.**	**DIMENSIONAL DRAWING**	
APPROVED	SSN	6-Dec-18			

CG Power and Industrial Solutions Limited
LT Motors Division
Ahmednagar

DRG NO
NMCI811287/300-4
REV 0





CREEPAGE = 25
CLEARNCE = 11

MATERIAL OF T/BOX
CAST IRON

ACCESSORIES	SPACE HEATER		THERMISTOR	RTD	
APPLICABLE	NA		NA	NA	
CABLE SIZE (ENTRY)	NA		NA	NA	
MAIN CABLE SIZE	1 * 3C,10-MM²		**CABLE ENTRY**	M25X1.5P 1-No.	
CUSTOMER	TANGENCO			RATED O/P kW	5.5
PO No				NO OF POLES	4
INDENT / ENQ No	NMCI811287/300			FRAME	NG132S
CLIENT	TANGENCO		Tag No.		
PROJECT	2X660 MW ENNORE TPS				
	NAME	DATE	ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED		
DRAWN BY	AMR	06-12-2018	**TITLE :**		
CHECKED BY	SBK	06-12-2018	TERMINAL BOX ARRANGEMENT		
APPROVED BY	SRB	06-12-2018			

CG Power and Industrial Solutions Limited
LT Motors Division
Ahmednagar

EA9103R1

DRG No :

61906101

CG Power and Industrial Solutions Limited

LT Motors Division
Ahmednagar

CUSTOMER : TANGENCO

Project: 2X660 MW ENNORE TPS

MOTOR DATA SHEET (BHEL)

SrNo	Particulars	VALUE
1	Application	CONDENSER WATER PUMP FOR ADMIN BUILDING
2	Quantity	2
3	Make	**CG Power and Industrial Solutions Limited**
4	Frame Size	ND180L
5	Application Standards	IS/IEC 60034,
6	Type of Motor	3 PHASE AC SQUIRREL CAGE INDUCTION MOTOR IE3
7	Service	CONTINUOUS
8	Harzardous Area Classification if any	TEFC Safe Area
9	Duty Cycle/Designation	S1
10	Rated Output at 40 deg Ambient kW	23.91
11	Rated Output at 50 deg Ambient kW	22.00
12	Rates Speed (RPM)	1470
13	Rated Voltage & % Variation	415/+-10%
14	Rated Frequency & % Variation	50/+3-5%
15	Full Load Current (A)	41
16	No load current (Approx.) (A)	12/16
17	Rated Power Factor	0.81
18	Efficiency at rated voltage and frequency : %	
19	Full Load	93
20	3/4 Load	93
21	1/2 Load	92
22	Method of starting	Direct On Line
23	Starting current at rated Voltage (% of FLC)	700
24	Starting Torque at rated voltage	200
25	Pull out Torque at rated Voltage	250
26	Starting time at 80% 100% for fans motors and 90% 100% for mill motors : sec	
27	With Load	0.239296405416235 / 0.179106230640637
28	Without Load	less than 2 seconds.
29	Safe Stall time at 110% rated voltage	
30	HOT Condition	8
31	COLD Condition	17
32	Safe stall time at 100% / 80% rated V for fans	
33	HOT	10/15.625
34	COLD	20/31.25
35	Thermal Time Constant	
36	Heating	30
37	Cooling	60
38	Starts	
39	Equally spread/Hour	4 for load GD2 = motor GD2
40	Successive cold	3 for load gd2=motor gd2
41	Successive hot	2 for load gd2=motor gd2
42	Noise level	As Per IS:12065
43	Vibration level	As per IS:12075
44	Degree of protection of enclosure	IP55
45	Method of cooling	FAN COOLED (IC 0141)
46	Insulation class	F (Temp. rise limited to class 'B')
47	Temperature rise over 50 deg ambient (by resistance)	70
48	Tropicalised	NO
49	Winding connection	Delta
50	Bearing	6310-ZZ/6210-ZZ
51	Make	SKF / FAG / NTN / EQUIVALENT
52	Type DE/NDE	BALL/BALL
53	Recommended lubricant	Greased for life
54	Motor Terminal Box	
55	Type, phase segregated	CAST IRON, NON PHASE SEGREGATED
56	Location as seen from DE	RHS From DE
57	Fault withstand	
58	Current	50 kA
59	Time	0.25 second

CG Power and Industrial Solutions Limited

LT Motors Division
Ahmednagar

CUSTOMER :TANGENCO

Project: 2X660 MW ENNORE TPS

MOTOR DATA SHEET (BHEL)

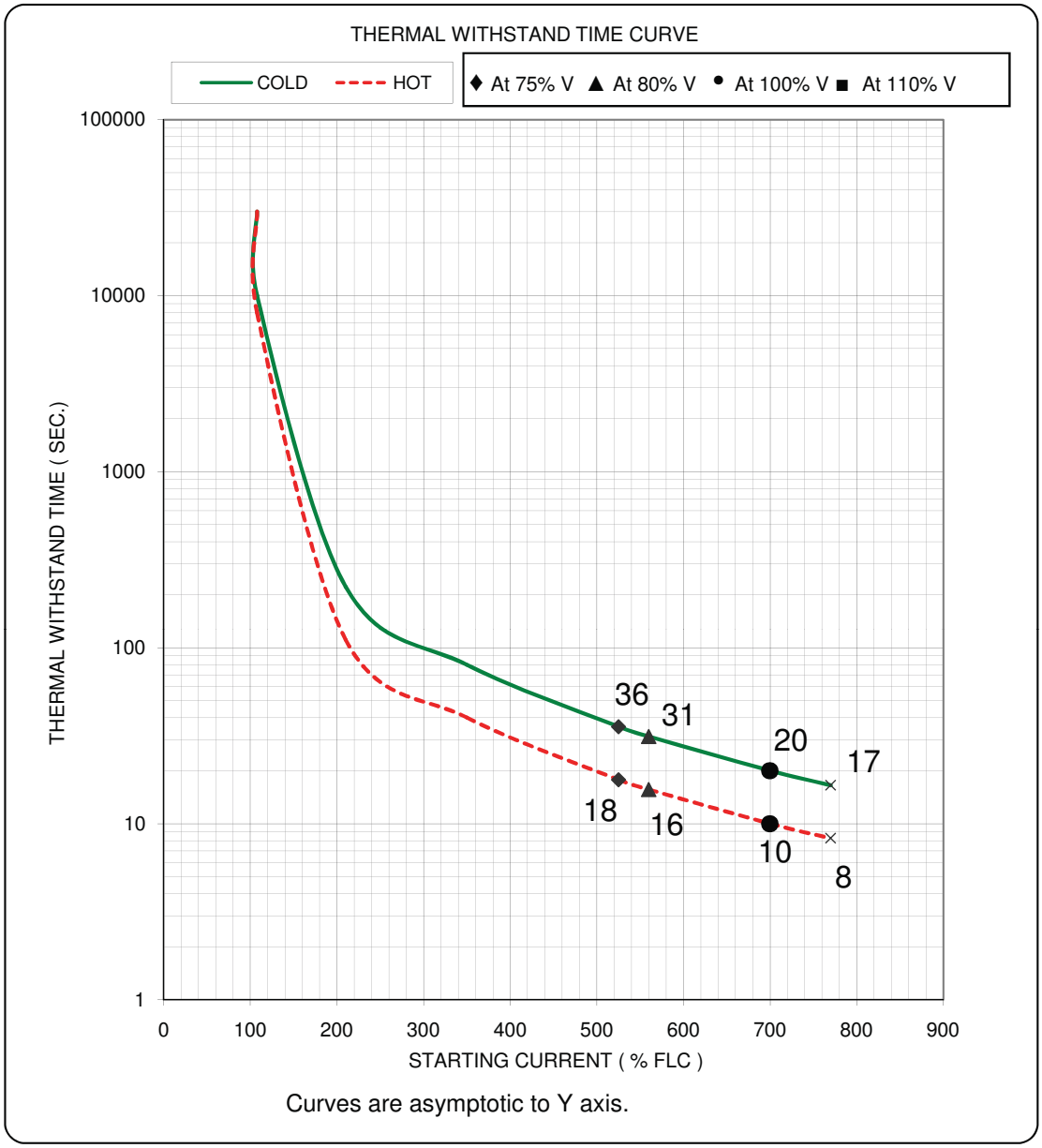
SrNo	Particulars	VALUE
60	Cable lugs and Glands furnished	Cable Gla d & L g S iable f Cable i e
61	Type and Range/size of cable	1 * 3C,50-MM²
62	Space Heaters	
63	No. x Watt(Total)	N.A
64	Volts, Phase, Frequency	240V,1PH, 50 HZ
65	Separate terminal box	AS PER TB DRAWING
66	Winding Temperature Detector	NO
67	Type	N.A.
68	Nos. and locations where provided	N.A.
69	Resistance at 0°	N.A.
70	Bearing Temperature Indicator	NO
71	Type	N.A.
72	Nos. furnished	N.A.
73	Resistance at 0°	N.A.
74	Temperature Indicators	NOT APPLICABLE
75	Type	--
76	No provided	--
77	Locations	--
78	Temperature Alarm Contacts	NOT APPLICABLE
79	Nos. provided	--
80	Locations	--
81	Contact Rating	--
82	Flow Switch	NOT APPLICABLE
83	Nos. provided	--
84	Locations	--
85	Contact Rating	--
86	Current Transformer for Differential Protection	NOT APPLICABLE
87	Nos. provided	--
88	Locations	--
89	Contact Rating	--
90	Accessory Terminal Box	
91	Nos. provided	AS PER TB DRAWING
92	Cable Glands/lugs furnished	only DCG in CG scope
93	Type and Range/size of cable	AS PER TB DRAWING
94	Number of grounding pads provided	
95	On Motor Body	2
96	On Terminal Box	1
97	Type of Mounting	B3
98	Overall Dimensions	AS PER GENERAL ARRANGEMENT DRAWING
99	Moment of Inertia GD2 IN KG-M2	
100	Driven Equipment	0.94
101	Rotor	0.94
102	Total	1.88
103	Weight kg	
104	Stator with winding kg	110
105	Rotor(with winding) kg	55
106	Total kg	184

NOTEs:

All performance data is subject to tolerance as per IEC 60034
All performance shall be measured on sinusoidal supply
Temp rise test shall be carried at rated kW & voltage for 1 hour other than S1 duty

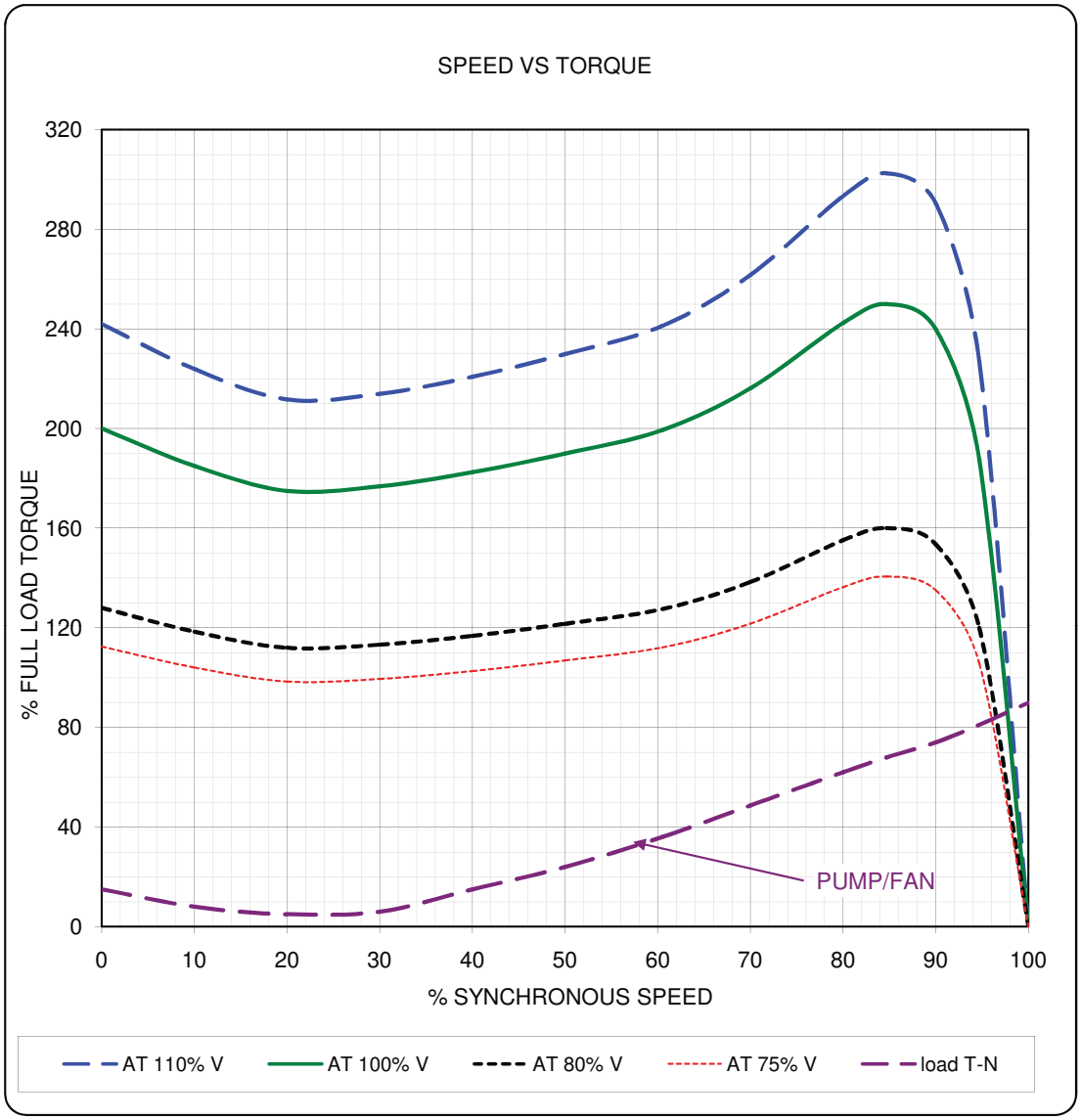
Customer specific paint shade and paint thickness will not be applicable on powder coated components.

ISSUED BY :	Md Shuaib Timmapure
	LT MOTORS DIVISION ,
	A-6/2 MIDC , AHMEDNAGAR



CUSTOMER	TANGENCO			RATED O/P kW	22
P.O.NO				NO OF POLES	4
IND.NO:	NMCI811286/100			FRAME	ND180L
CLIENT:	TANGENCO			TAG NO.	0
PROJECT:	2X660 MW ENNORE TPS				
	NAME	DATE	TITLE		
DRN	PLP	6-Dec-18	THERMAL WITHSTAND TIME CURVE		
CHD	PLP	6-Dec-18			
APPROVED	RGV	6-Dec-18	SC10/20/700		

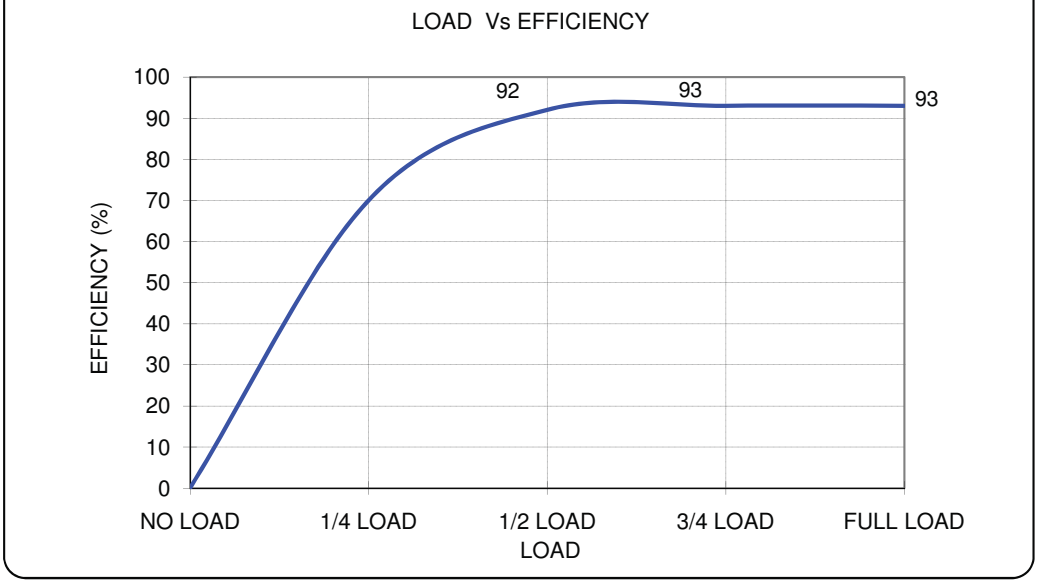
CG Power and Industrial Solutions Limited
LT Motors Division
Ahmednagar

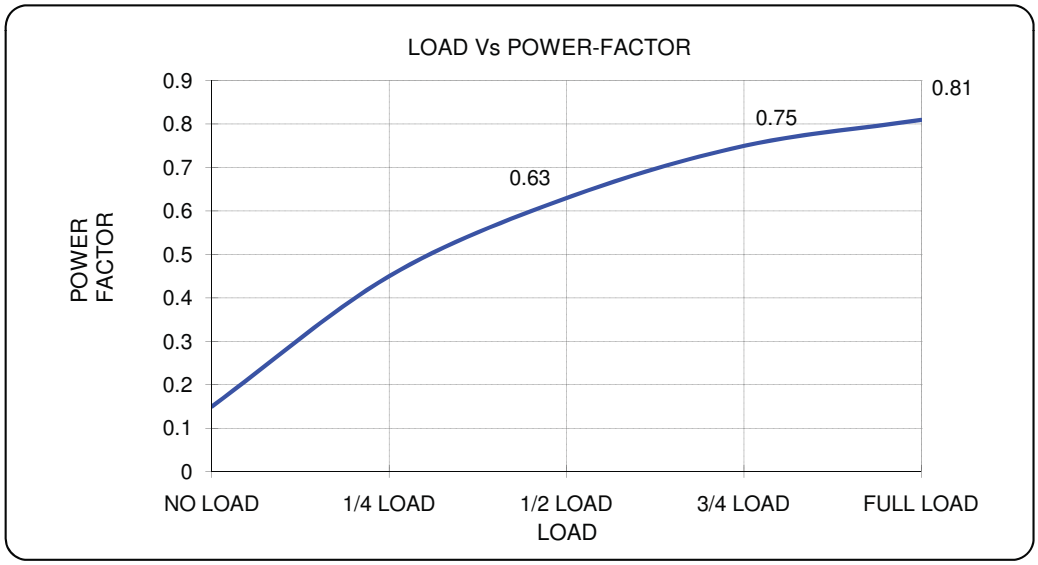


CUSTOMER	TANGENCO	RATED O/P kW	22
P.O.NO		NO OF POLES	4
IND.NO:	NMCI811286/100	FRAME	ND180L
CLIENT:	TANGENCO	TAG NO.	0
PROJECT:	2X660 MW ENNORE TPS		

	NAME	DATE	TITLE
DRN	PLP	6-Dec-18	SUPERIMPOSED TORQUE SPEED CURVE
CHD	PLP	6-Dec-18	
APPROVED	RGV	6-Dec-18	SC200/700

CG Power and Industrial Solutions Limited
LT Motors Division
Ahmednagar

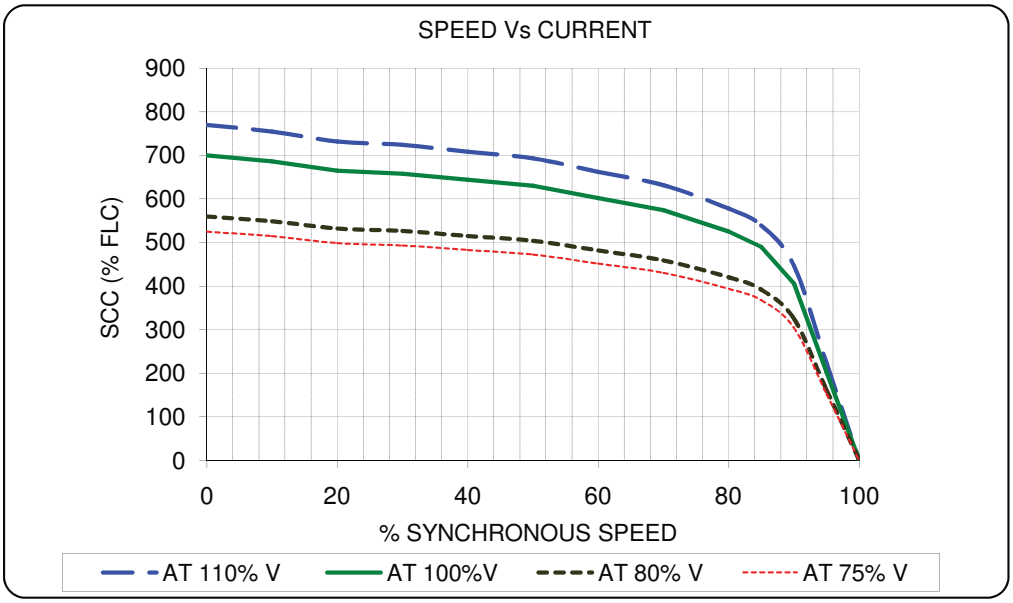


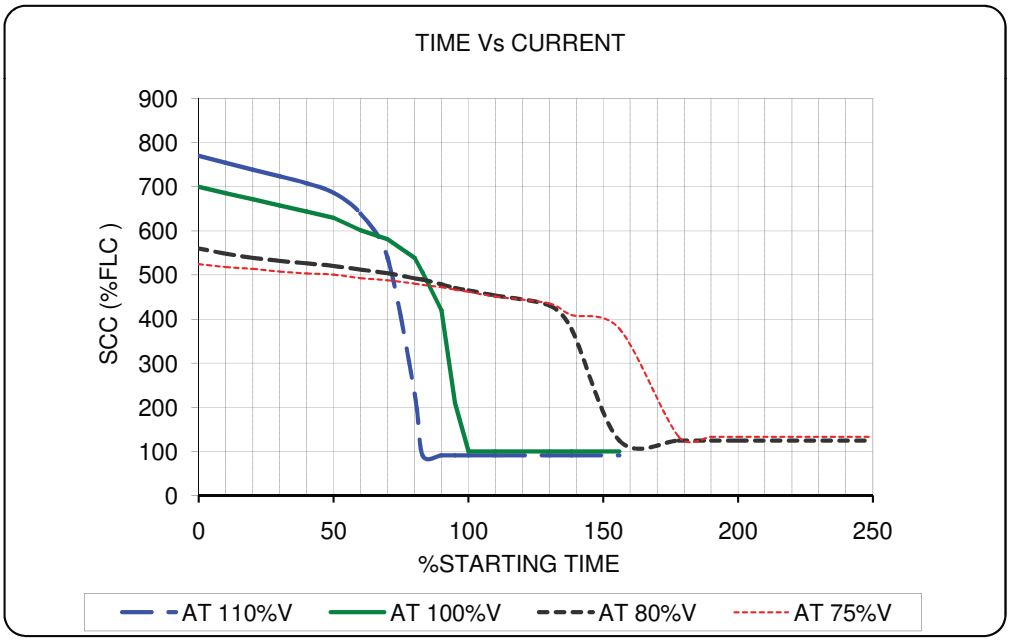


CUSTOMER	TANGENCO	RATED O/P kW	22
P.O.NO		NO OF POLES	4
IND.NO:	NMCI811286/100	FRAME	ND180L
CLIENT:	TANGENCO	TAG NO.	0
PROJECT:	2 X 660 MW ENNORE TPS		

	NAME	DATE	TITLE
DRN	PLP	6-Dec-18	LOAD Vs EFFICIENCY & POWER FACTOR CURVE
CHD	PLP	6-Dec-18	
APPROVED	RGV	6-Dec-18	SC93.00/0.81

CG Power and Industrial Solutions Limited
LT Motors Division
Ahmednagar

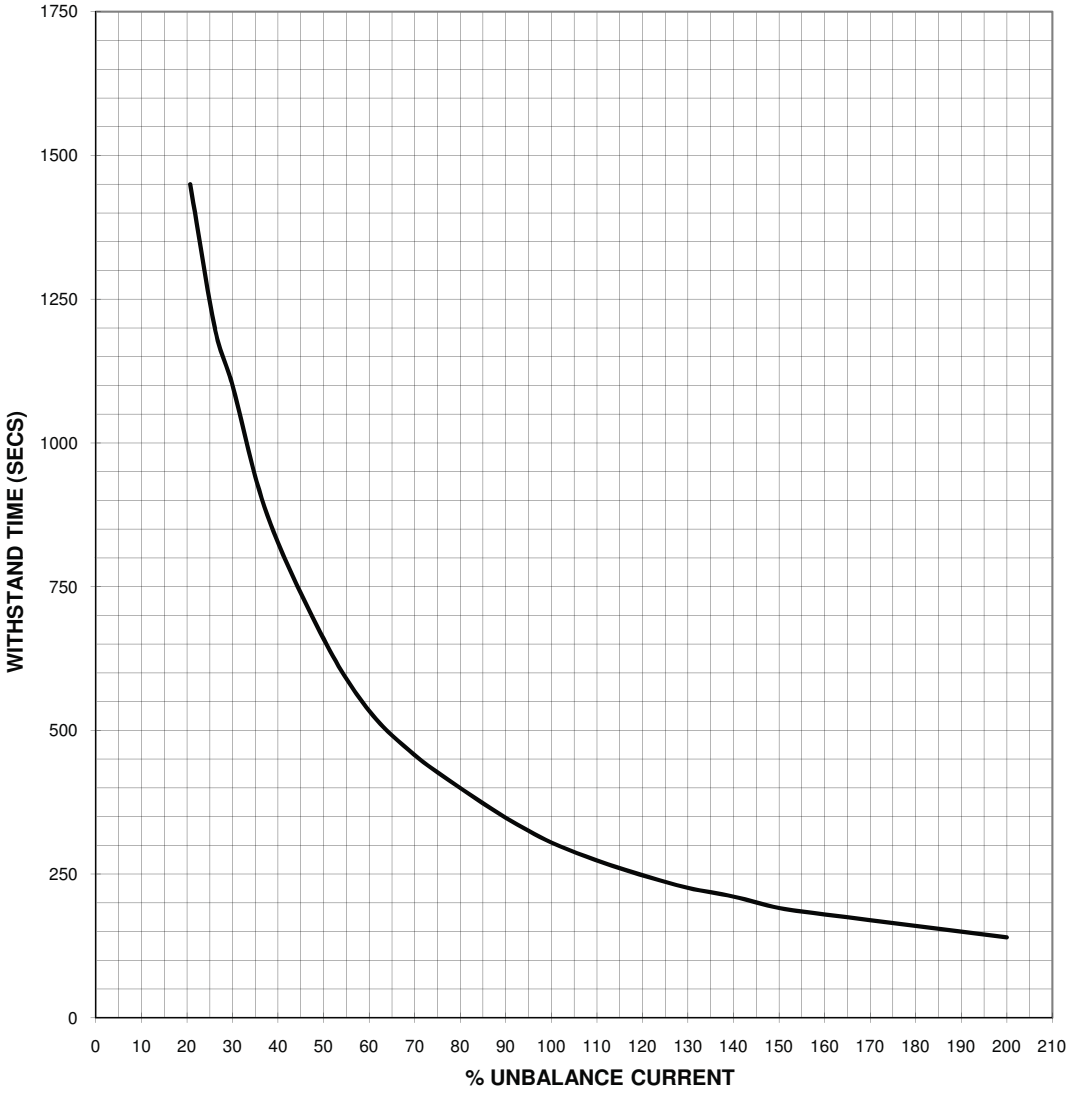




CUSTOMER	TANGENCO			RATED O/P kW	22
P.O.NO				NO OF POLES	4
IND.NO:	NMCI811286/100			FRAME	ND180L
CLIENT:	TANGENCO			TAG NO.	0
PROJECT:	2 X 660 MW ENNORE TPS				
	NAME	DATE	TITLE		
DRN	PLP	6-Dec-18	CURRENT SPEED & CURRENT TIME CURVE		
CHD	PLP	6-Dec-18			
APPROVED	RGV	6-Dec-18	SC1470/100		

CG Power and Industrial Solutions Limited
LT Motors Division
Ahmednagar

NEGATIVE SEQUENCE CHARACTERISTICS



CUSTOMER	TANGENCO	RATED O/P kW	22
P.O.NO		NO OF POLES	4
IND.NO:	NMCI811286/100	FRAME	ND180L
CLIENT:	TANGENCO	TAG NO.	0
PROJECT:	2 X 660 MW ENNORE TPS		

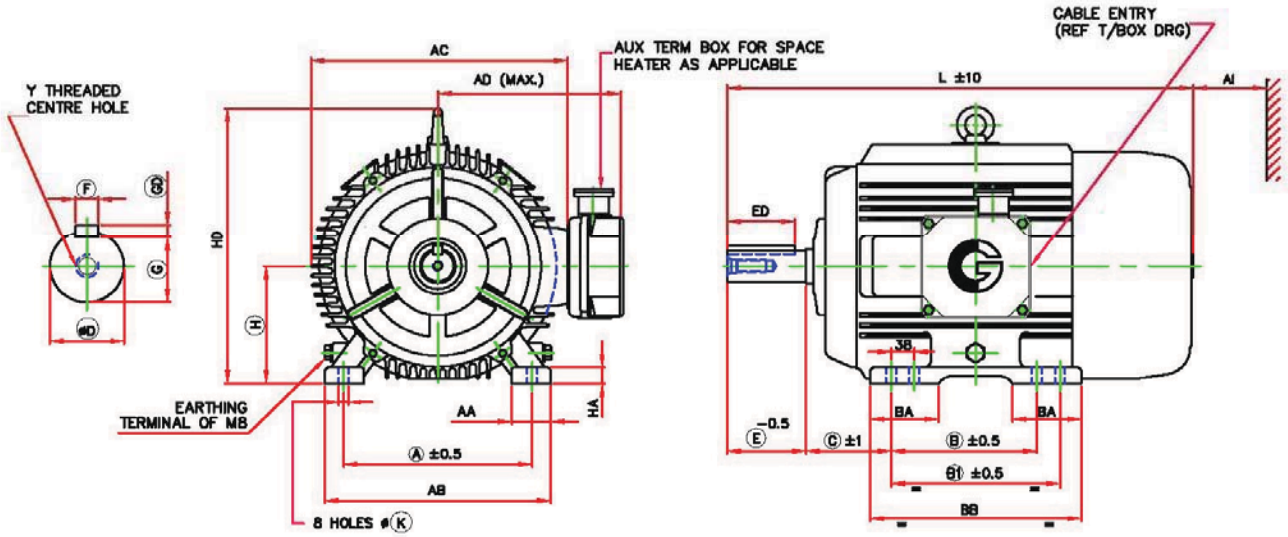
	NAME	DATE	TITLE
DRN	PLP	6-Dec-18	NEGATIVE SEQUENCE CHARACTERISTICS
CHD	PLP	6-Dec-18	
APPROVED	RGV	6-Dec-18	

CG Power and Industrial Solutions Limited
LT Motors Division
Ahmednagar

DIMENSION DRAWING OF 3 PH SQUIRREL CAGE TEFC FOOT MOUNTED TB ON RHS (FROM DE) INDUCTION MOTOR

PROJECTION

DO NOT SCALE | PLEASE ASK, IF IN DOUBT



FRAME	FOOT FIXING										OVER ALL					MOTOR wt (kg)	AI**
	A	B	B1	C	H TOL	AA	AB	BA	BB	K TOL	AD	AC	L	HD	HA		
ND180L	279	241	279	121	180.0 / 179.5	84	348	114	323	15.0 / 15.5	365	352	715	418	22	184	100

D END SHAFT EXTENSION AND KEY						
D TOL	E	ED	F TOL	GD TOL	G	Y
48.018 / 48.002	110	80	14.00 / 13.957	9.0 / 8.9	42.5 / 42.3	M16X32

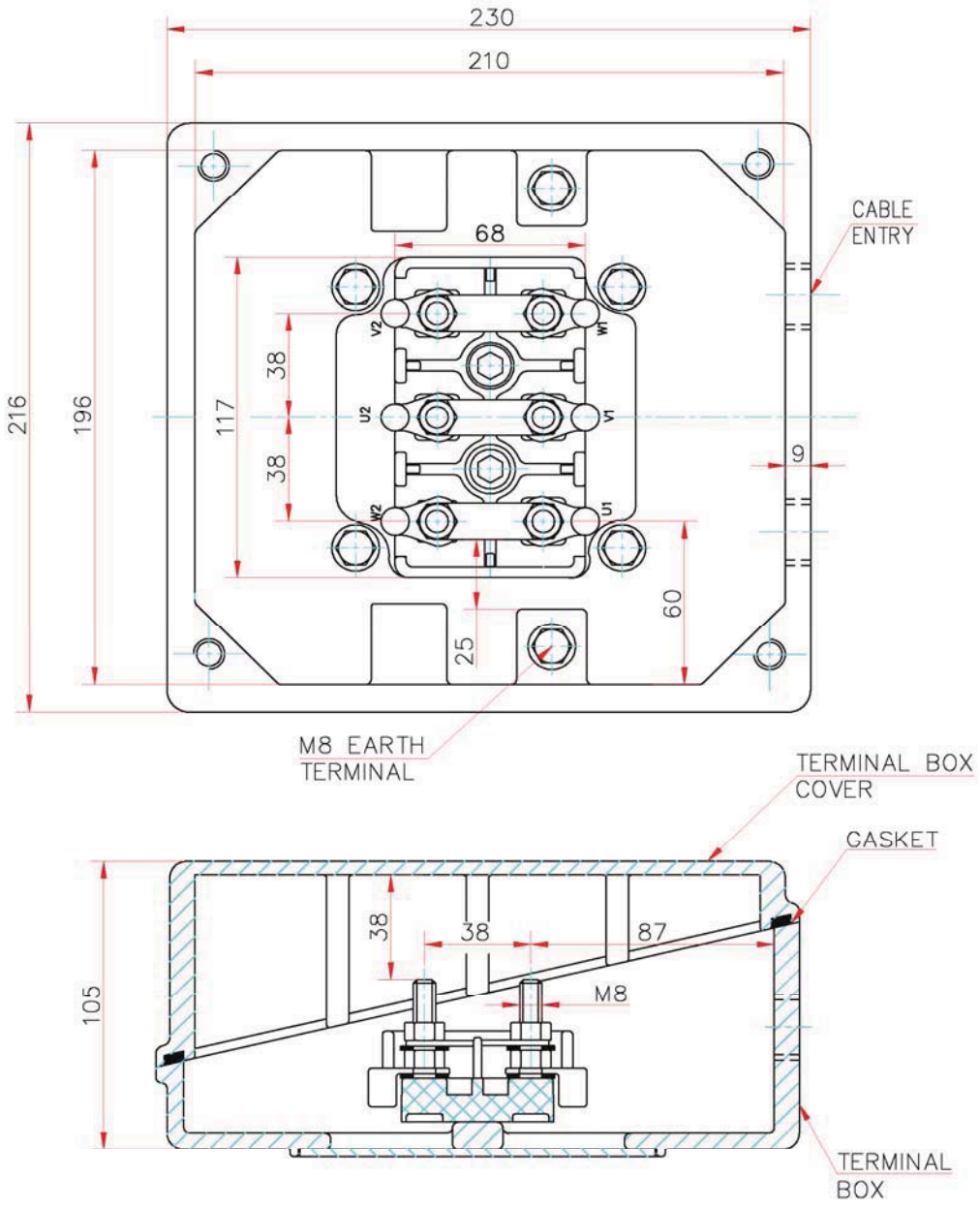
NOTES TERMINAL BOX CAN BE ROTATED IN 360 DEG @90 DEG.
ONE EARTHING TERMINAL IS PROVIDED INSIDE MAIN TERMINAL BOX.
MOTOR MAY HAVE ADDITIONAL FOOT HOLES FOR CUSTOMER/SITE FLEXIBILITY
**MINIMUM DISTANCE FOR EFFICIENT COOLING OF MOTOR TO BE MAINTAINED BY USER

ALL DIMENSIONS ARE IN mm
RINGED DIMENSIONS ARE AS PER IS:1231/IEC60072

CUSTOMER	TANGENCO		RATED O/P kW	22	
P.O. NO.			NO OF POLES	4	
IND. NO.	NMCI811286/100		FRAME	ND180L	MOUNTING B3
CLIENT	TANGENCO		TAG NO.		
PROJECT	2 X 660 MW ENNORE TPS				
	NAME	DATE	REMARKS	TITLE	
DRN	SBK	6-Dec-18		DIMENSIONAL DRAWING	
CHD	SBK	6-Dec-18			
APPROVED	SSN	6-Dec-18			

CG Power and Industrial Solutions Limited
LT Motors Division
Ahmednagar

DRG NO
NMCI811286/100-4
REV 0



CREEPAGE = 25
CLEARNCE =12

MATERIAL OF T/BOX
CAST IRON

ACCESSORIES	SPACE HEATER		THERMISTOR	RTD	
APPLICABLE	NA		NA	NA	
CABLE SIZE (ENTRY)	NA		NA	NA	
MAIN CABLE SIZE	1 * 3C,50-MM²		**CABLE ENTRY**	M40X1.5P 1-No.	
CUSTOMER	WILO Mather And Platt Pumps P Ltd.			RATED O/P kW	22
PO No				NO OF POLES	4
INDENT / ENQ No	NMCI811286/100			FRAME	ND180L
CLIENT	TANGENCO		Tag No.		
PROJECT	2 X 660 MW ENNORE TPS				
	NAME	DATE	ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED		
DRAWN BY	AMR	06-12-2018	**TITLE :**		
CHECKED BY	SBK	06-12-2018	TERMINAL BOX ARRANGEMENT		
APPROVED BY	SRB	06-12-2018			

CG Power and Industrial Solutions Limited
LT Motors Division
Ahmednagar

EA9102R1

DRG No :

61910101

CG Power and Industrial Solutions Limited

LT Motors Division
Ahmednagar

CUSTOMER: TANGENCO

MOTOR DATA SHEET (BHEL)

SrNo	Particulars	VALUE
1	Application	CHILLER WATER PUMP FOR TG HALL
2	Quantity	2
3	Make	**CG Power and Industrial Solutions Limited**
4	Frame Size	ND200L
5	Application Standards	IS/IEC 60034,
6	Type of Motor	3 PHASE AC SQUIRREL CAGE INDUCTION MOTOR IE3
7	Service	CONTINUOUS
8	Harzardous Area Classification if any	TEFC Safe Area
9	Duty Cycle/Designation	S1
10	Rated Output at 40 deg Ambient kW	32.61
11	Rated Output at 50 deg Ambient kW	30.00
12	Rates Speed (RPM)	1470
13	Rated Voltage & % Variation	415/+-10% (Combined V&F variation +/-10%)
14	Rated Frequency & % Variation	50/+3-5%
15	Full Load Current (A)	52
16	No load current (Approx.) (A)	18/22
17	Rated Power Factor	0.86
18	Efficiency at rated voltage and frequency : %	
19	Full Load	93.6
20	3/4 Load	93.6
21	1/2 Load	92.6
22	Method of starting	Direct On Line
23	Starting current at rated Voltage (% of FLC)	700
24	Starting Torque at rated voltage	225
25	Pull out Torque at rated Voltage	275
26	Starting time at 80% 100% for fans motors and 90% 100% for mill motors : sec	
27	With Load	0.295061820177936 / 0.222522266661976
28	Without Load	less than 2 seconds.
29	Safe Stall time at 110% rated voltage	
30	HOT Condition	10
31	COLD Condition	20
32	Safe stall time at 100% / 80% rated V for fans	
33	HOT	12/18.75
34	COLD	24/37.5
35	Thermal Time Constant	
36	Heating	45
37	Cooling	90
38	Starts	
39	Equally spread/Hour	4 for load GD2 = motor GD2
40	Successive cold	3 for load gd2=motor gd2
41	Successive hot	2 for load gd2=motor gd2
42	Noise level	As Per IS:12065
43	Vibration level	As per IS:12075
44	Degree of protection of enclosure	IP55
45	Method of cooling	FAN COOLED (IC 0141)
46	Insulation class	F (Temp. rise limited to class 'B')
47	Temperature rise over 50 deg ambient (by resistance)	70
48	Tropicalised	NO
49	Winding connection	Delta
50	Bearing	6312-ZZ/6212-ZZ
51	Make	SKF / FAG / NTN / EQUIVALENT
52	Type DE/NDE	BALL/BALL
53	Recommended lubricant	Greased for life
54	Motor Terminal Box	
55	Type, phase segregated	CAST IRON, NON PHASE SEGREGATED
56	Location as seen from DE	RHS From DE
57	Fault withstand	
58	Current	50 kA
59	Time	0.25 second

CG Power and Industrial Solutions Limited

LT Motors Division
Ahmednagar

CUSTOMER : TANGENCO

Project: 2X660 MW ENNORE TPS

MOTOR DATA SHEET (BHEL)

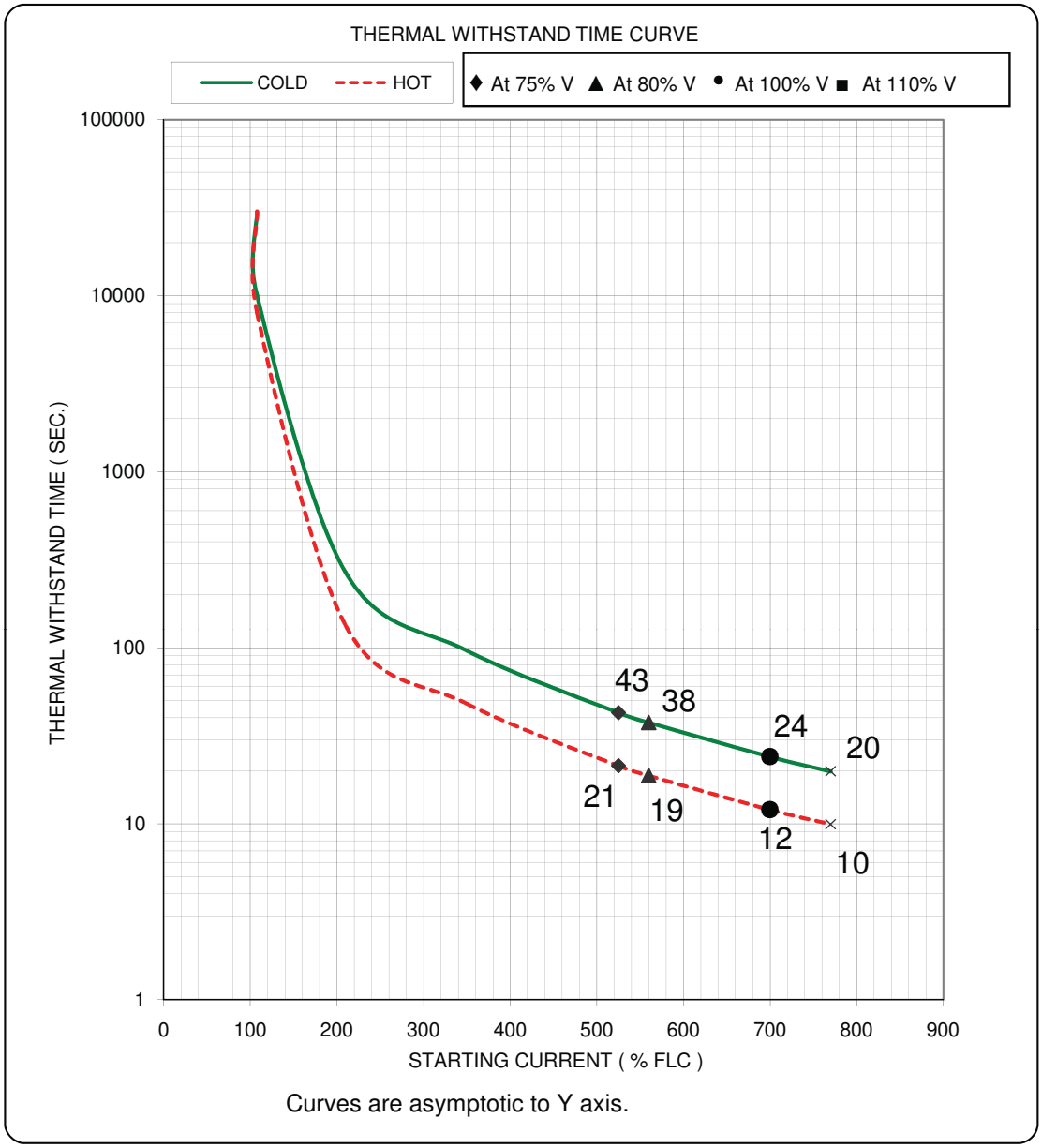
SrNo	Particulars	VALUE
60	Cable lugs and Glands furnished	Cable Gla d & L g S iable f Cable i e
61	Type and Range/size of cable	1 * 3C,25-MM²
62	Space Heaters	
63	No. x Watt(Total)	SPACE HEATER 60WX1 (200/225)
64	Volts, Phase, Frequency	240V,1PH, 50 HZ
65	Separate terminal box	AS PER TB DRAWING
66	Winding Temperature Detector	NO
67	Type	N.A.
68	Nos. and locations where provided	N.A.
69	Resistance at 0°	N.A.
70	Bearing Temperature Indicator	NO
71	Type	N.A.
72	Nos. furnished	N.A.
73	Resistance at 0°	N.A.
74	Temperature Indicators	NOT APPLICABLE
75	Type	--
76	No provided	--
77	Locations	--
78	Temperature Alarm Contacts	NOT APPLICABLE
79	Nos. provided	--
80	Locations	--
81	Contact Rating	--
82	Flow Switch	NOT APPLICABLE
83	Nos. provided	--
84	Locations	--
85	Contact Rating	--
86	Current Transformer for Differential Protection	NOT APPLICABLE
87	Nos. provided	--
88	Locations	--
89	Contact Rating	--
90	Accessory Terminal Box	
91	Nos. provided	AS PER TB DRAWING
92	Cable Glands/lugs furnished	only DCG in CG scope
93	Type and Range/size of cable	AS PER TB DRAWING
94	Number of grounding pads provided	
95	On Motor Body	2
96	On Terminal Box	1
97	Type of Mounting	B3
98	Overall Dimensions	AS PER GENERAL ARRANGEMENT DRAWING
99	Moment of Inertia GD2 IN KG-M2	
100	Driven Equipment	1.79
101	Rotor	1.79
102	Total	3.58
103	Weight kg	
104	Stator with winding kg	151
105	Rotor(with winding) kg	76
106	Total kg	252

NOTEs:

All performance data is subject to tolerance as per IEC 60034
All performance shall be measured on sinusoidal supply
Temp rise test shall be carried at rated kW & voltage for 1 hour other than S1 duty

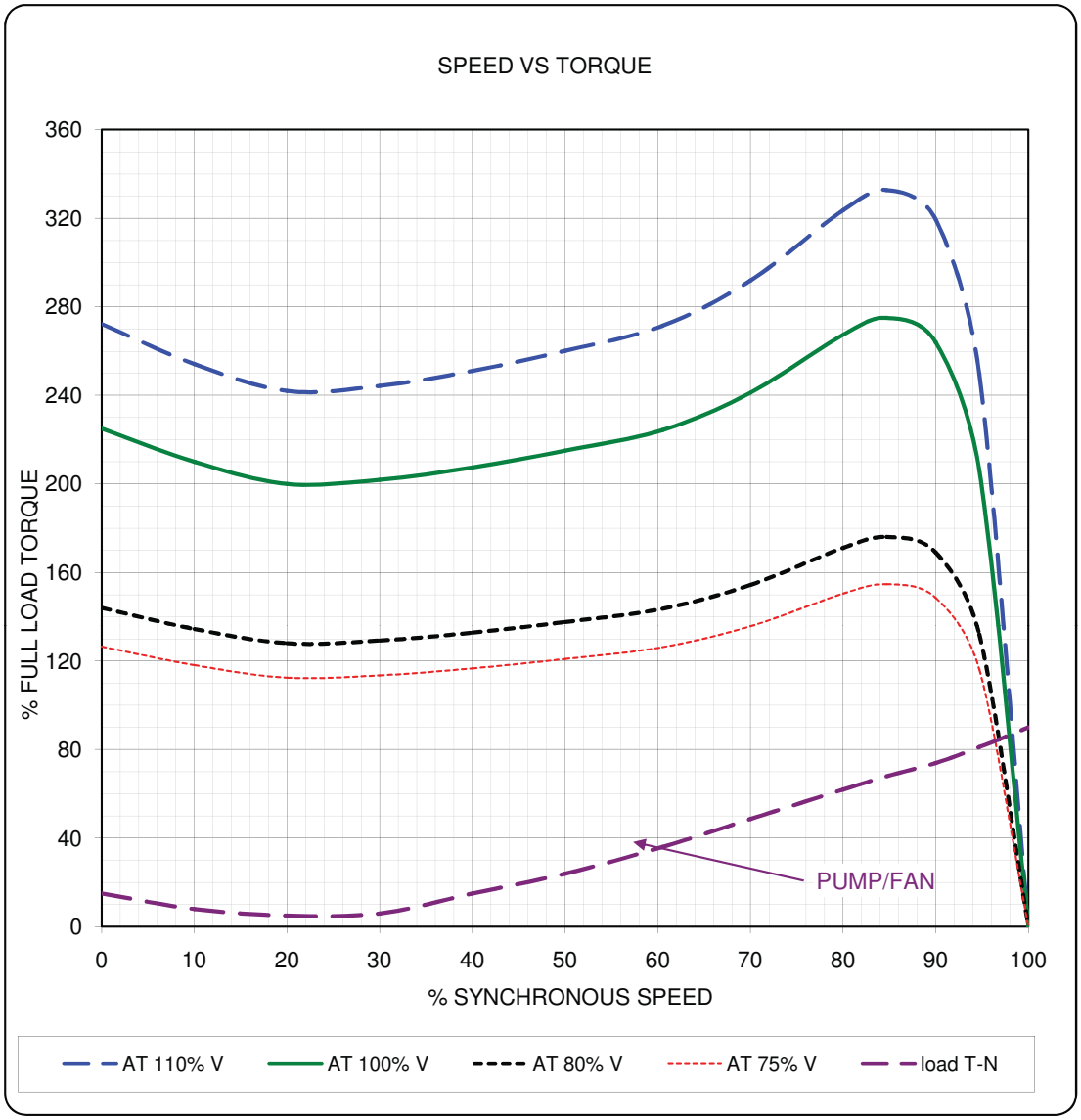
Customer specific paint shade and paint thickness will not be applicable on powder coated components.

ISSUED BY :	Md Shuaib Timmapure
	LT MOTORS DIVISION ,
	A-6/2 MIDC , AHMEDNAGAR



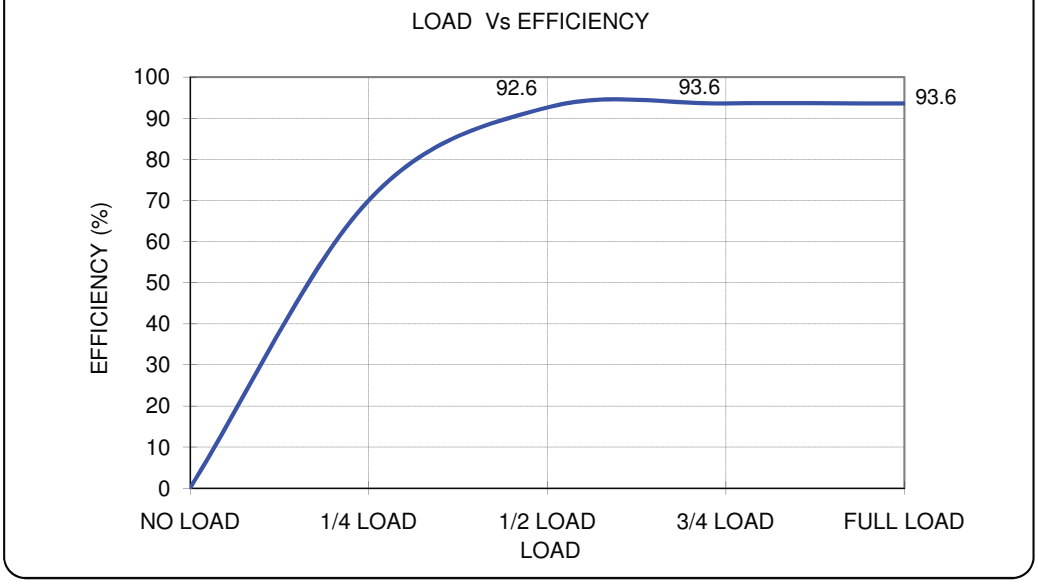
CUSTOMER	TANGENCO			RATED O/P kW	30
P.O.NO				NO OF POLES	4
IND.NO:	NMCI811287/100			FRAME	ND200L
CLIENT:	TANGENCO			TAG NO.	0
PROJECT:	2 X 660 MW ENNORE TPS				
	NAME	DATE	TITLE		
DRN	PLP	6-Dec-18	THERMAL WITHSTAND TIME CURVE		
CHD	PLP	6-Dec-18			
APPROVED	RGV	6-Dec-18	SC12/24/700		

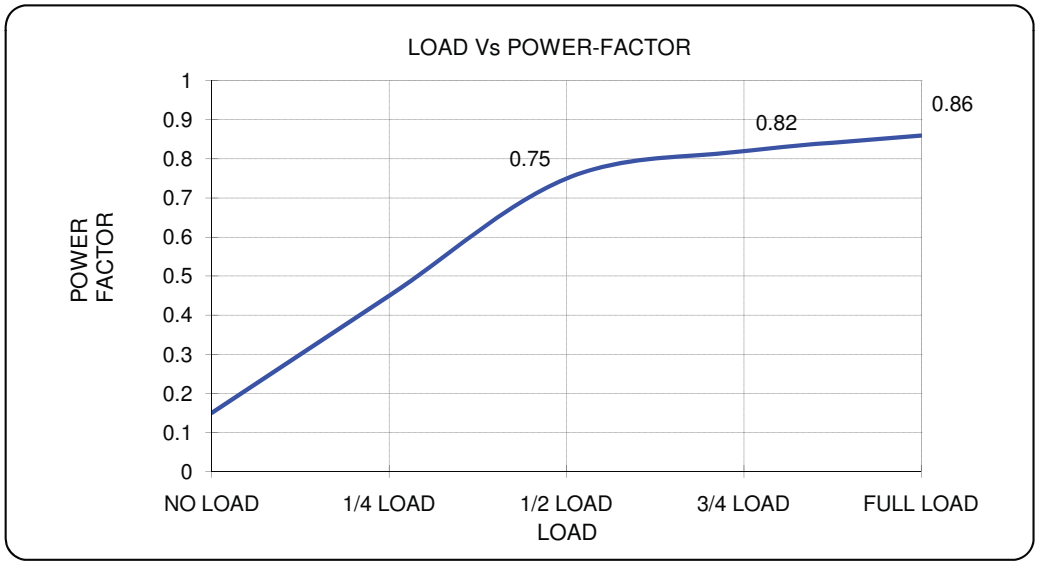
CG Power and Industrial Solutions Limited
LT Motors Division
Ahmednagar



CUSTOMER	TANGENCO			RATED O/P kW	30
P.O.NO				NO OF POLES	4
IND.NO:	NMCI811287/100			FRAME	ND200L
CLIENT:	TANGENCO			TAG NO.	0
PROJECT:	2 X 660 MW ENNORE TPS				
	NAME	DATE	TITLE		
DRN	PLP	6-Dec-18	SUPERIMPOSED TORQUE SPEED CURVE		
CHD	PLP	6-Dec-18			
APPROVED	RGV	6-Dec-18	SC225/700		

CG Power and Industrial Solutions Limited
LT Motors Division
Ahmednagar

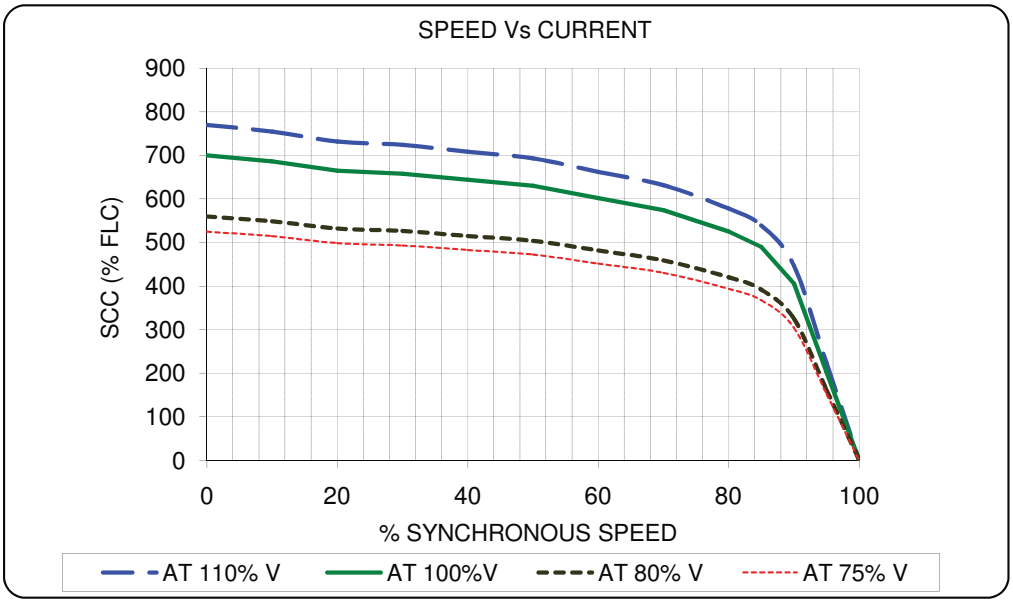


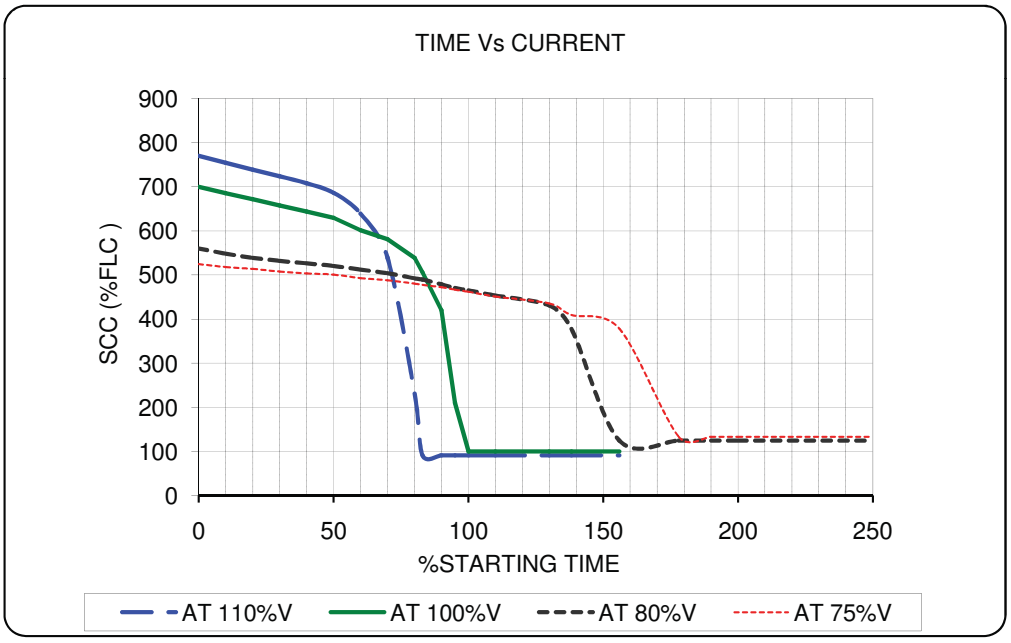


CUSTOMER	TANGENCO	RATED O/P kW	30
P.O.NO		NO OF POLES	4
IND.NO:	NMCI811287/100	FRAME	ND200L
CLIENT:	TANGENCO	TAG NO.	0
PROJECT:	2 X 660 MW ENNORE TPS		

	NAME	DATE	TITLE
DRN	PLP	6-Dec-18	LOAD Vs EFFICIENCY & POWER FACTOR CURVE
CHD	PLP	6-Dec-18	
APPROVED	RGV	6-Dec-18	SC93.60/0.86

CG Power and Industrial Solutions Limited
LT Motors Division
Ahmednagar





CUSTOMER	TANGENCO			RATED O/P kW	30
P.O.NO				NO OF POLES	4
IND.NO:	NMCI811287/100			FRAME	ND200L
CLIENT:	TANGENCO			TAG NO.	0
PROJECT:	2 X 660 MW ENNORE TPS				
	NAME	DATE	TITLE		
DRN	PLP	6-Dec-18	CURRENT SPEED & CURRENT TIME CURVE		
CHD	PLP	6-Dec-18			
APPROVED	RGV	6-Dec-18	SC1470/100		

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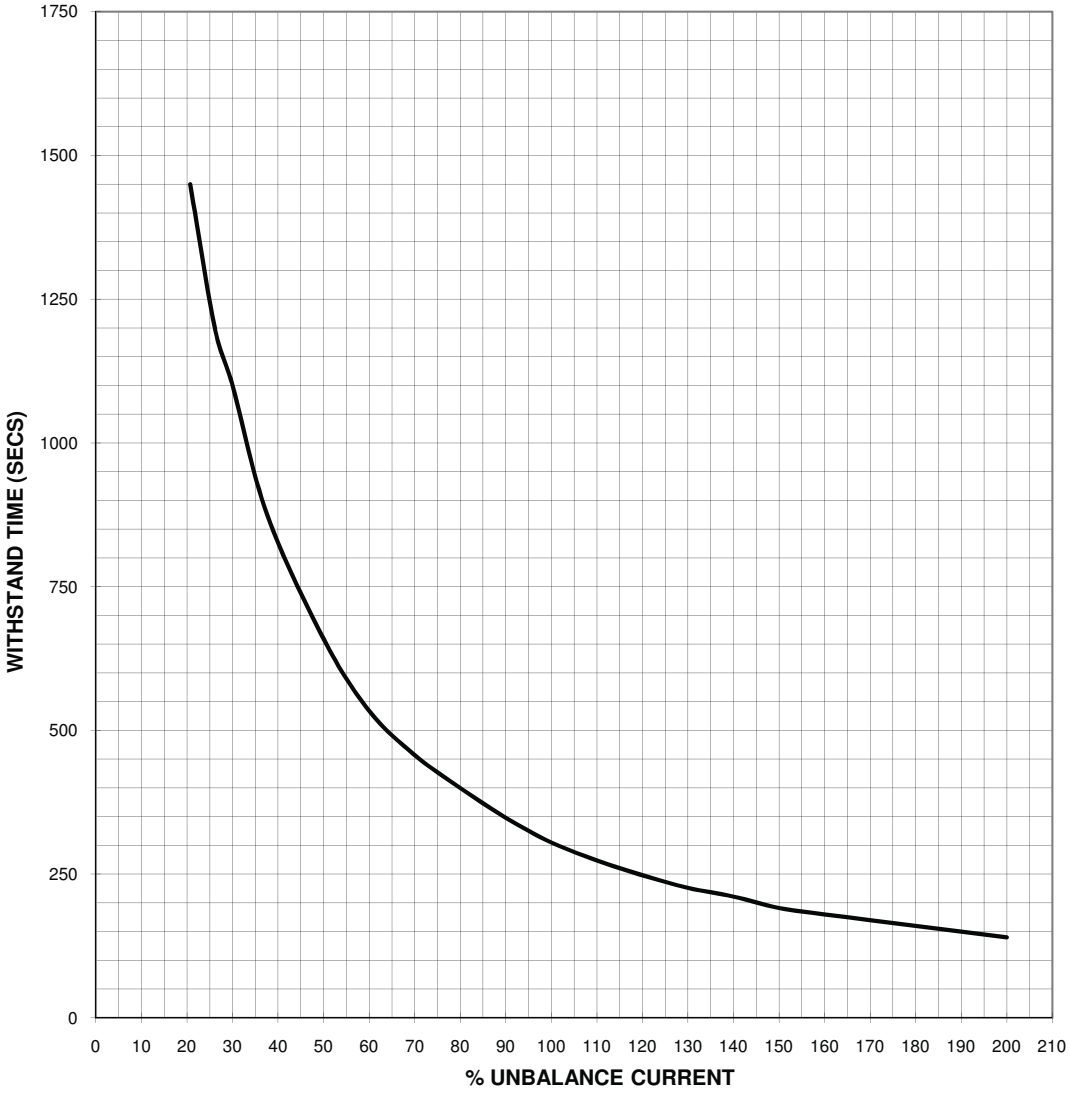
NEGATIVE SEQUENCE CHARACTERISTICS



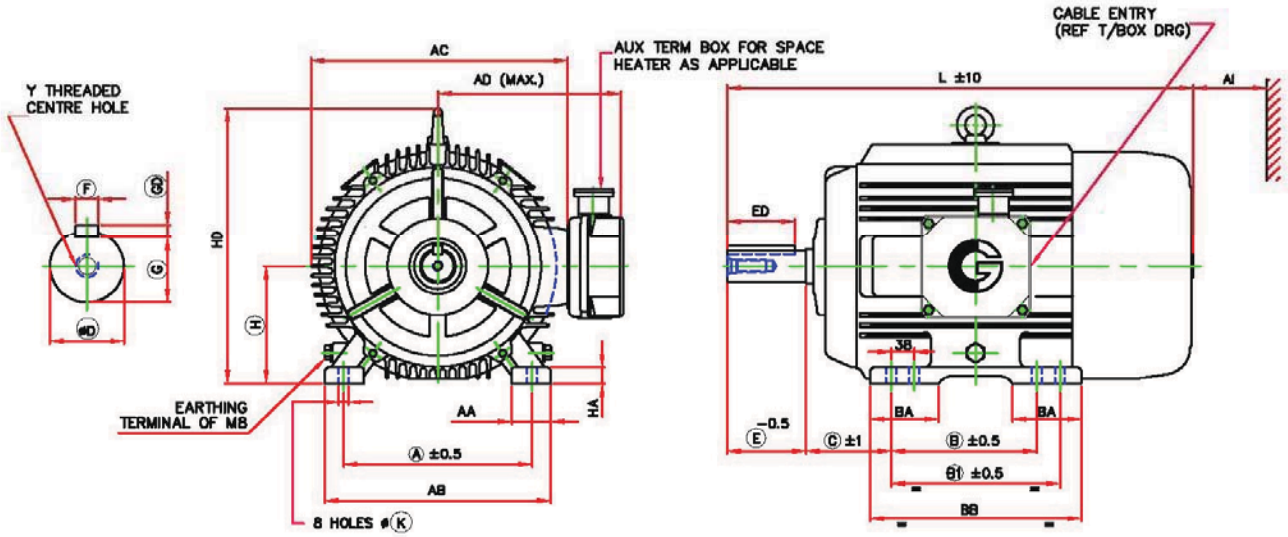
CUSTOMER	TANGENCO			RATED O/P kW	30
P.O.NO				NO OF POLES	4
IND.NO:	NMCI811287/100			FRAME	ND200L
CLIENT:	TANGENCO			TAG NO.	0
PROJECT:	2 X 660 MW ENNORE TPS				
	NAME	DATE	TITLE		
DRN	PLP	6-Dec-18	NEGATIVE SEQUENCE CHARACTERISTICS		
CHD	PLP	6-Dec-18			
APPROVED	RGV	6-Dec-18			

CG Power and Industrial Solutions Limited
LT Motors Division
Ahmednagar

DIMENSION DRAWING OF 3 PH SQUIRREL CAGE TEFC FOOT MOUNTED TB ON RHS (FROM DE) INDUCTION MOTOR

PROJECTION

DO NOT SCALE | PLEASE ASK, IF IN DOUBT



FRAME	FOOT FIXING										OVER ALL					MOTOR wt (kg)	AI**
	A	B	B1	C	H TOL	AA	AB	BA	BB	K TOL	AD	AC	L	HD	HA		
ND200L	318	267	305	133	200.0 / 199.5	66	381	115	356	19.0 / 19.5	325	428	775	480	25	252	100

D END SHAFT EXTENSION AND KEY						
D TOL	E	ED	F TOL	GD TOL	G	Y
55.030 / 55.011	110	80	16.00 / 15.957	10.0 / 9.9	49.0 / 48.8	M20X40

NOTES TERMINAL BOX CAN BE ROTATED IN 360 DEG @90 DEG.
ONE EARTHING TERMINAL IS PROVIDED INSIDE MAIN TERMINAL BOX.
MOTOR MAY HAVE ADDITIONAL FOOT HOLES FOR CUSTOMER/SITE FLEXIBILITY
**MINIMUM DISTANCE FOR EFFICIENT COOLING OF MOTOR TO BE MAINTAINED BY USER

ALL DIMENSIONS ARE IN mm
RINGED DIMENSIONS ARE AS PER IS:1231/IEC60072

CUSTOMER	TANGENCO		RATED O/P kW	30	
P.O. NO.			NO OF POLES	4	
IND. NO.	NMCI811287/100		FRAME	ND200L	MOUNTING B3
CLIENT	TANGENCO				
PROJECT	2 X 660 MW ENNORE TPS				
	NAME	DATE	REMARKS	TITLE	
DRN	SBK	6-Dec-18		**DIMENSIONAL DRAWING**	
CHD	SBK	6-Dec-18			
APPROVED	SSN	6-Dec-18			

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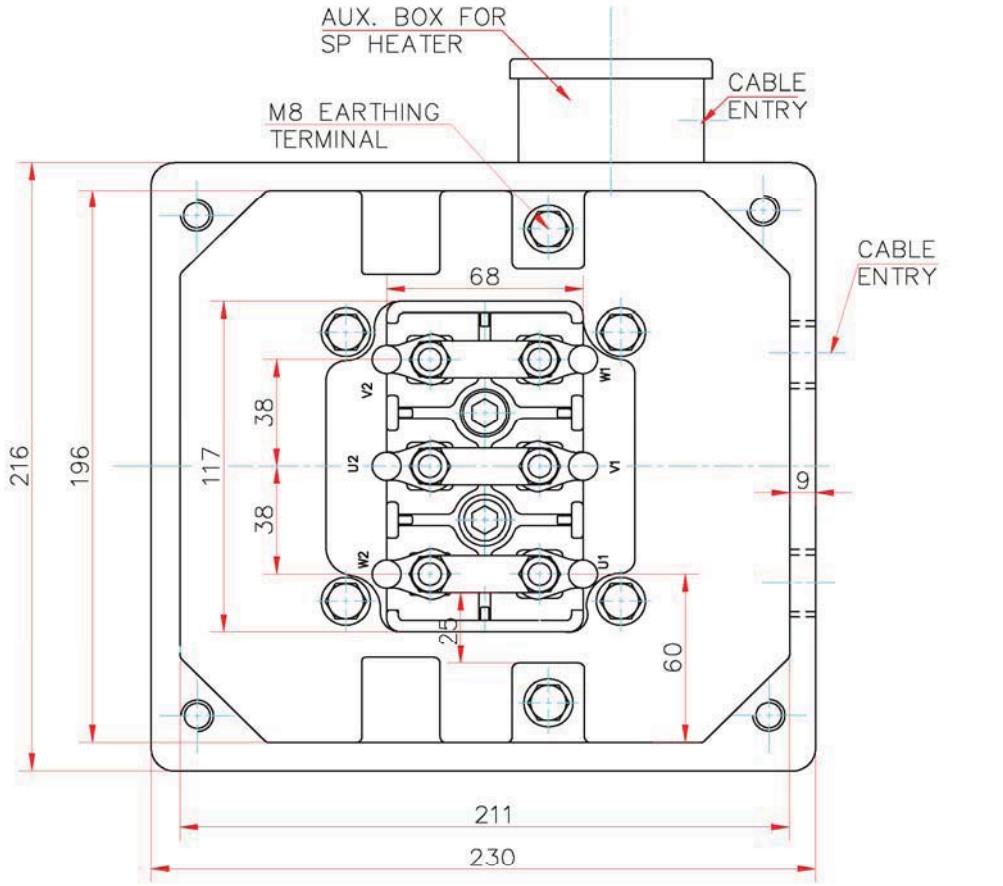
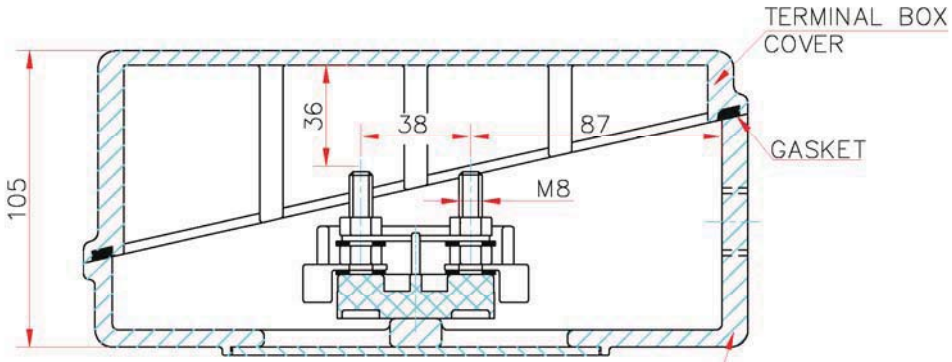
DRG NO
NMCI811287/100-4
REV 0





CREEPAGE = 25
CLEARNCE = 12

TERMINAL
BOX

MATERIAL OF T/BOX
CAST IRON

ACCESSORIES	SPACE HEATER	THERMISTOR	RTD
APPLICABLE	YES	NA	NA
CABLE SIZE (ENTRY)	1X2CX1.5mm² (M20X1.5P 1No)	NA	NA
MAIN CABLE SIZE	1 * 3C,25-MM²	**CABLE ENTRY**	M25X1.5P 1-No.

CUSTOMER	TANGENCO		RATED O/P kW	30
PO No			NO OF POLES	4
INDENT / ENQ No	NMCI811287/100		FRAME	ND200L
CLIENT	TANGENCO	Tag No.		
PROJECT	2 X 660 MW ENNORE TPS			

	NAME	DATE	
			ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED
DRAWN BY	AMR	06-12-2018	**TITLE :**
CHECKED BY	SBK	06-12-2018	TERMINAL BOX ARRANGEMENT
APPROVED BY	SRB	06-12-2018	

CG Power and Industrial Solutions Limited
LT Motors Division
Ahmednagar

SEA9102R1

DRG No :

61910106

CG Power and Industrial Solutions Limited

LT Motors Division
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CUSTOMER : TANGENCCO

MOTOR DATA SHEET (BHEL)

SrNo	Particulars	VALUE
1	Application	CONDENSER WATER PUMP FOR TG HALL (2 NOS) & CONDENSER WATER PUMP FOR SERVICE BUILDING (2 NOS)
2	Quantity	2 + 2
3	Make	**CG Power and Industrial Solutions Limited**
4	Frame Size	ND225M
5	Application Standards	IS/IEC 60034,
6	Type of Motor	3 PHASE AC SQUIRREL CAGE INDUCTION MOTOR IE3
7	Service	CONTINUOUS
8	Harzardous Area Classification if any	TEFC Safe Area
9	Duty Cycle/Designation	S1
10	Rated Output at 40 deg Ambient kW	48.91
11	Rated Output at 50 deg Ambient kW	45.00
12	Rates Speed (RPM)	1475
13	Rated Voltage & % Variation	415/+-10% (Combined V&F variation +/-10%)
14	Rated Frequency & % Variation	50/+3-5%
15	Full Load Current (A)	80
16	No load current (Approx.) (A)	30/35
17	Rated Power Factor	0.83
18	Efficiency at rated voltage and frequency : %	
19	Full Load	94.2
20	3/4 Load	94.2
21	1/2 Load	93
22	Method of starting	Direct On Line
23	Starting current at rated Voltage (% of FLC)	700
24	Starting Torque at rated voltage	250
25	Pull out Torque at rated Voltage	300
26	Starting time at 80% 100% for fans motors and 90% 100% for mill motors : sec	
27	With Load	0.229797149738432 / 0.174349321338486
28	Without Load	less than 2 seconds.
29	Safe Stall time at 110% rated voltage	
30	HOT Condition	10
31	COLD Condition	20
32	Safe stall time at 100% / 80% rated V for fans	
33	HOT	12/18.75
34	COLD	24/37.5
35	Thermal Time Constant	
36	Heating	45
37	Cooling	90
38	Starts	
39	Equally spread/Hour	4 for load GD2 = motor GD2
40	Successive cold	3 for load gd2=motor gd2
41	Successive hot	2 for load gd2=motor gd2
42	Noise level	As Per IS:12065
43	Vibration level	As per IS:12075
44	Degree of protection of enclosure	IP55
45	Method of cooling	FAN COOLED (IC 0141)
46	Insulation class	F (Temp. rise limited to class 'B')
47	Temperature rise over 50 deg ambient (by resistance)	70
48	Tropicalised	NO
49	Winding connection	Delta
50	Bearing	6313-ZZ/6213-ZZ
51	Make	SKF / FAG / NTN / EQUIVALENT
52	Type DE/NDE	BALL/BALL
53	Recommended lubricant	Greased for life
54	Motor Terminal Box	
55	Type, phase segregated	CAST IRON, NON PHASE SEGREGATED
56	Location as seen from DE	RHS From DE
57	Fault withstand	
58	Current	50 kA
59	Time	0.25 second

CG Power and Industrial Solutions Limited

LT Motors Division
Ahmednagar

CUSTOMER : TANGENCO

Project: 2X660 MW ENNORE TPS

MOTOR DATA SHEET (BHEL)

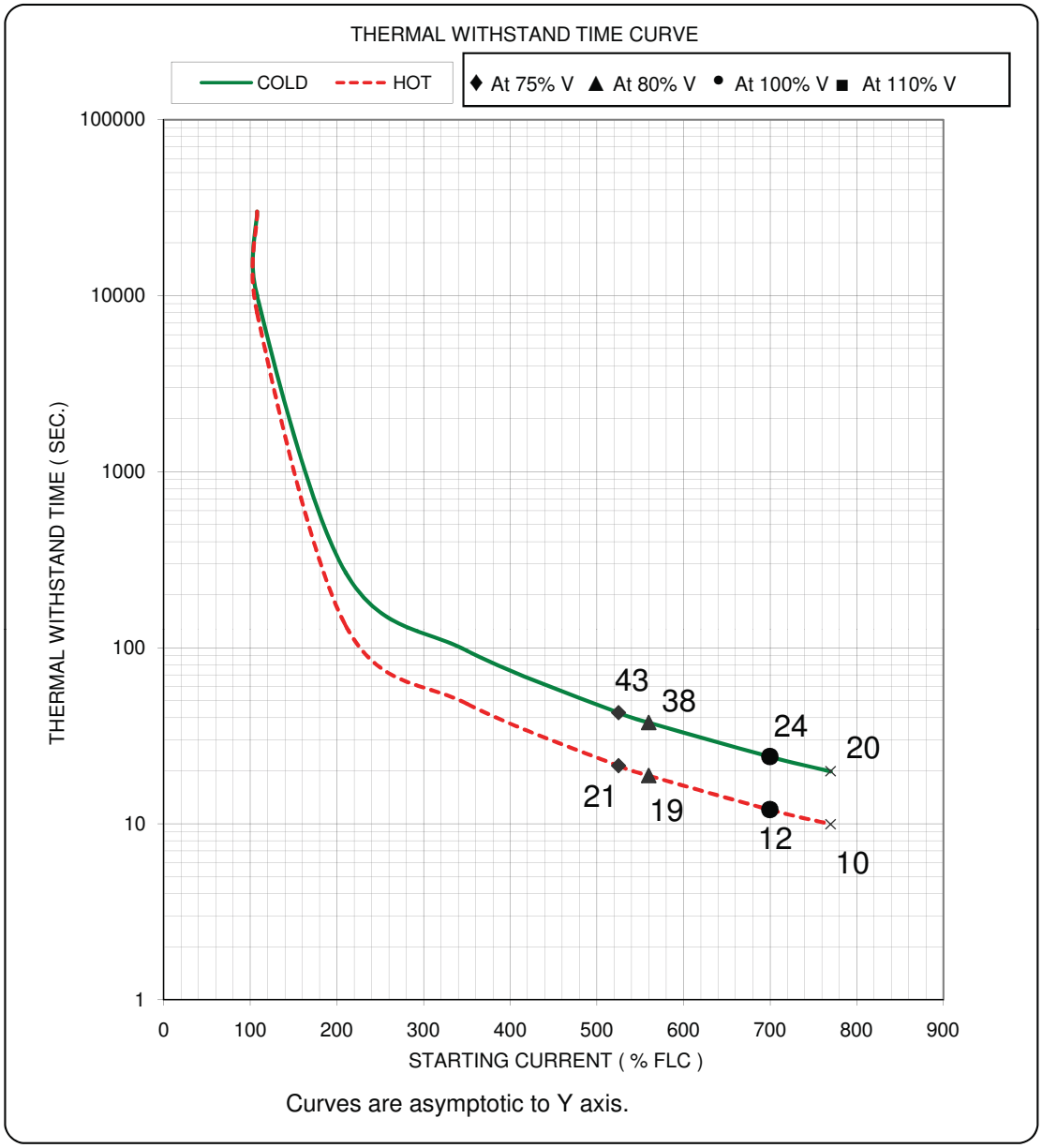
SrNo	Particulars	VALUE
60	Cable lugs and Glands furnished	Cable Gla d & L g S iable f Cable i e
61	Type and Range/size of cable	1 * 3C,95-MM²
62	Space Heaters	
63	No. x Watt(Total)	SPACE HEATER 60WX1 (200/225)
64	Volts, Phase, Frequency	240V,1PH, 50 HZ
65	Separate terminal box	AS PER TB DRAWING
66	Winding Temperature Detector	NO
67	Type	N.A.
68	Nos. and locations where provided	N.A.
69	Resistance at 0°	N.A.
70	Bearing Temperature Indicator	NO
71	Type	N.A.
72	Nos. furnished	N.A.
73	Resistance at 0°	N.A.
74	Temperature Indicators	NOT APPLICABLE
75	Type	--
76	No provided	--
77	Locations	--
78	Temperature Alarm Contacts	NOT APPLICABLE
79	Nos. provided	--
80	Locations	--
81	Contact Rating	--
82	Flow Switch	NOT APPLICABLE
83	Nos. provided	--
84	Locations	--
85	Contact Rating	--
86	Current Transformer for Differential Protection	NOT APPLICABLE
87	Nos. provided	--
88	Locations	--
89	Contact Rating	--
90	Accessory Terminal Box	
91	Nos. provided	AS PER TB DRAWING
92	Cable Glands/lugs furnished	Only DCG in CG scope
93	Type and Range/size of cable	AS PER TB DRAWING
94	Number of grounding pads provided	
95	On Motor Body	2
96	On Terminal Box	1
97	Type of Mounting	B3
98	Overall Dimensions	AS PER GENERAL ARRANGEMENT DRAWING
99	Moment of Inertia GD2 IN KG-M2	
100	Driven Equipment	2.32
101	Rotor	2.32
102	Total	4.64
103	Weight kg	
104	Stator with winding kg	214
105	Rotor(with winding) kg	107
106	Total kg	357

NOTEs:

All performance data is subject to tolerance as per IEC 60034
All performance shall be measured on sinusoidal supply
Temp rise test shall be carried at rated kW & voltage for 1 hour other than S1 duty

Customer specific paint shade and paint thickness will not be applicable on powder coated components.

ISSUED BY :	Md Shuaib Timmapure
	LT MOTORS DIVISION ,
	A-6/2 MIDC , AHMEDNAGAR



CUSTOMER	TANGENCO			RATED O/P kW	45
P.O.NO				NO OF POLES	4
IND.NO:	NMCI811287/200			FRAME	ND225M
CLIENT:	TANGENCO			TAG NO.	0
PROJECT:	2 X 660 MW ENNORE TPS				
	NAME	DATE	TITLE		
DRN	PLP	6-Dec-18	THERMAL WITHSTAND TIME CURVE		
CHD	PLP	6-Dec-18			
APPROVED	RGV	6-Dec-18	SC12/24/700		

CG Power and Industrial Solutions Limited
LT Motors Division
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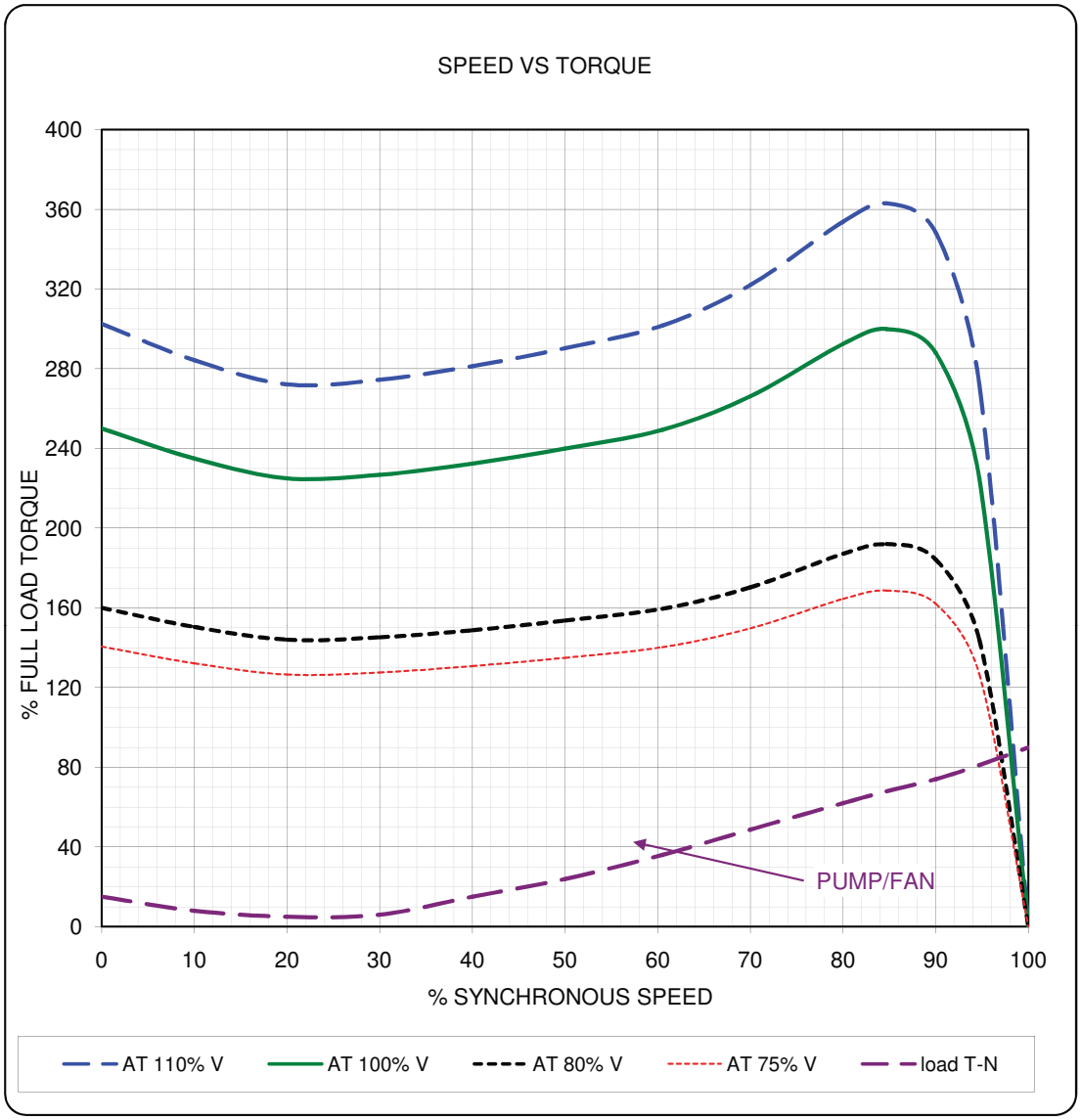

CUSTOMER	TANGENCO	RATED O/P kW	45
P.O.NO		NO OF POLES	4
IND.NO:	NMCI811287/200	FRAME	ND225M
CLIENT:	TANGENCO	TAG NO.	0
PROJECT:	2 X 660 MW ENNORE TPS		

	NAME	DATE	TITLE
DRN	PLP	6-Dec-18	SUPERIMPOSED TORQUE SPEED CURVE
CHD	PLP	6-Dec-18	
APPROVED	RGV	6-Dec-18	SC250/700

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LT Motors Division
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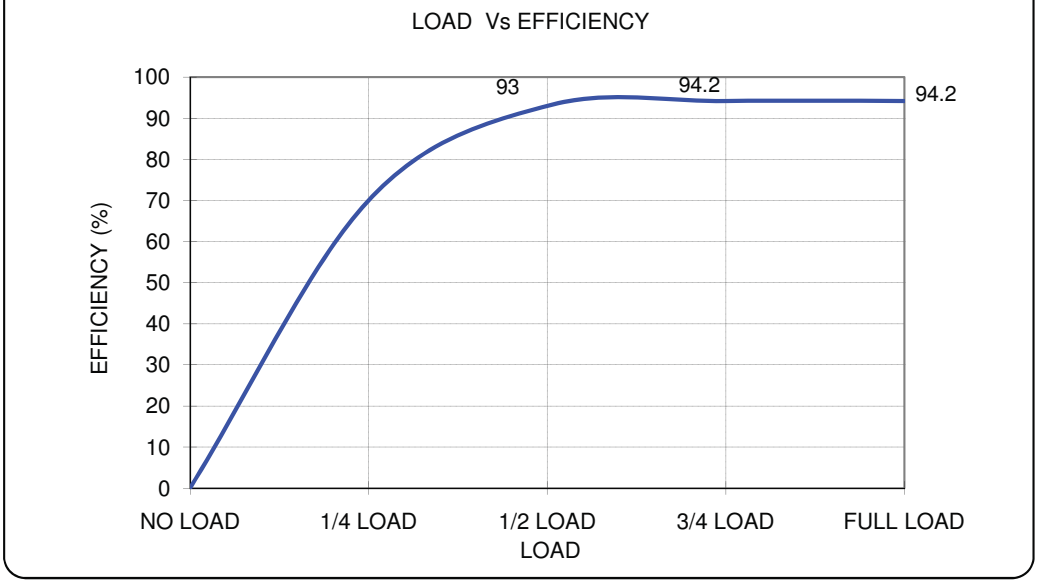

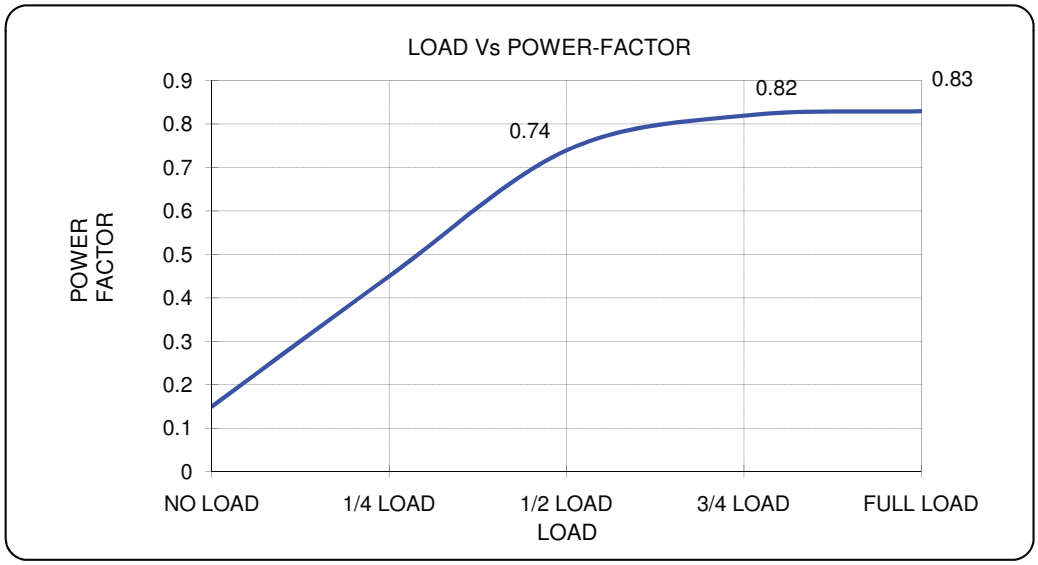

CUSTOMER	TANGENCO	RATED O/P kW	45
P.O.NO		NO OF POLES	4
IND.NO:	NMCI811287/200	FRAME	ND225M
CLIENT:	TANGENCO	TAG NO.	0
PROJECT:	2 X 660 MW ENNORE TPS		

	NAME	DATE	TITLE
DRN	PLP	6-Dec-18	LOAD Vs EFFICIENCY & POWER FACTOR CURVE
CHD	PLP	6-Dec-18	
APPROVED	RGV	6-Dec-18	SC94.20/0.83

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LT Motors Division
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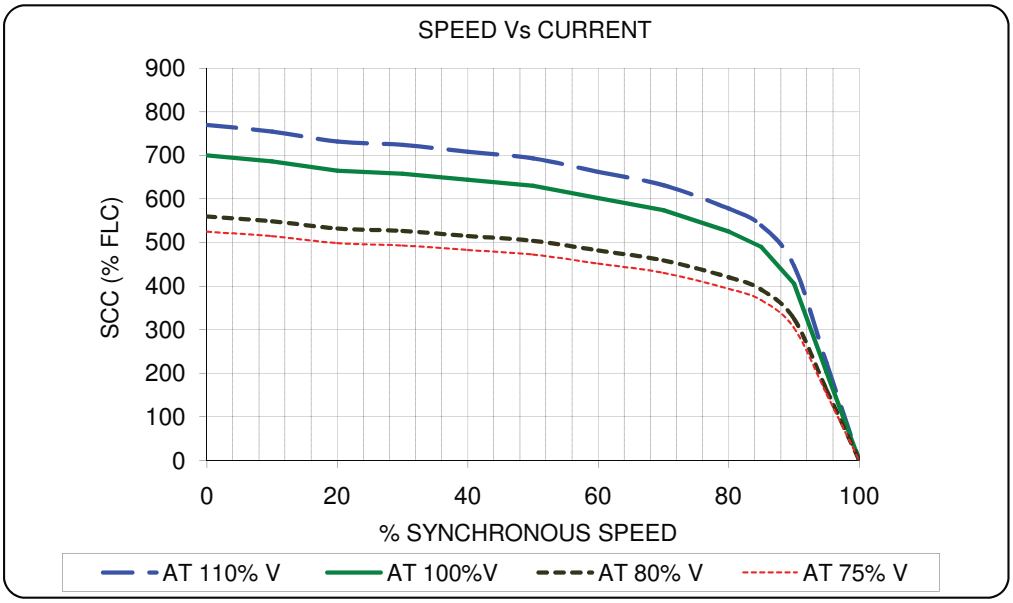

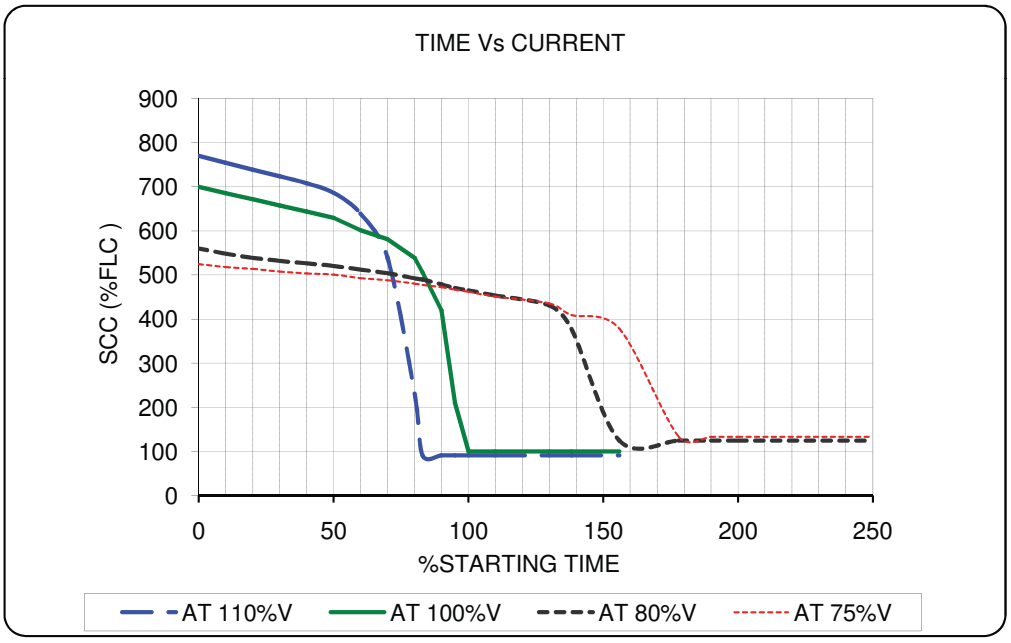

CUSTOMER	TANGENCO			RATED O/P kW	45
P.O.NO				NO OF POLES	4
IND.NO:	NMCI811287/200			FRAME	ND225M
CLIENT:	TANGENCO			TAG NO.	0
PROJECT:	2 X 660 MW ENNORE TPS				
	NAME	DATE	TITLE		
DRN	PLP	6-Dec-18	CURRENT SPEED & CURRENT TIME CURVE		
CHD	PLP	6-Dec-18			
APPROVED	RGV	6-Dec-18	SC1475/100		

CG Power and Industrial Solutions Limited
LT Motors Division
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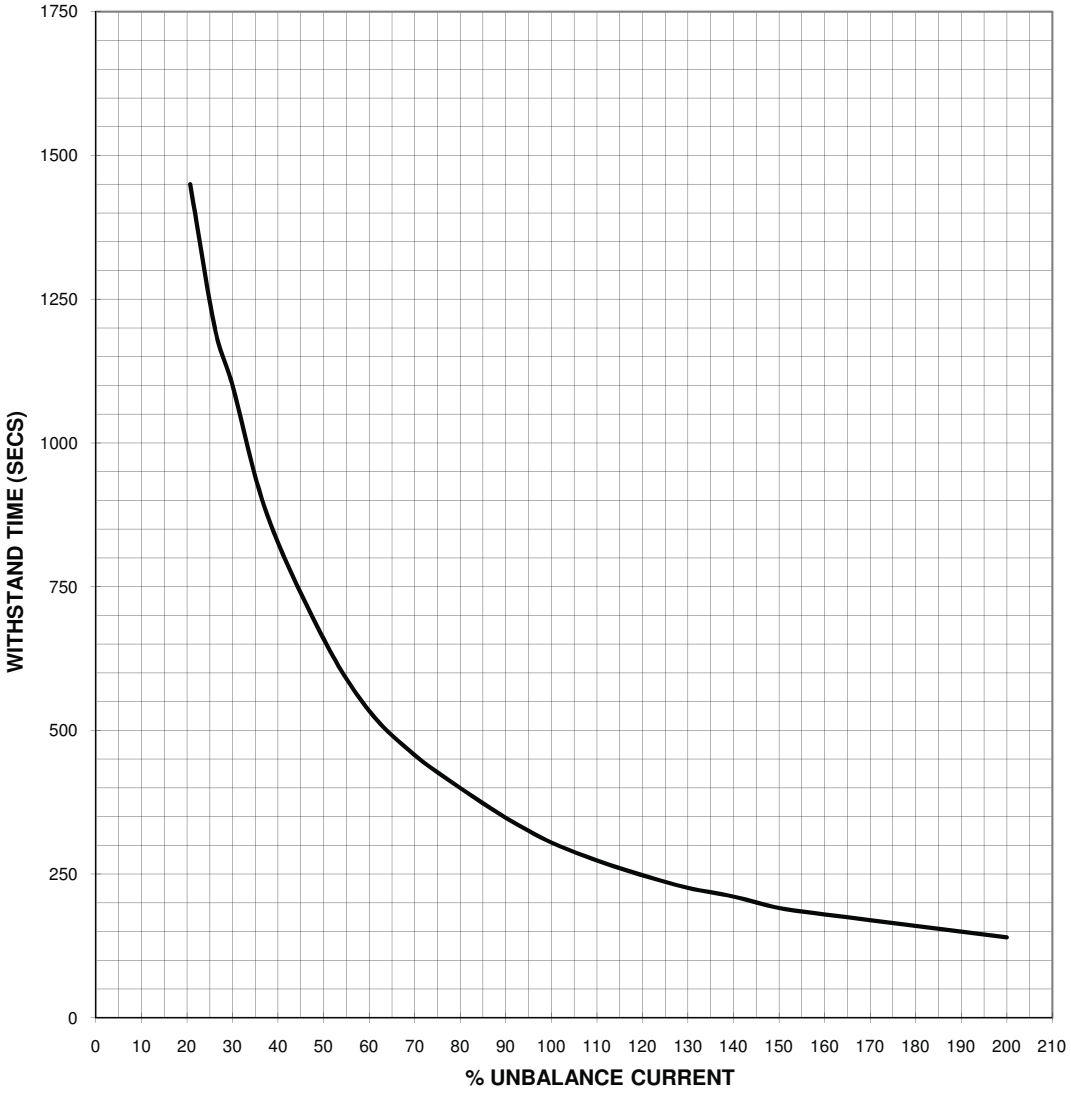
NEGATIVE SEQUENCE CHARACTERISTICS



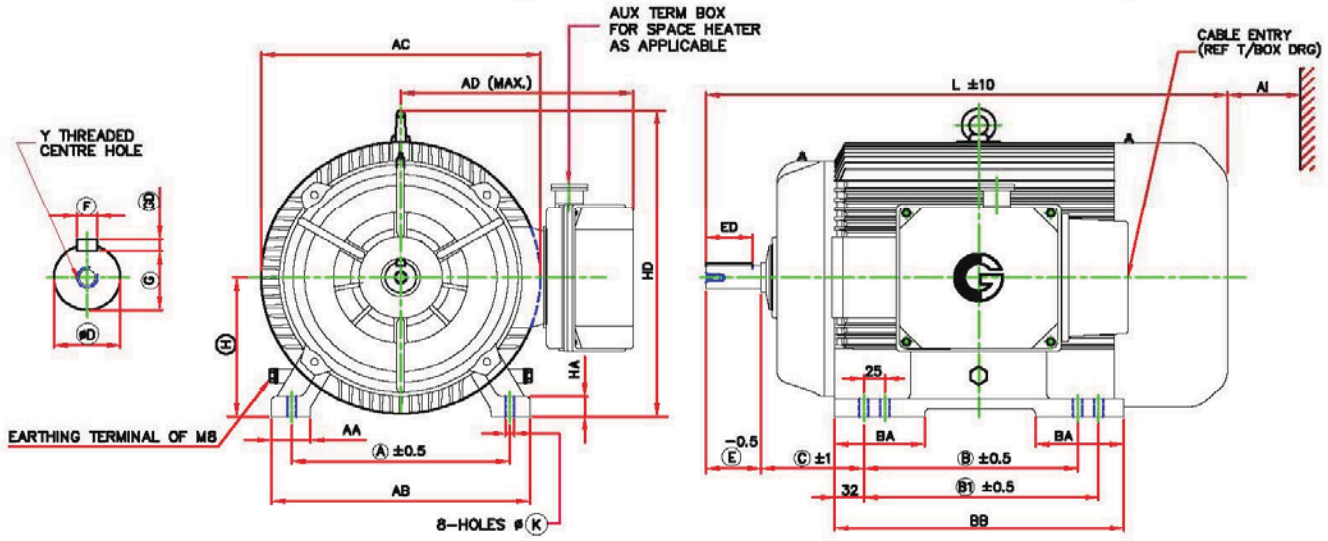
CUSTOMER	TANGENCO			RATED O/P kW	45
P.O.NO				NO OF POLES	4
IND.NO:	NMCI811287/200			FRAME	ND225M
CLIENT:	TANGENCO			TAG NO.	0
PROJECT:	2 X 660 MW ENNORE TPS				
	NAME	DATE	TITLE		
DRN	PLP	6-Dec-18	NEGATIVE SEQUENCE CHARACTERISTICS		
CHD	PLP	6-Dec-18			
APPROVED	RGV	6-Dec-18			

CG Power and Industrial Solutions Limited
LT Motors Division
Ahmednagar

DIMENSION DRAWING OF 3 PH SQUIRREL CAGE TEFC FOOT MOUNTED TB ON RHS (FROM DE) INDUCTION MOTOR

PROJECTION

DO NOT SCALE | PLEASE ASK, IF IN DOUBT



FRAME	FOOT FIXING										OVER ALL					MOTOR wt (kg)	AI**
	A	B	B1	C	H TOL	AA	AB	BA	BB	K TOL	AD	AC	L	HD	HA		
ND225M	356	286	311	149	225.0 / 224.5	70	425	102	375	19.0 / 19.5	395	470	850	534	25	357	110

D END SHAFT EXTENSION AND KEY						
D TOL	E	ED	F TOL	GD TOL	G	Y
60.030 / 60.011	140	110	18.00 / 17.957	11.0 / 10.9	53.0 / 52.8	M20X40

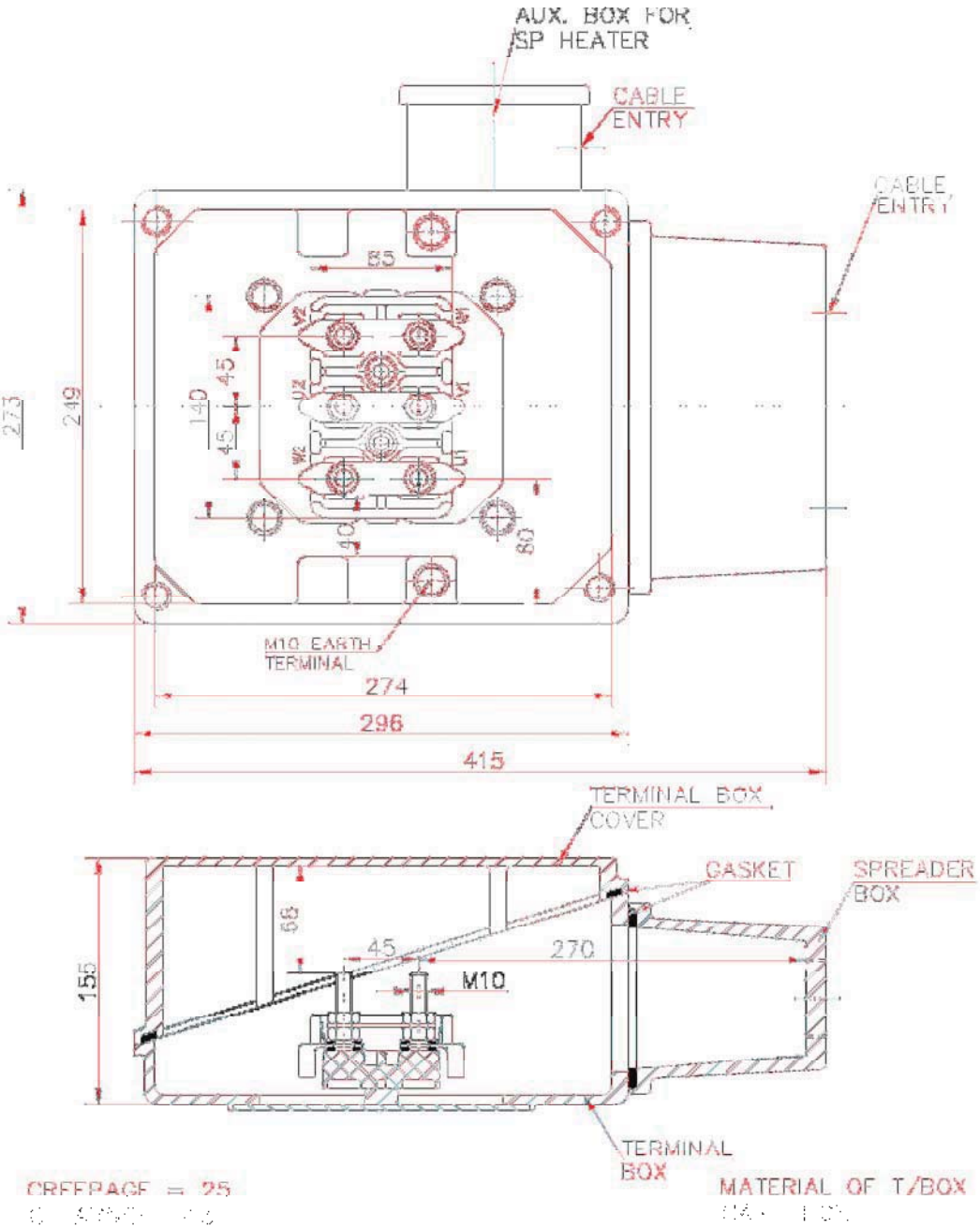
NOTES TERMINAL BOX CAN BE ROTATED IN 360 DEG @90 DEG.
ONE EARTHING TERMINAL IS PROVIDED INSIDE MAIN TERMINAL BOX.
MOTOR MAY HAVE ADDITIONAL FOOT HOLES FOR CUSTOMER/SITE FLEXIBILITY
**MINIMUM DISTANCE FOR EFFICIENT COOLING OF MOTOR TO BE MAINTAINED BY USER

ALL DIMENSIONS ARE IN mm
RINGED DIMENSIONS ARE AS PER IS:1231/IEC60072

CUSTOMER	TANGENCO		RATED O/P kW	45	
P.O. NO.			NO OF POLES	4	
IND. NO.	NMCI811287/200		FRAME	ND225M	MOUNTING B3
CLIENT	TANGENCO		TAG NO.		
PROJECT	2 X 660 MW ENNORE TPS				
	NAME	DATE	REMARKS	TITLE	
DRN	SBK	6-Dec-18		**DIMENSIONAL DRAWING**	
CHD	SBK	6-Dec-18			
APPROVED	SSN	6-Dec-18			

CG Power and Industrial Solutions Limited
LT Motors Division
Ahmednagar

DRG NO
NMCI811287/200-4
REV 0



ACCESSORIES	SPACE HEATER		THERMISTOR	RTD	
APPLICABLE	YES		NA	NA	
CABLE SIZE (ENTRY)	1X2CX1.5mm² (M20X1.5P 1No)		NA	NA	
MAIN CABLE SIZE	1 * 3C,95-MM²		**CABLE ENTRY**	M40X1.5P 1-No.	
CUSTOMER	WILO Mather And Platt Pumps P Ltd.			RATED O/P kW	45
PO No				NO OF POLES	4
INDENT / ENQ No	NMCI811287/200			FRAME	ND225M
CLIENT	TANGENCO		Tag No.		
PROJECT	2 X 660 MW ENNORE TPS				
	NAME	DATE	ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED		
DRAWN BY	AMR	06-12-2018	**TITLE :**		
CHECKED BY	SBK	06-12-2018	TERMINAL BOX ARRANGEMENT		
APPROVED BY	SRB	06-12-2018			

CG Power and Industrial Solutions Limited
LT Motors Division
Ahmednagar

SEA9256R2

DRG No :

61911106

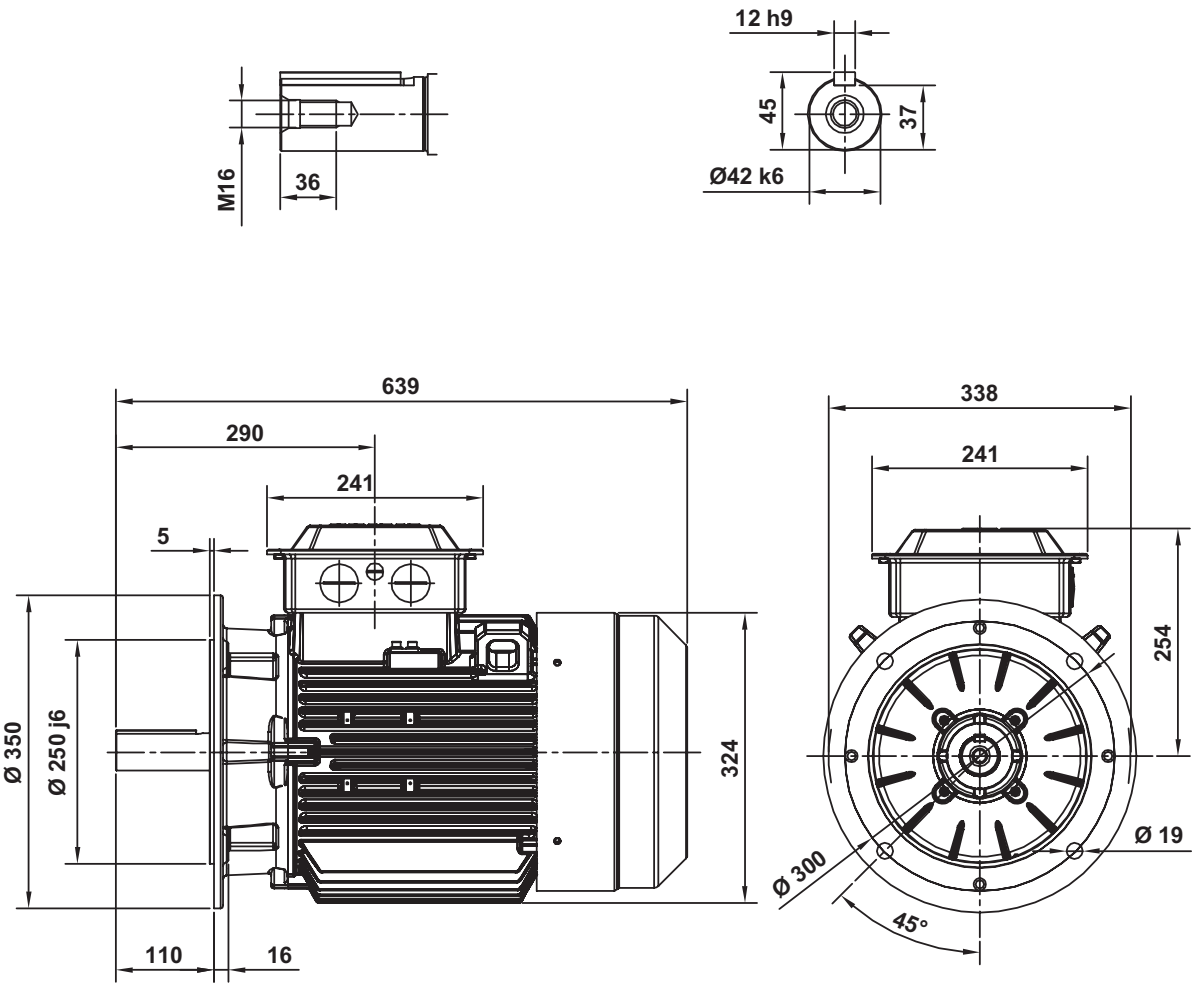
TDS OF MOTOR FOR COOLING TOWER

ABB Motors and Generators	Technical Data Sheet			
	Project 2X660 MW ENNORE TPS		Location : COOLING TOWER FAN TG BLDG, ADMIN & SERVICE BLDG.	
Department/Author	Customer name TANGEDCO		Customer ref.	Item name **1.0001**
Our ref.	Rev/Changed by **A**	Date of issue **4/13/2017**	Saving ident **untitled.xls**	Pages **1(3)**

No.	Definition	Data	Unit	Remarks	
1	Product	***TEFC, 3-phase, squirrel cage induction motor***			
2	Product code	***3GBA 163 410-BDDIN***		Calc. ref.	3GZH021016-39
3	Type/Frame	***M2BAX 160MLA 6***			
4	Mounting	***IM3001, B5(flange)***			
5	Rated output P_N	***7.5***	kW		
6	Service factor	***1***			
7	Type of duty	***S1 100%***			
8	Rated voltage U_N	***415***	VD	+10, -10 %	
9	Rated frequency f_N	***50***	Hz	+5, -5 %	
10	Rated speed n_N	***972***	r/min		
11	Rated current I_N	***15.7***	A		
12	Starting current I_s/I_N	***6.5***			
13	Nominal torque T_N	***74***	Nm		
14	Locked rotor torque T_S/T_N	***2.1***			
15	Maximum torque T_{max}/T_N	***3.1***			
	Load characteristics	Load %	Current A	Efficiency %	Power factor
16		*100*	**15.7**	**89.1 / IE3**	**0.75**
17		*75*	**12.6**	**90.2**	**0.69**
18		*50*	**10.2**	**90**	**0.57**
19	Thermal withstand time hot	***12***	s		
20	Thermal withstand time cold	***19***	s		
21	Insulation class / Temperature class	***F / B***			
22	Ambient temperature	***50***	°C		
23	Altitude	***1000***	m.a.s.l.		
24	Degree of protection	***IP55***			
25	Cooling system	***IC411***			
26	Bearing DE/NDE	***6209-2Z/C3 - 6209-2Z/C3***			
27	Sound pressure level (LP dB(A) 1m)	***70***	dB(A)	at no-load	
28	Moment of inertia J = ¼ GD2	***0.089***	kg-m2		
29	Position of terminal box	***Top***			
30	Direction of rotation	***Bi-directional***			
31	Weight of rotor	***31***	kg		
32	Total weight of motor	***119***	kg		

Remarks:

All performance values are subject to IS/IEC tolerances



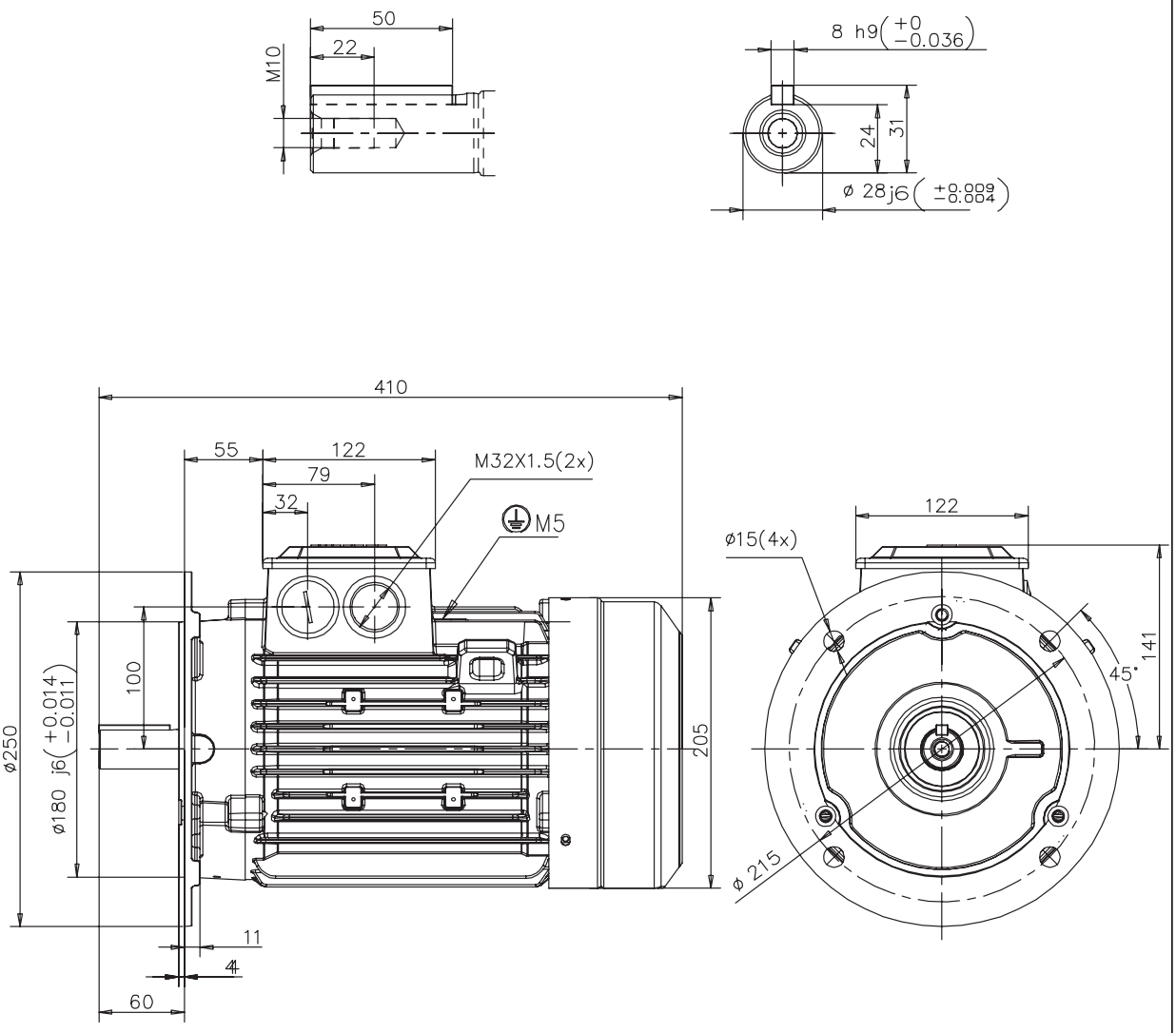
Motor Dimension Print	Motor Type : M2BAX160ML A2,B2,A4,A6	Document Nº : 3GZH500016-207
Description : Motor IE3 flange mounted IM3001		
Unit : ABB, LV Motors, India Date : 2018-01-09	Issued by : AKK Approved by : SA	Replaces : Replaced by :
ABB India Ltd.	Customer Reference :	ABB

ABB Motors and Generators	Technical Data Sheet			
	Project 2X660 MW ENNORE TPS		Location : COOLING TOWER FAN FOR ESP BUILDING	
Department/Author	Customer name TANGEDCO		Customer ref.	Item name **1.00006**
Our ref.	Rev/Changed by **A**	Date of issue **4/13/2017**	Saving ident **untitled.xls**	Pages **1(3)**

No.	Definition	Data	Unit	Remarks	
1	Product	***TEFC, 3-phase, squirrel cage induction motor***			
2	Product code	***3GBA 102 520-BDDIN***		Calc. ref.	3GZH021010-2
3	Type/Frame	***M2BAX 100LB 4***			
4	Mounting	***IM3001, B5(flange)***			
5	Rated output P_N	***2.2***	kW		
6	Service factor	***1***			
7	Type of duty	***S1 100%***			
8	Rated voltage U_N	***415***	VD	+10, -10 %	
9	Rated frequency f_N	***50***	Hz	+5, -5 %	
10	Rated speed n_N	***1450***	r/min		
11	Rated current I_N	***4.6***	A		
12	Starting current I_s/I_N	***6.8***			
13	Nominal torque T_N	***14.5***	Nm		
14	Locked rotor torque T_S/T_N	***3.1***			
15	Maximum torque T_{max}/T_N	***3.7***			
	Load characteristics	Load %	Current A	Efficiency %	Power factor
16		*100*	**4.6**	**86.7 / IE3**	**0.76**
17		*75*	**3.9**	**86.9**	**0.68**
18		*50*	**3.3**	**85.1**	**0.55**
19	Thermal withstand time hot	***7***	s		
20	Thermal withstand time cold	***12***	s		
21	Insulation class / Temperature class	***F / B***			
22	Ambient temperature	***50***	°C		
23	Altitude	***1000***	m.a.s.l.		
24	Degree of protection	***IP55***			
25	Cooling system	***IC411***			
26	Bearing DE/NDE	***6206-2Z/C3 - 6205-2Z/C3***			
27	Sound pressure level (LP dB(A) 1m)	***70***	dB(A)	at no-load	
28	Moment of inertia J = ¼ GD2	***0.00919***	kg-m2		
29	Position of terminal box	***Top***			
30	Direction of rotation	***Bi-directional***			
31	Weight of rotor	***8***	kg		
32	Total weight of motor	***34***	kg		

Remarks:

All performance values are subject to IS/IEC tolerances



Rev	Change	Date	Prep.	Rev.	Appr.
A	Hole size changed from Dia.14.5 to Dia.15mm	19/12/2017	AKK	DKS	SA

Motor Dimension Print	Motor Type : **M2BAX 100LK 2-8P**	Document Nº : **3GZH500010-2**
Description : **Motor IE3 flange mounted IM3001**		
Unit : **ABB, LV Motors, India** Date : **2015-10-16**	Issued by : **DKS** Approved by : **SA**	Replaces : Replaced by :
ABB India Ltd.	Customer Reference :	ABB

DOC MENT IS APPRO ED IDE TANGEDCO LETTER NO. SE/E/TH&H P/ EE-7/M/AEE/M/F.EN SE STPP/D.670 /18 DT.25.09.2018

BHARAT HEAVY ELECTRICALS LIMITED
PROJECT ENGINEERING MANAGEMENT
(MECHANICAL AUXILIARY)

This approval status shall be interpreted as laid down in the contract and it shall not relieve the contractor from his contractual obligation.

APPROVAL CATEGORY AWARED = I

CAT I - Approved
CAT II - Approved with Comments as Noted
CAT III - Not Approved
CAT IV - Reference Drawing

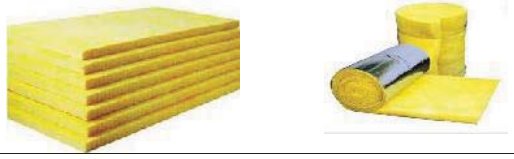
Name: VIPIN NAUNI
Signature:

VIPIN NAUNI
Document is prepared as per specification and is found in order. Submitted for customer approval.
2017.12.05 12:27:12 +05'30'

Date	Rev	Description of Revision	ALT	CHD	APPD
23/11/2017	00	Revised as per BHEL comments	Vikas	Rajvir	PC
06/11/2017	B	Revised as per BHEL comments	Vikas	Rajvir	PC
17/08/2017	A	First Submission	Vikas	Rajvir	PC

PROJECT	2x660 MW ENNORE SEZ COAL BASED STPP AT ASH DYKE OF NCTPS, CHENNAI
	CUSTOMER TAMILNADU GENERATION AND DISTRIBUTION CORPORATION LIMITED (TANGEDCO)
	CONSULTANT **DESEIN PRIVATE LIMITED** **DESEIN HOUSE, GREATER KAILASH-II, NEW DELHI**
	EPC CONTRACTOR BHARAT HEAVY ELECTRICALS LTD PS-PEM, PPEI-BUILDING, SECTOR-16A, PLOT NO. 25, NOIDA-201301

PACKAGE	**AIR CONDITIONING SYSTEM**
TITLE	**TDS of Insulation material (Duct Insulation, duct lining, Pipe Insulation)**

TECHNICAL DATA SHEET FOR THERMAL INSULATION ACCOUSTIC		
S.NO.	**DESCRIPTION**	**SPECIFICATION**
A.	**DUCT INSULATION**	
1	Item	Fiber Glass Wool
2	Application	Duct Thermal Insulation For AC Duct
3	**MAKE**	**AS PER APPROVED VENDOR LIST**
4	Product (Indicative)	
5	Chemical Name	Resin bonded Foil Faced Fiber Glass Wool
6	Thermal Conductivity in W/MK at 50^{o}C(K Value)	0.033 W/MK
7	Density	48 Kg/m^{3}
8	Thickness	50 mm
9	Shapes	Slab or Roll Form for indoor ducts/Rigid Board for exposed duct only
10	Facing	26G Aluminium Cladding
B.	**DUCT ACOUSTIC, AHU ROOM ACOUSTIC AND PAC ROOM ACCOUSTIC**	
1	Item	Fiber Glass Wool
2	Application	Duct Acoustic for AC Duct and PAC/AHU Room Acoustic
3	**MAKE**	**AS PER APPROVED VENDOR LIST**
4	Product Image	
5	Chemical Name	Resin bonded Plain Fiber Glass Wool
6	Thermal Conductivity in W/MK at 50^{o}C(K Value)	0.033 W/MK
7	Density	48 Kg/m^{3}
8	Thickness	25 MM
9	Accoustic Area	First 6.00 meter of duct and wall adjacent to AC Area
10	Perforation	26 Gauge Al Sheet with 30% Perforation
11	Shapes	Slab/Roll Form
12	Facing	Al perforated sheet
C.	**Chilled Water Pipe, Valves and Pump**	
1	Item	Expanded Polystyrene (EPS) TF Quality
2	Applicable Standard	IS:4671-1984
3	Application	Insulation of Supply & Return Chilled Water Pipe, Valves in Chilled water line and CHW Pump
4	Product Image(indicative)	
5	**MAKE**	**AS PER APPROVED VENDOR LIST**

6	Chemical Name	Rigid Expanded Polystyrene
7	Temperature	-150ºC to 80º C
8	Thermal Conductivity mW/cm ^{o}C at (10º)C	0.32 at 10ºC
9	Density	32 Kg/m^3
10	Shapes	Pipe Section/Slab
11	Facing	Al Cladding, 26 Gauge for indoor and outdoor both
12	Thickness	50mm
D.	**AHU & Chiller Drain Pipe Insulation**	
1	Item	Expanded Polystyrene (EPS) TF Quality
2	Applicable Standard	IS:4671-1984
3	Application	AHU Drain Water Insulation
4	**MAKE**	**AS PER APPROVED VENDOR LIST**
5	Product Image(indicative)	
6	Chemical Name	Rigid Expanded Polystyrene
7	Temperature	-150ºC to 80º C
8	Thermal Conductivity mW/cm ^{o}C at (10º)C	0.37 at 10ºC
9	Density	16 Kg/m^3
10	Shapes	Pipe Section
11	Facing	Al Cladding, 26 Gauge
12	Thickness	25 MM
E	**Refrigerant Pipe Insulation for Split AC**	
1	Item	Nitrile Rubber Insulation
2	Application	Liquid & Gas Pipe Insulation
3	**MAKE**	**AS PER APPROVED VENDOR LIST**
4	Product Image(indicative)	
5	Chemical Name	Closedcell Nitrile Rubber Class-0
6	Thermal Conductivity W/MK at (0º)C	0.035
7	Shapes	Pipe Section/Slab
8	Facing	Nitrile Rubber Plain
9	**THICKNESS OF INSULATION**	
9.1	Liquid Line of Condensing Units	13 mm thick
9.2	Gas line of Condensing Units	13 mm thick
F	**Refrigerant Pipe Insulation for Condensing Units**	
1	Item	Nitrile Rubber Insulation
2	Application	Liquid & Gas Pipe Insulation
3	**MAKE**	**AS PER APPROVED VENDOR LIST**

4	Product Image(indicative)	
5	Chemical Name	Closedcell Nitrile Rubber Class-0
6	Thermal Conductivity W/MK at (0º)C	0.035
7	Shapes	Pipe Section/Slab
8	Facing	Nitrile Rubber Plain
9	**THICKNESS OF INSULATION**	
9.1	Liquid Line of Condensing Units	19 mm thick
9.2	Gas line of Condensing Units	25 mm thick
G	**Drain Pipe Insulation for Split AC**	
1	Item	Nitrile Rubber Insulation
2	Application	Liquid & Gas Pipe Insulation
3	**MAKE**	**AS PER APPROVED VENDOR LIST**
4	Product Image(indicative)	
5	Chemical Name	Closedcell Nitrile Rubber Class-0
6	Thermal Conductivity W/MK at (0º)C	0.035
7	Shapes	Pipe Section/Slab
8	Facing	Nitrile Rubber Plain
9	Thickness of Insulation	13 mm thick
H.	**Expansion Tank**	
1	Item	Expanded Polystyrene (EPS) TF Quality
2	Applicable Standard	IS:4671-1984
3	Application	Expansion Tank
4	Product Image(indicative)	
5	MAKE	AS PER APPROVED VENDOR LIST
6	Chemical Name	Rigid Expanded Polystyrene
7	Temperature	-150ºC to 80º C
8	Thermal Conductivity mW/cm ^{o}C at (10º)C	0.32 at 10ºC
9	Density	16 Kg/m3
10	Shapes	Slab
11	Facing	Covered with 12.5mm thick sand cement plaster
12	Thickness	50mm

Note: 1. Insulation of Split AC indoor and Packaged AC will be as per manufacturer standard (if any).
2. CHW pipe insulation shall be finished with 26G Aluminium cladding instead of sand cement plaster for both indoor and outdoor, since Al cladding is aesthetically and technically better.

BHARAT HEAVY ELECTRICALS LIMITED
PROJECT ENGINEERING MANAGEMENT
(MECHANICAL AUXILIARY)

This approval status shall be interpreted as laid down in the contract and it shall not relieve the contractor from his contractual obligation.

APPROVAL CATEGORY AWARED = I

CAT I - Approved
CAT II - Approved with Comments as Noted
CAT III - Not Approved
CAT IV - Reference Drawing

Name: VIPIN NAUNI
Signature:

VIPIN NAUNI
Revised as per TANGEDCO / DESEIN Comments.
Reviewed by BHEL and found in order. Submitted for customer approval.
2019.10.09 18:04:22 +05'30'

Date	Rev	Description of Revision	ALT	CHD	APPD
09/10/2019	01	As per BHEL Comments	OWAIS	NAYAB	SKT
10/05/2019	00	As per BHEL Comments	OWAIS	NAYAB	SKT
19/12/2018	B	As per BHEL Comments	ALAM	SALIM	SKT
13/11/2018	A	First Submission	ALAM	SALIM	SKT

PROJECT	2x660 MW ENNORE SEZ COAL BASED STPP AT ASH DYKE OF NCTPS, CHENNAI
	CUSTOMER TAMILNADU GENERATION AND DISTRIBUTION CORPORATION LIMITED (TANGEDCO)
	CONSULTANT **DESEIN PRIVATE LIMITED** **DESEIN HOUSE, GREATER KAILASH-II, NEW DELHI**
	EPC CONTRACTOR BHARAT HEAVY ELECTRICALS LTD PS-PEM, PPEI-BUILDING, SECTOR-16A, PLOT NO. 25, NOIDA-201301

STATUS	**CONTRACT**	**DOC. NO: PE-V0-412-553-A024**	Rev: **01**
PACKAGE		**AIR CONDITIONING SYSTEM**	
TITLE		**TDS & GAD of Fresh Air Fans**	

PROJECT: 2X660 MW ENNORE TPS
CUSTOMER / CONSULTANT: TANGEDCO / DESEIN
EPC CONTRACTOR: BHEL

PACKAGE SUPPLIER:
PACKAGE: AIR CONDITIONING SYSTEM
DOCUMENT NO: PE- V0-412-553-A024

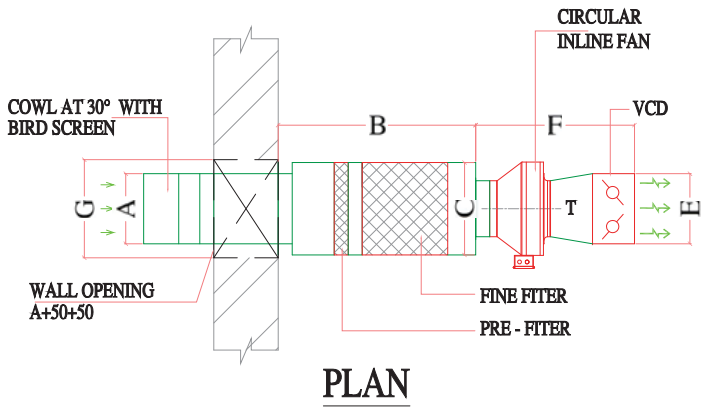
TECHNICAL DATA SHEET FOR INLINE FRESH AIR FANS										
Sr. No.	**Description**	**Unit**	**Particulars**							
1	Manufacturer of Fan		Nicotra							
2	Model No.		CF-200B	CF-315 AA	CF-315 B	CF-315 B	CDIF-09	CDIF-09	CDIF-10	CDIF-10
3	Type of Fan		Circular Inline fan - Supply	Circular Inline fan - Supply	Circular Inline fan - Supply	Circular Inline fan - Supply	Direct Drive cabinet fan -Supply	Direct Drive cabinet fan -Supply	Direct Drive cabinet fan -Supply	Direct Drive cabinet fan -Supply
4	Capacity	CFM	250	400	500	600	650	700	850	900
5	Static pressure	mmWG	36	38	42	35	36	35	45	44
6	Quantity	Nos.	4	2	6	8	2	4	2	6
7	Impeller Diameter	mm	200	315	315	315	175	175	200	200
8	Type of Fan Drive		Direct Drive	Direct Drive	Direct Drive	Direct Drive	Direct Drive	Direct Drive	Direct Drive	Direct Drive
9	Fan/Impeller Speed	RPM	2488	2300	2277	2277	1380	1380	1350	1350
10	Rated kW of Motor	kW	0.145	0.23	0.3	0.3	0.37	0.37	0.5	0.5
11	Power Supply		Single Phase Supply Feeder							
12	Bearing Type		Ball Bearing	Ball Bearing	Ball Bearing	Ball Bearing	Ball Bearing	Ball Bearing	Ball Bearing	Ball Bearing
13	Selection curves enclosed (yes/No)		yes	yes	yes	yes	yes	yes	yes	yes
14	Material of Casing		GI with 275 GSM	GI with 275 GSM	GI with 275 GSM	GI with 275 GSM	GI with 275 GSM	GI with 275 GSM	GI with 275 GSM	GI with 275 GSM
15	Thickness of Casing		20G	20G	20G	20G	20G	20G	20G	20G
16	Inspection & Testing		As per Certificate of Conformance							

TECHNICAL DATA SHEET FOR AXIAL FRESH AIR FANS

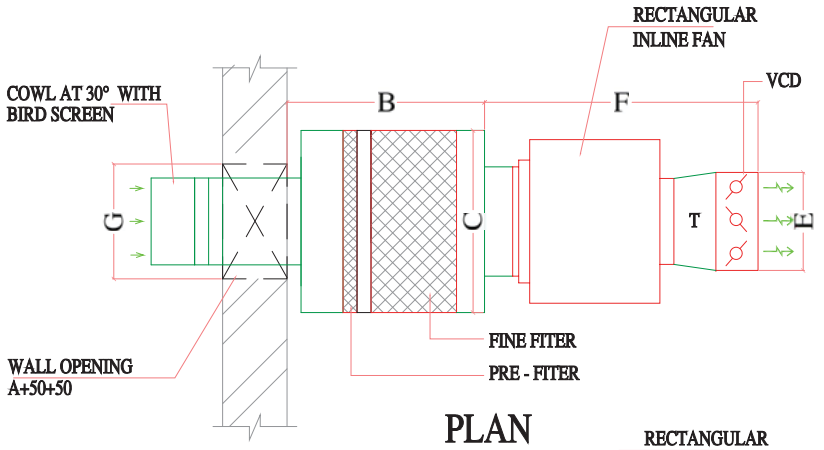
Sr. No.	Description	Unit	Particulars
1	Manufacturer		Nicotra
2	Model No.		ADTA-400
3	Type of Fan		Axial fan -Supply
4	Capacity	CFM	3000
		M3/Sec	1.42
5	Static pressure	mmWG	30
6	Total pressure	mmWG	35
7	No. of Blades	Nos.	5
8	Blade Angle	Deg.	As per OEM Standard
9	Location Areawise		At EL. 24.0 M, TG Bldg.
10	Quantity	Nos.	2
11	Impeller Diameter	mm	400
12	Type of Fan Drive		Direct Drive
13	Fan/Impeller Speed	RPM	2800
14	Critical Speed	RPM	3500
15	Shaft Power	BkW	1.07
16	Fan Efficiency	%	56
17	Bearing Type		Ball Bearing
18	Selection curves enclosed (yes/No)		yes
19	Motor Data		
	a) Rating	kW/Pole	1.5/2
	b) Speed	RPM	2800
	c) Direction of Rotation		Clockwise / Anti-clockwise
	d) Motor Protection and Class		IP55 / IE3
20	Material		
	a) Impeller		Cast Aluminum
	b) Casing		MS Sheet as per IS: 1079/IS: 2062/IS:513
	c) Casing thickness		3 mm
	d) Shaft		Motor Shaft (EN-8)
21	Painting		Epoxy Paint with DFT 150 Microns
22	Inspection & Testing		As per Certificate of Conformance

FRESH AIR FAN SCHEDULE

S.No.	Location	Fan Capacity (CFM)	Quantity
1	**POWER HOUSE BUILDING(AC-01)**		
1.1	AHU Room, EL. 24.0 m LVL	3000	02.00 No. [2W]
1.2	AHU Room, EL. 8.50 m LVL	500	02.00 No. [2W]
2	**SERVICE BUILDING(AC-04)**		
2.1	PAC Room, EL. 00.0 m LVL Zone-1	900	02.00 No. [2W]
2.2	PAC Room, EL. 00.0 m LVL Zone-2	400	02.00 No. [2W]
2.3	PAC Room, EL. 04.25 m LVL Zone-1	600	02.00 No. [2W]
2.4	PAC Room, EL. 04.25 m LVL Zone-2	500	02.00 No. [2W]
2.5	PAC Room, EL. 08.5 m LVL Zone-1	600	02.00 No. [2W]
2.6	PAC Room, EL. 08.5 m LVL Zone-2	600	02.00 No. [2W]
2.7	PAC Room, EL. 12.75 m LVL Zone-1	600	02.00 No. [2W]
2.8	PAC Room, EL. 12.75 m LVL Zone-2	700	02.00 No. [2W]
2.9	PAC Room, EL. 17.0 m LVL Zone-1	700	02.00 No. [2W]
2.1	PAC Room, EL. 17.0 m LVL Zone-2	650	02.00 No. [2W]
3	**ADMIN BUILDING(AC-05)**		
3.1	PAC Room -1 , EL. 00.0 m LVL Zone-1	500	02.00 No. [2W]
3.2	PAC Room - 2 , EL. 00.0 m LVL Zone-2	850	02.00 No. [2W]
3.3	PAC Room - 3 , EL. 4.5 m LVL Zone-1	900	02.00 No. [2W]
3.4	PAC Room - 4 , EL. 4.5 m LVL Zone-2	900	02.00 No. [2W]
4	**ESP-1 BUILDING(AC-02)**		
4.1	AHU Room	250	02.00 No. [2W]
5	**ESP-2 BUILDING(AC-03)**		
5.1	AHU Room	250	02.00 No. [2W]



PLAN



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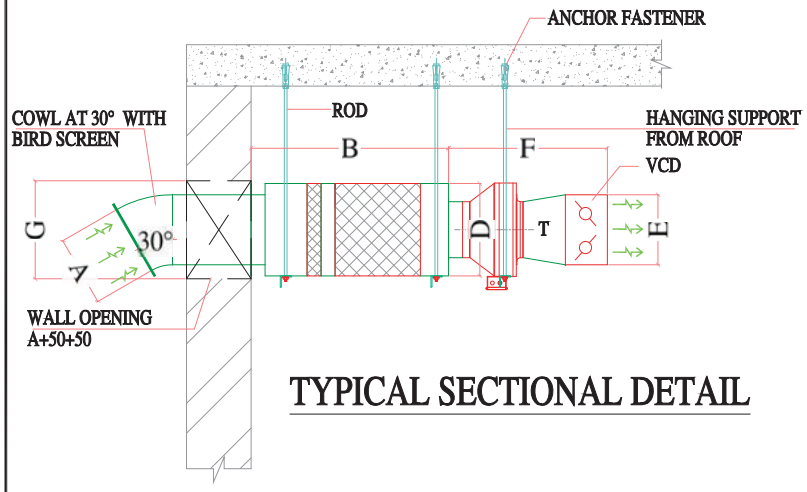
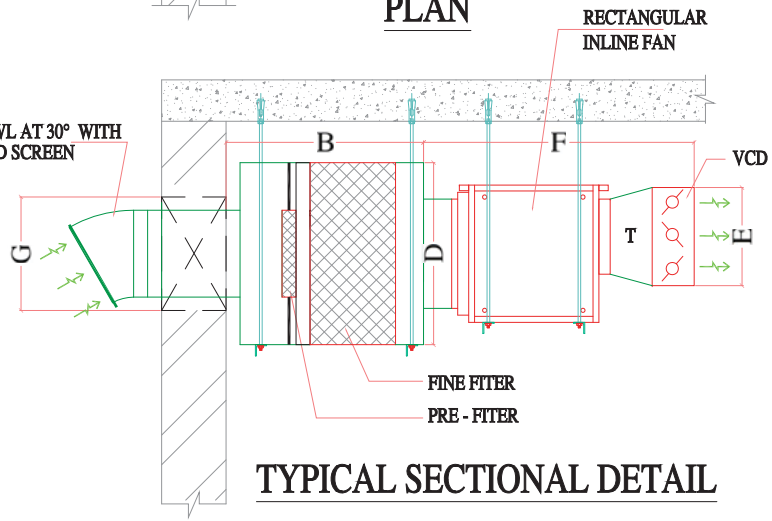


TYPICAL SECTIONAL DETAIL



TYPICAL SECTIONAL DETAIL

HVAC LEGEND :-

	INLINE FAN
	CANVAS CONNECTION
	PRE FILTER
	FINE FILTER

NOTES -

1. CLOSING OF OPENING POST ERECTION OF FAN SHALL BE BY AC SUPPLIER
2. THE PRE FILTER AND FINE FILTER SHALL BE REMOVABLE TYPE WITH REMOVABLE PANEL FOR MAINTENANCE PURPOSE.

FOR APPROVAL

BILL OF QUANTITY FOR EACH INLINE FAN

S.NO.	CAPACITY	MODEL NO.	PRE FILTER	QTY	FINE FILTER	QTY	BIRD SCREEN	QTY	VCD	QTY
1	250CFM	CF-200B	305X305X50mmTHICK	01	305X305X305mmTHICK	01	250x250	01	250x250	01
2	400CFM	CF-315AA	610X305X50mmTHICK	01	610X305X305mmTHICK	01	300x300	01	300x300	01
3	500CFM	CF-315B	610X305X50mmTHICK	01	610X305X305mmTHICK	01	300x300	01	300x300	01
4	600CFM	CF-315B	610X305X50mmTHICK	01	610X610X305mmTHICK	01	350x350	01	350x350	01
5	650CFM	CDIF-09	610X305X50mmTHICK	01	610X610X305mmTHICK	01	350x350	01	350x350	01
6	700CFM	CDIF-09	610X610X50mmTHICK	01	610X610X305mmTHICK	01	350x350	01	350x350	01
7	850CFM	CDIF-10	610X610X50mmTHICK	01	610X610X305mmTHICK	01	400x400	01	400x400	01
8	900CFM	CDIF-10	610X610X50mmTHICK	01	610X610X305mmTHICK	01	400x400	01	400x400	01

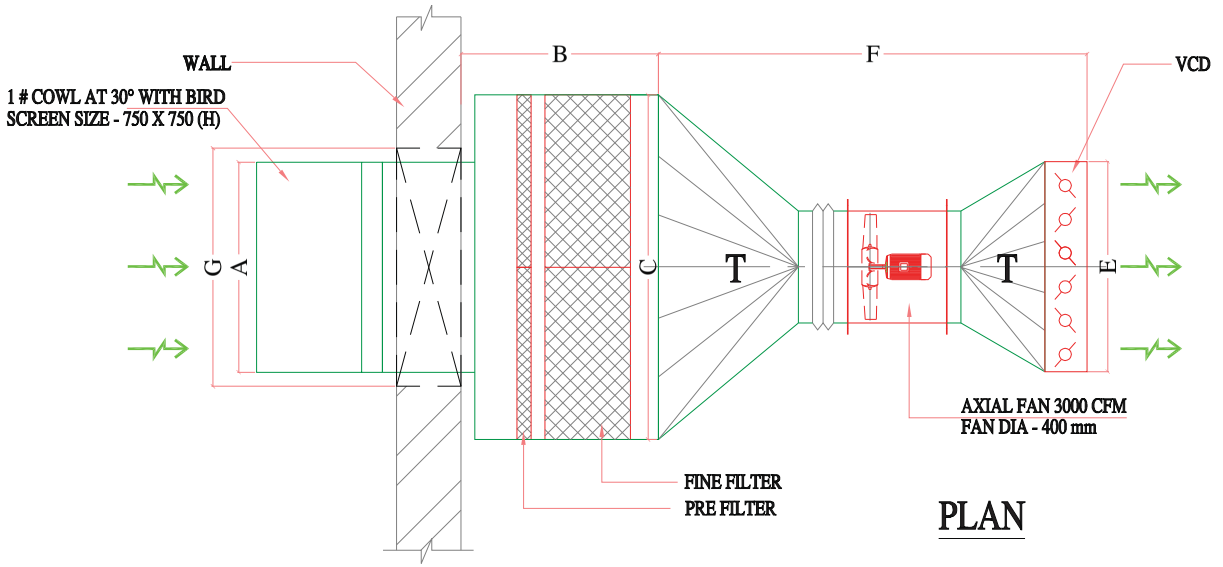
CIRCULAR INLINE FAN DATA					RECTANGULAR INLINE FAN DATA			
DIMENSION	CF-200B	CF-315AA	CF-315B	CF-315B	CDIF-09	CDIF-09	CDIF-10	CDIF-10
FAN	250CFM	400CFM	500CFM	600CFM	650CFM	700CFM	850CFM	900CFM
A	250x250	300x300	300x300	350x350	350x350	350x350	400x400	400x400
B	705	705	705	705	705	705	705	705
C	310	615	615	615	615	615	615	615
D	310	310	310	615	615	615	615	615
E	250x250	300x300	300x300	300x300	350x350	350x350	400x400	400x400
F	567	580	580	580	965	965	1050	1050
G	350x350	400x400	400x400	450x450	450x450	450x450	500x500	500x500

REVISIONS

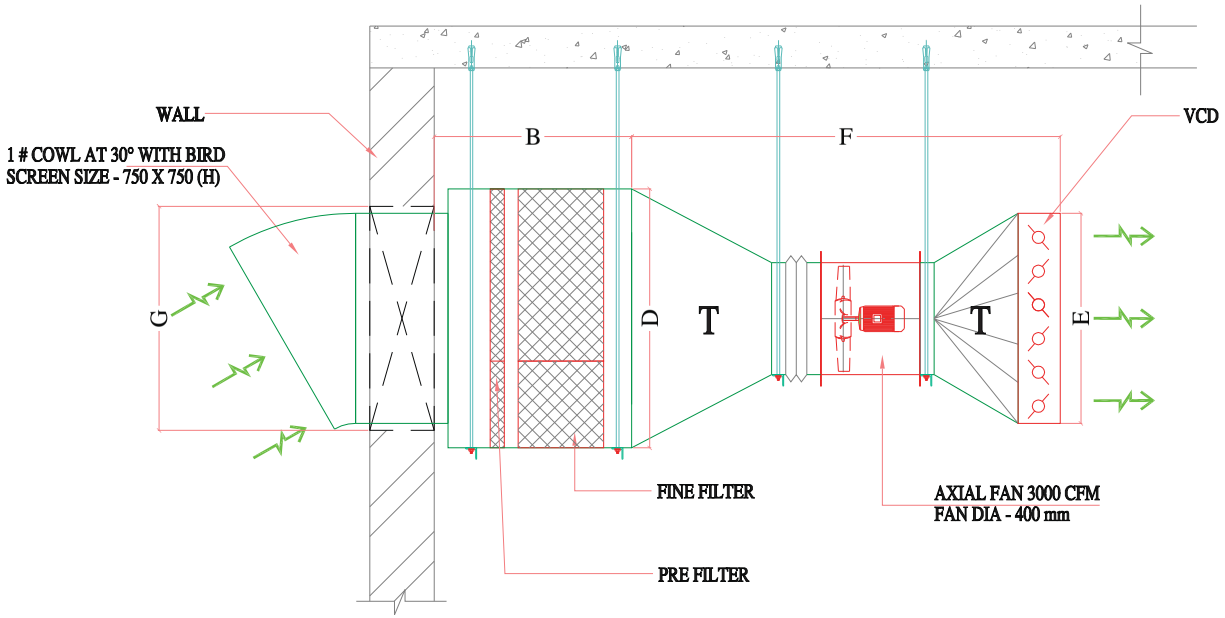
PROJECT:	2x660 MW ENNORE SEZ COAL BASED STPP AT ASH DYKE OF NCTPS, CHENNAI
CUSTOMER	TAMILNADU GENERATION AND DISTRIBUTION CORPORATION LIMITED (TANGEDCO)
CONSULTANT	DESEIN PRIVATE LIMITED DESEIN HOUSE, GREATER KAILASH-II, NEW DELHI
EPC CONTRACTOR:	BHARAT HEAVY ELECTRICALS LTD. POWER SECTOR PROJECT ENGINEERING MANAGEMENT NOIDA
BHEL DRAWING NO.	PE-V0-412-553-A024

DRAWING TITLE

TDS & GAD OF FRESH AIR FANS



PLAN



TYPICAL SECTIONAL DETAIL

BILL OF QUANTITY										
S.NO.	CAPACITY	MODEL NO.	PRE FILTER	QTY	FINE FILTER	QTY	BIRD SCREEN	QTY	GRILLE	QTY
1	3000CFM	ADTA 400	610X610X50mmTHICK	02	610X305X305mmTHICK	02	750x750	01	750x750	01
			610X305X50mmTHICK	02	610X305X305mmTHICK	02	750x750	01	750x750	01

AXIAL FLOW FAN DATA	
FAN	3000CFM, ADTA 400
A	750x750
B	705
C	1230
D	925
E	750x750
F	1530
G	850x850

HVAC LEGEND :-

	INLINE FAN
	CANVAS CONNECTION
	PRE FILTER
	FINE FILTER

NOTES -

1. CLOSING OF OPENING POST ERECTION OF FAN SHALL BE BY AC SUPPLIER
2. THE PRE FILTER AND FINE FILTER SHALL BE REMOVABLE TYPE WITH REMOVABLE PANEL FOR MAINTENANCE PURPOSE.

FOR APPROVAL

REVISIONS

PROJECT:	2x660 MW ENNORE SEZ COAL BASED STPP AT ASH DYKE OF NCTPS, CHENNAI	
CUSTOMER		TAMILNADU GENERATION AND DISTRIBUTION CORPORATION LIMITED (TANGEDCO)
CONSULTANT	DESEIN	DESEIN PRIVATE LIMITED DESEIN HOUSE, GREATER KAILASH-II, NEW DELHI
EPC CONTRACTOR:	BHARAT HEAVY ELECTRICALS LTD. POWER SECTOR PROJECT ENGINEERING MANAGEMENT NOIDA	BHEL DRAWING NO. PE-V0-412-553-A024

DRAWING TITLE

TDS & GAD OF FRESH AIR FANS

NICOTRA Gebhardt

fan tastic solutions

CIRCULAR IN-LINE FANS

Designed For Optimum Efficiency and Low Noise

Inline centrifugal duct fan is a straight through radial fan. It is compact, with a high capacity and very easy to install. The fan can cope with high pressure and long duct runs, whilst still operating at an acceptable sound level.

The fan speed can be controlled by voltage or frequency variation regulators. Several fans can be connected to the same controller provided the total nominal current of the fans does not exceed the rating of controller.

The Circular Inline fans are moisture resistant and are approved for installing in humid or damp environments. The fans are rated IP44 when installed in a duct system. They must not be used for transporting grinding dust, soot or similar air borne particles. The casing is manufactured from pre-galvanized steel. Automatic thermo-contacts open if the temperature within the motor windings becomes excessive. Fan is equipped with CE certified external rotor single phase asynchronous motor.

Circular Inline Fan - Technical Data

Circular Inline Fan		CF-100B	CF-125B	CF-150B	CF-160B	CF-200B	CF-250B	CF-315AA	CF-315B
Dimension	¢A	100	125	150	160	200	250	315	315
	¢B	243	243	333	333	333	333	401	401
	C	194	195	222	222	217	203	230	230
	D & E	23	27	28	28	25	27	25	25
	F	45	45	45	45	45	45	45	45
Speed 'Rpm'		2370	2260	2370	2567	2488	2284	2300	2277
Sound Pressure Level 'db (A)'		46	47	47	49	52	51	53	53
Current 'A'		0.26	0.3	0.43	0.6	0.65	0.8	1.1	1.35
Input 'W'		60	65	95	125	145	170	230	300
Net Weight 'Kg.'		3.2	3.2	4.6	4.6	5.7	5.7	7	7

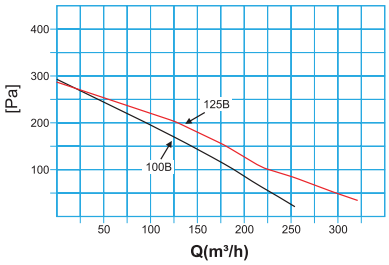
*Power Supply 220V - 240V, 1- ø, 50 Hz A. C.

*Motors have 1P-44 Enclosure with class F insulation.

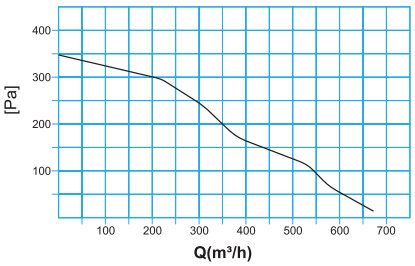
*Weighted Sound pressure level in dB (A) is at a distance of 3 meters.

*Noise data given is at lab test condition.

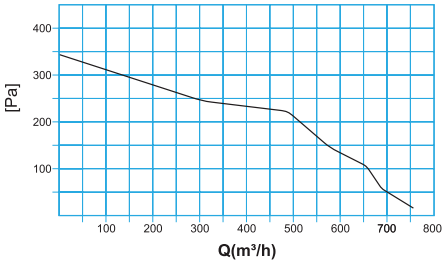
CF-100B & CF-125B



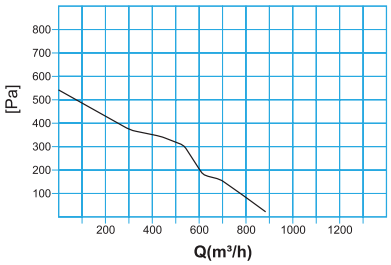
CF-150B



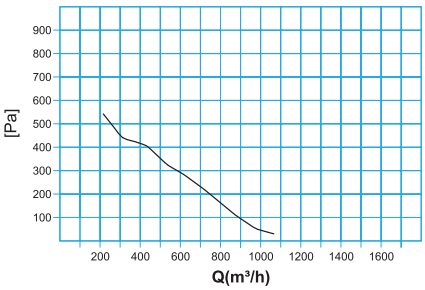
CF-160B



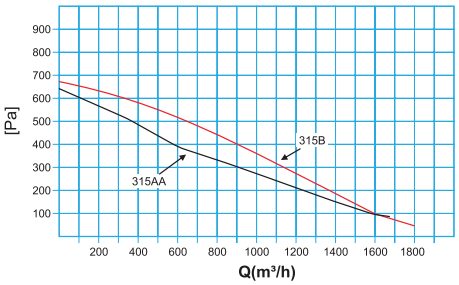
CF-200B



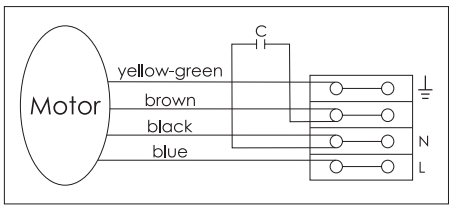
CF-250B

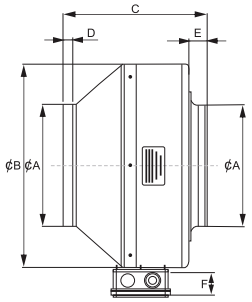


CF - 315AA & 315B



Wiring Diagram





NICOTRA Gebhardt

NICOTRA INDIA PRIVATE LIMITED

An ISO 9001 : 2008 Certified Company

Works : Plot No 28F & 29, Sector-31, Kasna, Greater NOIDA - 201 308 U.P. (India) Mob : +91 9818657131, 9818382440

Sales Office : A-10, Sector-59, Noida - 201 301 Tel. : +91 120 2580553/4/5/6, Fax : +91 120 2580557

E-mail : sales@nicotraindia.com, info@nicotraindia.com

Website : www.nicotra-gebhardt.com

Mumbai : Tel. : +91 22 65702056, 57 Fax : +91 22 28547314

Bangalore : Tel. : +91 80 25727830, 31 Fax : +91 80 25727833

NICOTRA Gebhardt

fan tastic solutions

CDIF

Direct Drive CABINET FANS

Features

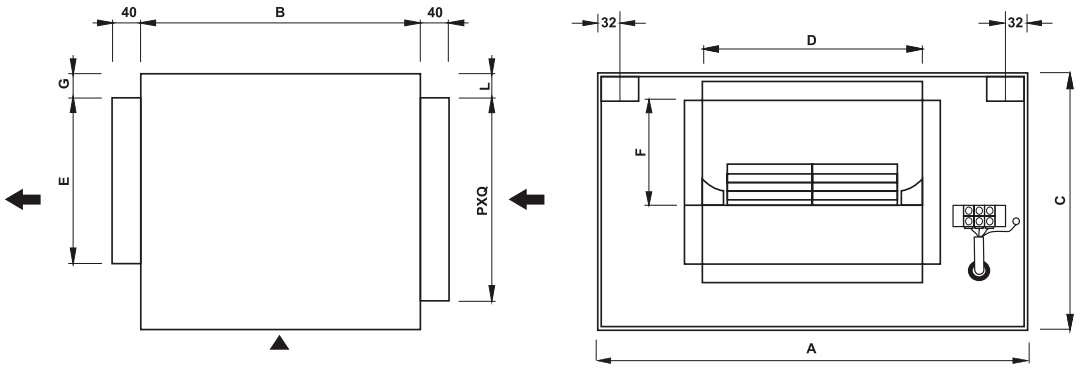
- Cabinet manufactured in 20 Guage galvanised steel complete with inlet and outlet spigots.
- Mounting brackets and access panel fitted as standard.
- Electronic speed regulator is available in CDIF-12 Model only.
- Multispeed motor is available for speed control in CDIF-09 & CDIF-10 model instead of electronic speed regulator.
- High efficiency forward curved DIDW impeller with galvanised steel scroll.
- Squirrel cage induction motors with sealed for life bearing suitable for single phase electrical supply.
- Double skin models are available having 20 guage GI outer skin with 25 mm glasswool wrapped in tissuepaper and covered with 20 guage perforated GI sheet from inside.

Technical Data

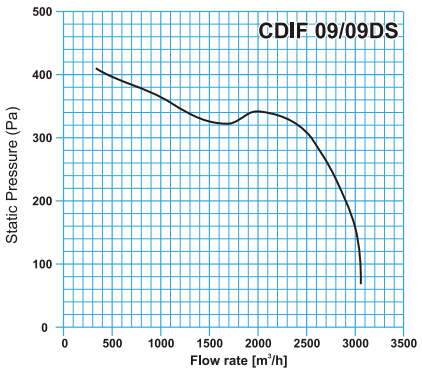
Model	Poles P	Power W	Hz	CL.	Voltage	Max. Amp.
CDIF-09/09DS	4	370	50	B	220/240	3.5
CDIF-10/10DS	4	504	50	B	220/240	3.2
CDIF-12/12DS	6	736	50	B	220/240	7.5

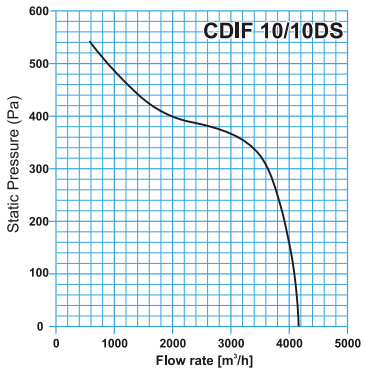
Note : DS means double skin

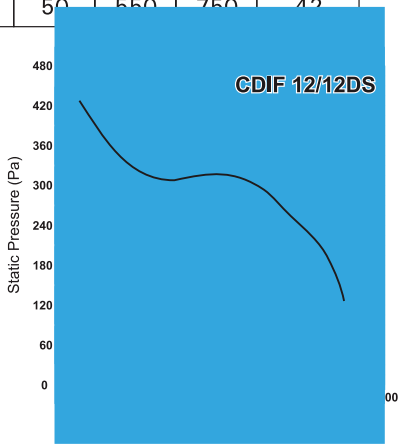
Dimensions



Model	A	B	C	D	E	F	G	L	P	Q	Approx. kg.
CDIF-09/09DS	670	520	520	298	262	160	28	50	420	550	30
CDIF-10/10DS	740	570	570	331	289	179	28	50	470	620	33
CDIF-12/12DS	870	650	650	395	341	214	28	50	550	750	42







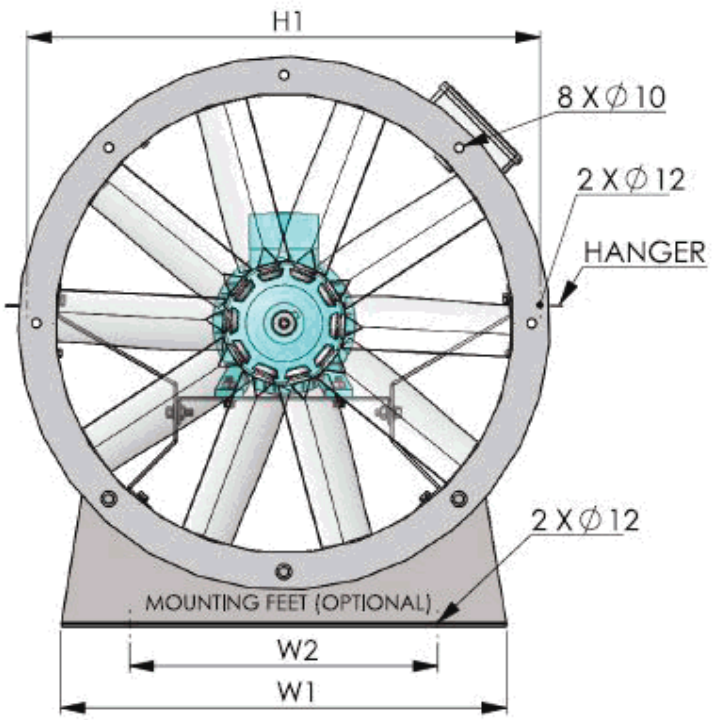
NICOTRA Gebhardt

NICOTRA INDIA PRIVATE LIMITED

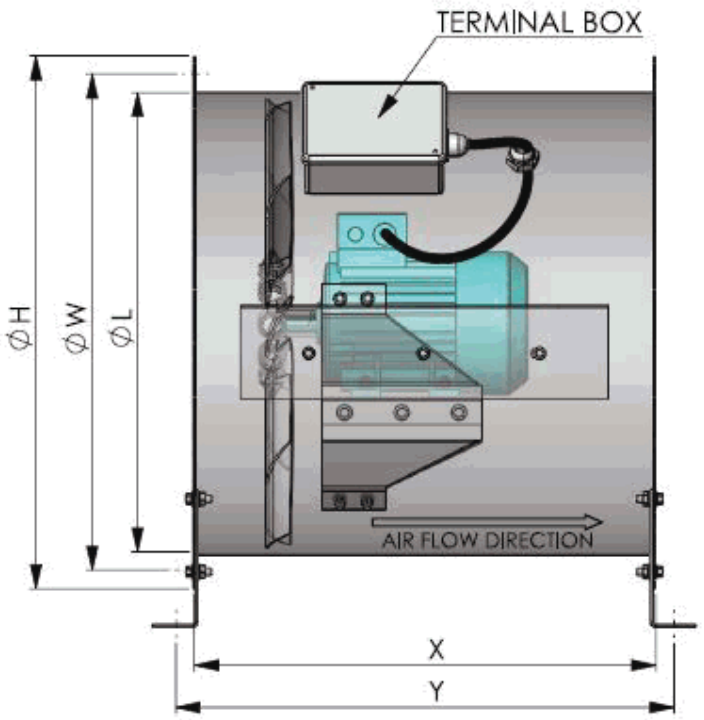
An ISO 9001 : 2000 Certified Company

Head Office : Plot No 28F & 29, Sector-31, Kasna,
Greater NOIDA - 201 308 U.P. (India)
Tel : +91 120 4783400 Fax : +91 120 4203401
E-mail : sales@nicotraindia.com | info@nicotraindia.com
Website : www.nicotra-gebhardt.com
Mumbai : Tel. : +91 22 65702056, 57 Fax : +91 22 28547314
Bangalore : Tel. : +91 80 25727830, 31 Fax : +91 80 25727833

Item Name	ADTA 400	Item Code	COM0FG0100



FRONT VIEW



TOP VIEW

PROJECT: 2X660 MW ENNORE TPS
CUSTOMER: TANGEDCO
CONSULTANT: DESEIN

EPC CONTRACTOR: BHEL
PACKAGE SUPPLIER: ROOTS COOLING SYSTEM
PACKAGE: AIR CONDITIONING SYSTEM
DOCUMENT NO: PE- V0-412-553-A024

Techenical Data	Air Flow	SP	Motor Detail	FAN RPM	MOUNTING	DISCHARGE	WEIGHT
	CFM	35	1.5-F CLASS-IE-3-ABB-CG	2800	Yes		

DIM. Detail	L	W	W1	W2	H	H1	X	Y	C	E
	400	440	190	340	480	450	355	405	0	0

NOTE **REMARK** Air Vol - 3000 St.pr. - 35 With Mounting **Qty** 2.00

NICOTRA Gebhardt

Customer Name	**Roots Cooling System Pvt. Ltd.-NEW DELHI**
Project	2x660 MW ENNORE
Drawing No	AXSeriesDrawing14.rpt

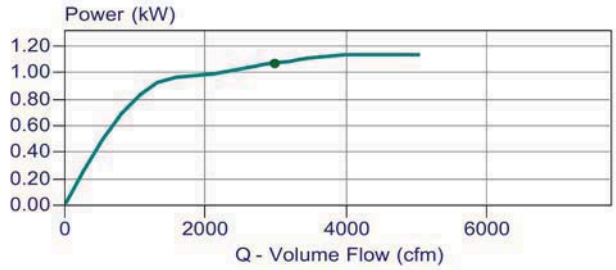
Nicotra India Pvt. Ltd
Greater Noida
India
201308

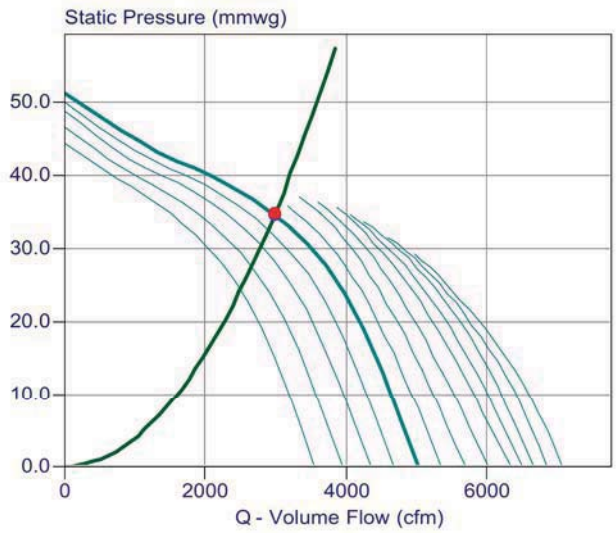
NICOTRA Gebhardt

Technical Data

Description	Axial Impeller Only
Impeller Reference	ADTA 400
Diameter	400 mm
Speed	2800 rpm
Blades	5-ALI

Volume	3000 cfm
Static Pressure	35.00 mmwg
Dynamic Pressure	7.54 mmwg
Operating Conditions	1.200 kg/m³ @ Sea Level (20°C)
Outlet Velocity	11.21 m/s
Fan Total Efficiency	56 %
Tip Speed	58.65 m/s
Absorbed Power	1.07 kW
Peak Power	1.15 kW
In duct dBW[63-8k Hz]	92 91 92 90 87 84 77 64
Sound Pressure dBA	81 @ 3 dia
Hub	110
Std Bore Range	9.5 - 19 mm





PROJECT: 2X660 MW ENNORE TPS
CUSTOMER: TANGEDCO
CONSULTANT: DESEIN
EPC CONTRACTOR: BHEL
PACKAGE SUPPLIER: ROOTS COOLING SYSTEM
PACKAGE: AIR CONDITIONING SYSTEM
DOCUMENT NO: PE- V0-412-553-A024

DOCUMENT IS APPROVED VIDE TANGEDCO LETTER NO. SE/E/Th&HyP/ EE-7/M/AEE/M/F.En SEZ STPP/D.799 /19 dt.19.02.2019.

BHARAT HEAVY ELECTRICALS LIMITED PROJECT ENGINEERING MANAGEMENT (MECHANICAL AUXILIARY)
This approval status shall be interpreted as laid down in the contract and it shall not relieve the contractor from his contractual obligation.
APPROVAL CATEGORY AWARED = I
CAT I - Approved CAT II - Approved with Comments as Noted CAT III - Not Approved CAT IV - Reference Drawing
Name: VIPIN NAUNI Signature:

VIPIN NAUNI
Reviewed by BHEL and found in order. Submitted for TANGEDCO / Desein Approval.
2019.02.06 13:57:30 +05'30'

PROJECT	2x660 MW ENNORE SEZ COAL BASED STPP AT ASH DYKE OF NCTPS, CHENNAI
	CUSTOMER TAMILNADU GENERATION AND DISTRIBUTION CORPORATION LIMITED (TANGEDCO)
	CONSULTANT **DESEIN PRIVATE LIMITED** **DESEIN HOUSE, GREATER KAILASH-II, NEW DELHI**
	EPC CONTRACTOR BHARAT HEAVY ELECTRICALS LTD PS-PEM, PPEI-BUILDING, SECTOR-16A, PLOT NO. 25, NOIDA-201301

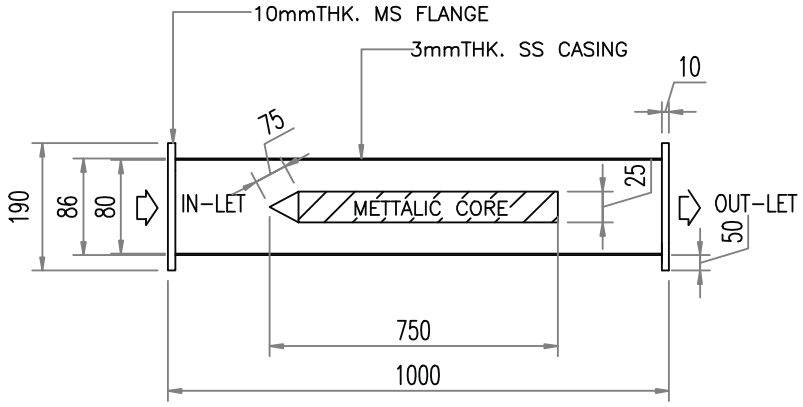
STATUS	**CONTRACT**	**DOC. NO: PE-V0-412-553-A025**	Rev: **00**
PACKAGE		**AIR CONDITIONING SYSTEM**	

S. No.	DESCRIPTION				
1	MAKE	SCALEOFF	SCALEOFF	SCALEOFF	SCALEOFF
2	Location	Power House	Service Building	Admin Building	ESP Control Building
3	Quantity, Nos.	1	1	1	1
4	Designed water flow rate, CMH	307	350	150	30
5	Model No.	WS-9I	WS-9I	WS-8H	WS-5E
6.	Max. flow rate CMH	420	420	180	45
7	Inlet/Outlet pipe dia, mm	200	200	150	80
8	Overall length of the unit (Approx.) MM	1000	1000	1000	1000
9	Diameter of unit MM	200	200	150	80
10	Design Pressure Kg/Cm2(g)	6	6	6	6
11	Test Pressure Kg/Cm2(g)	10	10	10	10
12	Max. Working Pressure Kg/Cm2(g)	4	4	4	4
13	Designed for total hardness as CaCo3, PPM	1000	1000	1000	1000
14	MOC – Body / Shell	SS-316	SS-316	SS-316	SS-316
15	Body/Shell Thickness	04 MM	04 MM	03 MM	03 MM
16	Flange Dia	300 MM	300 MM	258	190
17	Flange Thickness	19 MM	19 MM	12 MM	11 MM
18	Flange PCD	290	290	229	147
19	Flange Holes	08	08	08	04
20	Bolts	M20	M20	M20	M16
21	MOC - Metallic Core		Proprietary Material		
22	Pressure drop across scale preventer (Kg/Cm2)	0.15	0.15	0.15	0.15

REVIEWED

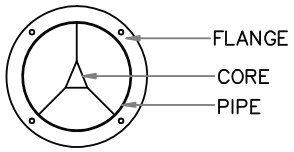
By VIPIN NAUNI at 10:46 am, Dec 05, 2018

REVIEWED
By VIPIN NAUNI at 10:45 am, Dec 05, 2018

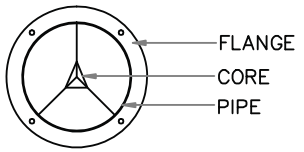


PLAN

ONLINE SCALE PREVENTER



BACK VIEW



FRONT VIEW

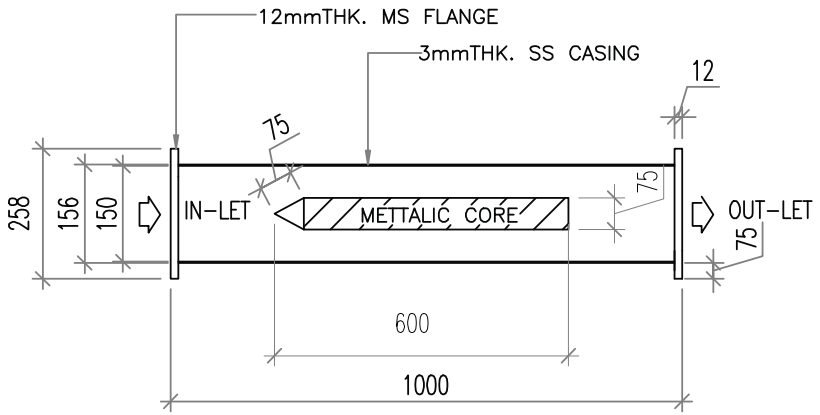
MATERIAL OF CASING –SS316
PIPE THICKNESS –3MM
TYPE –FLANGE ENDS
.
FLANGES THICKNESS –12MM
PIPE INNER DIAMETER–80MM
PIPE OUTER DIAMETER–86MM

NOTE=ALL DIMENSION ARE IN MM OTHERWISE SPECIFIED

		WELDON ENGINEERS (INDIA)	TITLE	NON CHEMICAL ON–LINE SCALE PREVENTER–SCALE–OFF	DRN D.K KALRA
			CLIENT	TANGEDCO CONSULTANT DESIGN	CHD. CMS NEGI
		WELDON ENGINEERS (INDIA)	PROJECT	2X660 MW ENNORE TPS	APPD. CMS NEGI
11–09–18	CMS NEGI	WZ–409,O/B Ist FLOOR, PLOT NO–2.	MODEL NO	WS–5E (45 CMH) ESP BUILDING	DATE 11–09–18
DATE	CHD.	JANAK PARK,HARI NAGAR,NEW DELHI–110064	ESP CONTR.	BHEL–	DRG NO–03

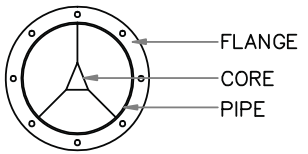
P 3 5

REVIEWED
By VIPIN NAUNI at 10:45 am, Dec 05, 2018

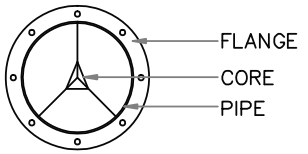


PLAN

ONLINE SCALE PREVENTER



BACK VIEW



FRONT VIEW

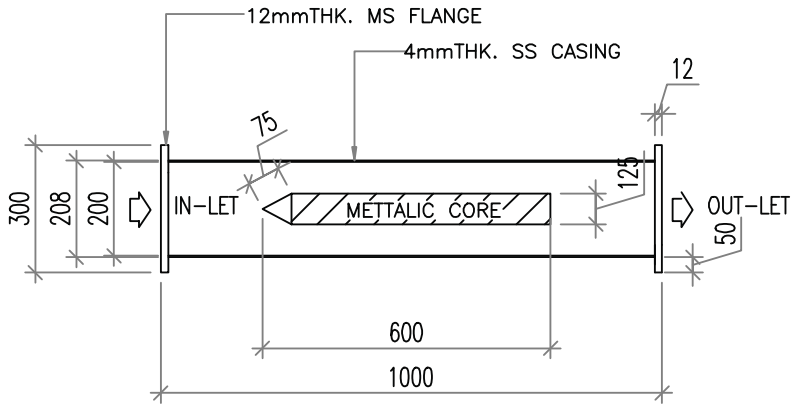
MATERIAL OF CASING –SS316
PIPE THICKNESS –3MM
TYPE –FLANGE ENDS
.
FLANGES THICKNESS –12MM
PIPE INNER DIAMETER–150MM
PIPE OUTER DIAMETER–156MM

NOTE=ALL DIMENSION ARE IMM OTHERWISE SPECIFIED

		WELDON ENGINEERS (INDIA)	TITLE	NON CHEMICAL ON–LINE SCALE PREVENTER–SCALE–OFF	DRN D.K KALRA
			CLIENT	TANGEDCO CONSULTANT DESIGN	CHD. CMS NEGI
		WELDON ENGINEERS (INDIA)	PROJECT	2 X 660 ENNORE TPS	APPD. CMS NEGI
21–12–16	CMS NEGI	WZ–409,O/B Ist FLOOR, PLOT NO–2.	MODEL NO	WS–8H 150 CMF FOR ADMIN BUILDING	DATE 11–09–18
DATE	CHD.	JANAK PARK,HARI NAGAR,NEW DELHI–110064	TITLE	ESP CONTRR. BHEL	

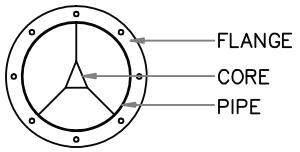
P 4 5

REVIEWED
By VIPIN NAUNI at 10:45 am, Dec 05, 2018

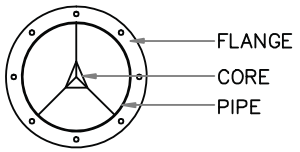


PLAN

ONLINE SCALE PREVENTER



BACK VIEW



FRONT VIEW

MATERIAL OF CASING –SS316
PIPE THICKNESS –4MM
TYPE –FLANGE ENDS

FLANGES THICKNESS –12MM
PIPE INNER DIAMETER–200MM
PIPE OUTER DIAMETER–208MM

NOTE=ALL DIMENSION ARE IMM OTHERWISE SPECIFIED

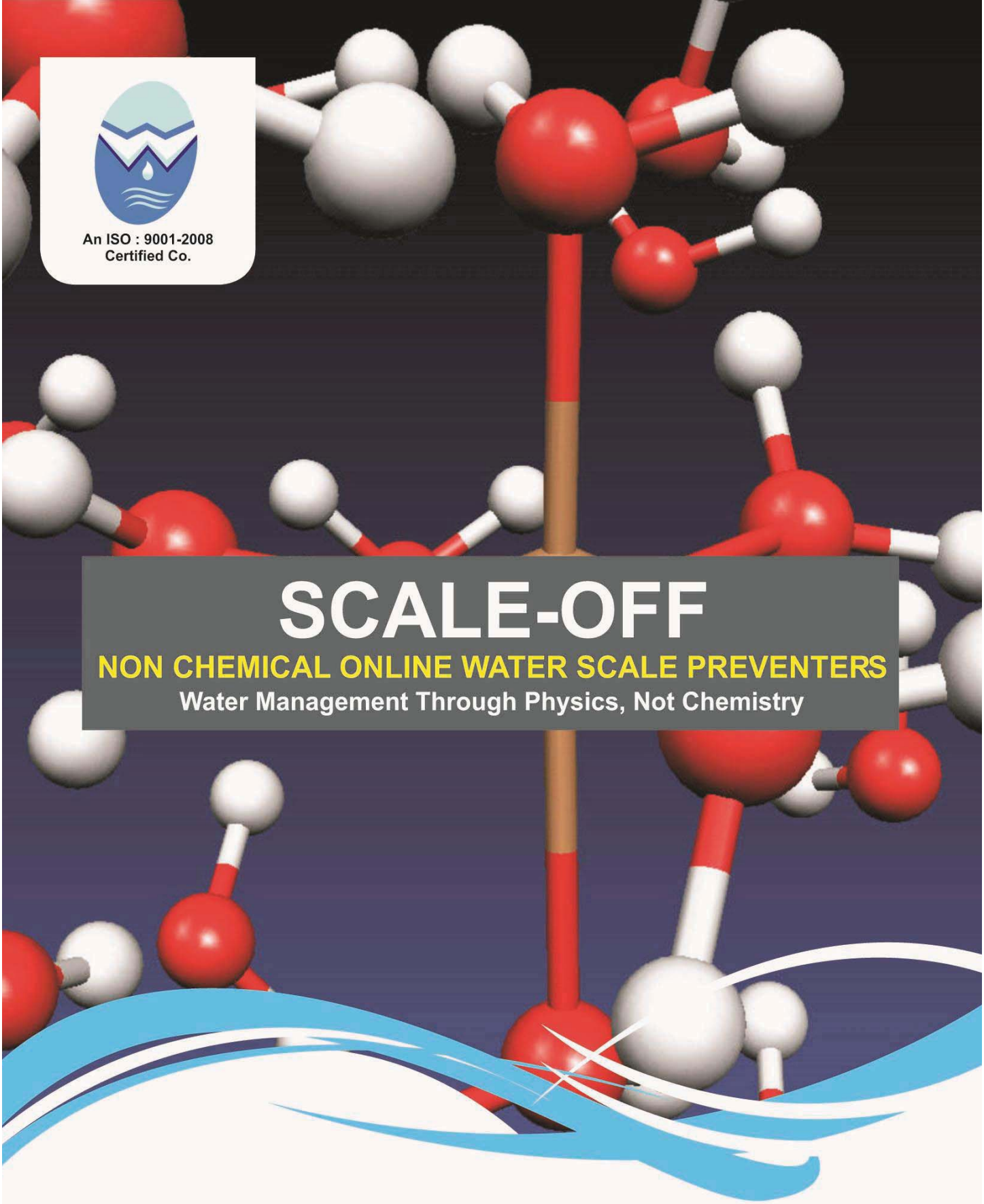
DATE	CHD.

WELDON ENGINEERS (INDIA)

WELDON ENGINEERS (INDIA)
WZ–409,0/B Ist FLOOR, PLOT NO–2.
JANAK PARK,HARI NAGAR,NEW DELHI–110064

TITLE	NON CHEMICAL ON–LINE SCALE PREVENTER–SCALE–OFF	CLIENT	
		DRN	
CLIENT	TANGEDCO CONSULTANT DESIGN	CHD.	
PROJECT	2 X 660 ENNORE TPS	APPD.	
MODEL NO	WS–9I (200mm) 400 CMH ForPowerHouse& Service Buildg.	DATE	
CLIENT	ESP CONTRACTR BHEL		

P 5 5



WELDON ENGINEERS (INDIA)

Manufacturer of POLO make FRP Cooling Towers & Non-Chemical On Line Scale Preventers

SCALE-OFF
TYPICAL APPLICATIONS:

Below are some examples of systems treated by Scale-off:

- Heat Exchangers
- Injection Molding Machines
- Air Conditioning Systems
- Vacuum Pumps
- Condensers
- Water Heaters
- General Cooling Circuits
- Cooling Towers
- Mixing Valves
- Sea Water Cooling Circuits
- Refrigeration Systems

Distilarires

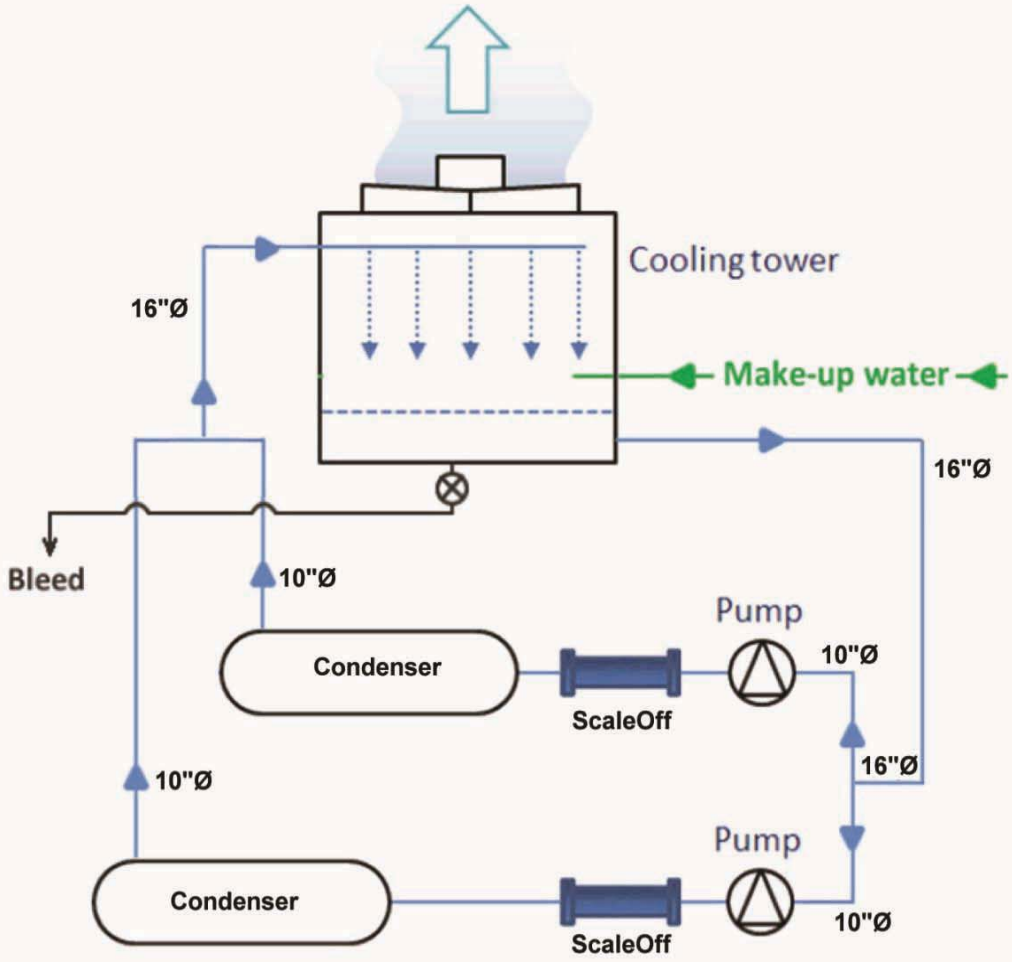
Before Scale-off

HVAC Plant

After Scale-off

A Revolution In Scale Solution "Scaleoff"

INSTALLATION EXAMPLES

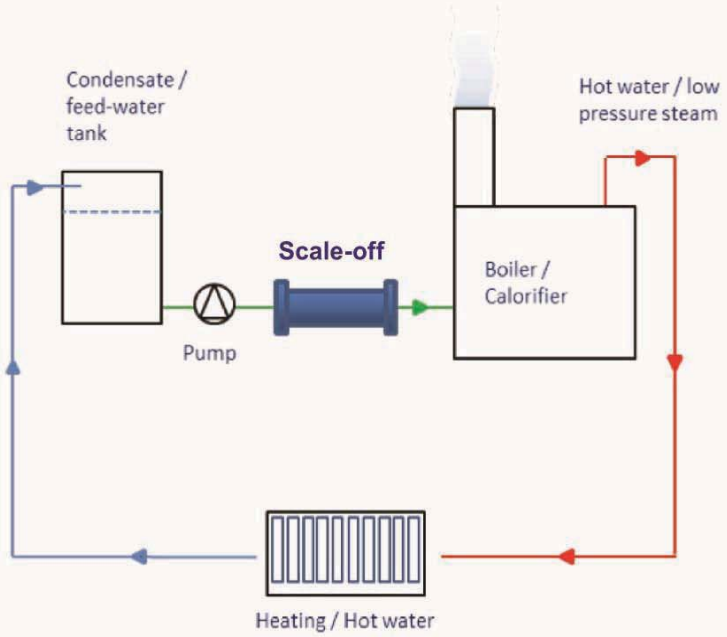


Installation at NBCC AC Plant, New Delhi

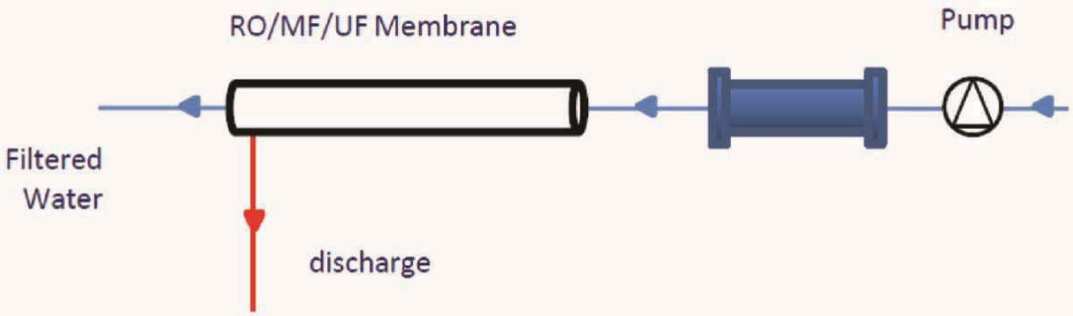
A Revolution In Scale Solution "Scaleoff"

INSTALLATION EXAMPLES CONTINUED

Hot water / low pressure steam for heating



Reverse Osmosis / Ultra filtration

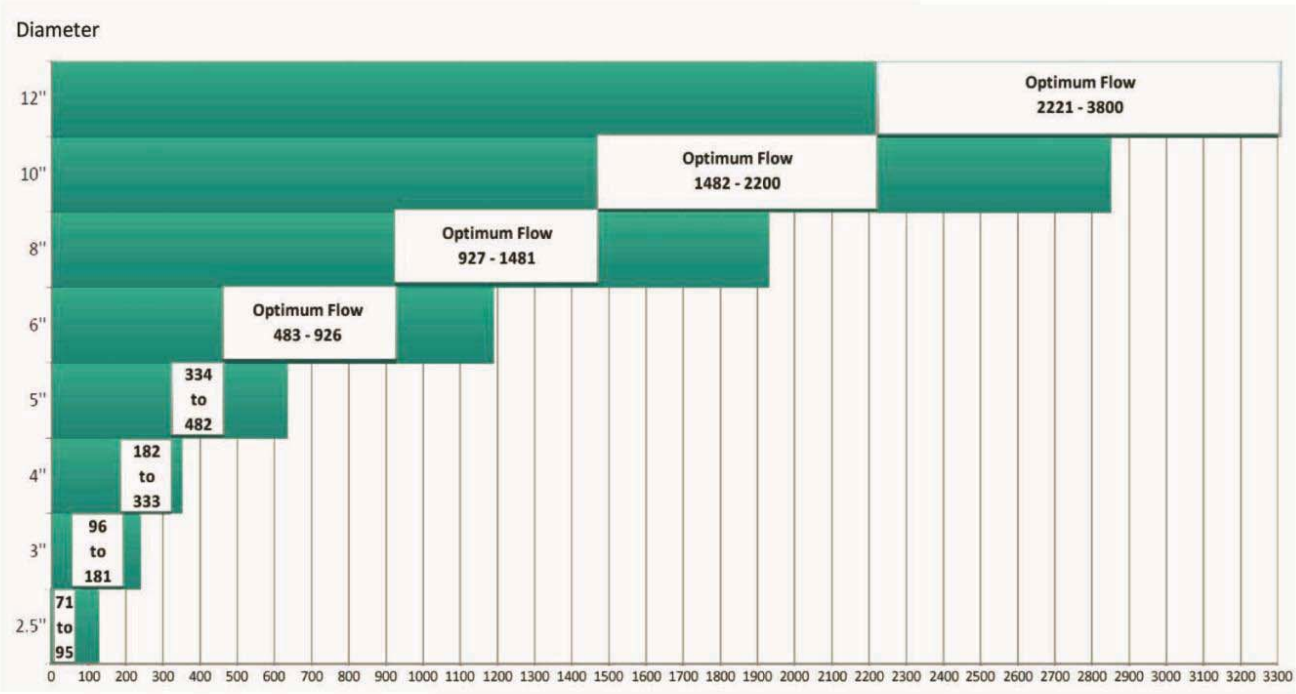


Selection Guidance:

Peak and average flow rates should be considered when selecting the correct **Scale Off** for a system.
Once the flow has been determined the "Product Selection Guidance Chart" shown below will provide assistance in selecting the diameter suited to the application.

The goal is to determine and select the minimum diameter unit that can be used without incurring unacceptable pressure losses at peak demand periods.

Product Selection Guidance Chart:



Actual maximum water flow according to system pressure.

Selection Table

Model No.	Length	Diameter	Flowrange
WS-1A	12”	1”	50 – 80 LPM
WS-2B	24”	1.5”	120 – 200 LPM
WS-3C	24”	2”	200 – 310 LPM
WS-4D	36”	2.5”	310 – 440 LPM
WS-5E	36”	3”	440 – 750 LPM
WS-6F	36”	4”	750 – 1800 LPM
WS-7G	36”	5”	1800 – 2400 LPM
WS-8H	36”	6”	2400 – 4200 LPM
WS-9I	36”	8”	4200 – 7000 LPM
WS-10J	36”	10”	7000 – 10000 LPM
WS-11K	36”	12”	10000 – 14000 LPM
WS-12L	36”	14”	14000 – 19000 LPM
WS-13M	36”	16”	19000 – 25000 LPM
WS-14N	36”	18”	25000 – 32000 LPM
WS-15O	36”	20”	32000 – 40000 LPM
WS-16P	36”	22”	40000 – 48000 LPM
WS-17Q	36”	24”	48000 – 57000 LPM
WS-18R	36”	26”	57000 – 67000 LPM
WS-19S	36”	28”	67000 – 78000 LPM
WS-20T	36”	30”	78000 – 89000 LPM

LARGER SIZES AVAILABLE ON REQUEST

Pressure Drop Graphs

2-1/2"

	0	46 GPM	57 GPM	60 GPM	85 GPM	95 GPM	127 GPM	150 GPM	170 GPM	180 GPM	227 GPM	255 GPM
PSI	0	0	0	0.29	0.36	0.5	0.72	1.23	1.88	2.17	5	6.5

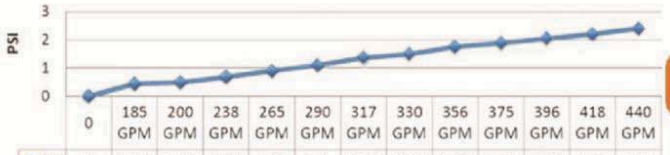
3"

	0	80 GPM	127 GPM	155 GPM	180 GPM	220 GPM	255 GPM	285 GPM	310 GPM
PSI	0	1.16	2.17	2.9	4.27	6.6	9.13	11.09	13.3

4"

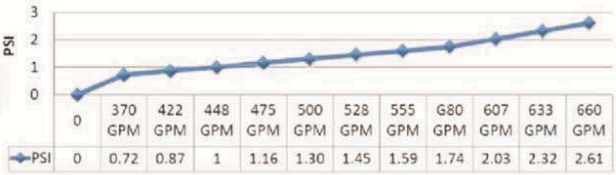
	221 GPM	255 GPM	285 GPM	313 GPM	338 GPM	360 GPM	383 GPM	404 GPM	424 GPM	443 GPM
PSI	0	0.145	0.5	0.87	1.45	1.74	2.17	2.68	3.04	3.62

5"



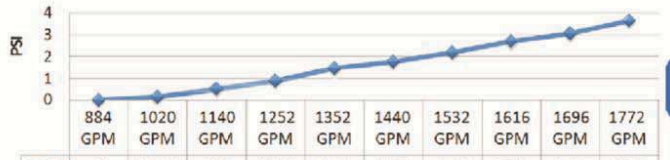
	0	185 GPM	200 GPM	238 GPM	265 GPM	290 GPM	317 GPM	330 GPM	356 GPM	375 GPM	396 GPM	418 GPM	440 GPM
PSI	0	0.44	0.49	0.68	0.9	1.1	1.36	1.49	1.75	1.88	2.04	2.2	2.4

6"



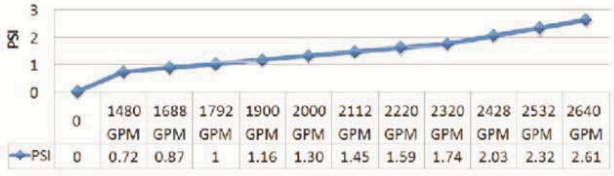
	0	370 GPM	422 GPM	448 GPM	475 GPM	500 GPM	528 GPM	555 GPM	G80 GPM	607 GPM	633 GPM	660 GPM
PSI	0	0.72	0.87	1	1.16	1.30	1.45	1.59	1.74	2.03	2.32	2.61

8"



	884 GPM	1020 GPM	1140 GPM	1252 GPM	1352 GPM	1440 GPM	1532 GPM	1616 GPM	1696 GPM	1772 GPM
PSI	0	0.145	0.5	0.87	1.45	1.74	2.17	2.68	3.04	3.62

10"



	0	1480 GPM	1688 GPM	1792 GPM	1900 GPM	2000 GPM	2112 GPM	2220 GPM	2320 GPM	2428 GPM	2532 GPM	2640 GPM
PSI	0	0.72	0.87	1	1.16	1.30	1.45	1.59	1.74	2.03	2.32	2.61

12"

	0	2600 GPM	2810 GPM	2922 GPM	3025 GPM	3138 GPM	3260 GPM	3302 GPM	3482 GPM	3590 GPM	3670 GPM	3710 GPM
PSI	0	0.44	0.49	0.68	0.92	1.1	1.4	1.7	1.8	2.04	2.6	2.8

Technical Specifications of "SCALEOFF"

•The Scaleoff system is an on-line non chemical type scale preventer not requiring any chemicals. The system shall be installed in the existing condenser water circuit of AC Plant.

•Scaleoff Non-chemical water treatment systems prevent the formation of hard scale in cooling circuits of air conditioning equipment.

•It works with a combination of Adsorption, Turbulence and Galvanic action.

•The inner core is capable to convert the hardness salts into colloidal particles.

•The outer casing is of stainless steel.

•This system does not require electricity or any other source of energy.

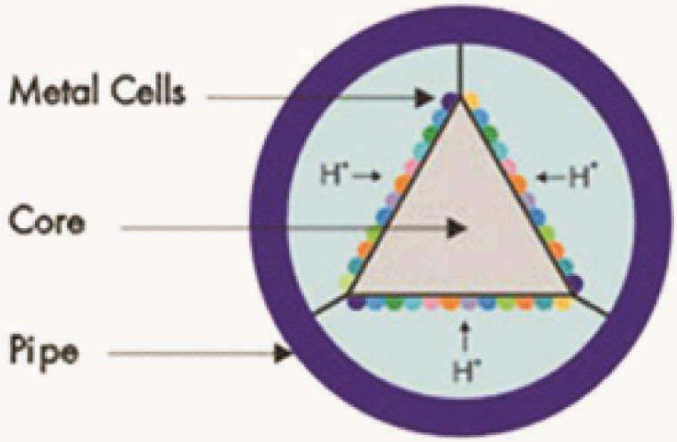
•This system does not have any recurring, operating and maintenance cost.

•The size of the Scaleoff shall be determined based on the water quality and water flow rate.

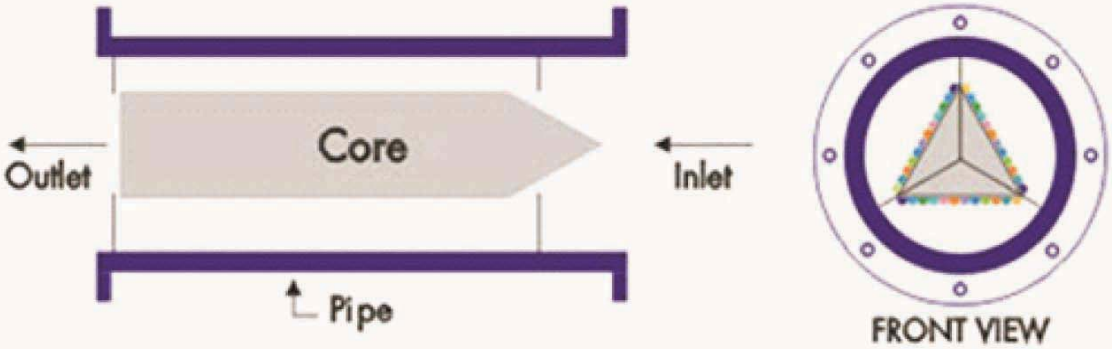
•The system is installed in the condenser water circuit after the pump.

•The system is suitable for reducing the hardness of water up to 2000 PPM.

THE FUNCTIONING OF SCALEOFF!



Cross Section of SCALEOFF,



As water passes through **SCALEOFF**, the whole core inside gets negatively charged, since water itself acts as an electrolyte within the equipment. This negatively charged core attracts H+ from water, which are the lightest ions. The relationship between pH of water and H+ is expressed by the formula pH• •1/H+. Thus with the H+ becoming less and less, pH value of water increases, thereby precipitating hardness causing Calcium and Magnesium salts.

There could be a doubt in mind regarding formation of scales within **SCALEOFF**itself and that the equipment itself might get chocked after sometime. However, this is not the case since the shape of core is trapezoidal, which creates turbulence in the water, and the scale particles being very small, the flow of water carries away these colloidal particles with it and the equipment remains completely clean forever.

As with any other equipment, **SCALEOFF**too has its optimal operating range, within which it performs best. Ideally, the pH value of water should not exceed 8.0 in recirculation and the minimum flow rate as is applicable for various pipe sizes should be strictly maintained. Minimum and Maximum flow rates corresponding to various pipe sizes.

POWER PLANT

SCALE OFF can be very gainfully installed in condensing type thermal power plants. Typically, a 1000 MW power plant would require approximately 98000 M^3 of water per day, much of which is wasted resulting in higher operating costs for the plant. SCALE OFF offers a huge saving potential by way of:

- Saving this precious water.
- Improving the Plant Load Factor (PLF) by optimizing condenser vacuum thus resulting in higher
- power generation with better efficiency.
- Reducing the plant down time required for condenser cleaning.

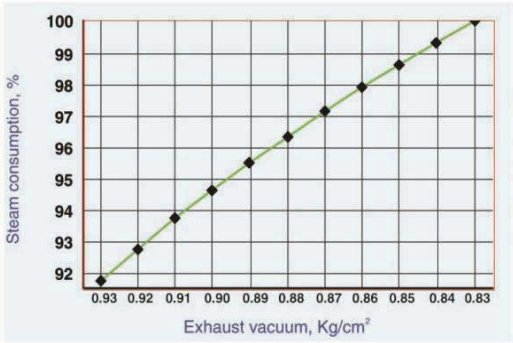
As one might expect, with millions of liters of circulating (cooling) water flowing through the condenser tubes, anything that is contained within the water and flowing through the tubes, can ultimately end up either on the condenser tube-sheet or within the tube itself. Tube side fouling for surface condensers is caused mainly due to SCALING, which are crystalline forms of Calcium and Magnesium salts.

Depending on the extent of this fouling, the impact can be quite severe on the condenser's ability to condense exhaust steam coming from the turbine. As fouling builds up within the tubing, an insulating effect is created and the heat transfer characteristics of the tubes are diminished requiring the turbine to be slowed to a point where the condenser can handle the exhaust steam produced. Typically, this can be quite costly to power plants in the form of reduced output, increased fuel consumption and increased CO_2 emissions. This "de-rating" of the turbine to accommodate the condenser's fouled or blocked tubing is an indication that the plant needs to clean the tubing in order to regain the turbine's rated capacity.

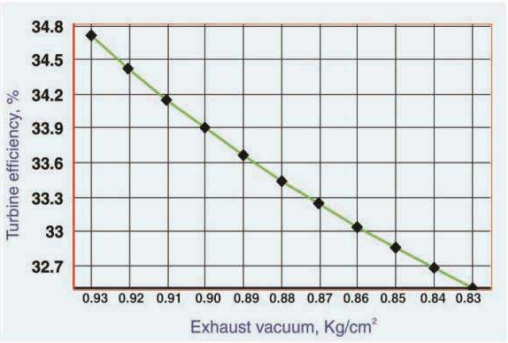
EFFECT OF EXHAUST PRESSURE/ VACUUM IN POWER PLANT:

Higher exhaust pressure i.e. lower vacuum, increases the steam consumption in the turbine, keeping all other operating parameters constant. Exhaust pressure lower than that specified, will reduce the steam consumption and improve the turbine efficiency. Similarly exhaust vacuum lower than that specified, will lower the turbine efficiency and increase the steam consumption.

Figures below represent the effects of exhaust vacuum on steam consumption and turbine efficiency respectively, keeping all other factors constant for the condensing type turbine.



1. Effect of exhaust vacuum on steam consumption in condensing type turbine



2. Effect of exhaust vacuum on turbine efficiency in condensing type turbine

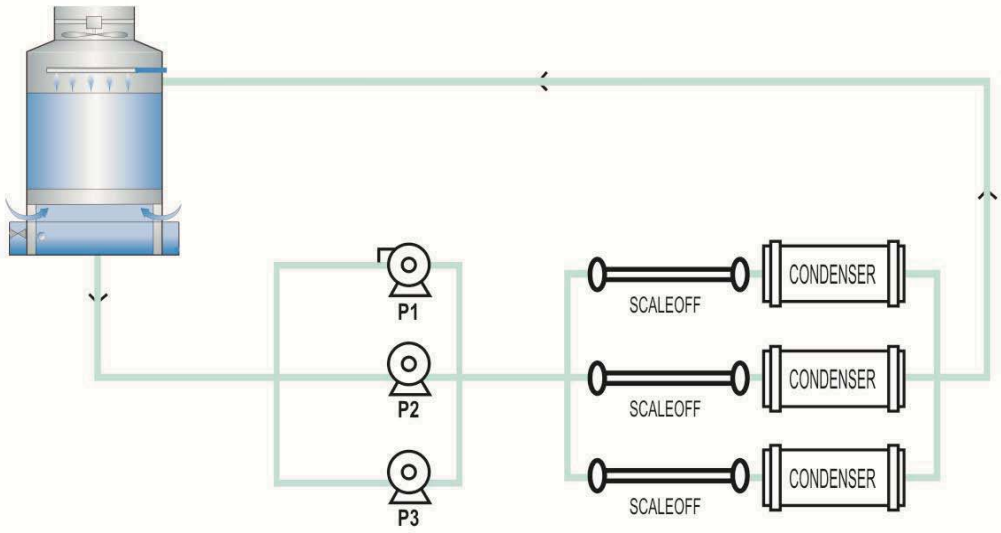
These figures also indicate that an improvement in exhaust vacuum by 0.014 Kg/cm , reduces the steam consumption in the turbine by about 1.1% and improves in turbine efficiency significantly from 0.24% to 0.4%.

Our Installation :

& many more.....

AIR CONDITIONING PLANT

Total elimination of hard water Scale in the cooling system of Refrigeration plant by installation of our SCALE OFF Equipment.



Our Equipment SCALE OFF has been established in the market to give the following savings in Refrigeration plant / cooling tower operation.

- Zero Scale in condensers.
- Optimum Head Pressure maintained in Refrigeration plant.

SCALE OFF Equipment is an online equipment which is fitted just before water cooled condensers/ Heat Exchangers.

A brief description given below, will easily establish the benefits that can be achieved by installing SCALE OFF:

- Anti-scaling chemicals are not required in cooling water.
- Descaling of heat exchangers is not required.
- No Softening plant is required.
- No shutdown of plant is required for cleaning of condenser / heat exchanger's tubes, In conventional water treatment system shut down of plant is required frequently to clean the tubes Chemically / Mechanically, as the case may be.
- Cost of manpower, Chemicals and Loss of production for a large number of days due to shutdown is saved every year.
- Due to repeated cleaning of the hard scales in tubes with rod & acid, the tube surface becomes weak and prone to leakages. Any leak in condenser/cooler causes shutdown of plant and adds cost of replacing tubes.
- Head pressure in Refrigeration plant remains maintained which gives Considerable savings of electricity.
- Due to scale free system, optimum approach is maintained thus plant runs at optimum efficiency.

Our Installation :

& many more.....

An ISO : 9001-2008
Certified Co.

WELDON ENGINEERS (INDIA)

Manufacturer of POLO make FRP Cooling Towers & Non-Chemical On Line Scale Preventers

WZ-409-O/B, 1st Floor, Plot No.12, Janak Park, Hari Nagar, New Delhi-110 064 INDIA
☎ 011-25120124, 47323831 ✉ info@weldonwatercooling.com, weldonengg@gmail.com
Website : www.weldonwatercooling.com
Works at : Nangloi-Najafgarh Road, Delhi-110041

DOCUMENT IS APPROVED VIDE TANGEDCO LETTER NO. CE/E/P1/SE/E/ T&H(P)/EE-6/AEE/E/P/F.ENNORE SEZ DRG. APPL./D.842 /19 DT. 05/02/2019

BHARAT HEAVY ELECTRICALS LIMITED
PROJECT ENGINEERING MANAGEMENT
(MECHANICAL AUXILIARY)

This approval status shall be interpreted as laid down in the contract and it shall not relieve the contractor from his contractual obligation.

APPROVAL CATEGORY AWARED = I

CAT I - Approved
CAT II - Approved with Comments as Noted
CAT III - Not Approved
CAT IV - Reference Drawing

Name: VIPIN NAUNI
Signature:

VIPIN NAUNI
2018.12.15
17:57:51
+05'30'

Date	Rev	Description of Revision	ALT	CHD	APPD
PROJECT		2x660 MW ENNORE SEZ COAL BASED STPP AT ASH DYKE OF NCTPS, CHENNAI			
		CUSTOMER TAMILNADU GENERATION AND DISTRIBUTION CORPORATION LIMITED (TANGEDCO)			
		CONSULTANT **DESEIN PRIVATE LIMITED** **DESEIN HOUSE, GREATER KAILASH-II, NEW DELHI**			
		EPC CONTRACTOR BHARAT HEAVY ELECTRICALS LTD PS-PEM, PPEI-BUILDING, SECTOR-16A. PLOT NO. 25. NOIDA-201301			

PACKAGE	**AIR CONDITIONING SYSTEM**
TITLE	**TDS & GAD of water cooled Packaged Ac unit**

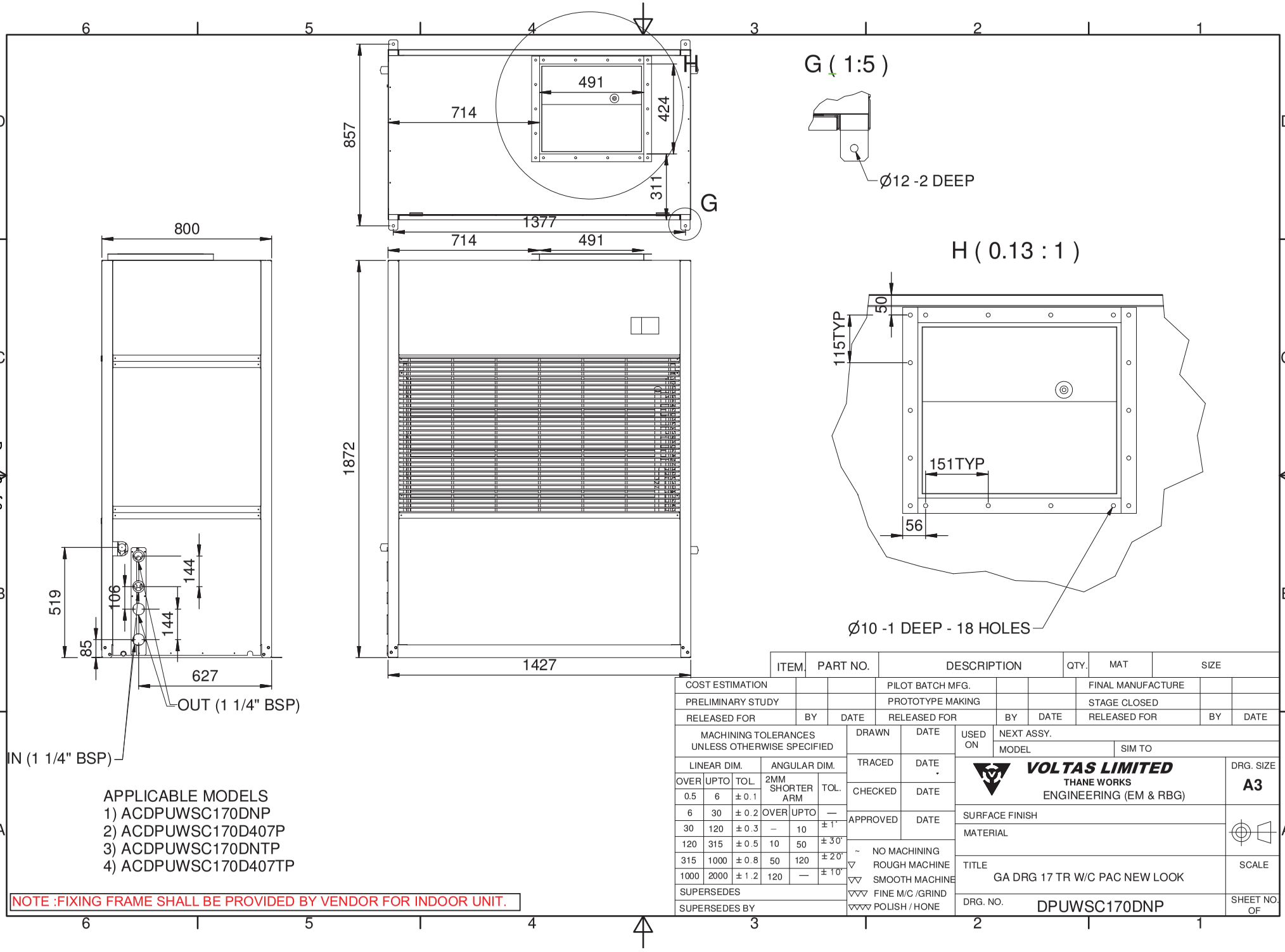
DATE	11/5/2018	TECHNICAL DATA SHEET - SCROLL PACKAGE UNITS WATER COOLED (R-22)- NEW LOOK PAC			
Sr No	Parameter		Unit	Value	Value
1	UNIT	Indoor unit model number		ACDPUWSC170DNP	ACDPUWSC220DNP
2		Power Supply (to IDU)	Ph-V-Hz	3 Ph - 415 V - 50 Hz - 4 wire(R,Y,B,N)	3 Ph - 415 V - 50 Hz - 4 wire(R,Y,B,N)
3	PERFORMANCE	Unit Nominal Cooling Capacity	Btu/Hr	204000	264000
4			TR	17	22
5		Actual Capacity at Site Conditions (32 C condensing water temp)	TR	15.3	20
6		Unit Rated Power Input	KW	17.244	23.280
		Actual Power Consumption at Site Conditions (32 C condensing water temp)	KW	17.530	23.230
7		Rated Current	A	28.2	38.1
8		Indoor Airflow			
9		High	CMH	11220	14960
10		ESP @ High Speed	mm WG	10.5	12
11		TSP @ High Speed	mm WG	35	35
12	Compressor	Model		SM110	SM147
13		Type		Hermetic Scroll	Hermetic Scroll
14		Make		Danfoss	Danfoss
15		Qty	Nos	2	2
16		Rated Speed	RPM	2900	2900
17		Thermal Protector Type		Internal overload protector	Internal overload protector
18		Vibration Isolator Type		Neoprene rubber grommets	Neoprene rubber grommets
19		Lubricant		Mineral Oil	Mineral Oil
20		Refrigerant Oil Quantity	ml	3250	3300
21	Indoor Fan Motor	Make		Hindustan Motors/Equivalent	Hindustan Motors/Equivalent
22		Power Output	W	2230 (3 HP)	3730 (5 HP)
23		Power Supply To Fan Motor	Ph-V-Hz	3 Ph-415 V-50 Hz	3 Ph-415 V-50 Hz
24		No of Poles / RPM	Nos / RPM	4 / 1425	4 / 1425
25		Motor Speed	RPM	1425	1425
26	Indoor Coil	Number of Rows	nos	3	3
27		Fin Spacing	mm	1.95 (13 FPI)	1.95 (13 FPI)
28		Fin Type / Material		Aluminium / Hydrophillic Blue	Aluminium / Hydrophillic Blue
29		Tube Type / Material		Copper IGT	Copper IGT
30	Blower Indoor Unit	Type of blower		Centrifugal DIDW, Forward curved	Centrifugal DIDW, Forward curved
31		Make of blower		Voltas Apprvd Vendor/equivalent	Voltas Apprvd Vendor/equivalent
32		Model		as per manufacturer	as per manufacturer
33		No off Blowers	Nos	1	2
34	Indoor Unit Dimensions	Unit			
35		Length	mm	1427	1988
36		Height	mm	1872	1872
37		Depth	mm	800	800
38		Packing			
39		Length	mm	1527	2088
40		Height	mm	1922	1922
41		Depth	mm	850	850
42		Operating Weight	Kg	480	625
43	Water Cooled Condenser	Model		09008TX	09015 TX
44		No Off Condenser / Unit	Nos	2	2
45		Tube Material		COPPER	COPPER
46		Tube Type		High Efficiency finned Tubes	High Efficiency finned Tubes
47		Tube Length	mm	680.0	680.0
48		Shell Diameter	mm	219.0	219.0
49		Condenser Length	mm	866.0	866
50		Water Inlet / Outlet Size	Inch	1 1/4" BSP	1 1/4" BSP
51		Water flow Rate	LPM	232 (Total)	290 (Total)
52	Expansion Device	Type		TEV	TEV
53		Make		Emerson/Danfoss/Sporlan/Equivalent	Emerson/Danfoss/Sporlan/Equivalent
54		Model	mm	AAE8/as per manufacturer	AAE11/As pe rmanufacturer
55		Qty	mm	2	2
56	REFRIGERANT	Refrigerant Type		R-22	R-22
57		Refrigerant Quantity	g	9000 (each)	10000 (each)
58	Refrigerant Piping	Liquid Line Size	mm	15.8	15.8
59		Suction Line Size	mm	28.5	28.5
60		Discharge Line	mm	19	19
61	Incomer Electrical Cable Size (Recommended)	Aluminium Armoured		3.5C x 25 Sqmm	3.5C x 25 Sqmm
62	Filter	Make		Airtech / Equivalent	Airtech / Equivalent
63		Length	mm	1229	1796
64		Height	mm	916	916
65		Thickness	mm	6	6
66		No of filters / unit	nos	1	1
67		Efficiency		90% down to 10 Microns	90% down to 10 Microns
68		Material of Filter		HDPE/Nylon Washable	HDPE/Nylon Washable
69		Material of Frame		MS	MS
70		Pressure drop in dirty conditions	mmWC	7.5	7.5

NOTES

1) THE ABOVE SPECS ARE SUBJECT TO CHANGE WITHOUT NOTICE AS PRODUCT REVISONS AND DEVELOPMENT IS A CONTINOUS PROCESS IN VOLTAS

2) THE VALUES OF NOMINAL COOLING CAPACITY & RATED POWER INPUT ARE AT INDOOR CONDITIONS OF 27 DBT/ 19 WBT AND WATER INLET CONDITION OF 32 DEG C AND RATED FLOW.

Note: Operation of Water Cooled package AC (Start, Stop Operation and ON, OFF and Trip Feedback) shall be done through DCS Control System in provided in respective building. Provision of same in Package AC to be ensured by Supplier.



APPLICABLE MODELS
1) ACDPUWSC170DNP
2) ACDPUWSC170D407P
3) ACDPUWSC170DNTP
4) ACDPUWSC170D407TP

NOTE :FIXING FRAME SHALL BE PROVIDED BY VENDOR FOR INDOOR UNIT.

ITEM	PART NO.	DESCRIPTION	QTY.	MAT	SIZE

COST ESTIMATION			PILOT BATCH MFG.			FINAL MANUFACTURE		
PRELIMINARY STUDY			PROTOTYPE MAKING			STAGE CLOSED		
RELEASED FOR	BY	DATE	RELEASED FOR	BY	DATE	RELEASED FOR	BY	DATE

MACHINING TOLERANCES UNLESS OTHERWISE SPECIFIED

LINEAR DIM. OVER	UPTO	TOL.	ANGULAR DIM. 2MM SHORTER ARM		TOL.
0.5	6	± 0.1			
6	30	± 0.2	OVER	UPTO	—
30	120	± 0.3	–	10	± 1°
120	315	± 0.5	10	50	± 30'
315	1000	± 0.8	50	120	± 20'
1000	2000	± 1.2	120	—	± 10'

SUPERSEDES

SUPERSEDES BY

DRAWN	DATE	USED ON	NEXT ASSY.
TRACED	DATE		MODEL / SIM TO
CHECKED	DATE		
APPROVED	DATE		

~ NO MACHINING
▽ ROUGH MACHINE
▽▽ SMOOTH MACHINE
▽▽▽ FINE M/C /GRIND
▽▽▽▽ POLISH / HONE

VOLTAS LIMITED
THANE WORKS
ENGINEERING (EM & RBG)

DRG. SIZE **A3**

SURFACE FINISH

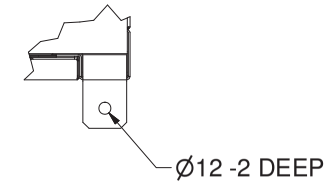
MATERIAL

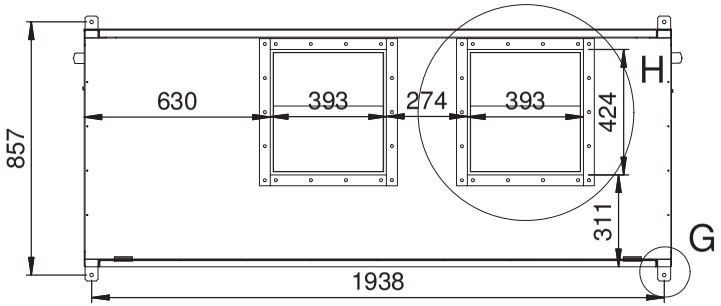
TITLE: GA DRG 17 TR W/C PAC NEW LOOK

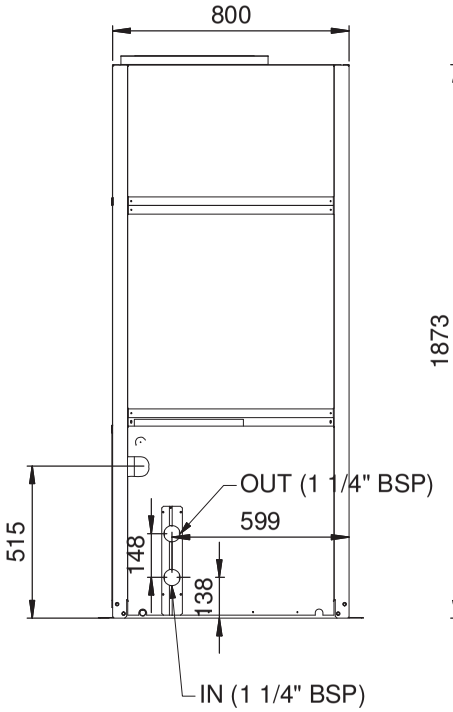
SCALE

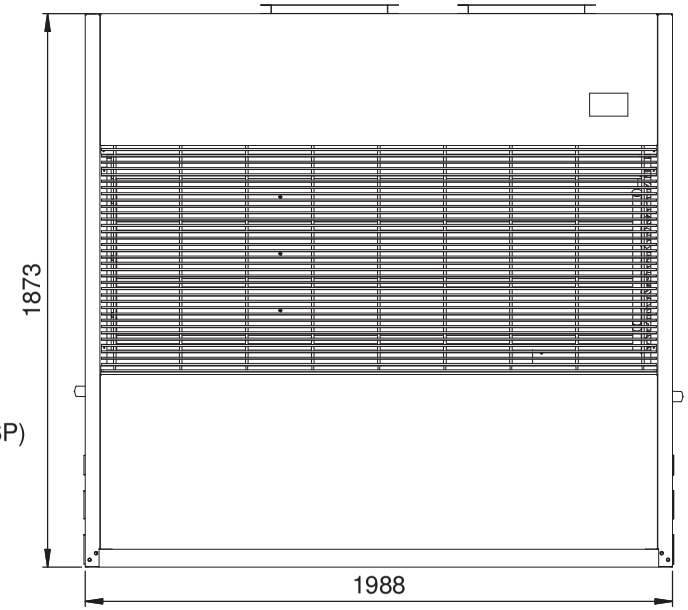
DRG. NO. DPUWSC170DNP

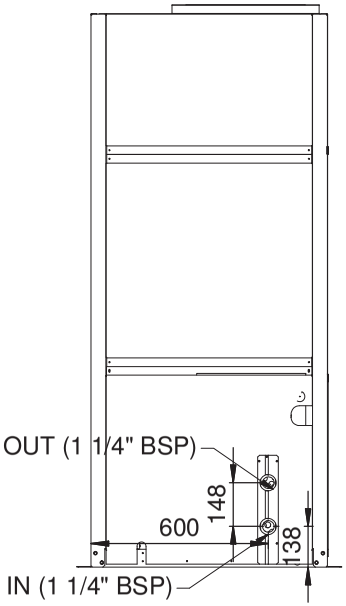
SHEET NO. OF

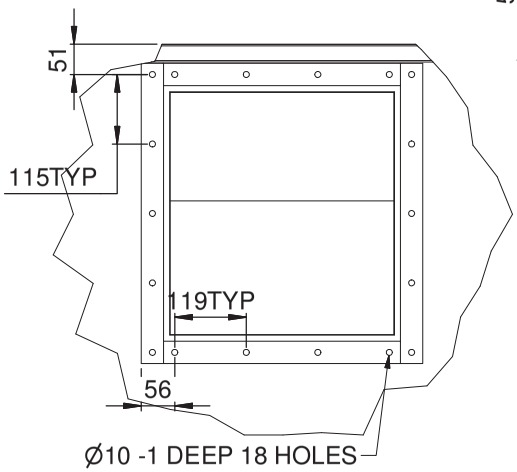












APPLICABLE MODELS
1) ACDPUWSC220DNP
2) ACDPUWSC220D407P
3) ACDPUWSC220DNTP
4) ACDPUWSC220D407TP

NOTE :FIXING FRAME SHALL BE PROVIDED BY VENDOR FOR INDOOR UNIT.

ITEM.	PART NO.	DESCRIPTION	QTY.	MAT	SIZE

COST ESTIMATION			PILOT BATCH MFG.			FINAL MANUFACTURE		
PRELIMINARY STUDY			PROTOTYPE MAKING			STAGE CLOSED		
RELEASED FOR	BY	DATE	RELEASED FOR	BY	DATE	RELEASED FOR	BY	DATE

MACHINING TOLERANCES UNLESS OTHERWISE SPECIFIED

LINEAR DIM. OVER	UPTO	TOL.	ANGULAR DIM. 2MM SHORTER ARM		TOL.
0.5	6	± 0.1			
6	30	± 0.2	OVER	UPTO	—
30	120	± 0.3	–	10	± 1°
120	315	± 0.5	10	50	± 30'
315	1000	± 0.8	50	120	± 20'
1000	2000	± 1.2	120	—	± 10'

SUPERSEDES
SUPERSEDES BY

DRAWN	DATE	USED ON	NEXT ASSY.
TRACED	DATE		MODEL / SIM TO
CHECKED	DATE		
APPROVED	DATE		

~ NO MACHINING
▽ ROUGH MACHINE
▽▽ SMOOTH MACHINE
▽▽▽ FINE M/C /GRIND
▽▽▽ POLISH / HONE

VOLTAS LIMITED
THANE WORKS
ENGINEERING (EM & RBG)

DRG. SIZE **A3**

SURFACE FINISH
MATERIAL

TITLE
GA DRG 22 TR W/C PAC NEW LOOK

SCALE

DRG. NO. DPUWSC220DNP

SHEET NO. OF

OPERATING MANUAL OF PAC MPD TWIN (7-22A) WITH SW BMS & Fire & EI DI

SCROLLING OF IMP. VALUES

4 DIGIT DISPLAY	MEANING OF DISPLAY IN RUN MODE
t 25.0 (t)	temp (Return Air)
r 10.2 (r)	Rph Comp-1 Current
y 10.5 (y)	Yph Comp-1 Current
b 11.3 (b)	Bph Comp-1 Current
r 12.8 (r)	Rph Comp-2 Current
y 11.6 (y)	Yph Comp-2 Current
b 12.9 (b)	Bph Comp-2 Current
r 12.3 (r)	Rph Blower Current
y 12.1 (y)	Yph Blower Current
b 12.0 (b)	Bph Blower Current
H000 (H)	Operating Hours of comp -1
H000 (H)	Operating Hours of comp -2

SETTING OF IMP. PARAMETERS

4 DIGIT DISPLAY	MEANING OF DISPLAY IN PARA MODE
SP 1.0 (S)	Set temp (15.0 to 30.0 ℃)
d0.00 (d)	dead band (0.5 to 5.0 ℃)
C21.2 (C)	Set Current of Comp (7.0 to 22.0 A)
U2.0.0 (U)	Underload (0.0 to 21.0 A)
Ph-E (Ph)	Phase Reversal (Enable (E) / disable (d))
F 2.0 (F)	Blower Current (1.0 to 10.0 A)
t 1.2 (t)	Offset temp (Calibration) (± 2.0 C)
r 0.0 (r)	Offset adj. of Rph Comp-1 Current (Calibration) (± 2.0 A)
y 0.0 (y)	Offset adj. of Yph Comp-1 Current (Calibration) (± 2.0 A)
b 0.0 (b)	Offset adj. of Bph Comp-1 Current (Calibration) (± 2.0 A)
r 0.0 (r)	Offset adj. of Rph Comp-2 Current (Calibration) (± 2.0 A)
y 0.0 (y)	Offset adj. of Yph Comp-2 Current (Calibration) (± 2.0 A)
b 0.0 (b)	Offset adj. of Bph Comp-2 Current (Calibration) (± 2.0 A)
r 0.0 (r)	Offset adj. of Rph Blower Current (Calibration) (± 1.0 A)
y 0.0 (y)	Offset adj. of Yph Blower Current (Calibration) (± 1.0 A)
b 0.0 (b)	Offset adj. of Bph Blower Current (Calibration) (± 1.0 A)

SETTING OF IMP. PARAMETERS

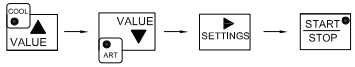
4 DIGIT DISPLAY	MEANING OF DISPLAY IN PARA MODE
A008 (m)	Scroll time (0 to 10 sec)
A CL (A)	Mode CooL (CL) / Fan (Fn)
oPLo (oP)	Operating Mode (Local (Lo) / BMS rEmote (rE)) a) In Local Mode : A/C Unit can be started from keyboard of display unit b) In BMS Remote Mode : A/C Unit Start : If Remote DI = Closing of Potential Free Contact from BMS A/C Unit Stop : If Remote DI = Opening of Potential Free Contact from BMS
n001 (n)	unit no. (1 to 31)

- ART TIME : 3 Min
- Equal Run Hours Logic :-
  Equal Run Hour Logic depends upon Operating Hours.

i) TEMP CONTROL ACTION :-
If Room Temp > Set Temp then COMP will ON.
If Room Temp < Set Temp then COMP will not ON.
AUTO-STOP : If Room Temp < Set Temp - Dead Band, then COMP turn OFF With 1 min delay.
AUTO-RESTART : If Room Temp > Set Temp , then COMP turn ON as per ON Sequence.

ii) OFF SEQUENCE :-
After manually stop given, all DO (COMP & COND DO) turn OFF. & after 120 Sec Blower DO turn OFF.

- DEFAULT PROCEDURE FOR OPERATING HOURS :
  After Power ON, Press Following sequence of keys within 10 Sec,



- When each COMP Completed Its 10 hours then run display shows 1. As per below,

Likewise, whenever Comp completed next 10hours then Run display count Increment by 1.

ANNUNCIATIONS OF ALL FAULTS / TRIPS

COMP-1	COMP-2	MEANING OF FAULT ANNUNCIATION
SPP	SPP	Single Phasing Protection
Ph-r	Ph-r	Phase- reversal
Ub	Ub	Unbalance Current
oL	oL	OverLoad Current
UL	UL	UnderLoad Current
bo	bo	blower Off
HP	HP	High Pressure / Low Pressure
E1	E1	External Intern lock
SE	SE	Sensor Error
CoMF	CoMF	COmmunication Fail
F1	F1	FIre Detector

SETTINGS — Parameter can be selected by pressing Settings key

COOL / VALUE — If in PARA MODE then value of selected parameter will be Incremented pressing this key
If in RUN MODE & Scroll time is zero then actual Temp, Current & OP. Hours will be display one by one by pressing this key.
COOL / FAN LED
COOL MODE = LED ON
FAN MODE = LED OFF

VALUE / ART — If in PARA MODE then value of selected parameter will be decrement by pressing this key.

START / STOP — Controller can be Start / Stop Locally by pressing this key

IMP. NOTE :-

PL. DO NOT MIX COMMUNICATION CABLE WITH POWER CABLE.

REV	DESCRIPTION	DATE	DRN	APPD.
01	NILL	12/12/17	SSZ	SSK

DRN. BY	CHD. BY	APPD. BY
SSZ		SSK

REF. No. OA - - -

NAME OF EQUIP. PAC MPD TWIN (7-22A) WITH SW BMS & Fire & EI DI

TITLE : OPERATING MANUAL OF PAC MPD TWIN (7-22A) WITH SW BMS & Fire & EI DI

PROJECT PAC MPD TWIN (7-22A) WITH SW BMS & Fire & EI DI

CUSTOMER : M/s VOLTAS LIMITED.

VOLTAS LIMITED

DRG. NO. PMN050304REVA

SHEET 1 OF 1
SIZE A4
REV 01

OPERATING MANUAL OF PAC MPD TWIN (11-30A) WITH SW BMS & Fire & EI DI

SCROLLING OF IMP. VALUES

4 DIGIT DISPLAY	MEANING OF DISPLAY IN RUN MODE
t 25.0	(t) temp (Return Air)
r 10.2	(r) Rph Comp-1 Current
y 10.5	(y) Yph Comp-1 Current
b 11.3	(b) Bph Comp-1 Current
r 12.8	(r) Rph Comp-2 Current
y 11.6	(y) Yph Comp-2 Current
b 12.9	(b) Bph Comp-2 Current
r 12.3	(r) Rph Blower Current
y 12.7	(y) Yph Blower Current
b 12.0	(b) Bph Blower Current
H000	(H) Operating Hours of comp -1
H000	(H) Operatlng Hours of comp -2

SETTING OF IMP. PARAMETERS

4 DIGIT DISPLAY	MEANING OF DISPLAY IN PARA MODE
S2 1.0	(S) Set temp (15.0 to 30.0 ℃)
d00.0	(d) dead band (0.5 to 5.0 ℃)
C2 1.2	(C) Set Current of Comp (11.0 to 30.0 A)
U20.0	(U) Underload (0.0 to 29.0 A)
Ph-E	(Ph) Phase Reversal (Enable / disable) (E) (d)
F 2.0	(F) Blower Current (1.0 to 10.0 A)
t 1.2	(t) Offset temp (Calibration) (± 2.0 C)
r 0.0	(r) Offset adj. of Rph Comp-1 Current (Calibration) (± 2.0 A)
y 0.0	(y) Offset adj. of Yph Comp-1 Current (Calibration) (± 2.0 A)
b 0.0	(b) Offset adj. of Bph Comp-1 Current (Calibration) (± 2.0 A)
r 0.0	(r) Offset adj. of Rph Comp-2 Current (Calibration) (± 2.0 A)
y 0.0	(y) Offset adj. of Yph Comp-2 Current (Calibration) (± 2.0 A)
b 0.0	(b) Offset adj. of Bph Comp-2 Current (Calibration) (± 2.0 A)
r 0.0	(r) Offset adj. of Rph Blower Current (Calibration) (± 1.0 A)
y 0.0	(y) Offset adj. of Yph Blower Current (Calibration) (± 1.0 A)
b 0.0	(b) Offset adj. of Bph Blower Current (Calibration) (± 1.0 A)

SETTING OF IMP. PARAMETERS

4 DIGIT DISPLAY	MEANING OF DISPLAY IN PARA MODE
m008	(m) Scroll time (0 to 10 sec)
A CL	(A) Mode CooL (CL) / Fan (Fn)
oPLo	(oP) Operating Mode (Local (Lo) / BMS rEmote (rE))
n001	(n) unit no. (1 to 31)

a) In Local Mode : A/C Unit can be started from keyboard of display unit

b) In BMS Remote Mode :
A/C Unit Start :
If Remote DI = Closing of Potential Free Contact from BMS
A/C Unit Stop :
If Remote DI = Opening of Potential Free Contact from BMS

- ART TIME : 3 Min
- Equal Run Hours Logic :-
  Equal Run Hour Logic depends upon Operating Hours.

I) TEMP CONTROL ACTION :-
If Room Temp > Set Temp then COMP will ON.
If Room Temp < Set Temp then COMP will not ON.
AUTO-STOP : If Room Temp < Set Temp - Dead Band, then COMP turn OFF WIth 1 mln delay.
AUTO-RESTART : If Room Temp > Set Temp , then COMP turn ON as per ON Sequence.

II) OFF SEQUENCE :-
After manually stop given, all DO (COMP & COND DO) turn OFF. & after 120 Sec Blower DO turn OFF.

- DEFAULT PROCEDURE FOR OPERATING HOURS :
  After Power ON, Press Following sequence of keys within 10 Sec,

- When each COMP Completed its 10 hours then run display shows 1. As per below,

Likewise, whenever Comp completed next 10hours then Run display count Increment by 1.

ANNUNCIATIONS OF ALL FAULTS / TRIPS

COMP-1	COMP-2	MEANING OF FAULT ANNUNCIATION
SPP	SPP	Single Phasing Protection
Ph-r	Ph-r	Phase - reversal
Ub	Ub	Unbalance Current
oL	oL	overLoad Current
UL	UL	UnderLoad Current
bo	bo	blower Off
HP	HP	High Pressure / Low Pressure
E1	E1	External Intern lock
SE	SE	Sensor Error
CONF	CONF	COmmunicatIon Fail
F1	F1	FIre Detector

SETTINGS — Parameter can be selected by pressing Settings key

COOL / VALUE — If in PARA MODE then value of selected parameter will be incremented pressing this key
If in RUN MODE & Scroll time is zero then actual Temp, Current & OP. Hours will be display one by one by pressing this key.
COOL / FAN LED
COOL MODE = LED ON
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VALUE / ART — If in PARA MODE then value of selected parameter will be decrement by pressing this key.

START / STOP — Controller can be Start / Stop Locally by pressing this key

IMP. NOTE :-

PL. DO NOT MIX COMMUNICATION CABLE WITH POWER CABLE.

REV	DESCRIPTION	DATE	DRN	APPD.
01	NILL	11/12/17	SSZ	SSK

DRN. BY	CHD. BY	APPD. BY
SSZ		SSK

REF. No. OA - - -

NAME OF EQUIP. PAC MPD TWIN (11-30A) WITH SW BMS & Fire & EI DI

TITLE : OPERATING MANUAL OF PAC MPD TWIN (11-30A) WITH SW BMS & Fire & EI DI

PROJECT PAC MPD TWIN (11-30A) WITH SW BMS & Fire & EI DI

CUSTOMER : M/s VOLTAS LIMITED.

VOLTAS LIMITED

DRG. NO. PMN050303REVA

SHEET 1 OF 1
SIZE A4
REV 01

A TATA Product

VOLTAS

R407C

Also available

Microprocessor-controlled Packaged & Ductable Split Units

THE VOLTAS INTELLISYS RANGE

The Voltas **INTELLISYS** range of Packaged and Ductable Split Units are designed to be the most **INTELLIGENT** and **COMPACT** systems, to cater to your total cooling requirements. Applications include offices, banks, departmental stores, entertainment centers, multiplexes, restaurants, fast food centers, residences, computer rooms, telephone exchanges, hospitals, auditoriums, conference halls, theatres, factories, control rooms, etc. Packaged & Ductable Split Units are available in both **Air-cooled** and **Water-cooled** options.

POWERFUL FEATURES

Energy Efficiency
A range of sophisticated components such as a highly energy efficient compressor, internally grooved crosshatched copper tube coil with matched circuitry, and a microprocessor controller, result in a low power consumption.

Low Noise, Compact Indoor & Outdoor Units
Superior engineering coupled with technologically advanced components; ensure low noise levels, indoors and outdoors. Our new design IDUs and ODUs are more compact, saving valuable space.

Higher False Ceiling Heights
Low height IDUs enable higher false ceiling heights, improving the aesthetics.

Equalization Of Compressor Runtime
The Microprocessor Controller ensures equal running of compressors in multiple compressor units. This ensures a longer life for compressors.

Space Saving
The outdoor condensing unit, in a ductable split unit, is a compact unit and can be placed on a ledge, terrace or a wall-mounted bracket. The indoor unit can be ceiling-suspended or loft-mounted, a unique advantage.

Indoor Air Quality
Special synthetic woven filters remove fine dust particles to give clean air at all times. The filters are easily removable and washable.

Humidity Control
A highly-efficient evaporator coil keeps the room humidity within the desired comfort range.

Reliability
Our manufacturing plants are equipped with the latest and sophisticated tooling and machinery, backed by a modern R&D facility. The products are best-in-class, designed especially for tropical conditions, with high levels of reliability.

Blue Fin treatment
Hydrophilic fins and inner-grooved copper pipes are standard feature which provides resistance to corrosion & optimizes heat exchange / efficiency.

MICROPROCESSOR-BASED LCD CONTROLLER FOR DUCTABLE UNITS

The microprocessor controller installed on all the units, offers you the following benefits:

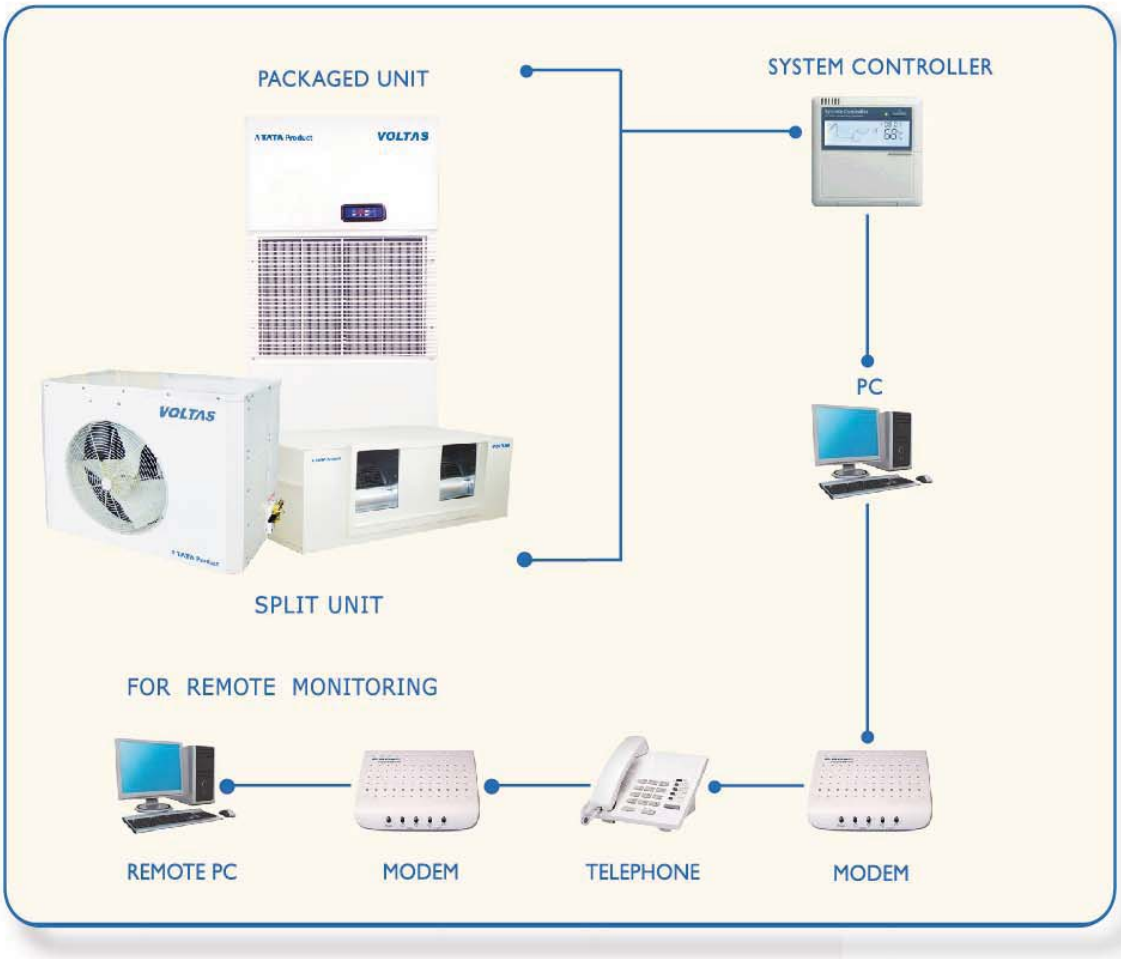
PACKAGED UNITS

Self–Diagnosis function, Auto-start mode, Energy saving, Motor protection device, Anti-recycle timer, Inbuilt temperature sensor and Programmable controller as mentioned above, but with LED display.

MONITORING AT YOUR FINGER TIPS

The VSCADA System (Optional)

- The Voltas Supervisory Control and Data Acquisition System (VSCADA) enables link-up of all the packaged and / or ductable split units in a building, to a Personal Computer.
- This enables Operation and Monitoring of each unit from the PC.
- Remote Monitoring from anywhere on the globe is also possible through a modem link-up.



DEPARTMENTAL STORES • SHOPPING MALLS • BANKS

Factory Charged Units *

SCROLL COMPRESSOR UNITS - R22 / R407C						
Nominal TR	5.5 TR	8.5 TR	11.0 TR	16.5TR	17.0 TR	22.0 TR
WATER-COOLED UNIT						
Model (R22)	ACDPUWSC55	ACDPUWSC875D	ACDPUWSC110	-	ACDPUWSC170CD	ACDPUWSC220CD
Model (R407c)	ACDPUWSC55R407	ACDPUWSC875DR407	ACDPUWSC110R407	-	ACDPUWSC170CDR407	ACDPUWSC220CDR407
No of Compressors	1	1	2	-	2	2
Net weight (kg)	290	320	430	-	540	660
No. of Condenser	1	1	2	-	2	2
Condenser Water (In/Out)	1 -1/4" BSP	1 -1/4" BSP	1 -1/4" BSP x 2	-	1 -1/4" BSP x 2	1 -1/4" BSP x 2
Water Flow Rate/Cond. (LPM)	73	113	73	-	113	146
AIR-COOLED UNIT						
Model (R22)	ACDPUASC55	ACDPUASC875D	ACDPUASC110	ACDPUASC165CD	ACDPUASC170CD	ACDPUASC220CD
Model (R407C)	ACDPUASC55R407	ACDPUASC875DR407	ACDPUASC110R407	ACDPUASC165CDR407	ACDPUASC170CDR407	ACDPUASC220CDR407
No of Compressors	1	1	2	3	2	2
Net weight (kg)	180	194	267	341	320	449
Airflow (CMH)	3740	5780	7480	11220	11560	14960
Evaporator fan	— Centrifugal Forward Curved, Double Inlet Double Width —					
Power Supply	415V • 3PH • 50Hz (4 Wire, AC Supply)					
Length (mm)	900	900	1220	1490	1490	2040
Depth (mm)	660	660	740	745	745	745
Height (mm)	1850	1850	1750	1790	1790	1790
AIR-COOLED CONDENSER						
Model	ACDC60	ACDC90	ACDC60	ACDC60	ACDC90	ACDC120
Power Supply	230V -1PH - 50Hz (2 Wire, AC Supply)					
No. of Condenser	1	1	2	3	2	2
Condenser fan	Axial					
No. of Fan/Condenser	1	1	1	1	1	2
Length/Condenser (mm)	950	1200	950	950	1200	1550
Depth/Condenser (mm)	450	450	450	450	450	575
Height/Condenser (mm)	960	960	960	960	960	960
Net weight/Condenser (kg)	80	87	80	80	87	111

NOTES:
1) Product design and innovation are a continuous process in VOLTAS and hence the above specifications are subject to change without notice.
2) The nominal capacities mentioned are at the rating conditions of Indoor Temperature: 27 deg C DBT /19 deg C WBT, and Outdoor Temperature: 35 deg C DBT for Air-cooled units & cooling water inlet temperature of 32 deg C for Water-cooled units.
3) Air-cooled Package units are suitable to operate upto 48 deg C.
4) *Only Water-Cooled units are Factory Gas charged & Air-cooled units are to be charged at site.

FEW OF OUR INSTALLATIONS

NATIONAL LAW UNIVERSITY AMPHITHEATRE

P&M MALL

VIT UNIVERSITY

BURGER KING

NAJRUL TIRTHA

SHREE NARAYANA STUDIO

RAJMAHAL RESORTS

PARADISE RESTAURANT

SYDNEY HEIGHTS RESORTS

PRODUCT RANGE

VARIABLE REFRIGERANT FLOW SYSTEM (VRF)

WATER COOLED CENTRIFUGAL CHILLER

ENERGY EFFICIENT
WATER COOLED SCREW CHILLER

ENERGY EFFICIENT
AIR COOLED SCREW CHILLER

PACKAGED & DUCTABLE SPLIT UNIT

CO-GEN VAPOUR ABSORPTION MACHINE (VAM)

DOUBLE EFFECT VAM

AIR COOLED SCROLL CHILLER

WATER COOLED SCROLL CHILLER

PROCESS REFRIGERATION PACKAGE

IAQ & ENERGY REDUCTION SYSTEM

STP EA ODOUR / H_2S REMOVAL SYSTEM

VOLTAS

VOLTAS LIMITED
Domestic Projects Group, Voltas House 'B', 3rd floor, T. B. Kadam Marg, Chinchpokli, Mumbai-400 033, India
Tel: +91 22 6792 0307 / 6792 0263, Email: avinashsakhardande@voltas.com, rsaxena@voltas.com, bijogeorge@voltas.com
North: vikasjain@voltas.com, East: saptarshigupta@voltas.com, South: vssriram@voltas.com,
West: Mumbai : varunrao@voltas.com, Pune : sandeshtoraskar@voltas.com, Ahmedabad : devendrasharma@voltas.com
Website: www.voltas.com

NORTH ZONE: **DELHI** (011) 66505659/66505678/66505680/66505657 **CHANDIGARH** (0172) 6610124 **JAIPUR** (0141) 6541011 **LUCKNOW** 8588862618 EAST ZONE: **KOLKATA** (033) 66266268 / 662662283 / 66266262 **BHUBANESHWAR** (0674) 6574044 **PATNA** (0612) 2500786 **RAIPUR** (077) 14033886 WEST ZONE: **MUMBAI** (022) 66656754/ 66656756 / 66656757 / 66656759 / 66656760 **NAGPUR** (0712) 6456894 **AHMEDABAD** (079) 66301102 / 6630 1107 **PUNE** (020) 66297446 **INDORE** (0731) 2498616 SOUTH ZONE: **CHENNAI** (044) 66760315 / 66760346 / 66760355 **BENGALURU** (080) 22535643 **HYDERABAD** (040) 66743007 **COCHIN** (0484) 6605553.

VL/MC-PDSU/10/16/7k

DOC MENT IS APPRO ED IDE TANGEDCO LETTER NO. CE/E/P.I/SE/E/P . I/AEE/ E/P/F.E SE D A ./D.348 /19 DT.03.09.2019

BHARAT HEAVY ELECTRICALS LIMITED
PROJECT ENGINEERING MANAGEMENT
(MECHANICAL AUXILIARY)

This approval status shall be interpreted as laid down in the contract and it shall not relieve the contractor from his contractual obligation.

APPROVAL CATEGORY AWARED = I

CAT I - Approved
CAT II - Approved with Comments as Noted
CAT III - Not Approved
CAT IV - Reference Drawing

Name: VIPIN NAUNI
Signature:

VIPIN NAUNI
Revised as per TANGEDCO / DESEIN Comments.
Reviewed by BHEL and found in order. Submitted for customer approval.
2019.07.30 16:26:46 +05'30'

PROJECT	2x660 MW ENNORE SEZ COAL BASED STPP AT ASH DYKE OF NCTPS, CHENNAI
	CUSTOMER TAMILNADU GENERATION AND DISTRIBUTION CORPORATION LIMITED (TANGEDCO)
	CONSULTANT **DESEIN PRIVATE LIMITED** **DESEIN HOUSE, GREATER KAILASH-II, NEW DELHI**
	EPC CONTRACTOR BHARAT HEAVY ELECTRICALS LTD PS-PEM, PPEI-BUILDING, SECTOR-16A, PLOT NO. 25, NOIDA-201301

STATUS	**CONTRACT**	**DOC. PE-V0-412-553-A027**	Rev: **00**
PACKAGE		**AIR CONDITIONING SYSTEM**	
TITLE		**TDS & GA of 3-way mixing valve**	

CV VALUE CALCULATION & VALVE SIZE				
S.NO	AHU	FLOW RATE (GPM)	CV VALUE=√(1/5) X GPM	VALVE SIZE SUITABLE AS PER CV VALUE
1	54200 CFM	342	150.48	100MM
2	31700 CFM	185	81.4	80MM

RAPID CONTROLS PVT.LTD.
B-47, Mayapuri, Indl. Area, Phase-1, New Delhi-64 (India)
Phone - 28117185, 28113873, 28115349, 45128360
E-mail : rapidcontrols@gmail.com, rapidcontrols47@gmail.com
Website : www.rapidcontrols.co.in

TECHNICAL DATA SHEET FOR 3 WAY MOTORIZED GLOBE VALVE-MIXING TYPE FOR VALVE SIZE UPTO 65mm to 80mm

S.No.	DESCRIPTION	DETAILS
	VALVE DETAILS	
1.	MAKE	**"RC"**
2.	BODY MATERIAL	CAST IRON IS:210 FG:260
3.	BONNET MATERIAL	CASTIRON IS:210 FG:260
4.	SPINDLE	S.S.304
5.	PLUG	BRASS IS:1264, GRADE DCB-I
6.	SEAT	BRASS IS:1264, GRADE DCB-I
7.	GLAND PACKAGING	SPRING LOADED WITH PTFE RINGS AND RUBBER SEALS
8.	END CONNECTION	FLANGE END CONNECTION AS PER BS-10 TABLE-E
9.	WORKING PRESSURE	7 Kg cm^2
10.	MIN. &MAX. TEMPURATURE	1^OC & 80^OC
11.	BODY TEST PRESSURE	21 Kg cm^2
12.	PAINTING	EPOXY PAINTED, MIN 150 MICRONS
	ACTUATOR DETAILS	
13.	MAKE	**"RC"**
14.	BODY MATERIAL	ALUMINIUM (PRESSURE DIE CASTED)
15.	TOP COVER MATERIAL	ABS MATERIAL
16.	LINKAGE	DIRECT MOUNTING
17.	TYPE OF OPERATION	LINEAR MOTION,NON-SPRING RETURN
18.	FAIL SAFE	STAY PUT
19.	OPERATING TEMPURATURE LIMIT	1^OC TO 80^OC
20.	VOLTAGE	24V AC/DC
21.	ELECTRIC CURRENT	LESS THAN 1 Amp
22.	CONTROL SIGNAL	MODULATING 0-10V DC CONTROL SIGNAL
	(not selectable type)	MODULATING 4-20mA CONTROL SIGNAL
		ON/OFF (COM,NO,NC) TYPE CONTROL SIGNAL
23.	FEEDBACK	4-20mA feedback provision (O) (only works with modulating 4-20mA control signal)
24.	ELECTRIC POWER	25 Watts max
25.	STROKE TIMING	95 Seconds
26.	JUMPER	FIELD CONFIGRABLES JUMPER'S FOR FORWARD/REVERSE ACTION
27.	INGRESS PROTECTION	I.P.64
28.	NOISE RATING	60dB MAX. SOUND PRESSURE LEVEL AT 1 meter.

RAPID CONTROLS PVT.LTD.
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E-mail : rapidcontrols@gmail.com, rapidcontrols47@gmail.com
Website : www.rapidcontrols.co.in

TECHNICAL DATA SHEET FOR 3 WAY MOTORIZED GLOBE VALVE-MIXING TYPE FOR VALVE SIZE 100mm

S.No.	DESCRIPTION	DETAILS
	VALVE DETAILS	
1.	MAKE	**"RC"**
2.	BODY MATERIAL	CAST IRON IS:210 FG:260
3.	BONNET MATERIAL	CASTIRON IS:210 FG:260
4.	SPINDLE	S.S.304
5.	PLUG	BRASS IS:1264, GRADE DCB-I
6.	SEAT	BRASS IS:1264, GRADE DCB-I
7.	GLAND PACKAGING	SPRING LOADED WITH PTFE RINGS AND RUBBER SEALS
8.	END CONNECTION	FLANGE END CONNECTION AS PER BS-10 TABLE-E
9.	WORKING PRESSURE	7 Kg cm^2
10.	MIN. &MAX. TEMPURATURE	1^OC & 80^OC
11.	BODY TEST PRESSURE	21 Kg cm^2
12.	PAINTING	EPOXY PAINTED, MIN 150 MICRONS
	ACTUATOR DETAILS	
13.	MAKE	**"RC"**
14.	BODY MATERIAL	ALUMINIUM (PRESSURE DIE CASTED)
15.	TOP COVER MATERIAL	ABS MATERIAL
16.	LINKAGE	DIRECT MOUNTING
17.	TYPE OF OPERATION	LINEAR MOTION,NON-SPRING RETURN
18.	FAIL SAFE	STAY PUT
19.	OPERATING TEMPURATURE LIMIT	1^OC TO 80^OC
20.	VOLTAGE	24V AC/DC
21.	ELECTRIC CURRENT	LESS THAN 1 Amp
22.	CONTROL SIGNAL	MODULATING 0-10V DC CONTROL SIGNAL
	(not selectable type)	MODULATING 4-20mA CONTROL SIGNAL
		ON/OFF (COM,NO,NC) TYPE CONTROL SIGNAL
23.	FEEDBACK	4-20mA FEEDBACK PROVISION (O) (only works with 4-20mA modulating control signal)
24.	ELECTRIC POWER	25 Watts max
25.	STROKE TIMING	130 Seconds
26.	JUMPER	FIELD CONFIGRABLES JUMPER'S FOR FORWARD/REVERSE ACTION
27.	INGRESS PROTECTION	I.P.64
28.	NOISE RATING	60dB MAX. SOUND PRESSURE LEVEL AT 1 meter.

RAPID CONTROLS PVT.LTD.
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E-mail : rapidcontrols@gmail.com, rapidcontrols47@gmail.com
Website : www.rapidcontrols.co.in

TECHNICAL DATA SHEET FOR 2/3 WAY MOTORIZED VALVE (GLOBE TYPE) for SIZES UPTO 50MM

S.No.	DISCRIPTION	DETAILS
A)	MATERIAL SPECIFICATION FOR VALVE	
1	MAKE	RC
2	BODY	CAST IRON IS:210 FG:260
3	BONNET	CAST IRON IS:210 FG:260
4	SPINDLE	S.S.-304
5	PLUG	BRASS IS:1264 GRADE DCB-I
6	SEAT	BRASS IS:1264 GRADE DCB-I
7	PACKING	RUBBER SEAL WITH TEFLON RING SPRING LOADED
8	END CONNECTION	SCREWED END CONNECTIONS
9	PORT TYPE	2 / 3 WAY
10	WORKING PRESSURE	7 Kg
11	TEST PRESSURE	21 Kg
12	TEMP. WITH STAND	90' C
13	PAINTING	EPOXY PAINTED, MIN 150 MICRONS
B)	MATERIAL SPECIFICATION FOR ELECTRIC ACTUATOR	
1	MAKE	RC
2	ACTUATOR MODEL	R-981-J
3	BODY	ALUMINIMUM (PRESSURE DIE CAST)
4	TOP COVER	ABS PLASTIC
5	MOTOR	MICRO DC MOTOR
6	LINKAGE TYPE	DIRECT MOUNTING
7	LINKAGE DESIGN	ALUMINIMUM (PRESSURE DIE CAST)
8	TYPE OF OPERATION	LINEAR MOTION
9	OPERATION TIME	120 SECONDS
10	MIN. OPERATING TEMP.	1 C
11	MAX. OPERATING TEMP.	80 C
12	INPUT VOLTAGE	24V AC/DC, 50Hz
13	CONTROL TYPE	SNAPACTING
		MODULATING TYPE
		i) 0-10 V DC
		ii) 4-20mA
14	FAIL SAFE	STAY PUT
15	DEGREE OF PROTECTION	IP 65
16	CERTIFICATION	CE certified

RAPID CONTROLS PVT.LTD.
B-47, Mayapuri, Indl. Area, Phase-1, New Delhi-64 (India)
Phone - 28117185, 28113873, 28115349, 45128360
E-mail : rapidcontrols@gmail.com, rapidcontrols47@gmail.com
Website : www.rapidcontrols.co.in

TECHNICAL DATA SHEET FOR 2/3 WAY MOTORIZED VALVE (GLOBE TYPE) for SIZES 65MM & ABOVE

S.No.	DISCRIPTION	DETAILS
A)	**MATERIAL SPECIFICATION FOR VALVE**	
1	MAKE	RC
2	BODY	CAST IRON IS:210 FG:260
3	BONNET	CAST IRON IS:210 FG:260
4	SPINDLE	S.S.-304
5	PLUG	BRASS IS:1264 GRADE DCB-I
6	SEAT	BRASS IS:1264 GRADE DCB-I
7	PACKING	RUBBER SEAL WITH TEFLON RING SPRING LOADED
8	END CONNECTION	FLANGED ENDCONNECTIONS AS PER TABLE-5
9	PORT TYPE	2 /3 WAY
10	WORKING PRESSURE	7 Kg
11	TEST PRESSURE	21 Kg
12	TEMP. WITH STAND	90' C
13	PAINTING	EPOXY PAINTED, MIN 150 MICRONS
B)	**MATERIAL SPECIFICATION FOR ELECTRIC ACTUATOR**	
1	MAKE	RC
2	ACTUATOR MODEL	R-981-S / SS
3	BODY	ALUMINIMUM (PRESSURE DIE CAST)
4	TOP COVER	ABS PLASTIC
5	MOTOR	MICRO DC MOTOR
6	LINKAGE TYPE	DIRECT MOUNTING
7	LINKAGE DESIGN	EXTRA HEAVY M.S. ROD ZINC PLATED
8	TYPE OF OPERATION	LINEAR MOTION
9	OPERATION TIME	120 SECONDS
10	MIN. OPERATING TEMP.	1 C
11	MAX. OPERATING TEMP.	80 C
12	INPUT VOLTAGE	24V AC/DC, 50Hz
13	CONTROL TYPE	SNAPACTING
		MODULATING TYPE
		i) 0-10 V DC
		ii) 4-20mA
14	FAIL SAFE	STAY PUT
15	DEGREE OF PROTECTION	IP 65
16	CERTIFICATION	CE certified

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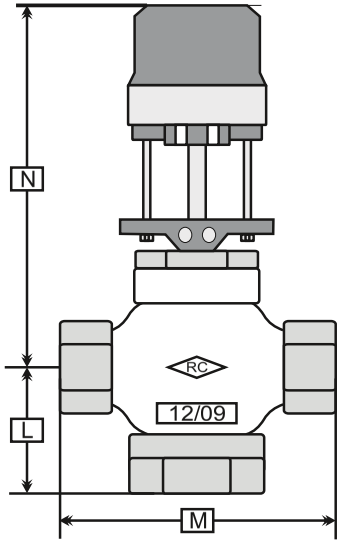
Website : www.rapidcontrols.co.in

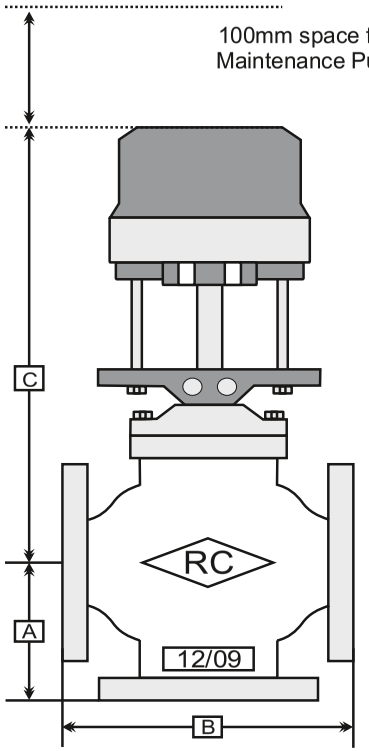
TECHNICAL DATA SHEET FOR MOTORIZED VALVE FOR F.C.U

S.No.	DISCRIPTION	DETAILS
1	MAKE	RC
2	PORT	2 / 3 WAY
3	BODY	BRASS IS:1264 GRADE DCB-I
4	CONNECTORS	BRASS IS:319 GRADE DCB-I
5	BLASÉ PLATE	BRASS SHEET
6	ACTUATOR BASE & HOUSING	ALUMINIUM
7	MOTOR	SHYNCHRONOUS MOTOR
8	SUPPORTING SPRING & SRWES	S.S. 304
9	SUPPLY	220V AC, 50,60 Hz
10	CERTIFICATION	CE certified

GA DRAWING FOR 3 WAY GLOBE TYPE MOTORIZED VALVE



VALVE DIEMENSION			
VALVE SIZE	L	M	N
20 mm	81	116	280
25 mm	81	116	280
32 mm	85	116	277
40 mm	91	130	288
50 mm	94	153	294



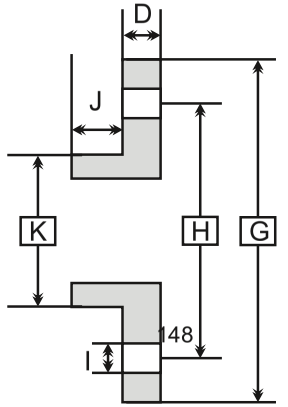
NOTE: Upto 50 Mm Valve is screwed ends, 65mm & above flange ends

VALVE DIMENSION			
VALVE SIZE	A	B	C
65 mm	133	224	408
80 mm	140	240	418
100 mm	153	282	450
125 mm	187	305	477

Flange end 65mm to 100mm as per IS 6418 Table - 5

FLANGE AND DRILLING DETAILS							
VALVE SIZE	D	G	NO. OF HOLES	H	I	J	K
65 mm	20	160	04	130	14	03	110
80 mm	21	180	04	150	18	03	120
100 mm	22	210	04	170	18	03	148
125 mm	30	254	08	210	17		
150 mm							

FLANGE DETAILS



Client:

Job:

DRAWING NO, DATED -

RAPID CONTROLS PVT.LTD
B - 47, MAYAPURI , PHASE - I, NEW DELHI - 64
(INDIA) PHONE - 28117185,28115349,28113873
FAX: 28116281, Email: sales1@rapidcontrols.in

2 / 3 WAY MOTORISED DIVERTING VALVES

APPLICATION :-

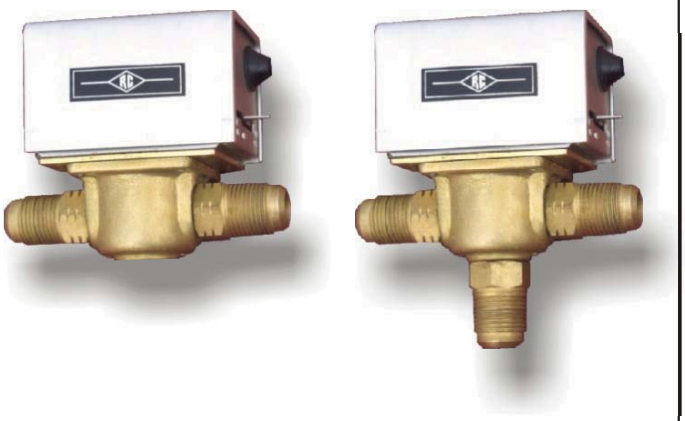
These valves are compact units consisting of small Electric Actuator and 2 / 3 Way Valve for controlling the flow of water or any liquid that is not injurious to Brass. These valves are designed for use in Fan Coil Units or any other system requiring quite and compact water lines.
These valve are made for use upto 150 P.S.I.G.

NOTE :- THIS IS A SIMPLE DIVERTING VALVE AND CAN BE USED IN ANY WHERE THERE IS A REQUIREMENT FOR DIVERTING LIQUID , THIS VALVE IS ONLY MEANT FOR USE IN LIQUID .

VALVE / MOTOR RATING :-

VALVE :-
CONSTRUCTION MATERIEL :- BRASS
PIPE THREAD : - 5/8 " FLARE (M)

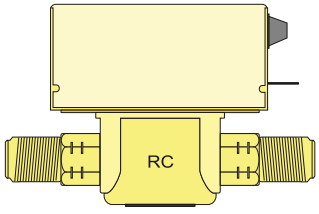
MOTOR :-
SYNCHRON (U.S.A.)
MOTOR SPEED : 6 R.P.M.
ELECT. RATING : 220V AC 60 HZ
5 W

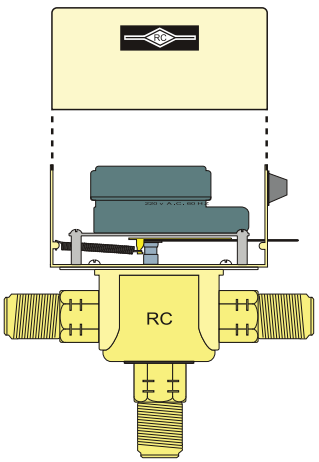


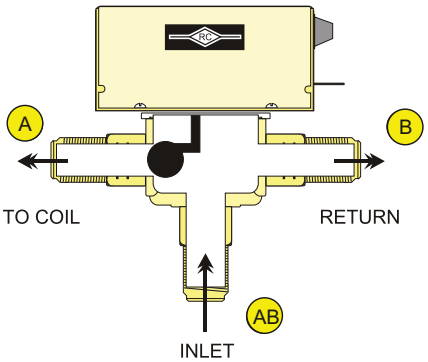
INSTALLATION :-

The valve installation must be done by a trained experienced technician only The rating given on the valve should be checked and confirmed suitable for line use before installation . Install the valve in on area with adequate Clearance , so that the manual opening lever on the body can be moved freely.

It can be mounted in any position on vertical pipe line . If it is mounted Horizontally . The power head must be even with or above the center line of The piping . Always ensure that enough space is provided above the power Head to remove the cover for servicing.







INDEX

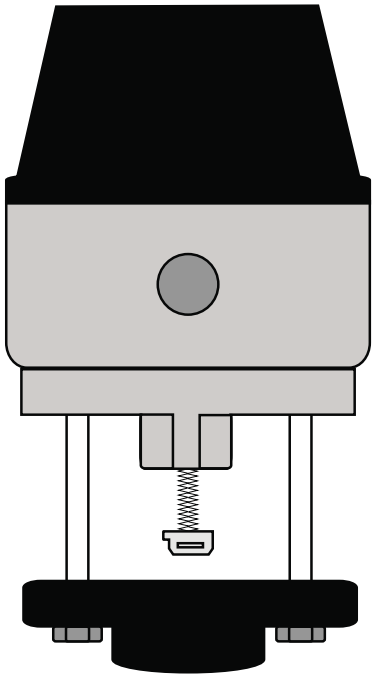
AB	INLET FOR THE VALVE
B	RETURN
A	TO COIL

DIRECT MOUNTING ACTUATOR
LINEAR MOTION
RAPID ACTUATOR SERIES R-981 S

Rapid Actuatorseries R-981S is a Linear Movement Equal Percentage , Direct Mounting Electric Actuator. The R-981S series actuator is ideally used for control valves with linear movement or any other application which requires a linear movement .The actuator comes with a range of inputs eg. 4-20mA, 0-10 V DC, S.P.D.T. Switch, Thermostat etc. . Its basic features cover include a very intelligent circuit, which can sense any hindrance in the movement of valve and stop till the hindrance is removed . It also have field replaceable jumpers for forward / reverse motion

BASIC FEATURES

- ✓ Intelligent Circuit that senses any hindrance in movement of the Valve .
- ✓ Electronic current sensing provides internal protection and positive full closing force .
- ✓ Position indicator .
- ✓ Low Noise Level .
- ✓ Field configurable jumpers for forward/reverse action .
- ✓ Selectable signal input terminals (0-10V DC , 0-20mA ,. 4-20mA) .
- ✓ Screw terminal connections .
- ✓ Compact size for easy installation in confined areas .
- ✓ Provision for usage of one common power supply transformer for multiple Actuators and Controllers .
- ✓ B.M.S Compatible .
- ✓ Self contained Valve Linkage .



R- 981S

SPECIFICATIONS

Electrical Rating :
Standard - 24 V AC , 50 Hz.
Inputs - 4-20 V mA , 0 -10V DC , 0-20mA .

Ambient Rating :
Operating Temperature : 0 to 55 C
Relative Humidity : 15% to 95% at 40 C

Operating Noise :
55dBA max. Sound Pressure Level at 1metre .

Mechanical Rating :
Stroke - 19mm (3/4”) or less .
Stroke Timing - Approx. 70 seconds for 3/4” Stroke .
Closing Force - 710 NM (160 lbs) .
Break away Force - 710 NM (160lbs)

3 WAY MOTORIZED GLOBE VALVE-DIVERTING TYPE

RAPID CONTROLS

APPLICATION - Used for 2 position, or floating control of liquids for diverting service or in systems requiring that the flow be directed from either of one inlets to a two outlets.

CONSTRUCTION - 3 way motorized globe valve diverting type with Metal to metal seating/soft seating and spring loaded packing.Constant total flow throughout full plug travel. Linkage provides with strain relief mechanism assuring tightest possible close-off without putting excessive strain on the motor. Linkage has easy to read valve position indicator.

SPECIFICATION

BODY & BONNET	: Cast iron
SEAT & PLUG	: Brass
SPINDLE	: S.S.304
GLAND PACKAGING	: Spring loaded PTFE rings with rubber seals
BODY TEST PRESSURE	: 21 Kg/cm^2
WORKING PRESSURE	: 7 Kg/cm^2
WORKING TYPE	: Diverting (1 inlet & 2 outlet)
VOLTAGE	: 24V AC/DC
CONTROL SIGNAL	: Modulating 0-10V DC
	: Modulating 4-20 mA
	: ON/OFF Type (NO,NC)
FEEDBACK (Works with 4-20mA control signal)	: 4-20M feedback (O)

VALVE RATING

VALVE SIZE MM	CV	RECOMMENDED MAXIMUM PRESSURE DIFFRENTIAL	MAXIMUM TEMPERATURE OF FLUID	MAXIMUM PRESSURE OF FLUID	NORML LIMITING FACTOR
15	4.0	20 P.S.I.G.	115 ℃	150 P.S.I.G SCREWED 125 P.S.I.G FLANGED	MAXIMUM PRESSURE DIFFRENTIAL
20	6.3				
25	10.0				
32	16.0				
40	25.0				
50	40.0				
65	63.0				
80	100.0				
100	160.0				
125	250.0				
150	360.0				
200	600.0				

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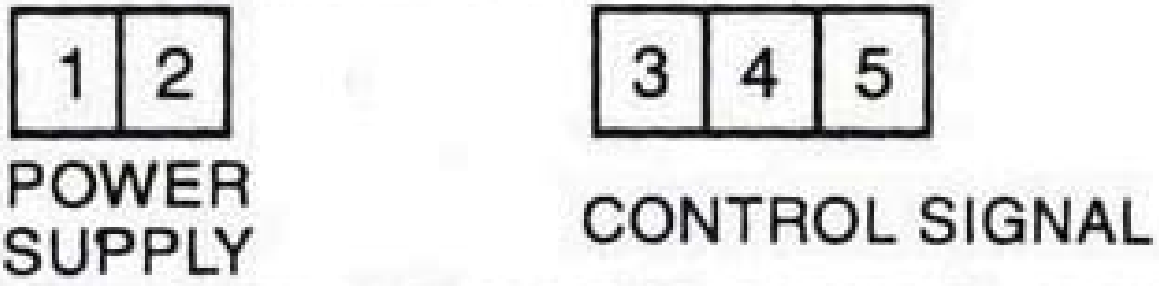
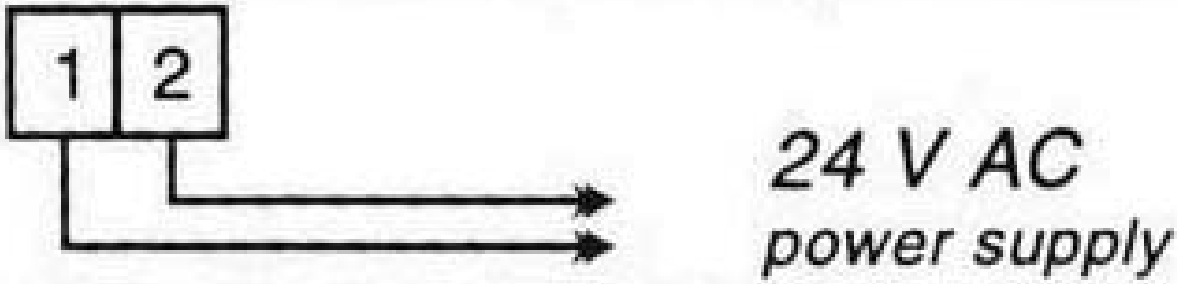
WIRING DETAIL FOR ACTUATOR

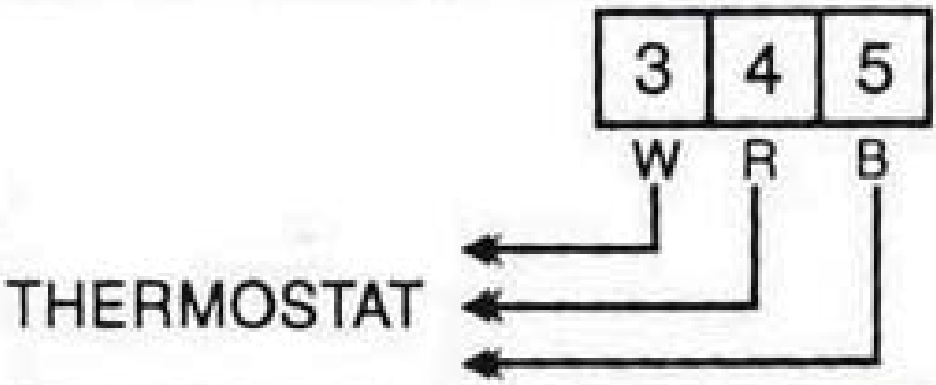
R981S COMPATIBLE WITH MASTER CONTROL THERMOSTAT

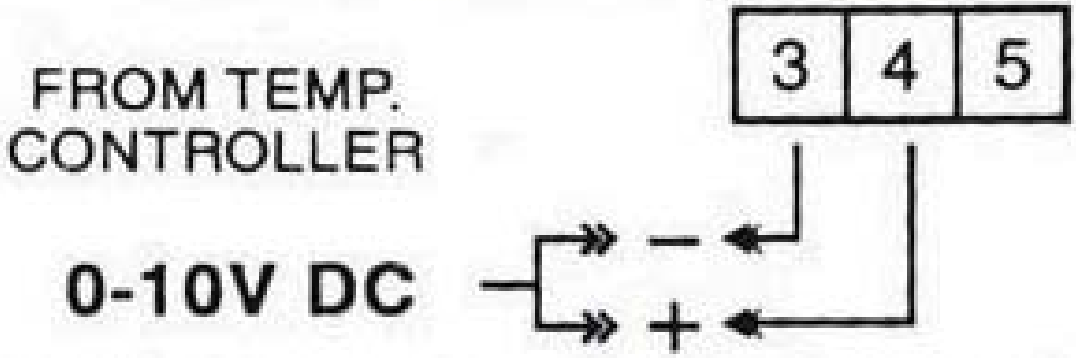
MODEL - M 911A - M 912 B



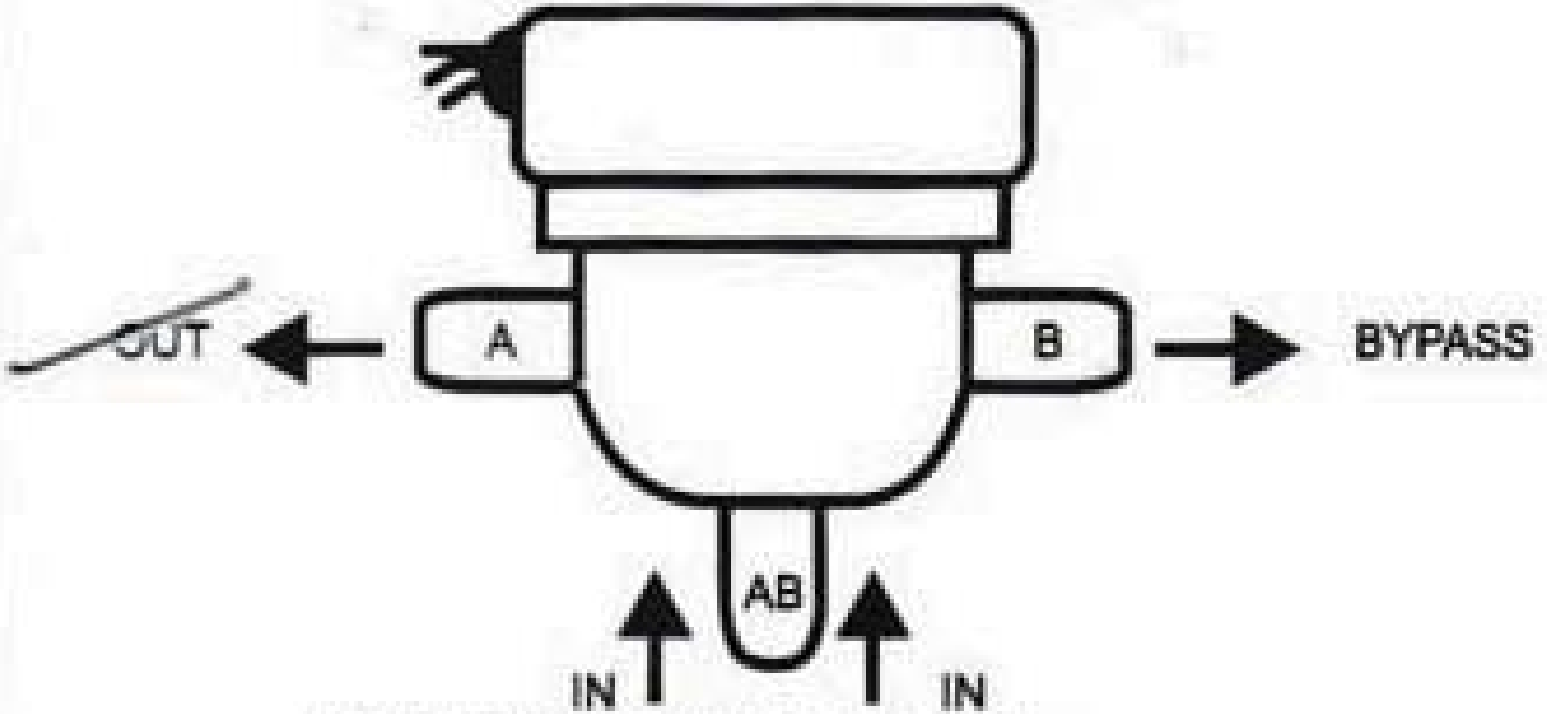
WIRING:







MOTORIZED VALVE



DIFF. PRESSURE: 10 P.S.I.
MAX STATIC PRESSURE: 125 P.S.I.
MOTOR COMPARTMENT NOT TO BE
USED FOR FIELD SPLICES
RAPID CONTROLS PVT. LTD.
NEW DELHI

BHARAT HEAVY ELECTRICALS LIMITED
PROJECT ENGINEERING MANAGEMENT
(MECHANICAL AUXILIARY)

This approval status shall be interpreted as laid down in the contract and it shall not relieve the contractor from his contractual obligation.

APPROVAL CATEGORY AWARED = I

CAT I - Approved
CAT II - Approved with Comments as Noted
CAT III - Not Approved
CAT IV - Reference Drawing

Name: VIPIN NAUNI

Signature:

VIPIN NAUNI
Reviewed and found in order. Submitted for customer approval.
2017.10.24 12:24:13 +05'30'

Date	Rev	Description of Revision	ALT	CHD	APPD

PROJECT	2x660 MW ENNORE SEZ COAL BASED STPP AT ASH DYKE OF NCTPS, CHENNAI
	CUSTOMER TAMILNADU GENERATION AND DISTRIBUTION CORPORATION LIMITED (TANGEDCO)
	CONSULTANT **DESEIN PRIVATE LIMITED** **DESEIN HOUSE, GREATER KAILASH-II, NEW DELHI**
	EPC CONTRACTOR BHARAT HEAVY ELECTRICALS LTD PS-PEM, PPEI-BUILDING, SECTOR-16A, PLOT NO. 25, NOIDA-201301

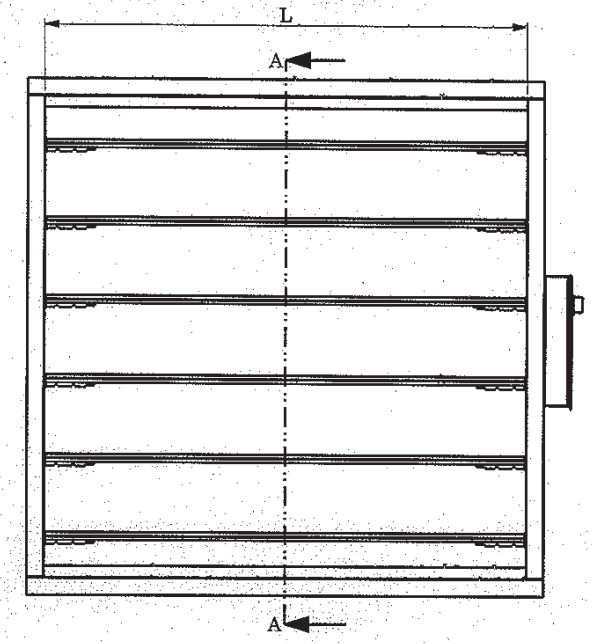
STATUS	**CONTRACT**	**DOC. NO: PE-V0-412-553-A029**	Rev: **00**
PACKAGE		**AIR CONDITIONING SYSTEM**	
TITLE		**Technical Data Sheet of Fire Damper with Actuator**	

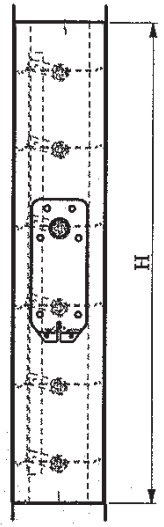
TECHNICAL DATA SHEET FOR MOTORIZED FIRE DAMPER & ACTUATOR		
S.NO.	**DESCRIPTION**	**SPECIFICATION**
A	**MOTORIZED FIRE DAMPER**	
1	**Item**	**Motorized Fire Damper**
2	Application	Isolation From Fire Area at the time of Fire
3	Purpose of use	Isolating the Supply air/Return air to the served premises when any emergency condition(fire) occurs
4	**MAKE**	**Caryaire/Ravistar(System air)/TSC**
5	Product Image (Indicative)	
6	Service Area	As per approved drawing
7	Type	Motorized
8	Reference Standard Code	UL 555, 1995, CBRI approved.
9	Material of Construction	Galvanized Iron
10	**Casing/Frame**	
10.1	Material	GSS
10.2	Thickness	16 Gauge
11	**Blades**	
11.1	Material	GSS
11.2	Thickness	16 Gauge
11.3	Construction	'V' Type
12	**Sleeve** (Shall be as per approved drawing-If Applicable)	
12.1	Material	GSS
12.2	Thickness	18 Gauge
13	Bearing	Self lubricated Sintered bronze Bush Bearing
14	Fire Rating	90 - 120 Minutes
15	Power Supply to Fire Damper Control Panel from LSCP/MCC	230V±10% AC
16	Principle of operation	In normal condition damper will be opened by the actuator through FDCP. In case of power failure damper will be closed by the spring action of actuator. Also If fire signal is detected at FDCP damper will be closed automatically through Actuator with the power cut off. Damper Open/ close Indication through Actuator Auxiliary switches shall be provided at FDCP
17	Whether CBRI Approved	Yes
18	Size & Quantity	Shall be as per Approved Drawing
19	Fire damper control panel	Yes, Provided
B.	**ACTUATOR**	
1	Item	Actuator
2	Application	To Operate Fire Damper
3	**MAKE**	**BELIMO/Honeywell**
TECHNICAL DATA SHEET FOR MOTORIZED FIRE DAMPER & ACTUATOR		

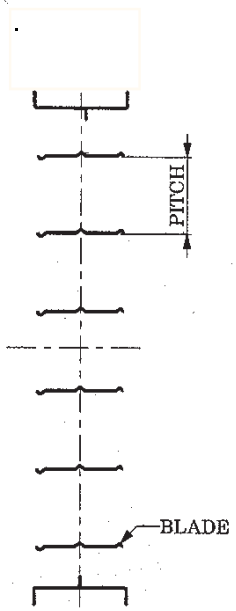
S.NO.	DESCRIPTION	SPECIFICATION
4	Application	For Fire Damper Operation
5	Product Image	
6	Type	Spring Return Type with Auxiliary Switches for Open/close Indication
7	Model	NFA series & SFA series
8	Signal Type	Digital Type
9	Signal Voltage	Potential Free

UNLESS OTHERWISE SPECIFIED ALL DIMENSION ARE IN m.m.

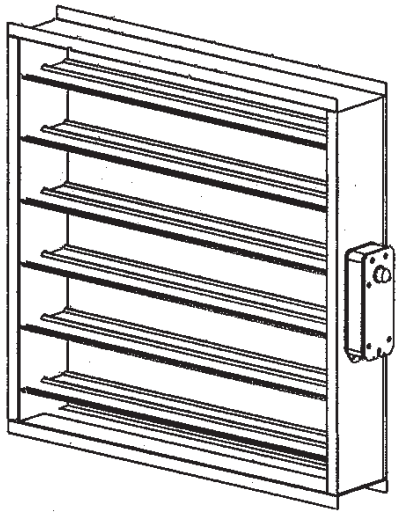
REV NO.	DATE	REVISION	REV. BY

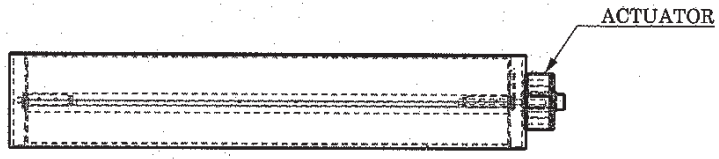






SECTION A-A





PART DESCRIPTION:	REMOVE SHARP EDGES	DRAWING No.:	REV NO.:
MOTORIZED FIRE DAMPER WITHOUT SLEEVE	DATE: 20-Aug-2015	SIPL/ADP/GA/1738	

MATERIAL:	M. STANDARD:	SCALE:	DRN. BY:	CHKD. BY:	APPD. BY:
G.I		N.T.S.	VIPIN	DALIP	

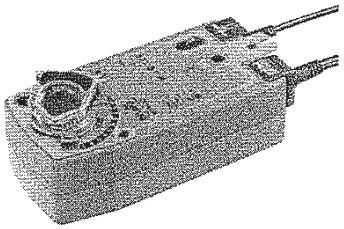
MASS PROPERTIES:	
VOLUME (mm³)	-
WEIGHT (kg)	-

No. of SC/CC	
SC	
CC	

TOLERANCE LIMIT UNLESS SPECIFIED	
0.5 - 6 = ±0.1	120 - 315 = ±1.0
6 - 30 = ±0.2	315 - 1000 = ±2.0
30 - 120 = ±0.4	1000 - 2000 = ±4.0

Spring return actuator with emergency function for adjusting air dampers in ventilation and air conditioning systems in buildings

- Torque 10Nm
- Nominal voltage AC 24...240V / DC 24...125V
- Control: Open-close
- Two integrated auxiliary switches



Technical data

Electrical data	Nominal voltage		AC 24...240V, 50/60Hz / DC 24...125V
	Nominal voltage range		AC 19.2...264V / DC 21.6...137.5V
	Power consumption	In operation	6W @ nominal torque
		At rest	2.5W
		For wire sizing	9.5VA
	Auxiliary switch		2 x SPDT, 1mA...3 (0.5) A, AC 250V ⧈ (1 x fix 10% / 1 x adjustable 10...90%)
	Connection	Motor	Cable 1m, 2 x 0.75mm²
		Auxiliary switch	Cable 1m, 6 x 0.75mm²
Functional data	Torque	Motor	Min. 10Nm @ nominal voltage
		Spring return	Min. 10Nm
	Direction of rotation		Can be selected by mounting L / R
	Manual override		With hand crank and interlocking switch
	Angle of rotation		Max. 95°∢, can be limited with adjustable mechanical end stop
	Running time	Motor	≤75s (0...10Nm)
		Spring return	20s @ –20...50°C / max. 60s @ –30°C
	Sound power level	Motor	≤45dB(A)
		Spring return	≤62dB(A)
	Service life		Min. 60,000 emergency positions
	Position indication		Mechanical
Safety	Protection class		II Totally insulated ⧈
	Degree of protection		IP54 NEMA2, UL Enclosure Type 2
	EMC		CE according to 2004/108/EC
	Low-voltage directive		CE according to 2006/95/EC
	Certification		Certified to IEC/EN 60730-1 and IEC/EN 60730-2-14 cULus according to UL 60730-1A and UL 60730-2-14 and CAN/CSA E60730-1:02
	Mode of operation		Type 1.AA.B
	Rated impulse voltage	Actuator	4kV
		Auxiliary switch	2.5kV
	Control pollution degree		3
	Ambient temperature		–30...+50°C
	Non-operating temperature		–40...+80°C
	Ambient humidity		95% r.h., non-condensating
	Maintenance		Maintenance-free
Dimensions / Weight	Dimensions		See «Dimensions»
	Weight		Approx. 2.3kg

Dimensions [mm]

Dimensional drawings

Variant 1a:
¾"-spindle clamp (with insertion part) EU Standard

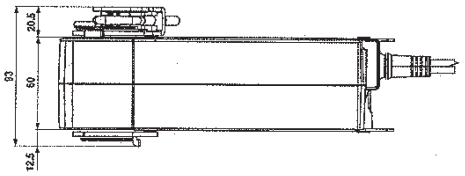
Damper spindle	Length	◎I	▣I	◇I
	≥85	10 ...22	10	14 ... 25.4
	≥15			

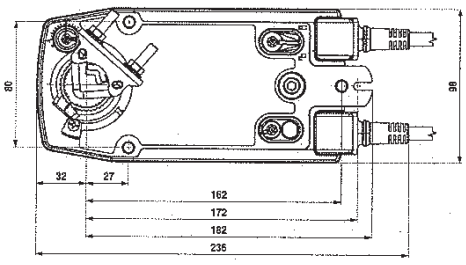
Variant 1b:
1"-spindle clamp (without insertion part) EU Standard

Damper spindle	Length	◎I	▣I
	≥85	19 ... 25.4 (26.7)	12 ... 18
	≥15		

Variant 2:
½"-spindle clamp (optional via configuration)

Damper spindle	Length	◎I	◇I
	≥85	10 ... 19	14 ... 20
	≥15		





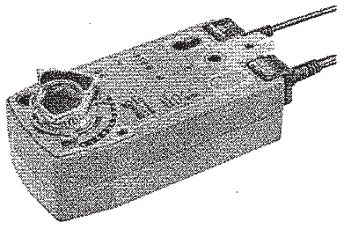
UL marked actuators is optional, please contact your local Sales Representative for details.

Mechanical Fail-Safe Damper Actuator SFA-S2

BELIMO

Spring return actuator with emergency function for adjusting air dampers in ventilation and air conditioning systems in buildings

- Torque 20Nm
- Nominal voltage AC 24...240V / DC 24...125V
- Control: Open-close
- Two integrated auxiliary switches



Technical data

Electrical data	Nominal voltage		AC 24...240V, 50/60Hz / DC 24...125V
	Nominal voltage range		AC 19.2...264V / DC 21.6...137.5V
	Power consumption	In operation	7W @ nominal torque
		At rest	3.5W
		For wire sizing	18VA
	Auxiliary switch		2 x SPDT, 1 mA...3 (0.5) A, AC 250V ⧈ (1 x fix 10% / 1 x adjustable 10...90%)
	Connection	Motor	Cable 1m, 2 x 0.75mm^2
		Auxiliary switch	Cable 1m, 6 x 0.75mm^2
Functional data	Torque	Motor	Min. 20Nm @ nominal voltage
		Spring return	Min. 20Nm
	Direction of rotation		Can be selected by mounting L / R
	Manual override		With hand crank and interlocking switch
	Angle of rotation		Max. 95°∢, can be limited with adjustable mechanical end stop
	Running time	Motor	≤75s (0...20Nm)
		Spring return	20s @ –20...50°C / max. 60s @ –30°C
	Sound power level	Motor	≤45dB(A)
		Spring return	≤62dB(A)
	Service life		Min. 60,000 emergency positions
	Position indication		Mechanical
Safety	Protection class		II Totally insulated ⧈
	Degree of protection		IP54 NEMA2, UL Enclosure Type 2
	EMC		CE according to 2004/108/EC
	Low-voltage directive		CE according to 2006/95/EC
	Certification		Certified to IEC/EN 60730-1 and IEC/EN 60730-2-14 cULus according to UL 60730-1A and UL 60730-2-14 and CAN/CSA E60730-1:02
	Mode of operation		Type 1.AA.B
	Rated impulse voltage	Actuator	4kV
		Auxiliary switch	2.5kV
	Control pollution degree		3
	Ambient temperature		–30...+50°C
	Non-operating temperature		–40...+80°C
	Ambient humidity		95% r.h., non-condensating
	Maintenance		Maintenance-free
Dimensions / Weight	Dimensions		See «Dimensions»
	Weight		Approx. 2.4kg

Dimensions [mm]

Dimensional drawings

Variant 1a:
¾"-spindle clamp (with insertion part) EU Standard

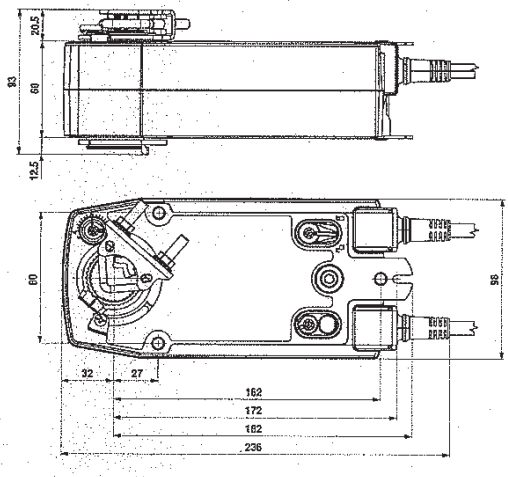
Damper spindle	Length	⌀	□	◇
	≥85	10...22	10	14...25.4
	≥15			

Variant 1b:
1"-spindle clamp (without insertion part) EU Standard

Damper spindle	Length	⌀	□
	≥85	19...25.4 (26.7)	12...18
	≥15		

Variant 2:
½"-spindle clamp (optional via configuration)

Damper spindle	Length	⌀	◇
	≥85	10...19	14...20
	≥15		

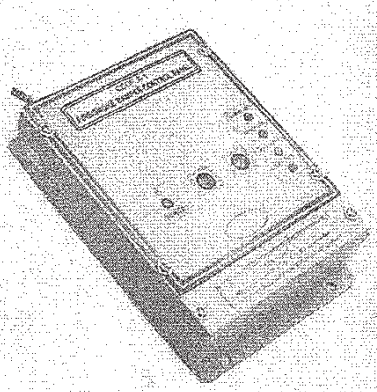


UL marked actuators is optional, please contact your local Sales Representative for details.

V6.1 02.2015 Subject to modification

DAMPER CONTROL

CONTROL PANEL FOR SMOKE AND FIRE DAMPER



MODELS AVAILABLE

- CCCP A-1A - Control Panel for Actuator Coupled Dampers
- CCCP A-1S - Control Panel for Solenoid Coupled Dampers

FEATURES

(a) **ACTUATION SYSTEM**

Actuators **(Spring Return or non-spring return)** and **Solenoids** of any make can be controlled from the control panel. Please refer to **DAMPER ACTUATOR** Connections in the connection diagram for further details.

(b) **AIR HANDLING UNIT (A.H.U.) INTERLOCKING**

A.H.U. fans can be easily **put on or put off automatically / Manually** with the help of Control Panel. The A.H.U. Relay inside the panel de-energises immediately after recieving the **fault signal/ test signal** thereby putting off the A.H.U. contactor & hence putting off the A.H.U. motor, The A.H.U. Relay inside the panel will operate after 50 seconds (approx.) after resetting the panel.Please refer to **A.H.U.** connections in the connection diagram for further details.

(c) **WARNING SIGNAL CONNECTIONS**

A **Hooter/Alarm/Flasher** can be easily **put on or put off automatically / Manually** with the help of control panel. The **Hooter/Alarm/Flasher** Relay energises immediately after recieving a **fault signal / test signal** thereby putting on a **Hooter/Alarm/Flasher.** This relay resets immediately after resetting the panel. Please refer to **ALARM** connections in the connection diagram for further details.

(d) **EXTERNAL PANEL (FIRE PANEL) CONNECTIONS**

The control panel can be easily connected to any external panel (fire panel). A **normally closed point (N/C) and a common point (COM)** of any operative relay on the external

panel (fire panel) may be used for this purpose. Note that these relay points should be at **Zero potential**. The panel will go into fault mode if the N/C point leaves the COM. point. The panel can be reset manually (automatic reset version also available) once the N/C &COM points of the External Panel (Fire Panel) get reconnected. Please refer to **EXT PANEL** connections in the connection diagram.

(e) **HEAT DETECTOR CONNECTIONS**

Heat detector (provided by M/s CHANDRA CONTROLS with every panel) is nothing but a **thermal cut out**. After reaching a particular temperature, this thermal cut out opens its electrical contacts. The control panel **senses the opening of these contactsof the heat detector and puts off the A.H.U. fans, puts on the warning signal and closes the damper** with the help of an actuator/solenoid. The panel can be reset manually (automatic reset version also available) once the heat detector resets. Please refer to **TEMP.** connections in the connection diagram for further details.

(f) **SMOKE DETECTOR CONNECTIONS**

A Duct Smoke detector (provided by M/s CHANDRA CONTROLS), after sensing smoke, produces an **alarm signal** which is captured by the control panel and then the control panel **automatically puts off the A.H.U. Motor** by breaking the power supply to A.H.U. and also **puts on the warning signal** by connecting the power supply to a hooter/alarm/flasher. The control panel also gives a **closing signal** to the actuator / solenoid which is turn closes the damper. The Duct Smoke Detector & the panel can be reset manually only if the Duct Smoke Detector is wired through the control panel. Please refer to **SMOKE** connections in the connection diagram for further details. **SENSE**

(g) **TEST BUTTON**

The panel can be put into test mode i.e. to close the Fire / Smoke Dampers, put off the A.H.U. motor, put on the alarm signals once this button is **pressed momentarily**. Hence the purpose of this button is routine manual testing of the various devices functionality.

(h) **RESET BUTTON**

The panel can be reset i.e. open the Fire / Smoke Dampers, put on the A.H.U. motors **after some delay** & put off the alarm signals once this button is **pressed momentarily. THIS BUTTON CAN ALSO BE USED FOR PUTTING OFF JUST THE A.H.U. MOTOR ONLY.** Hence, when in normal (No-Fault) condition this button is pressed momentarily, the A.H.U. Relay inside the panel will de-energise for 50 seconds (approx.) & will energise after the lapse of the said period. Another function of this button is that the A.H.U. Motor will not start at all till this button is **kept pressed.** The A.H.U. Motor will start after 50 seconds (approx.) once this button is released.

(i) AUTO RESET & MANUAL RESET SWITCH SW1

When SW1 is kept at Auto Reset position, the panel can be reset from B.M.S. or a Fire Panel. The panel can also be reset manually.
When SW1 is kept at Manual Reset position, the panel can be reset only manually with the help of the Reset Button as described in point (h).

☛ **The switch is Factory setted at Manual Reset position.**

(j) VISUAL INDICATIONS

(1) **Power Indication**

A yellow lamp glows indicating the presence of power supply.

(2) **Damper open Indication**

A green lamp glows if the damper is open.

(3) **Damper close Indication**

A red lamp glows if the damper is closed.

(4) **Fault (Alarm Indication)**

A red lamp glows instantly once the control panel recieves a signal from Smoke/Fire/Ext. panel or from test button.

(5) **A.H.U. Status Indication**

A green lamp glows if the A.H.U. Relay inside the panel is energised.

(k) AUDIO INDICATION

A sharp buzzer will beep continously after the panel recieves a fault/test signal. It will stop beeping once the panel is reset.

☛ **Please note that Damper status indications (open/close) shall be available only if either AUX. Contacts of the actuator or micro switch contacts are connected to relevant connections inside the control panel. Please refer to the connection diagram for further details**

COMPATIBILITY

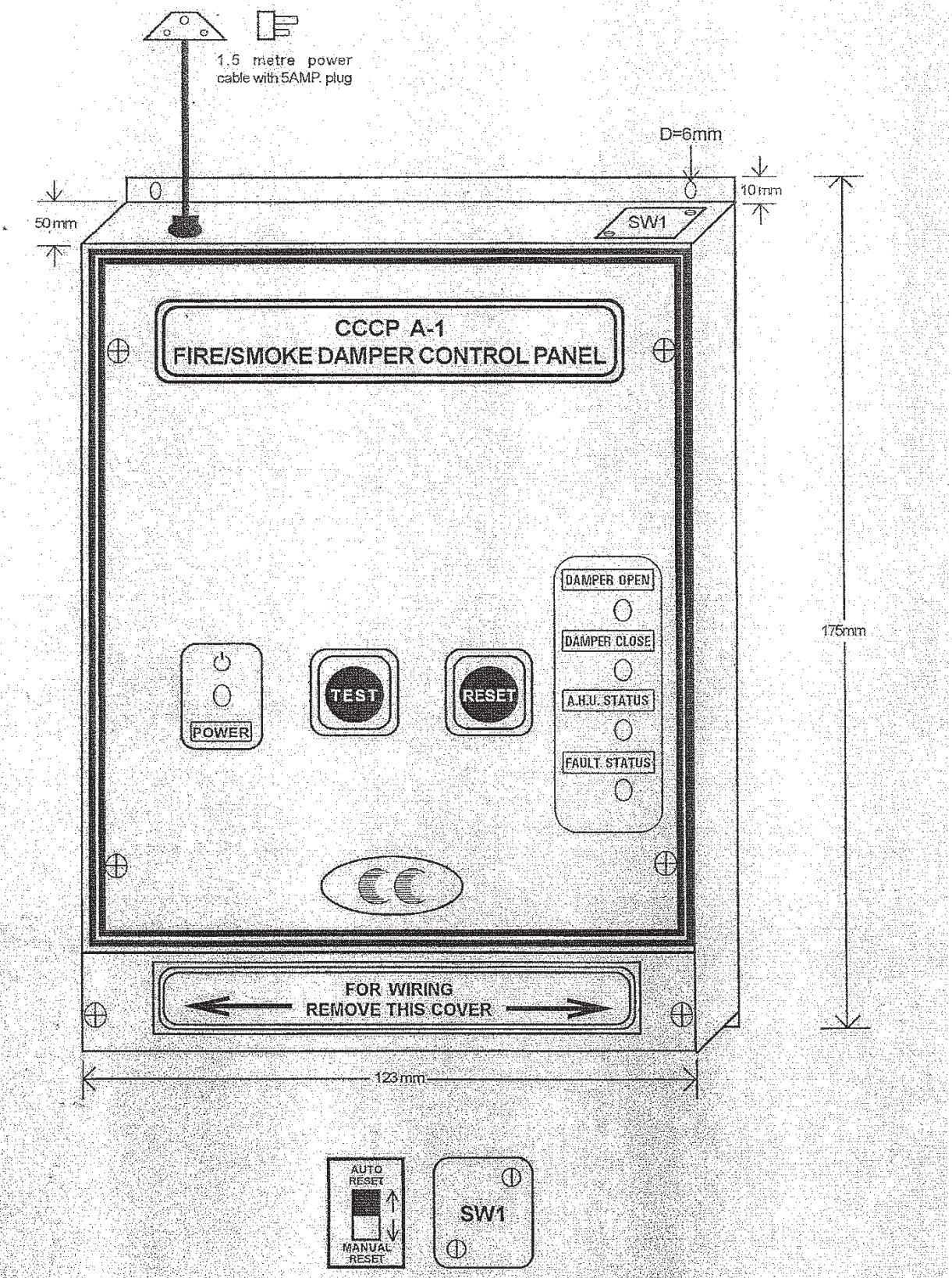
The control panel can be easily connected to the reputed actuator makes such as **BELIMO, SIEMENS, HONEYWELL, JOVENTA** etc.

Solenoids of **B.C.H** or any other make can be easily connected to the control panel.

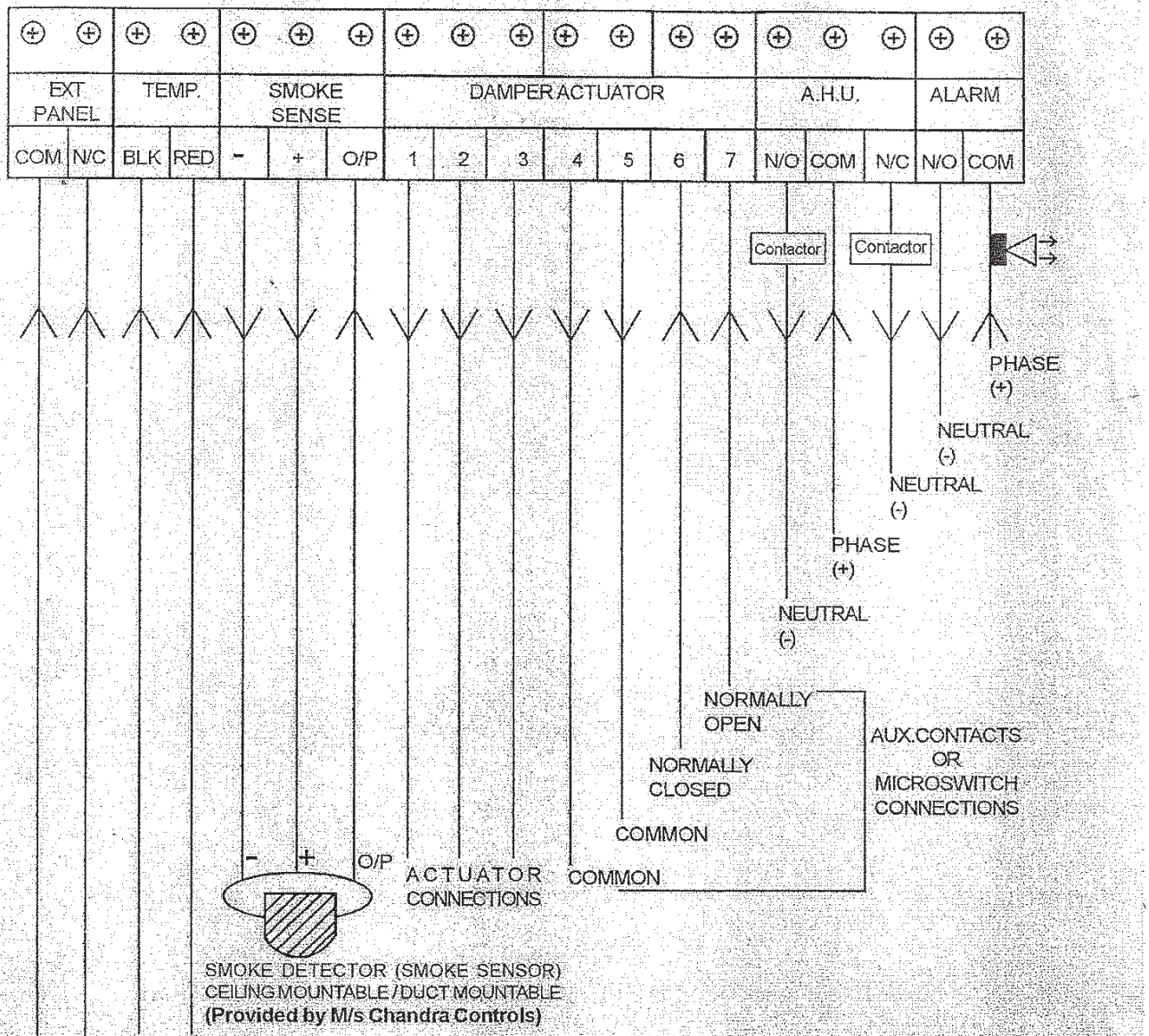
ELECTRICAL PARAMETERS

(a) Operating voltage = 24V

(b) Power Consumption < 0.8 W


1.5 metre power cable with 5AMP. plug
D=6mm
10mm
50mm
SW1
CCCP A-1
FIRE/SMOKE DAMPER CONTROL PANEL
DAMPER OPEN
DAMPER CLOSE
A.H.U. STATUS
FAULT STATUS
POWER
TEST
RESET
175mm
FOR WIRING
REMOVE THIS COVER
123mm
AUTO RESET
MANUAL RESET
SW1

CONNECTION DIAGRAM

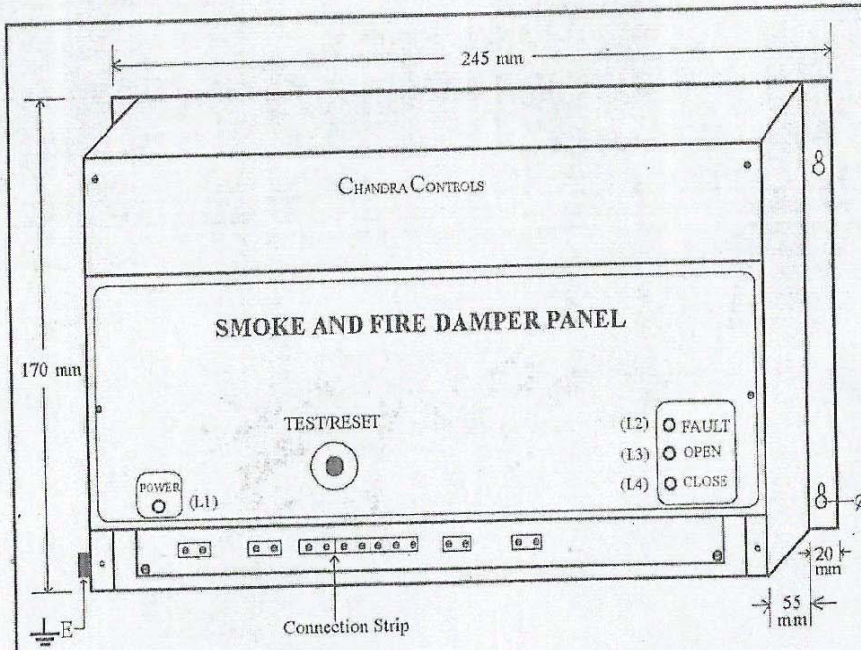


SMOKE DETECTOR (SMOKE SENSOR)
CEILING MOUNTABLE / DUCT MOUNTABLE
(Provided by M/s Chandra Controls)

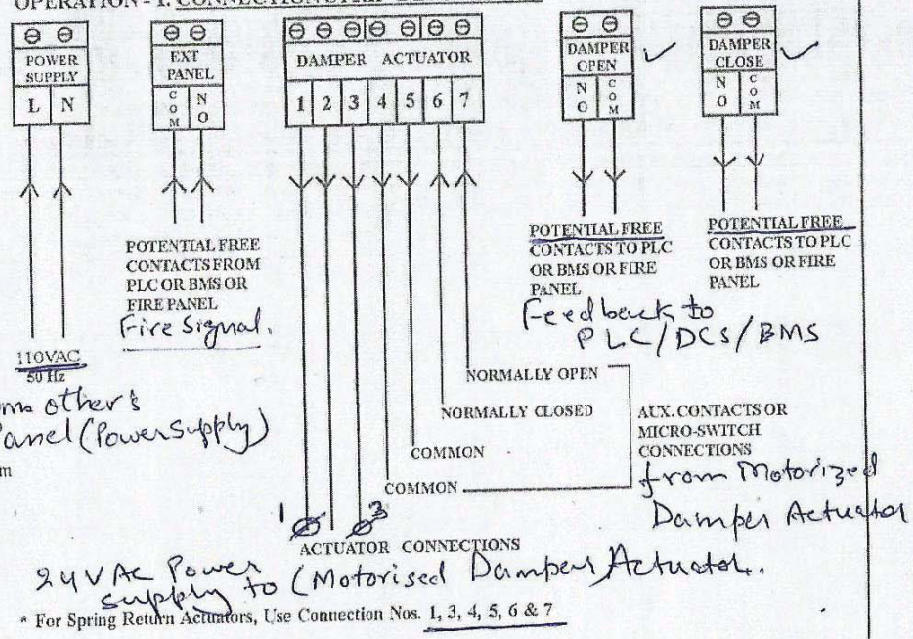
WIRES FROM THE HEAT DETECTOR (TEMPERATURE SENSOR) PROVIDED WITH THE CONTROL PANEL. IN CASE HEAT DETECTOR (TEMPERATURE SENSOR) IS NOT USED, KEEP THESE TWO POINTS SHORTED WITH A PIECE OF WIRE.
(Provided by M/s Chandra Controls)

WIRES FROM THE COMMON POINT & NORMALLY CLOSED POINT OF ANY OPERATIVE RELAY ON EXTERNAL PANEL (FIRE PANEL). NOTE THAT THESE TWO POINTS SHOULD BE AT ZERO POTENTIAL. ALSO, IN CASE EXTERNAL PANEL (FIRE PANEL) IS NOT USED, KEEP THESE TWO POINTS SHORTED WITH A PIECE OF WIRE.

- ◆ **For spring return actuators, use connection nos. 1, 3, 4, 5 ,6 & 7.**
- ◆◆ **For non-spring return actuators, use connection nos. 1, 2, 3, 4, 5,6 & 7.**
- ◆◆◆ **Damper Status indications (OPEN/CLOSE) shall be available only if either AUX. contacts or microswitch connections are done at points 4,5,6 & 7.**



OPERATION - 1. CONNECTION STRIP DESCRIPTION



* For Spring Return Actuators, Use Connection Nos. 1, 3, 4, 5, 6 & 7

* * For Non- Spring Return Actuators, Use Connection Nos. 1, 2, 3, 4, 5, 6 & 7

* * * Damper Status Indication(OPEN/CLOSE) Shall be available only if either AUX. Contacts or Micro-switch connections are done at points No. 4, 5, 6 & 7

Provision for 110V AC, 50Hz power supply to each Motorized fire damper Control panel to be provided from other's panel.

2. TEST/RESET BUTTON DESCRIPTION

The Actuator fitted Damper can be opened or closed manually with the help of a push button provided on the front side of the panel.

TECHNICAL SPECIFICATIONS:

1. Panel texture powder coated, Siemens grey colour, MAKE : BERGER
2. 15 Pin, 10 AMPS connector (connection strip) provided in the panel for input / output connections, MAKE : VITAL ELECTROCOMP
3. 2 mm sheet thickness of Panel
4. Four types of LED lamp indications(VISUAL INDICATION) provided on the front of the panel, MAKE : EVERLITE
   - L1(Red) - Power indication - Indicates presence of power
   - L2(Blinking Red) - Fault indication - Indicates fire/smoke condition
   - L3 (Green) - Damper open indication
   - L4 (Yellow) - Damper close indication
5. A sharp sounding buzzer provided inside the panel for AUDIO INDICATION
6. A Test / Reset switch provided on the front of the panel for routine manual testing, MAKE : PMECH INDIA LTD.
7. Stickers provided on the front of the panel which describe all indications and operation
8. Very easy installation on the wall by means of four screw holes provided at the corner of the panels
9. Operating Voltage - 110 VAC @ Frequency - 50 Hz
11. Power Consumption (no load) - 1.0 watt
12. Wire Thickness for connection on connection strip: 2.5mm max.
13. Transformer : 110VAC to 0-24 VAC, 1500mA, make: CC
14. Control Card No. CC07

Note: Typical wiring scheme for all the Motorized fire damper Control Panel.

Drawing not to scale
all dimensions are in mm

Date	27-08-2015	Title	GENERAL ARRANGEMENT OF CONTROL PANEL FOR FIRE DAMPER	Company: M/S CHANDRA CONTROLS NEW DELHI	Project: ENNORE STPP PROJECT
Drawn	C.C.				Drawing No. 24
Chkd.	S.CHOPRA				Client: M/S ROOTS COOLING SYSTEMS PVT. LTD.
Qty.	[redacted]				Sheet No. 1 of 1

BHARAT HEAVY ELECTRICALS LIMITED
PROJECT ENGINEERING MANAGEMENT
(MECHANICAL AUXILIARY)

This approval status shall be interpreted as laid down in the contract and it shall not relieve the contractor from his contractual obligation.

APPROVAL CATEGORY AWARED = I

CAT I - Approved
CAT II - Approved with Comments as Noted
CAT III - Not Approved
CAT IV - Reference Drawing

Name: VIPIN NAUNI
Signature:

VIPIN NAUNI
Revised as per TANGEDCO / Desein Comments. Reviewed by BHEL and found in order. Submitted for TANGEDCO / Desein Approval.
2019.06.20 14:06:37 +05'30'

PROJECT	2x660 MW ENNORE SEZ COAL BASED STPP AT ASH DYKE OF NCTPS, CHENNAI
	CUSTOMER TAMILNADU GENERATION AND DISTRIBUTION CORPORATION LIMITED (TANGEDCO)
	CONSULTANT **DESEIN PRIVATE LIMITED** **DESEIN HOUSE, GREATER KAILASH-II, NEW DELHI**
	EPC CONTRACTOR BHARAT HEAVY ELECTRICALS LTD PS-PEM, PPEI-BUILDING, SECTOR-16A, PLOT NO. 25, NOIDA-201301

JOB No.	**412**	B-35,HOSIERY COMPLEX,NOIDA,PHASE-II,NOIDA-201305	
STATUS	**CONTRACT**	**DOC. NO: PE-V0-412-553-A030**	Rev: 01
PACKAGE		**AIR CONDITIONING SYSTEM**	
TITLE		**Technical Data Sheet of Manual Valves (Balancing Valve,gate valve,Check Valve,Y-strainer) & Motorised Butterfly Valve**	

BH2X660 MW ENNORE TPS MOM FOR MAUX PACKAGE DURING ERM DATED 18-20 DEC. 2018		
Document / Drawing Title	TECHNICAL DATA SHEET OF MANUAL VALVES (BALANCING VALVE,GATE VALVE,CHECK VALVE,Y-STRAINER)	
Document / Drawing No.	PE-V0-412-553-A030	Revision No. 00
Customer	TANGEDCO	
Contract package	EPC Package	

Sl No.	Customer Comments	BHEL Reply	Resolution dated 18-20/12/2018
1	MOC of all valves shall be in line with Volume III, Clause 13.19.2, Sheet 484 & 485 and Clause 13.20.00, Clause 485 & 486. Revise accordingly. Please note that as per spec following MOC has to be given. Revise accordingly A. Cast Iron valves Seating surfaces and rings 13% chromium steel/13% Chrome overlay Disc for non-return valves BS 1452 Gr. 14/IS-210 Gr FG 260 Hinge pin for non-return valves AISI 316 Stem for gate globe valves 13% chromium steel or Equivalent Back Seat 13% chromium steel / 13% Chrome overlay	MOC of valves is specified under clause no. 19.8.8 and 19.8.9 of Technical Specification CE/C/ P & E/ EE/ E/OT No.3 /2013-14, Vol-III, page no. 703 & 704 (HVAC Specification). a) Seating surface and rings shall be 13% Chrome Steel and same is already provided. b) 13% chrome steel having higher hardness is more apt for hinge pit as it will be in contact with hinge. c) Stem for gate valve shall be 13% Chrome steel.	TANGEDCO / Desein Noted and point closed.
2	MOC of fasteners shall be SS 316 in line with specification	MOC of Fastener shall be Heat Treated MS. Please accept.	TANGEDCO / Desein Noted and point closed.
3	Strainer mesh shall be SS 316 in line with specification	Noted and same shall be SS316 and shall be updated in revised document.	TANGEDCO / Desein Noted and point closed.
4			BHEL to submit the revised document as per resolution for TANGEDCO approval. Point Closed.

VIPIN

BHEL

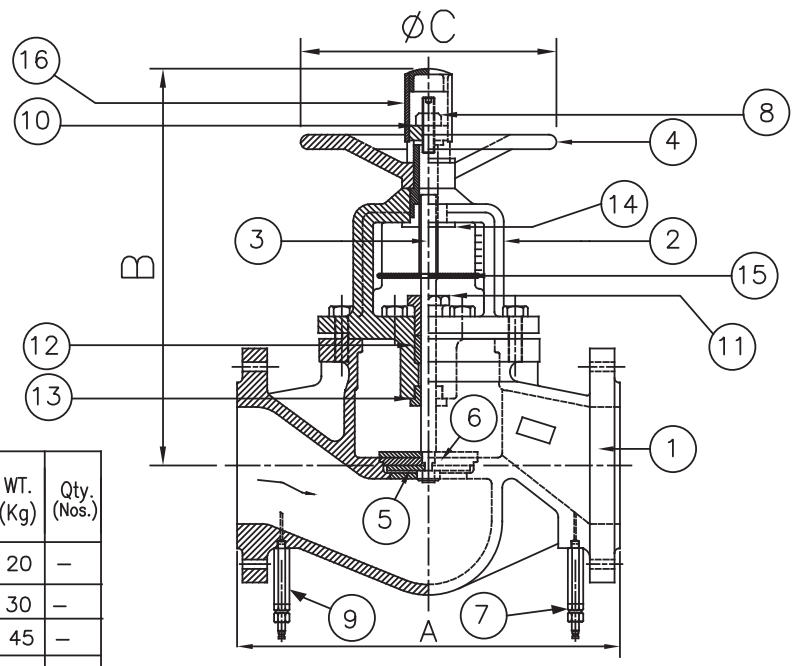
DESEIN

TANGEDCO

INDEX

TECHNICAL DATA SHEET FOR BALANCING VALVE		
S.No.	**Description**	**Specification**
1	**Item**	**Manual Balancing Valve**
2	Application	Chilled/Condenser Water Circuit
3	Serving area	As per valve schedule
4	Size / Quantity	As per valve schedule
4	**MAKE**	**ADVANCE VALVES**
5	Product Image (Indicative)	 
6	Type	Manual
7	**FOR SIZES 25 TO 50 MM DIA**	
7.1	Pressure Rating	PN-16
7.2	Style	Globe Type BSP Threaded Screwed End Construction
7.3	Body Test Pressure	24 Bar (g)
7.4	Seat Test Pressure	17.6 Bar (g)
8	**Material of Construction**	
8.1	Body	IS 318 LTB 2 (Gun Metal)
8.2	Bonnet	25mm in brass and 32 mm to 50mm in IS 318 LTB 2 (Gun Metal)
8.3	Plug	IS 318 LTB 2 (Gun Metal) / Brass IS 319
8.4	Stem	IS 319 Type-I (Brass)
8.5	Temperature	-46 Deg C to + 200 Deg C
8.6	Gland Nut	Brass
8.7	Hand Wheel	Nylon Gr. 66
8.8	Pressure Test Cocks	Brass
9	**FOR SIZES 65 TO 300 MM DIA**	
9.1	Pressure Rating	PN-16
9.2	Style	Globe Type Flanged End Construction
9.3	Body Test Pressure	24 Bar (g)
9.4	Seat Test Pressure	17.6 Bar (g)
10	**Material of Construction**	
10.1	Body	Cast Iron to IS 210 Gr. FG 260
10.2	Bonnet	Cast Iron to IS 210 Gr. FG 260
10.3	Hand Wheel	M S Fabricated
10.4	Stem	SS-410
10.5	Temperature	-40 Deg C to + 120 Deg C
10.6	Disc	EN-3
10.7	Sealing Disc	EPDM
10.8	Pressure Test Cocks	Steel Chrome Plated
10.9	End Connection	IS:6392 Table 17

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED. UNTOLERANCED DIMENSIONS SHOULD CONFIRM TO IS:2102 (PART-1) 1993 MEDIUM.



PART LIST

ITEM NO.	PART NAME	QTY	MATERIAL
1	BODY	1	CI,IS:210 Gr.FG 260
2	BONNET	1	CI,IS:210 Gr.FG 260
3	STEM	1	SS 410
4	HAND WHEEL	1	M.S
5	DISC	2	EN-3
6	SEALING DISC	1	E P D M
7	PRESSURE TEST COCKS	2	M.S. ELECTRO PLATED
8	LOCK SCREW + NUT	1	EN-8 HEAT TREATED
9	MT MORA	0	IS 319 TYPE-1
10	NUT HAND WHEEL	1	EN-8 HEAT TREATED
11	GLAND NUT	1	EN-8 HEAT TREATED
12	GLAND PACKING	2	GRAPHITE ASBESTOS
13	LIP SEAL	1	EPDM
14	STEM NUT	1	EN-9
15	INDICATOR PLATE	1	SS-304
16	LOCK SHIELD	1	Plastic

ITEM DETAILS

SIZE mm	SIZE inch	RATING	DIMENSIONS(mm) A	B	ØC	NO. OF TURNS	WT. (Kg)	Qty. (Nos.)
65	2.5"	PN 16	290	300	160	08	20	–
80	3"	PN 16	310	306	160	08	30	–
100	4"	PN 16	350	410	222	10	45	–
125	5"	PN 16	400	450	222	12	60	–
150	6"	PN 16	480	495	290	14	90	–
200	8"	PN 16	600	600	385	13	163	–
250	10"	PN 16	730	760	538	12	330	–
300	12"	PN 16	850	820	538	14.5	460	–

Note–1. Dimension A is ± 5mm
2. Dimension B is ± 10mm
3. Dimension C is ± 5mm
4. No. Turns is ± 10%

OTHER FACILITIES

LOCK	TEMPER PROOF LOCKIKG ARRANGMENT
MEASUREMENT	FLOW RATE & PRESSURE DROP MEASURMENT

OTHER DETAILS

BODY TEST PR.	24 Bar(g)
SEAT TEST PR.	17.6 Bar(g)
PERFORMANCE	As per approved flow Curves

CLIENT	–
Offer No.	–
PROJECT	SAMPLE DRAWING

REV.	DATE	DESCRIPTION	DRN BY	CKD BY	APPRD BY
0	04/06/2018	ISSUED FOR CLIENT'S APPROVAL	PRAWIN	SONU	DEBASHISH

BALANCING VALVE CAST IRON | MODEL – FLANGED TYPE

DESIGN	MANUFACTURER STANDARD
FACE TO FACE DIMNS.	MANUFACTURER STANDARD
TESTING	MANUFACTURER STANDARD

ADVANCE VALVES SOLUTIONS
BHARWAIN ROAD GAGRET
DIST.UNA–177201 H.P.,INDIA

GENERAL ASSEMBLY DRAWING

DRAWING NO 1611–19151–02
SHEET 1 OF 1

SCALE N.T.S.
REVISION 0

TECHNICAL DATA SHEET FOR CHECK VALVE (NON RETURN VALVE)		
S.No.	**Description**	**Specification**
1	**Item**	**Check Valve (Non Return Valve)**
2	Application	Condenser Water Circuit
3	Serving area	As per valve schedule
4	Size / Quantity	As per valve schedule
5	**MAKE**	**A.V. Valves**
6	Product Image (Indicative)	
7	Type	Wafer Ends Type to suit B16.5,Flanges
8	**Material Of Construction**	
8.1	Body Material	Cast Iron to IS 210 Gr. WCB
8.2	Plates	ASTM A 217 Gr. CA-15
8.3	Plate Coating	Integrally
8.4	Seat	Natural Rubber
8.5	Plate Type	Swing Type
8.6	Hinge/Stop Pin	SS-410
8.7	Retainer	Carbon Steel
8.8	Bearing	Stainless Steel / PTFE
	Hydraulic Pressure	
9	Body Test Pressure	24 Kg/cm2
9.1	Working Pressure	16 Kg/cm2