



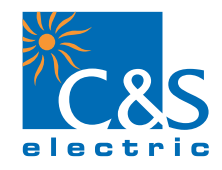
● C&S Etacom Installations

GLOBAL SPECIALIST FOR POWER BUSBARS



ISOLATED PHASE BUSDUCT

SEGREGATED PHASE BUSDUCT



GLOBAL SPECIALIST FOR POWER BUSBARS



Corporate Office:
C&S Electric Limited
 222, Okhla Industrial Estate, Phase-III
 New Delhi-110 020, India
 Tel.: +91 11 3384 9000-09
 Fax: +91 11 2684 7342

Domestic

Regional Office:
Northern Region / Export
 222, Okhla Industrial Estate, Phase-III
 New Delhi-110 020, India
 Tel.: +91 11 3384 9000-09
 Fax: +91 11 2684 7342
 email : powerbusbars@cselectric.co.in

Southern Region
 #N607, North Block, Rear Wing,
 Manipal Center, 47, Dickenson Road,
 Bengaluru -560 042, Karnataka, India
 Tel.: +91-80-30570359, 340
 Fax: +91-80- 25584839
 email: powerbusbars@cselectric.co.in

Eastern Region
 #24, Park Street, Development House,
 4th Floor, Kolkata -700016
 West Bengal, India
 Tel.: +91-033-40011417
 Fax: +91-033-22275849/40011417
 email: powerbusbars@cselectric.co.in

Western Region
 A-301/302, 3rd Floor, Nav Bharat Estate
 Zakaria Bunder Rd., Sewri (W)
 Mumbai - 400015, Maharashtra, India
 Tel.: +91-22-24114727 - 28
 Fax: +91-22-241137858, 24114704
 email: powerbusbars@cselectric.co.in

Works:
Plant -I
 Plot No. 1A, Sector 8C,
 Integrated Industrial Estate
 (SIDCUL), Ranipur, Haridwar
 Uttarakhand - 249403, India

Plant -II
 Plot No. 1C, Sector 8C,
 Integrated Industrial Estate
 (SIDCUL), Ranipur, Haridwar
 Uttarakhand - 249403, India

Overseas

Office:
Eta-com B NV/SA
 Scheldeweg 4
 2850, Boom
 Belgium
 Tel.: +32-3-880.64.00
 Fax: +32-3-844.42.50
 email: info@etacom.be

Eta-com BV
 Zwarte Zee 2-6,
 3144, DE MAASSLUIS,
 The Netherlands
 Tel.: +31-1059-16422
 Fax: +31-1059-20673
 email: info@etacom.be

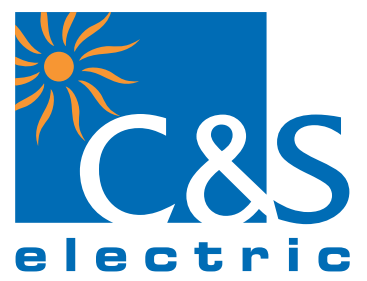
Eta-com UK Preedcrete Ltd.
 Unit 19/20, Horsham Court,
 City Business Centre, 6, Brighton Road,
 HORSHAM, West Sussex, RH13 5BB,
 United Kingdom
 Tel.: +44-1-403265767
 Fax: +44-1-403254131
 email: info@etacom.be

Middle East (FZE) Office:
 PO Box 124999
 Saif Zone Office, X2-13
 Sharjah - UAE
 Tel.: +971 65579786
 Fax: +971 65579786
 email: info@etacom.be

Works:
Eta-com B NV/SA
 Scheldeweg 4
 2850, Boom, Belgium
 Tel.: +32-3-880.64.00
 Fax: +32-3-844.42.50

BD/JMARCH/2020

www.cselectric.co.in
 www.etacomcs.com



We touch your electricity everyday!

We touch your electricity everyday!

C&S Electric Ltd. is a leading manufacturer of electrical and electronic equipment in India. It is India's largest exporter of industrial switchgear & power busbar products. C&S Electric products are used in applications ranging from power generation, transmission and distribution, protection and final consumption.

C&S Electric has the following product verticals:

- Switchgear - LV & MV
- Power Busbars - LV & MV
- Packaged Sub Station (PSS)
- Protection & Measurement Devices
- Lighting
- Diesel Generator

MARKET LEADER

C&S is amongst the top 4 players in the switchgear business segment and a market leader in the busbar business with more than 50% share in Indian market.

18 MANUFACTURING PLANTS

C&S Electric have 18 state-of-the-art manufacturing facilities equipped with latest tools and systems to ensure highest level of quality and services.

A dedicated network of channel partners, ensuring access to the farthest corners of India, with an obsession for customer services. In addition C&S products are available in 7500+ retail counters nationally.

600+ STOCKISTS

C&S has 5 international sales offices at London, The Netherlands, Dubai, Germany & USA. C&S exports the entire range of products across all 7 continents, thus reaffirming its position as India's largest exporter of industrial electrical products. Our new subsidiary C&S Electric UK Limited will enhance our coverage and customer service for the international market.

EXPORTS TO OVER 80 COUNTRIES

5000+ EMPLOYEES

5000+ Employees including over 600 engineers, dedicated sales team of 350 people & millions of satisfied customers.

2% OF REVENUE INVESTED IN R&D

Over 20,000 sqft. space dedicated to R&D, 70 R&D engineers, state of the art testing & design facilities ...& most of the all a passion for innovation & excellence.

Power Busbar division of C&S Electric Ltd has evolved by continuously addressing the market needs over past 40 year. With the acquisition of Eta-com, Belgium having specialization in cast resin insulated Busway, the merger between the two companies resulted in making C&S as "Global Power Busbar specialist."

C&S Power Busbars products comply with relevant national & International standards and proven with the Installation references available throughout the continents finding its applications in Power generating stations, Process & manufacturing industries, Commercial & residential Buildings, Infrastructure establishment - Airports, Metros, Railways, Hospitals, Tunnels, Ports, Shopping centers, Exhibition centers, Warehouses IT Parks, Data centers solutions, Solar farms, Oil & Gas and Chemical Industry.

C&S Power Busbar Division with combination of supreme range, vast experience in R&D, engineering, state of art manufacturing plants, in-house testing facilities and strong project management is aimed to provide one stop solutions to user.

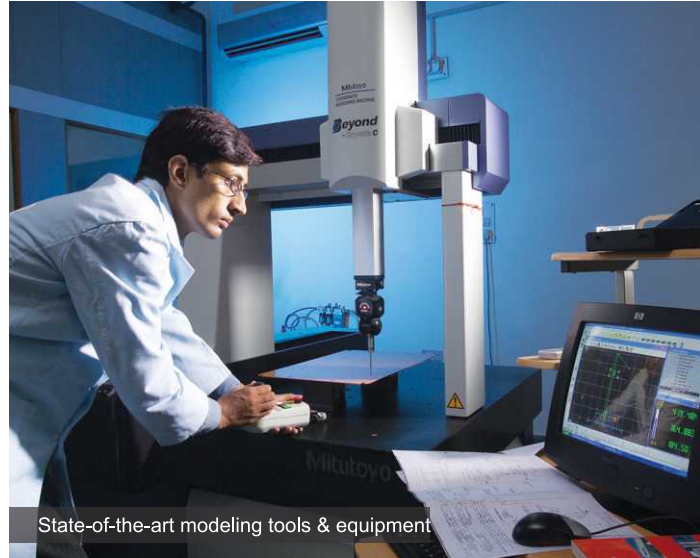


C&S Electric, India



Eta-com, Belgium

R&D and Testing Facilities



State-of-the-art modeling tools & equipment



Research Center



Impulse Testing Facilities at BD Plant



Dedicated team of engineers for development & value engineering



India's only 30,000A power busbar test center

Quality Assurance



metabar Range offers Low Voltage Busbar Trunking System – Lighting Trunking, Compact Air Bustrunking, Track Busway & Sandwich Bustrunking ranging from 25A to 6300A.

Metabar bustrunking is a low impedance, compact size, safe and reliable power distribution system with flexibility in distribution, ease of installation, reusability & better aesthetics – makes a preferred choice for user.

Metabar bustrunking offers highest safety features - short circuit withstand capacity, resistance to flame propagation, fire penetration, circuit integrity during fire, seismic resistance & corrosion resistance etc.

Sandwich Bustrunking (SB)-LV

Compliance of standard	IEC 61439 (1&6)
Conductor Material & Ratings	Copper 630A - 6300A Aluminium 400A - 5000A
Rated Operational Voltage (Ue)	1000V
Rated Impulse Withstand Voltage (Uimp)	12kV (1.2/50µs)
Enclosure Material	G.I.
Degree Of Protection	IP54 / IP55*
Plug In Box	32A-630A

*IP65 & IP66 available on request



Compact Air Bustrunking (CB)-LV

Compliance of standard	IEC 61439 (1&6)
Conductor Material & Ratings	Copper 125A - 1250A Aluminium 200A - 800A
Rated Operational Voltage (Ue)	1000V
Rated Impulse Withstand Voltage (Uimp)	12kV (1.2/50µs)
Enclosure Material	G.I.
Degree Of Protection	IP54
Plug In Box	32A-400A



Lighting Trunking (LB)-LV

Compliance of standard	IEC 61439 (1&6)
Conductor Material & Ratings	Copper 25A, 40A
Rated Operational Voltage (Ue)	500V
Enclosure Material	Aluminium
Degree Of Protection	IP54 / IP55
Plug In Box	Upto 16A



Track Busway (MB)-LV

Compliance of standard	IEC 61439 (1&6)
Conductor Material & Ratings	Copper 250A - 400A
Rated Operational Voltage (Ue)	690V
Enclosure Material	Aluminium
Degree Of Protection	IP42
Plug In Box	Upto 63A



betobar Range offers - Low Voltage and Medium Voltage cast resin Insulated Busway system ranging from 1000V to 17.5KV and 630A to 6300A.

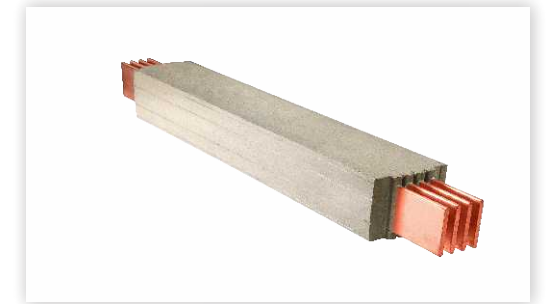
Betobar-Cast Resin bustrunking consists of copper or aluminum busbars casted in homogeneous Insulating compound BIM, made of Epoxy resin mixed with special fillers under vacuum. This insulating compound has class "F" insulation with high mechanical and electrical strength, excellent resistance to atmospheric pollution & chemicals, resistance to fungi, Insects and rodents. Bustrunking section Joints are also casted with B.I.M at site, resulting in homogeneous insulation over the full run of bustrunking.

Betobar-Cast Resin bustrunking with low impedance, compact size, better aesthetics offers - highest degree of Ingress protection (IP68), high short circuit withstand capacity, resistance to flame propagation, resistance to fire penetration, circuit integrity during fire, seismic resistance & UV resistance etc.

Betobar- Cast Resin bustrunking is highly safe and most reliable power distribution system for critical applications such as - Oil & Gas industry, explosive areas, humid and coastal area, chemical & dusty atmosphere and outdoor installations.

Cast Resin Insulated Busway (LA)-LV

Compliance of standard	IEC 61439 (1&6)
Conductor Material & Ratings	Copper 800A - 6300A Aluminium 630A - 5000A
Rated Operational Voltage (Ue)	1000V
Rated Impulse Withstand Voltage (Uimp)	12kV (1.2/50µs)
Degree of Protection	IP68
Mechanical Resistance	IK10



Cast Resin Insulated Busway (SH)-MV

Compliance of standard	IEC 62271 (1&201)
Conductor Material & Ratings	Copper 1300A - 1850A Aluminium 1350A - 1500A
Rated Operational Voltage (Ue)	3.6 kV - 7.2kV
Rated Impulse Withstand Voltage (Uimp)	12kV (1.2/50µs)
Degree of Protection	IP66 / IP67
Mechanical Resistance	IK10



Cast Resin Insulated Busway (PH)-MV

Compliance of standard	IEC 62271 (1&201)
Conductor Material & Ratings	Copper 1750A - 6100A Aluminium 1350A - 5000A
Rated Operational Voltage (Ue)	3.6 kV - 17.5kV
Rated Impulse Withstand Voltage (Uimp)	12kV (1.2/50µs)
Degree Of Protection	IP66 / IP67
Mechanical resistance	IK10



isobar Range offers - Isolated Phase busduct (IPB), segregated phase busduct (SPB) and Non-Segregated phase busduct (NSPB) ranging from 415V, 630A to 38KV, 30000A.

C&S is one of the global leaders in design, manufacturing, erection & commissioning of all variants of busducts for power generation and distribution upto 1000MW.

C&S has supplied more than 500 sets of isolated phase busducts with generating capacities of more than 150GW ranging from 80MW to 800MW.

Isobar busducts have been successfully type tested from renowned laboratories – KEMA-Netherlands / Czech Republic, EDF-France, CPRI-India.

Isolated Phase Busduct (IPB)-MV

Compliance of standard	IEC 62271 (1 & 200) / IS 8084 IEEE C37.23
Rated Continuous Current	100A-30,000A
Conductor	Aluminium*
Rated Operational Voltage (Ue)	11kV – 38kV
Enclosure Material	Aluminum Alloy
Rated Impulse Withstand Voltage (Uimp)	75kV - 170kV (1.2/50µs)
Degree of Protection	IP55 / IP65

*Copper Conductor available on request



Segregated Phase Busduct (SPB)**-MV

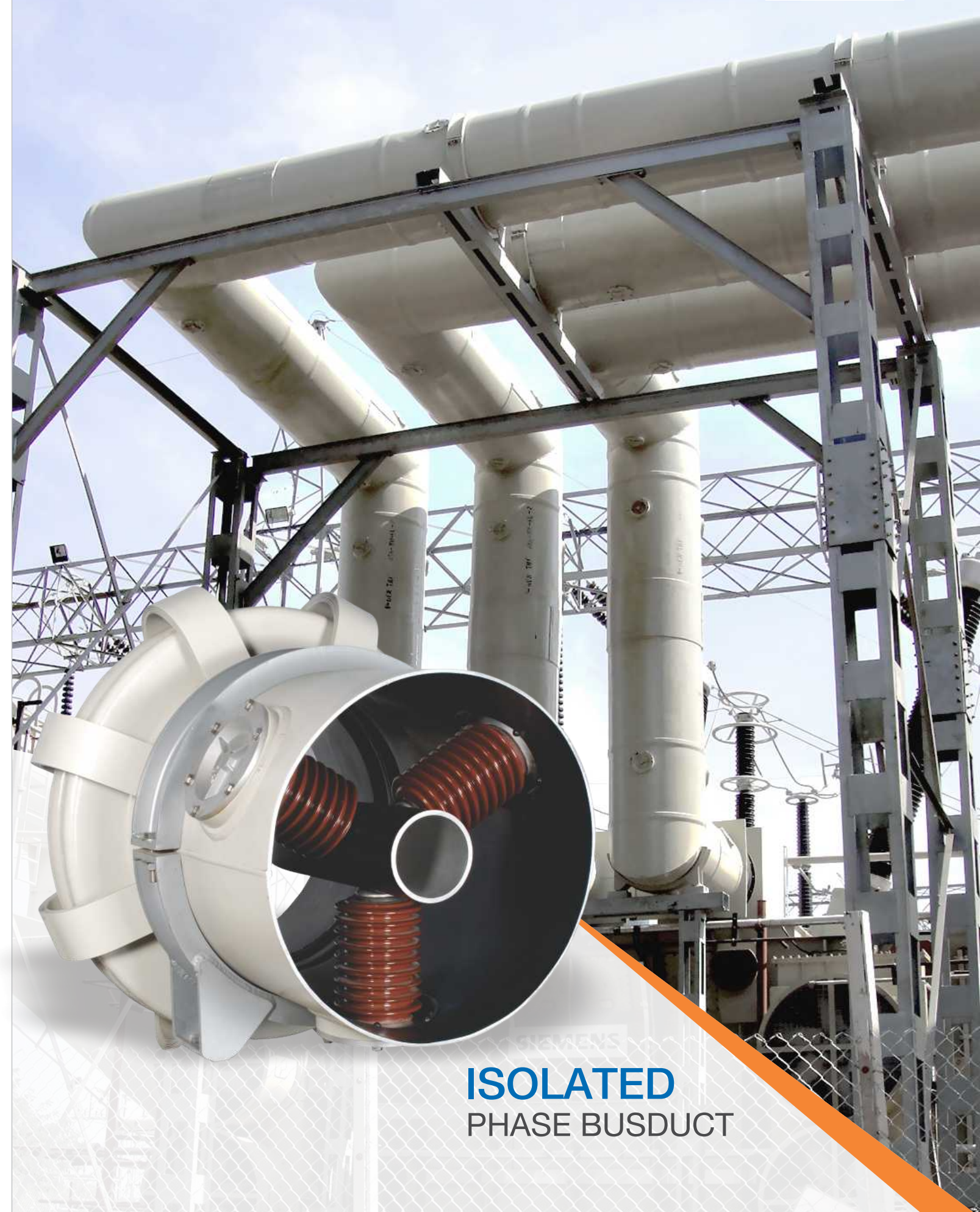
Compliance of standard	IEC 62271 (1 & 200) / IS 8084 / IEEE C37.23
Rated Continuous Current	630A - 5000A
Conductor	Aluminium / Copper
Rated Operational Voltage (Ue)	3.3kV - 33kV
Enclosure Material	Aluminum Alloy
Rated Impulse Withstand Voltage (Uimp)	40kV - 170kV (1.2/50µs)
Degree of Protection	IP55 / IP65

**Non-Segregated Phase Busduct (NSPB) - MV design available on request



Non Segregated Phase Busduct (NSPB)-LV

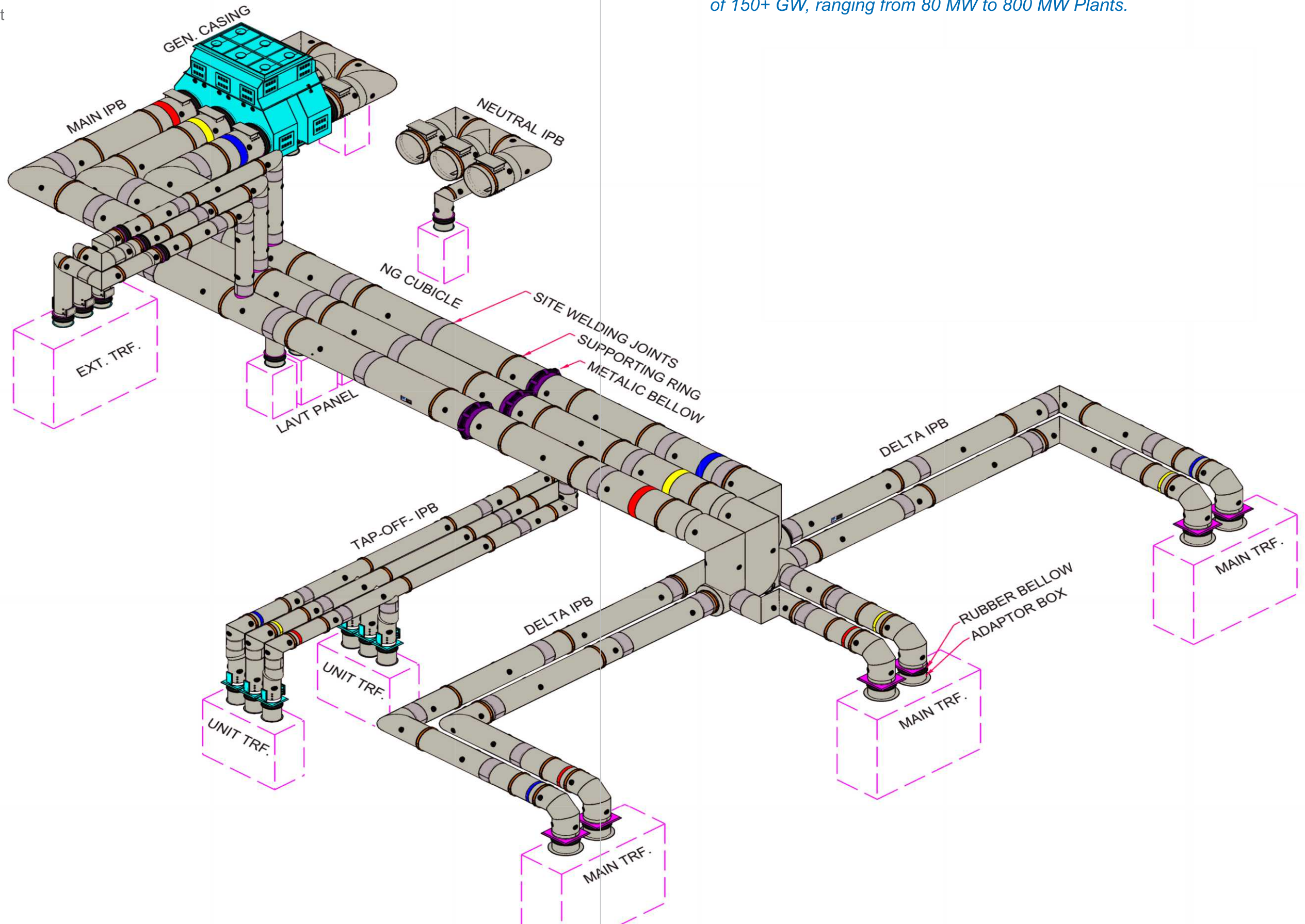
Compliance of standard	IEC 61439 (1&6) / IS 8623 (1&2)
Rated Continuous Current	630A - 6500A
Conductor	Aluminium / Copper
Rated Operational Voltage (Ue)	415V
Enclosure Material	Aluminum Alloy
Rated Impulse Withstand Voltage (Uimp)	12kV (1.2/50µs)
Degree of Protection	IP55 / IP65



ISOLATED
PHASE BUSDUCT

Typical Layout Arrangement

Isolated Phase Busduct



C&S has Supplied 500+ sets of Isolated Phase Busduct with Generating Capacity of 150+ GW, ranging from 80 MW to 800 MW Plants.

C&S offers a wide range of Isolated Phase Busduct from 11kV to 38kV upto 30000A.

APPLICATIONS:

Isolated Phase Busduct (IPB) finds application in Power Generating Units between

- Generator Phase terminals to Generator Transformers with Tap off Connections & Generator Transformers with Tap off Connections to Unit Auxiliary Transformer (UAT), Neutral Grounding Cubicles (NGC), Excitation Transformers and Lightning Arrester Voltage Transformer (LAVT) Cubicles
- Generator Phase terminals to Generator Circuit Breakers (GCB) & Generator Circuit Breakers (GCB) to Transformer with Tap off Connections to Unit Auxiliary Transformer (UAT), Neutral Grounding Cubicles (NGC), Excitation Transformers and Lightning Arrester Voltage Transformer (LAVT) Cubicles
- Generator Transformer Delta formation for three single phase transformers.
- Above applications will find Power Transmission solutions in power generating stations - Thermal, Hydro, Gas based, Nuclear & Combined cycle

■ **PRODUCT HIGHLIGHTS:**

- Excellent shielding under Short Circuit Conditions, near elimination of forces.
- Eliminates phase to phase faults.
- Reduces proximity effect between the main current carrying conductors of the adjacent phase to almost zero due to magnetic shielding, on the one hand.
- It provides complete protection for operating personnel from touch and high step voltages across the enclosures and the metallic structure.
- Best suited for adverse climatic and polluted atmospheric conditions.
- The busduct system is easy to handle and Install.
- Provides excellent degree of protection-IP65.
- Seismic compliant.

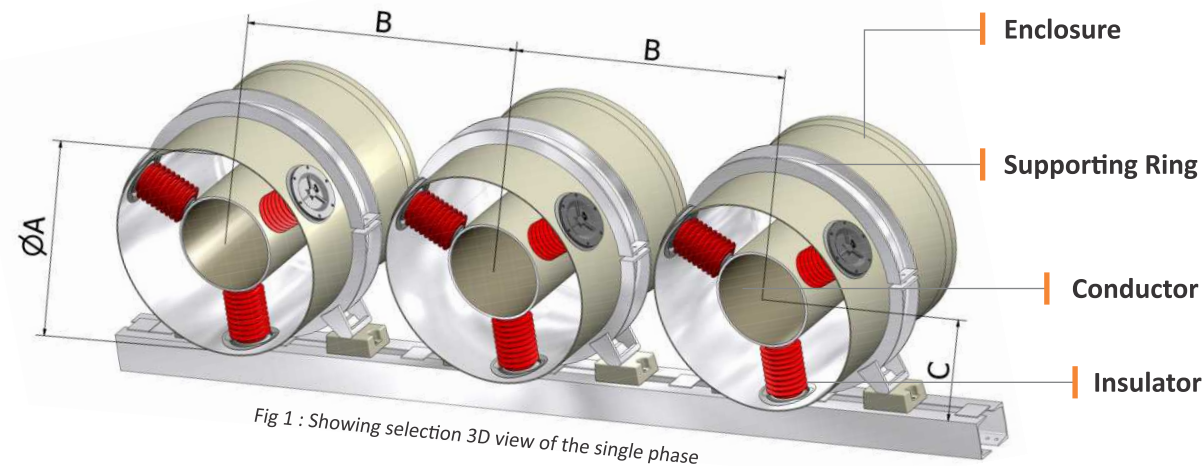
Technical Specifications

Compliance of standard	IEC-62271 (1& 200) / IS 8084 / IEEE C37.23
Rated Continuous Current	100A-30,000A
Configuration	3P
Conductor	Aluminium*
Rated Operational Voltage (Ue)	11kV – 38kV
Rated Short Time Withstand Current (Icw)	80KA -309KA (for 1 Sec.)
Enclosure Material	Aluminum Alloy
Rated Impulse Withstand Voltage (Uimp)	75kV - 170kV (1.2/50 µSec)
Degree of Protection	IP55 / IP65

*Copper conductor range available on request



Technical Data



Rated Voltage	Basic Insulation Level	Rated Current	Enclosure size		
			A	B	C
17.5	38/95	2000	450	750	396
		4000	500	900	410
		5000	520	900	410
		6000	585	1000	425
		8000	675	1000	465
		10000	750	1100	490
24	55/125	2000	570	900	420
		4000	620	1000	445
		6000	700	1000	480
		8000	795	1100	510
		10000	870	1200	535
		12500	970	1300	580
		14000	1070	1400	671
27	60/125	4000	670	1000	465
		15000	1070	1750	671
		22000	1420	1750	830
		24000	1520	1850	850
		26000	1620	1950	890
38	80/150	4000	750	1100	490
		15000	1120	1800	690
		23000	1450	1800	820
		26000	1620	1950	890

All dimensions in mm

Note:

1. Declared sizes are tentative and are subject to changes according to site ambient temperature and technical specifications.
2. Shipping sections maximum length is 10m. Adjacent sections are welded with bonding enclosures at site.

Conductor

The conductors are normally made of aluminium (Al - 99.5%) rolled and welded to one another so as to have tubular form.

Benefits of Tubular Busbars

1. Skin effect factor is minimum resulting in less losses.
2. Uniform heat dissipation over entire surface.
3. Shapes facilitates the effect of self-centering during short circuit forces and hence uniform dielectric is maintained relieving both enclosure and conductor from any undue stresses. The thermal effects in busbars are taken care of by the expansion joints.
4. Symmetry simplifies calculations & precision.
5. From manufacturing point of view, welding of bend / Tap offs in tubular design is simpler than other.

In some cases conductor can be copper 99.9% also.

External surfaces of conductors are painted matt black paint in order to increase the heat-dissipating capacity by radiation and reduce the temperature rise of the conductors.



Enclosure (Continuous Enclosure Type)

The enclosure is made of aluminum alloy sheets rolled and welded to form a tubular form of standard lengths. The successive standard lengths of enclosures are welded together by means of welding enclosures at site. This system is called as electrically continuous housing. In case of three phase system, each phase enclosure is then cross-connected with the enclosure of the other phases at the extreme ends of the installed bus duct. The welded bonding permits longitudinal flow of induced currents through the length of the enclosure and return through the enclosure of the other phases. One end of the shorting plate is grounded for safety of personnel. Enclosures are supported at the location with the help of supporting rings in two halves clamped to the enclosure. The enclosure is designed to carry longitudinal electromagnetic currents up to 90–95% of the rated current of the main bus and also accountable for the dissipation of heat of the main conductors, unless an additional forced cooling system is adopted.

Some of the prominent features of the enclosure design are –

1. Continuous enclosure provides a high degree of magnetic shielding for metallic objects and structures located in the vicinity.
2. Magnetic shielding also significantly reduces the electrodynamic stresses caused by short-circuits on the structures and between the enclosures of the other phases. The thermal effects of the enclosure are taken care of by the bellows.
3. The electrical bonding of enclosures thus nullifies the proximity effect and helps to reduce the heating in supporting beams/ Structures.
4. Voltage rise in enclosures is low due to its resistive origin hence ensuring personnel safety.
5. Aluminum housings are inherently corrosion-resistant, lighter in weight and easier to handle. The continuous housing design simplifies installation and reduces construction time by keeping joints to a minimum.

Sometimes canopy arrangement is also provided to nullify the effect of solar radiations.

Insulators

Insulators are used to support the conductors inside the enclosures. Their main purpose is to bear the weight of the conductors, stresses due to conductor expansion and short circuit faults. The insulators are positioned at 120° apart and this design has many benefits.

Benefits of Insulator design

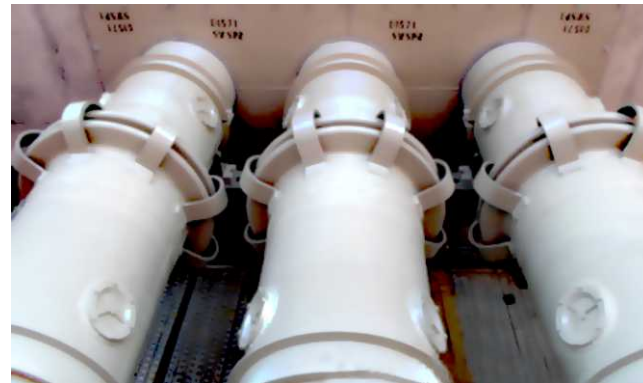
- Bus to get aligned at its magnetic center and therefore uniform dielectric strength is maintained between bus and enclosure.
- Free Movement of conductor during expansion.
- Eliminates the effect of cantilever forces.
- Easy maintenance as insulators can be easily removed from outside.
- No access door is required thus enhancing the efficiency of air pressurization system.

Accessories

Metallic Expansion Joints

Metallic expansion joints are provided to allow expansion and contraction on conductors and enclosures due to temperature variations.

Metallic expansion joints with double compensator made of aluminium alloy, same as that of enclosure, is installed along the route and location is established by proper designing and calculations. This joint also permits the path for the longitudinal enclosure circulating current thus achieving "continuous design" of Isolated Phase Busduct (IPB).



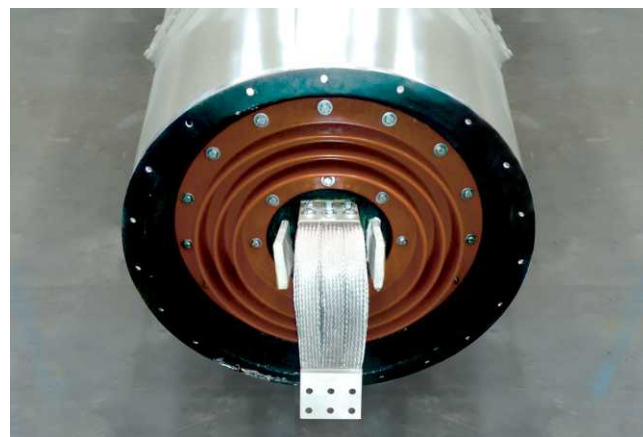
Rubber Bellows

EPDM Rubber Bellows are provided at equipment termination end to prevent transmission of vibrations to busduct and also to prevent flow of enclosure longitudinal currents to equipment. They also facilitates easy alignment with equipment flanges and equipment/Civil foundation tolerances.



Seal Off Bushing

These bushings are used to prevent hydrogen leakage from generator terminals from entering the IPB enclosure and also when a pressurization system is used. These seal-off bushings are made of epoxy cast resin.



Wall Frame Assembly

These are used to close the opening location where bus is passing through the wall. These plates are made of Aluminium along with silicone sealing to seal the resultant interface gap. wall frames can be supplied with fire barriers both inside and outside of the IPB. Wall passages are fully insulated from the busduct.



Auxiliary Systems

Pressurization System

Pressurization system is used to maintain a positive pressure above atmospheric pressure by few millibars of dry and clean air inside the enclosures, in order to prevent any entry of outside air into the busduct thus eliminating any dust or moisture into the busduct

It helps in maintaining good dielectric characteristics of the insulator during continuous operation and eliminates condensation.



Hot Air Blowing System

The hot air blowing system is required for blowing hot air into the busduct to evacuate moisture content inside the busduct during first time energizing or starting after maintenance.

This system is open loop circuit with hot air supplied through inlet valve until the interior of enclosure is completely dry. The unit is a low voltage equipment comprising axial flow fan, a heater, an inlet filter, pressure damper and can be customized with required controls and Interlocks.



Forced Air Cooling System

For higher ratings (usually 25 000A and above), heat dissipation through natural cooling alone may not be sufficient. It may require a larger enclosure. But this may become too large to terminate at the generator end and be a limiting factor, besides becoming more expensive. Hence this system is adopted to maintain & control temperature rise limits as per specification or customer needs.

This is the closed loop circuit, the air blown into two phases is drawn into the third, cooled when passing through the heat exchanger and returned to the circuit. As the warm air flows out of the return phase(s) into the heat exchanger, it is passed on to the cooling coils. The air then passes through a water eliminator before re-entering the enclosure(s) to be re-circulated.



Auxiliary Equipments

C&S manufactures and supply Auxiliary Equipment as per customer requirements.

1. Potential Transformer (PT) & Surge Protection (SP) Cubicles / Lightning Arrester Voltage Transformer Cubicles (LAVT)

PT & SP Cubicles or LAVT cubicles are used for generator voltage measurement and generator protection from over voltages due to surges.

Cubicle houses Potential Transformers, Lightning arrester, Surge arrester along with its associated assembly.



2. Neutral Grounding Cubicles

Generator Neutral Grounding Cubicles are designed to minimize fault damage incurred by generators, maintain sufficient fault detection and improve power system reliability.

Cubicle houses Neutral Grounding Transformer and Neutral Grounding Resistor along with its associated assembly.

- It is free standing floor mounted type cubicle made up of powdered coated mild steel CRCA or Galvanized sheets with IP54 ingress protection for NGT and IP23 for NGR compartments.



3. Generator Terminal Enclosures (GTE) & Generator Auxiliary Compartment (GAC)

GTE or GAC is mounted on Generator top is used for monitoring & protection system components in a large housing. The enclosure includes both line-side and neutral-side bus systems.

It is basically combination of PT & SP Cubicle and Neutral Grounding Cubicle with some extra features



4. DC Busbar Systems / Excitation Transformer

DC Busbar System are generally used for generator excitation system and in smelter plants for furnace connections.



5. Other Panels are also available on request

1. Neutral Point Cubicle (NPC)
2. Generator Auxiliary Box (GAB)
3. Generator Terminal Box (GTB)



SEGREGATED
PHASE BUSDUCT



C&S offers a wide range of Segregated Phase Busducts for medium voltage applications ranging from 3.3kV to 33kV upto 5000A

APPLICATIONS:

Segregated phase Busducts (SPB) finds application in small Power Generating Units & Utilities

- Generator Phase terminals to Generator Transformers with Tap off Connections & Generator Transformers with Tap off Connections to Unit Auxiliary Transformer (UAT), Neutral Grounding Cubicles (NGC), Excitation Transformers and Lightning Arrester Voltage Transformer (LAVT) Cubicles
- Generator Phase terminals to Generator Circuit Breakers (GCB) & Generator Circuit Breakers (GCB) to Transformer with Tap off Connections to Unit Auxiliary Transformer (UAT), Neutral Grounding Cubicles (NGC), Excitation Transformers and Lightning Arrester Voltage Transformer (LAVT) Cubicles
- Transformer to Switchgear Panel.
- Interconnection between Switchgear Panels.

Above applications will find power transmission solutions in following segments

- Power generating stations (Captive Power Plants , Hydro & Solar)
- Process plants, manufacturing industries & Industrial buildings
- Infrastructure establishment - Airports, Metros, Railways, Tunnels, Ports

PRODUCT HIGHLIGHTS

- Good shielding under short circuit conditions by virtue of non-magnetic metal barriers between phases.
- Minimizes phase to phase faults.
- Conformity to International standards.

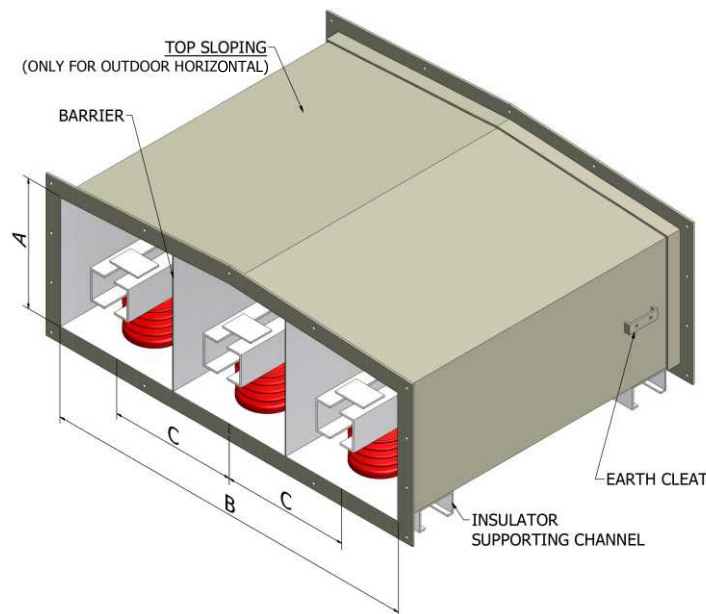
Technical Specifications

Compliance of standard	IEC 62271 (1 & 200) / IS 8084 / IEEE C37.23
Rated Continuous Current	630A-5000A
Configuration	3P
Conductor	Aluminium / Copper
Rated Operational Voltage (Ue)	3.3kV - 33kV (AC)
Rated Short Time Withstand Current	Up to 50kA (for 3 Sec.)
Rated Impulse Withstand Voltage	40kV - 170kV (1.2/50 µs)
Enclosure Material	Aluminium Alloy
Integral Earth	Aluminium Alloy Enclosure**
Degree of Protection	IP55 / IP65

Non- Segregated Phase Busduct (NSPB) design for MV are also available on request.
 **Separate External earthing available on request



Technical Data



Rated Voltage	Basic Insulation Level	Rated Current	Enclosure size		
kV	kV	Amps	A	B	C
Up to 7.2	28/60	1250 to 2000A	350	1000	330
		2500 to 3200A	400	1200	400
		3500 to 4000A	450	1400	470
12	35/75	1250 to 2000A	400	1200	400
		2500 to 3500A	450	1400	470
		4000A	500	1500	500
17.5	38/95	1250 to 2000A	450	1400	470
		2500 to 3200A	500	1650	550
		3500 to 4000A	550	1700	570

All dimensions in mm

Construction

In Segregated Phase Busduct (SPB) construction the conductors of all phases from each other are housed in a common non-magnetic metallic enclosure separated by metal barriers between adjacent phases. The busduct is natural air cooled.

Conductor

The conductors are normally made of aluminium alloy designed as bar, single channel or double channels assembled in a hollow square as per current rating. Conductor can be insulated on request.

In some cases conductor can be Copper also.

Enclosure

The enclosure is made of aluminum alloy sheets welded to form a rectangular form of standard lengths. The successive standard lengths of enclosures are bolted at site.

Enclosures are painted with uniform thickness makes it suitable for harsh environment. Special paint colors are available upon request.

Enclosure acts as Integral earth and separate external earth can also be provided on request.

The straight lengths (max. lengths of 4.5 meters) are supplied with all necessary elements like Bends, tees, rubber bellows, flexibles and adaptor boxes etc. as required to complete the route. Inspection covers are provided to allow access for assembly or removal of current transformers, expansion joints, space heaters, thermostat, flexible joints and other such equipment.

Insulators and Bushings

The insulators are usually of high strength porcelain or epoxy and bushings are in epoxy. Conductor supports are spaced at such intervals to ensure adequate mechanical strength to withstand forces due to fault conditions as specified.

Support Structures

Support Structures are designed and fabricated as per customer and site needs. These structures are manufactured from mild steel and are hot dip galvanized

Structural support is required to withstand the resultant static and dynamic loadings that the system will experience during fault & electromagnetic vibrations as they may have natural frequencies that coincide with the natural frequency or a harmonic of the current.



Design & Engineering Excellence

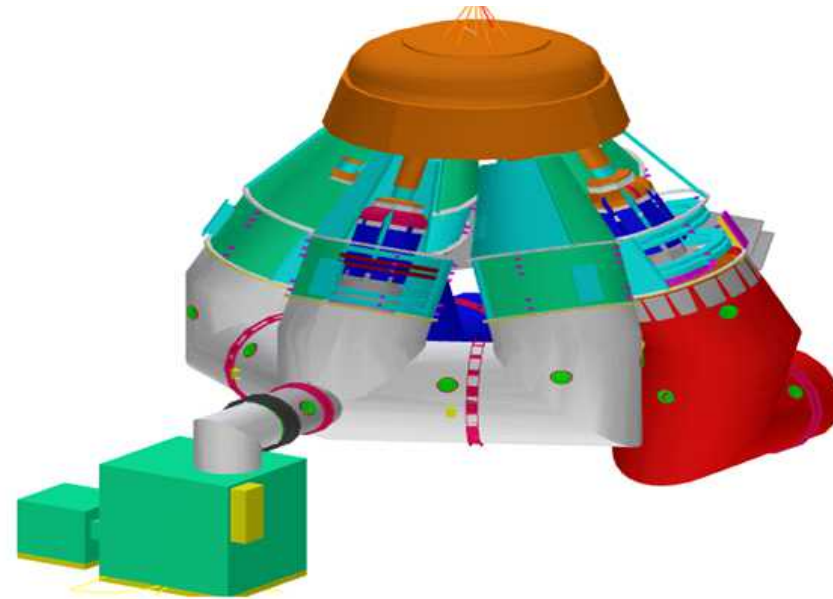
Our in-house skilled engineering team help users to select, specify & design complete solutions with full installation drawings.

- 3D Drawings with corresponding equipment
- 2D Drawings for Termination connections and equipment with dimensions
- 3D Complete Model drawings

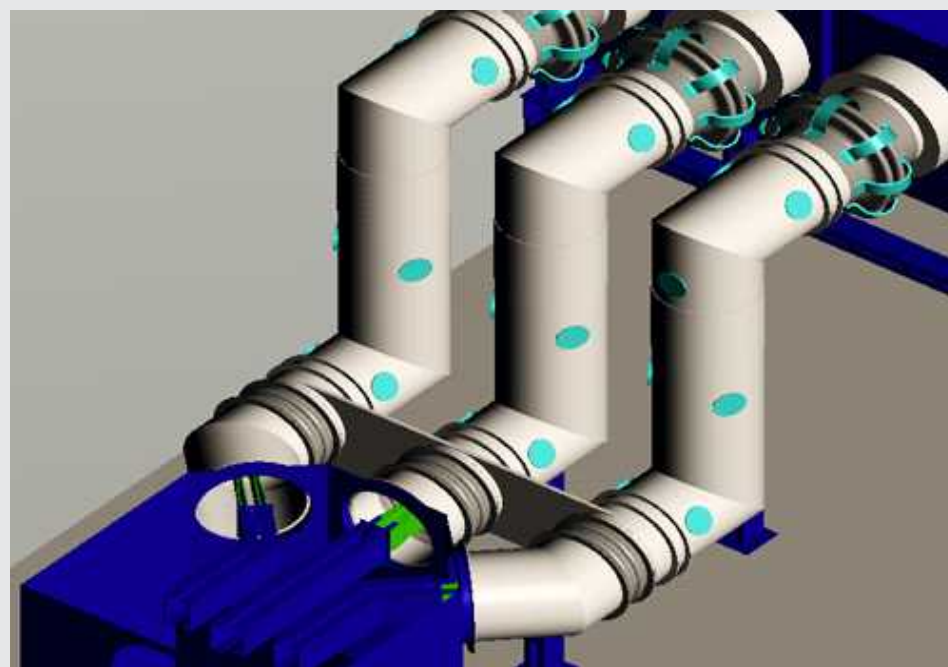
Connection & Terminations

Termination connections between IPB and Generator, Main Transformer, Generator Circuit Breaker (GCB), Neutral Ground Cubicle, Auxiliary Unit Transformer (UAT) etc respectively becomes critical due to limited space availability & very high forces on the bushing connections. As the generator size increases, a large number of flexible connections between the Isolated Phase bus-duct palms & auxiliary equipment are required to carry continuous rated currents. Following points need to be taken care for designing of termination connections:-

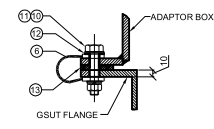
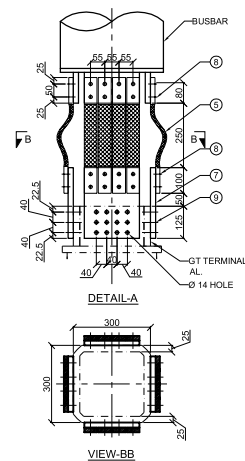
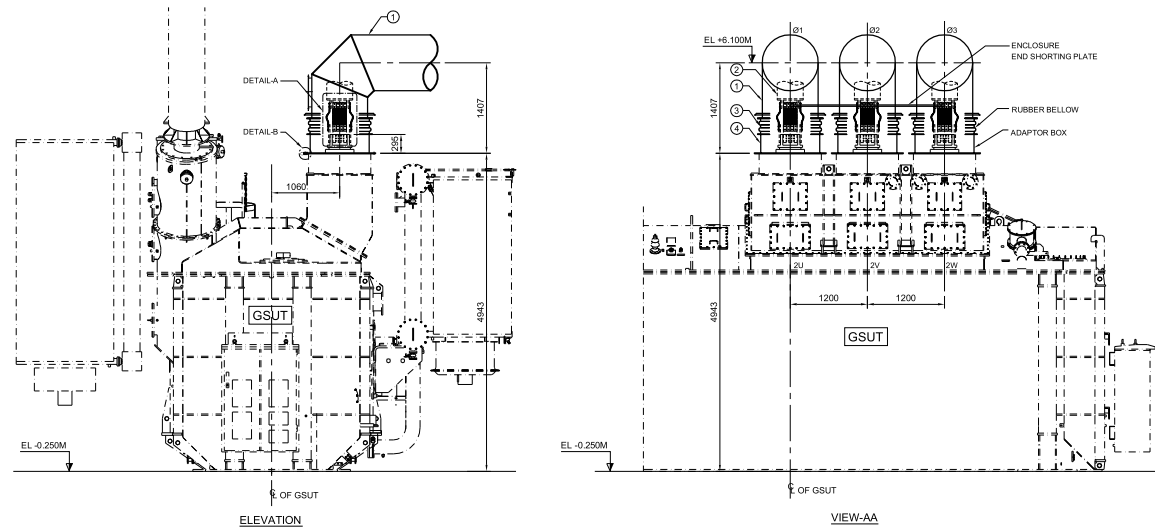
1. Short circuit forces on bushing connections,
2. Design of connection piece assembly,
3. Orientation of bushing connection plates/piece,
4. HV clearances,
5. IPB termination arrangement on generator (It is advisable to fully involve the generator manufacturing during design stages).



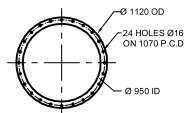
Typical Generator Connection



Typical 2D & 3D Connection Modeling

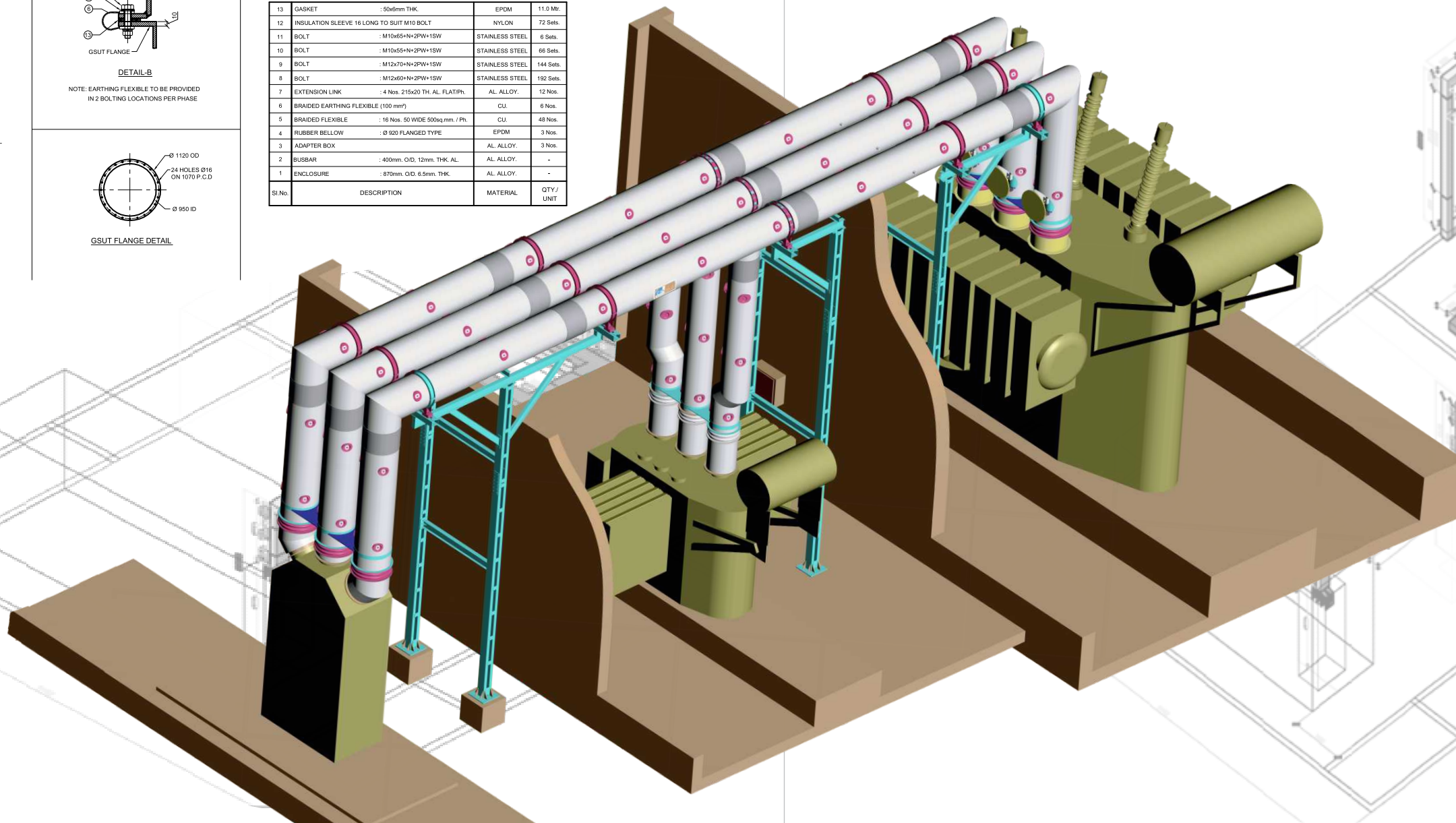


NOTE: EARTHING FLEXIBLE TO BE PROVIDED IN 2 BOLTING LOCATIONS PER PHASE



BILL OF MATERIAL ->

Sl No.	DESCRIPTION	MATERIAL	QTY / UNIT
13	GASKET : 50x6mm THK.	EPDM	11.0 Mtr.
12	INSULATION SLEEVE 16 LONG TO SUIT M10 BOLT	NYLON	72 Sets.
11	BOLT : M10x5+N+2PW+1SW	STAINLESS STEEL	6 Sets.
10	BOLT : M10x5+N+2PW+1SW	STAINLESS STEEL	66 Sets.
9	BOLT : M12x7+N+2PW+1SW	STAINLESS STEEL	144 Sets.
8	BOLT : M12x6+N+2PW+1SW	STAINLESS STEEL	192 Sets.
7	EXTENSION LINK : 4 Nos. 215x20 TH. AL. FLAT/Ph.	AL. ALLOY.	12 Nos.
6	BRAIDED EARTHING FLEXIBLE (100 mm ²)	CU.	6 Nos.
5	BRAIDED FLEXIBLE : 16 Nos. 50 WIDE 500sq.mm. / Ph.	CU.	48 Nos.
4	RUBBER BELLOW : Ø 920 FLANGED TYPE	EPDM	3 Nos.
3	ADAPTOR BOX	AL. ALLOY.	3 Nos.
2	BUSBAR : 400mm. O.D. 12mm. THK. AL.	AL. ALLOY.	-
1	ENCLOSURE : 870mm. O.D. 6.5mm. THK.	AL. ALLOY.	-

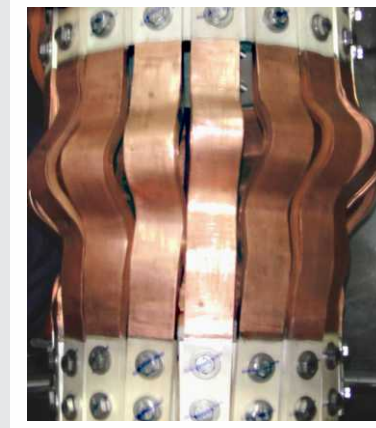


Typical Terminations

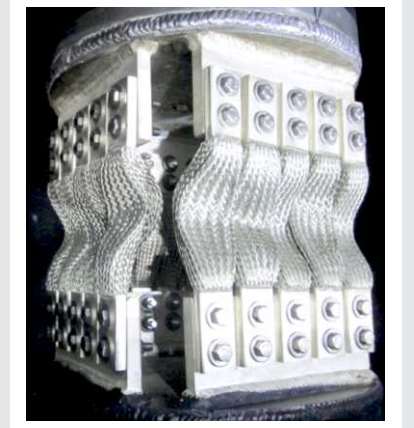
Copper laminates or copper braided flexibles are provided at all the terminals to connect the bus conductor for easy alignment /assembly with the equipment terminals besides preventing any stress at the joints on the equipment and terminals due to nullification of Vibrations.

Flexibles can be fixed or dismantled easily without disturbing equipment position.

All contact surfaces of busbar are Tinned or silver plated based on specification.



Laminated Flexible Connection



Braided Flexible Connection

Installation & Supervision Service

C&S in-house experienced and skilled team carry out Installations and supervision services worldwide.



REFERENCE LIST OF SOME OF THE MAJOR DOMESTIC PROJECTS FOR IPB & SPB

S.No.	Name of the Power Station	Location
1	2 x 600 MW Anpara 'C' TPP	Uttar Pradesh
2	3 x 660 MW Prayagraj TPP	Uttar Pradesh
3	2 x 660 MW Meja TPP	Uttar Pradesh
4	2 x 500 MW Rihand STPP	Uttar Pradesh
5	3 x 660 MW Barh STPP	Bihar
6	2 x 660 MW Barh STPP	Bihar
7	3 x 500 MW Kahalgaon STPP	Bihar
8	2 x 800 MW Lara STPP	Chhattisgarh
9	3 x 660 MW Sipat STPP	Chhattisgarh
10	2 x 685 MW GMR STPP	Chhattisgarh
11	2 x 600 MW Singhitarai TPP	Chhattisgarh
12	3 x 500 MW Korba STPP	Chhattisgarh
13	2 x 500 MW Sipat STPP	Chhattisgarh
14	2 x 600 MW DVC, Raghunathpur TPP	West Bengal
15	2 x 800 MW Darlipalli STPP	Odisha
16	2 x 660 MW Babandh TPP	Odisha
17	2 x 800 MW Sri Damodaram S TPP	Andhra Pradesh
18	2 x 660 MW Krishnapatnam STPP	Andhra Pradesh
19	"2 x 660 MW Bhavanapadu TPP"	Andhra Pradesh
20	2 x 500 MW Simhadri STPP	Andhra Pradesh
21	2 x 800 MW Ramanagundam STPP	Telangana
22	1 x 660 MW Ennore TPP	Tamil Nadu
23	3 x 500 MW Vallur TPP	Tamil Nadu
24	2 x 500 MW Nagarjuna TPP	Karnataka
25	5 x 660 MW Tiroda TPP	Maharashtra
26	3 x 660 MW Koradi TPP	Maharashtra
27	2 x 660 MW Vidarbha TPP	Maharashtra
28	2 x 660 MW Chhabra STPP	Maharashtra
29	2 x 660 MW Amarkantak TPP	Maharashtra
30	1 x 500 MW Chandrapur STPP	Maharashtra
31	2 x 500 MW Tarapur NPP	Maharashtra

SI.No.	Name of the Power Station	Location
31	2 x 500 MW Tarapur NPP	Maharashtra
32	1 x 500 MW Korba TPP	Maharashtra
33	2 x 490 MW Dadri TPP	Maharashtra
34	1 x 500 MW Farkka TPP	Maharashtra
35	2 x 500 MW Mauda STPP	Maharashtra
36	2 x 250 MW Dhanu TPP	Maharashtra
37	4 x 660 MW Sasan UMPP	Madhya Pradesh
38	2 x 660 MW Shri Singaji TPP	Madhya Pradesh
39	2 x 660 MW Khargone STPP	Madhya Pradesh
40	2 x 500 MW Vindhyachal STPP	Madhya Pradesh
41	2 x 600 MW Kalisindh TPP	Rajasthan
42	2 x 600 MW Hisar TPP	Haryana
43	3 x 500 MW Indira Gandhi STPP	Haryana
44	2 X 490 MW NTPC Dadri STPP	Uttar Pradesh
45	4 x 70 MW Dhali Ganga HPP	Uttaranchal
46	6 x 660 MW NTPC Nabinagar TPP	Bihar
47	1 x 500 MW Farkka TPP	West Bengal
48	3 x 170 MW Teesta HPP	West Bengal
49	2 x 600 MW Jindal India TPP	Odisha
50	3 X 250MW NTPC Bongaigoan TPP	Assam
51	2 x 660MW TPCIL STPP	Andhra Pradesh
52	2 x 500 MW Mauda STPP	Maharashtra
53	4x 330 Adani Mundra TPP	Gujarat
54	2 X 220 MW NPCIL Kakrapar APS	Gujarat
55	2 x 700 MW NPCIL Rajasthan APS	Rajasthan
56	2 x 660MW RRVUNL Chhabra TPP	Rajasthan
57	2 X 700 MW Nabha TPP	Punjab
58	2 x 210 MW Roper TPP	Punjab
59	6 x 250 MW Nathpa Jhakri HPP	Himachal Pradesh
60	3 x 350 MW Khalgaon TPP	Bihar
61	2 x 500 MW Singraulli TPP	Uttar Pradesh

REFERENCE LIST OF SOME OF THE MAJOR INTERNATIONAL PROJECTS FOR IPB & SPB

S.No.	Name of the Power Station	Location
1	900MW Az-Zour Emergency PP	Kuwait
2	50 MW OT-1086 Shagaya PP	Kuwait
3	1 x 90MW Rusail PP	Oman
4	20 MW Haima West CPP	Oman
5	7 x 10 MW Aden PP	Yemen
6	1800 MW Hamriyah PP	UAE
7	2x89.3 MW Shuakhevi Hydro PP	Georgia
8	3 X 186 MW Yusufeli Hydro PP	Turkey
9	2 x 650 MW Sokhna PP	Egypt
10	1500 MW Sulaymaniyah PP	Iraq
11	750MW DHI QAR & 432.8MW Samawa PP	Iraq
12	250 MW Deadsea works Gas PP	Israel
13	2 x 150 MW, Gilboa Hydro PP	Israel
14	259 MW Ashalim Solar TPP	Israel
15	800 MW Kokhav Hayardent PP	Israel
16	373 MW Al Qatrana PP	Jordan
17	730 MW Takhiatash PP	Uzbekistan
18	800 MW Talimardjan PP	Uzbekistan
19	100 MW Kaxu -Solor PP	South Africa
20	340 MW Kpone Independent PP	Ghana
21	100 MW Xina Solar PP	South Africa
22	100 MW Ilanga Solar PP	South Africa
23	760 MW Kainji Hydro PP	Nigeria
24	472 MW Abengoa ISCC AIN PP	Morocco
25	2 x 271 MW Berrouaghia PP	Algeria
26	114 MW Los Mina PP	Dominican Republic
27	138 MW Azito PP	Cote D Lvoire
28	2x136 MW+1x 46MW Angostura HEPP	Chile
29	77 MW Aconcagua Cogeneration PP	Chile
30	330 MW T6 PP	Argentina
31	185 MW Recka Gas Fired PP	Peru

S.No.	Name of the Power Station	Location
32	852 MW Chilca PP	Peru
33	3150 MW Substation Araraqura PP	Brazil
34	5 x 50 MW Hrazdan PP	Armenia
35	230 MW MINSK TPP	Belarus
38	6 x 170 MW Tala Hydro PP	Bhutan
39	82 MW Lower Solu Hydro PP	Nepal
40	225 MW Sikalbaha PP	Bangladesh
41	163 MW Fenchuganj PP	Bangladesh
42	225 MW Bhola PP	Bangladesh
43	330 MW Sarulla Geo TPP	Indonesia
44	1000 MW Tanjung PP	Indonesia
45	450 MW Grati PP	Indonesia
46	150 MW Pasuruan PP	Indonesia
47	3 x 110 MW Bengkanai2 PP	Indonesia
48	650 MW Muara Tawar PP	Indonesia
49	2 x 125 MW Hydro PP	Malaysia
50	2242 MW Melaka CCPP	Malaysia
51	2 x 150 MW Therma Visayas Energy PP	Philippines
36	3 x 205 MW Nam Ngum Hydro PP	Laos
52	160 MW Da Nhim Hydro PP	Vietnam
53	2 x 265 MW & 1 x 132 MW Nam Theun PP	Vietnam
54	667 MW Colongra PP	Australia
55	242 MW Yerevan PP	Australia
56	280 MW Mojave Gas PP	USA
57	Morelos CCPP	Mexico
58	220 MW A3T PP	Mexico
59	791 MW Empalme PP	Mexico
60	Alfa Co-Generation PP	Mexico
61	874 MW Tierra Mojada CCPP	Mexico
62	1875 MW Teeside PP	UK
63	900 MW Talimarjan PP	Uzbekistan
64	220 MW A3T Abengoa PP	Mexico
65	330 MW Sarulla Geothermal PP	Indonesia

C&S Power Busbars

One stop solution for all your Power Busbar needs

C&S Power busbar division offers wide range of Power Busbars under one roof. Our skilled team help users to select, specify, design, order, Install and commission the products.

We are committed to provide you reliable and cost efficient Power Busbar solutions globally and partner you throughout the project cycle with our in-house services.

Pre-Sales:

- Product selection
- Technical compliances
- Bill of Quantity generation
- Offer Management

Post Order:

- Site Measurement
- Routing drawing preparation
- Bill of Quantity generation as per approved Drawings

After Sales (On-site service on request):

- Installation
- Commissioning
- Supervision
- Pre-commissioning audits
- Annual Maintenance