



Diesel Generating Sets

C&S Electric

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 Substations
- Protection & Measurement Devices
- Lighting
- Diesel Generator



SUBSIDIARIES / JOINT VENTURES



C&S Electric International B.V.



C&S (Nantong) Electric Ltd.



Eta-com Middle East (FZE)



TC Electric Controls LLC



C&S Himoina Pvt. Ltd.



RS Components & Controls (India) Ltd.



C&S Electric, India

About CSH

C&S Himoinsa (P) Ltd. (CSH) is a 50:50 JV, between Control & Switchgear Company Ltd. (India) and Himoinsa (Spain), successfully commenced in 2006. The idea of bring this JV was to bring out Spanish technology & quality to India origin made products and taking competitive advantage at global level. Himoinsa, now is a part of Yanmar Group (Japan), as part of international expansion.



HIMOINSA was founded in 1982. Based in San Javier, Murcia, Spain Himoinsa specialises in the manufacturing and marketing of energy generation systems providing guaranteed, clean, efficient continuous-energy supply.

Himoinsa is now active in over 100 countries on five continents with 7 factories spread across Spain, France, USA, India and China. With over 30 years experience, HIMOINSA has established a reputation as an international manufacturer through continuous modernisation of its production processes, the incorporation of new technology and its human capital. A renowned name worldwide in generating sets with more than 60% production being exported, installed capacity of 20,000 units P.A for 0,6-2500kVA capacity.

CSH Manufacturing Competence

The Indo-Spanish JV started a state of art manufacturing unit in 2007 at Pant Nagar Industrial Zone, India. The plant is made on 40,000 Sq. Mtrs. of land area and has air cooled covered area of 15,000 Sq. Mtrs. The facility holds one of the best industrial CNC sheet metal Turret Punch Press networked along other high-tech machinery from AMADA Japan. We also have an advance assembling & testing facility to test gensets before dispatch of shipments. Together, the factory produces more than 6000 Gensets annually, which are sold in domestic and international markets.



CSH Plant - Rudrapur, India

State-of-the-art tools and machineries



Electronically coupled in-house process with minimal manual interface from sheet metal to final delivery ensuring highest quality at every stage



High Precision CNC press break



In house Powder Coating Facility for Canopy



High precision manufacturing facility CNC punch presses most modern electronic turret punch presses with 5 meter table



High precision Fully Integrated Manufacturing processes.



Sheet Metal Pre treatment Facility for Canopy to prevent rusting.

About Yanmar

Yanmar Co., Ltd. is a Japanese diesel engine manufacturer founded in Osaka, Japan in 1912. With its more than 100 years of manufacturing legacy, they are one of the world leaders in engine manufacturing. Yanmar manufactures and sells engines used in a wide range of applications, including Marine, Industrial and Power Application. It also manufactures and sells agricultural equipment, construction equipment, climate control systems, aquafarming systems etc.

With head office in Japan, Yanmar is operating across globe with their own subsidiaries and local representation to meet highest level of customer satisfaction. With wide spread service and distributor network, the company believes in minimal turnaround time to service customers.



Yanmar Engines

The TNV Series adds a whole range of “goodies” that makes this engine a mechanical “Work of Art”

TNV stands for:

Total New Value

Lets take a look at the salient features of YANMAR TNV Series of Engines

Emission Reduction

Its is a Cleaner Engines with even lower exhaust emission are achieved by improving on the already excellent TNE base. Stricter emission standards are cleared by a wide margin.



IDI Engines

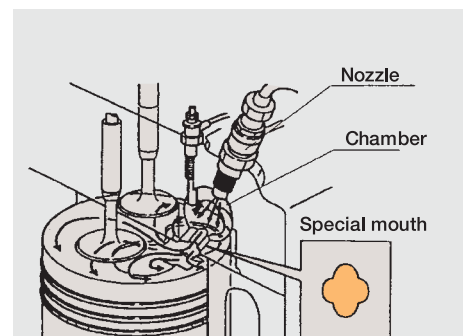
1.) Combustion Chamber

By investigating flow characteristics using experimental and numerical analysis methods, Yanmar research has achieved improved flow mixing in both the main chamber and the special mouth surrounding the injector. More efficient use of the incoming air charge results in cleaner burn and lower exhaust emission.

2.) Fuel Injection Equipment Mechanical Pump

Instead of a PFR pump, a newly developed inline pump has been used for the smaller TNV engines. Adjustments are made solely in the Yanmar’s own FIE factory ensuring precise compliance with regulations. Also, the following features are incorporated:

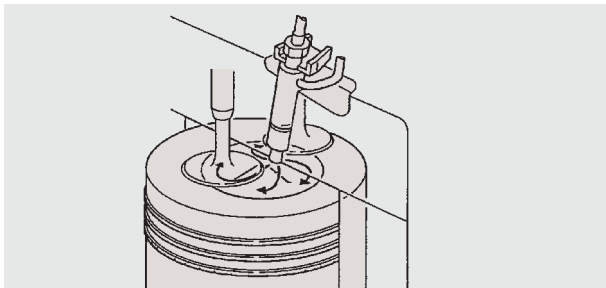
- Increased force is applied by the governor to quicken the fuel controlling rack response time. Engine revs are more constant. Matching to a wide range of machinery is simplified.
- Emissions have been reduced by controlling fuel injection timing according to engine load.
- Cam profile are matched to nozzle throttle needs which give a better controlled injection rate. Emissions are reduced.



DI Engines

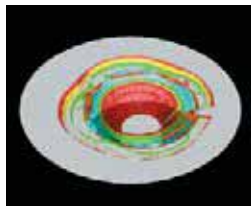
1.) Nozzle Installation Angle

The installation angle of the fuel injection nozzle is greater than that is conventional engines, so that uneven atomization of fuel between injections can be reduced. Excellent matching between intake swirl ration and the shape of the combustion chamber has resulted in uniform mixing of fuel in the combustion chamber. Therefore performance including combustion efficiency, startability, noise and exhaust emission has been improved. On the 4TN94L,-98 and -98T by using 2 inlet and 2 exhaust valves, air intake and expulsion is markedly improved. Vertically mounted injector nozzle minimized imbalance of spray pattern.



2.) Combustion Chamber

In Increase the fluid energy of the air and fuel charge. The swirl effect produced in the chamber continues while combustion occurs, aiding mixing and result in lower exhaust emissions compared to conventional chamber.



3.) Fuel Injection Equipment

MP Pump

A New MP pump has been developed especially for the TNV engine series. Our aim was to make improvements over a wide range of areas to even further reduce emissions. Features are:

High Injection pressure

- Use of mono plunger reduces uneven injection between the cylinders.
- Timing control Device system optimizes injection to consider speeds, loads and the startup phase.
- New mechanical governor helps to maintain cleaner exhausts.
- Minimal variation from chosen revs at low speed using constant pressure valve.

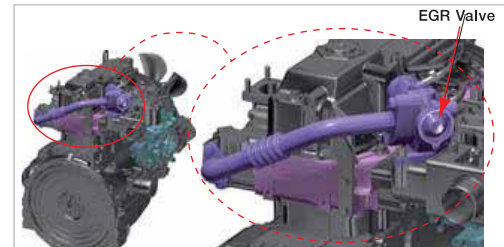
Fuel injection Nozzle

- Multiple numbers of very small holes are used to achieve uniform atomization.
- Holes are not simply drilled, their inside edges are carefully rounded to promote even flow and direction to spray, also to reduce resistance.
- Low sack nozzle profile improves combustion. Double corn shape protects from cavitation.



4.) EGR Valve (> 37 kW)

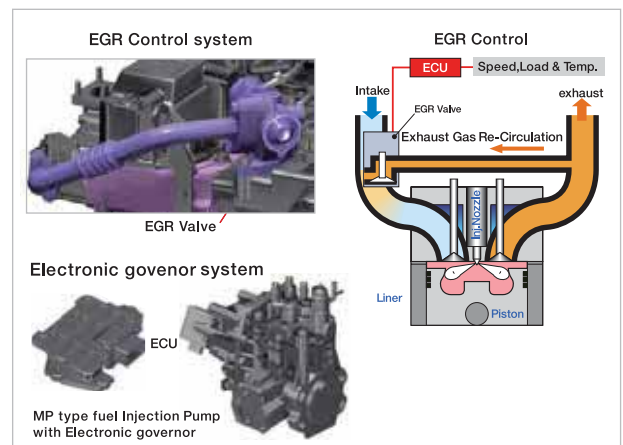
Modulation of EGR valve by the Engine control unit provides for the needs of all kinds of equipment.



5.) Electronic Control (>37 kW)

The electronic control system brings the world the highly evolved electronic governing technologies of many years' experience. It's standard fitting on the 37Kw+ engine series, superbly matched to all kinds of equipment, and also available as an option on sub-37kW units. This is the system that expands work flexibility.

The EGR value is modulated according to the RPM, load etc. to reduce NOx emission and treat the environment well. Fuel injection is regulated to the optimum level on starting and acceleration and black diesel smoke is much reduced. All is controlled by external switches. Integrated operation of the equipment ECU by CAN-bus communication enables RPM adjustment and the switching of governor features to suit the needs of the job. ECU troubleshooting and service tools have been enhanced for finding the answers on a personal computer.



Noise Level Reduction (i.e. a more Silent Engine)

1.) Cylinder Block Noise Reduction

Yanmar's original CAE techniques have optimized the stiffness, minimized transformation, and reduced radiant noise.



2.) Muffler Noise Reduction

Original CAE technique is used to design a muffler with optimized volumes and sound isolation materials.



Diesel Generating Sets:

C&S Himoinso, Silent DG's sets with Yanmar Engines (Made in Japan) are available for International Markets under CSH brand. The Japanese Engines are always known for their Ruggedness, Economics of performance & High Reliability, across globe. Yanmar Engines are based on water-cooled technology and offers low maintenance cost and best-in-class fuel economy.

Engine Key Benefits

Low Operating Cost:

- Remarkable Fuel Economy with Unmatched Engine Protections: Yanmar Engines are one of the most preferred engines in terms of fuel economy & it saves fuel, when compared to other international engine brands.
- Availability of Spare Parts & service centers across globe.
- Less Maintenance required due to robust design of engines and Japanese Technology.
- Longer Service Interval.

High Reliability:

- Robust Engine Design: Yanmar Engines are used in some of the toughest applications across globe i.e. Power Application, Construction Equipment, Material Handling, Marine, Agricultural and Pumping.
- In-Built Oil Cooler: Suitable for Continuous Operation and Lower Lubricating Oil Consumption.
- Piston Cooling Jet: provide cooling to piston at high temperature.
- Lower Break Down & higher reliability
- Bypass Filter: Secondary Filtration system, provide filtration in case of choking of primary filter.
- Air filter Choke indication: Provide safety indication for choking of Air Filter.
- Extremely Low Vibration: Sculpted/Ribbed block for high rigidity which results to Lower vibration and Lower wear & tear.
- Compact size: Engine very ideal for areas with sound constraints & also helps saving land space.

Performance:

- Quick Starting & smooth running
- Excellent Block Loading Capacity
- Excellent & unmatched fuel Efficiency
- Longer Product Life Cycle

Service Efficiency

- Easy Serviceability: Superior Accessibility of all Service points within Genset.
- Commonality of Spare Parts: Most of Spare parts used, are commonly available with exiting Yanmar dealers of other product representation.

Technicians training are available as in where as required by our partners. The sessions are for 3 days with technical & practical knowledge exchange.



Alternator:

We normally use Leroy Somer Alternators but other brands can be arranged.

- Description: Self-excited, Self-regulated Single bearing, Brushless & continuous duty
- Voltage: 415/230 Volts
- Power Factor: 0.8
- Frequency: 50 Hz/60Hz
- No. of Phase: 3 phase/ 1 phase
- Construction: SPDP enclosure
- Protection: IP 21 / IP 23
- Voltage Regulation: $\pm 1\%$
- Insulation Class: H

Salient Features:

- Highest Efficiency in its class
- Compact Size
- Better Response Time and allows faster recovery of stabilized rated voltage
- Excellent Motor starting capability in the range of DG sets
- Ensure constant Voltage operation even at 5% reduced speed band

Microprocessor Controlled

Deep sea or equivalent a microprocessor-based controller is being provided along with generator having self-diagnostic & self-management system.

Salient Features:

- It measures, monitor, control & operate all the required electrical mechanical parameters.
- User friendly LCD display.
- Logs last 50 Fault codes helps operator/service personal for troubleshooting.
- Safeties with annunciation.
- Engine Safeties: High Water Temperature, Low Lub. Oil Pressure, Low Fuel Level, Charging Failure, Radiator, Water Level, Air Filter Choke.
- Alternator Safeties: Under Voltage, Under Frequency, Over Frequency, Overloading.

Control Panel

- Availability of Standard Manual Panel and AMF Panel
- MS construction Control panel
- Suitable for 4 Pole MCB/MCCB
- All critical parameters of Engine and Alternator are displayed on Micro-processor-based controller.
- Indoor Type Mounting Inside Acoustic Enclosure (Standard Manual Control Panel)

Optional:

Auto Mains Failure Panel

Remote Start/Stop Panel

GPS Based system for Remote monitoring and controlling

Acoustic Enclosure:











- Noise level upto 65 dB(A) at a distance of 1 Meter under free field condition
- Made up of high-quality CRCA sheet
- Modular construction and good Aesthetic
- Sturdy designed built for last and Suitable for Outdoor Installation
- Single Point Lifting Arrangement: Easy Handling and avoid installation damages
- Online Spray Surface Treatment / phosphating and Pure Polyester Powder Coating for better finish and long-lasting Acoustic Enclosure's Colour
- Silencer inside the canopy
- Integrated Fuel Tank suitable for minimum 8 Hours contentious running
- Easy Access to accessories with secure serviceability
- Ready to use DG set








CSH Generator Specifications

GENSET MODEL	CSHY-5.5	CSHY-8.5	CSHY-12.5	CSHY-15
ENGINE Make	YANMAR	YANMAR	YANMAR	YANMAR
Model	3TNV70-GGEA	3TNV76-GGEA	3TNV88-GGEA	4TNV88-GGEA
Type of combustion chamber	Direct Injection	Direct Injection	Direct Injection	Direct Injection
Aspiration	Naturally Aspirated	Naturally Aspirated	Naturally Aspirated	Naturally Aspirated
Bore (mm) x stroke (mm)	70x74	76x82	88x90	88x90
Piston displacement (cm3)	854	1116	1642	2190
No. of cylinders	3	3	3	4
Continous rating (kW)	6.1	8.2	12.2	16.4
Rated Speed (RPM)	1500	1500	1500	1500
Compression ratio	23.4	23.5	19.1	19.1
Fuel	Diesel Fuel ASTM 2D	Diesel Fuel ASTM 2D	Diesel Fuel ASTM 2D	Diesel Fuel ASTM 2D
Lubricating oil capacity (Ltr.)	2.8	3.5	6.7	7.4
Coolant capacity (Ltr.)	0.9	0.9	2	2.7
Charging generator (VDC-A)	12V- 40	12V- 40	12V- 40	12V- 40
Cooling system	Coolant Cool	Coolant Cool	Coolant Cool	Coolant Cool
Lubricating system	Forced Feed	Forced Feed	Forced Feed	Forced Feed
Starting system	Electric Starter	Electric Starter	Electric Starter	Electric Starter
Fuel Consumption (Ltr./Hrs) +5 %	50% - 1.1 / 75% - 1.35 / 100% - 1.7	50% - 1.38/75% - 1.77/100% - 2.31	50%- 1.9/75% - 2.5/100% - 3.3	50%- 2.26/75% - 2.9/100% - 3.77
ALTERNATOR Make	Leroy Somer	Leroy Somer	Leroy Somer	Leroy Somer
Model	LSAP 40 C1	LSAP 40 C2	LSAP 40D	LSAP 40 E
kVA / kWe	5.5 / 4.4	8.5/6.8	12.5/10	15/12
Voltage (VAC)	400	400	400	400
Rated current (Amps)	7.9	12.3	18	21.6
Voltage (VAC)	400	400	400	400
Voltage Regulation	±1%	±1%	±1%	±1%
Power Factor	0.8 pf (lag)	0.8 pf (lag)	0.8 pf (lag)	0.8 pf (lag)
No of Poles	4	4	4	4
Insulation Class	Class-H	Class-H	Class-H	Class-H
Enclosure	IP - 23	IP - 23	IP - 23	IP - 23
AVR	R - 120	R - 120	R - 120	R - 120
Efficiency @ 100/75/50/25 % Load	81.3 / 83.4 / 81.9 / 78.5	82.8/84.5/83.2/79.9	83.5/84.7/84.6/80.4	85.2/86.1/85.9/81.7
ACOUSTIC ENCLOSURE				
Size (LxWxH) mm	1700X900X1130	1700X900X1130	2100X1000X1325	2100X1000X1325
Acoustic material	PU FOAM	PU FOAM	PU FOAM	PU FOAM
Acoustic Finish	Powder Coated	Powder Coated	Powder Coated	Powder Coated
Silencer	Inside Enclosure	Inside Enclosure	Inside Enclosure	Inside Enclosure
Battery	12VDC, maintenance free	12VDC, maintenance free	12VDC, maintenance free	12VDC, maintenance free
Integrated Fuel Tank (Ltr.)	100	100	100	100
Sound Level (75% Load@ 1Mtr)	65dBA±2	65dBA±2	65dBA±2	65dBA±2

AUTO START LOGIC CONTROL PANEL WITH DEEP SEA DSE-4520

DISPLAY - GENSET ELECTRICAL VALUES	GENERATOR PROTECTIONS
Generator Voltage (ph-N)	 Fail to Start
Generator Voltage (ph-ph)	 Fail to Stop
Generator Frequency	 Engine High Temperature
Generator Current	 Battery Charge Failure
Generator Total Load (kW)	 Low Fuel Level
Generator Load (kW)	 Battery Under / Over Voltage
Generator Total Load (kVA)	 Generator Under Voltage
Generator Power Factor	 Generator Over Voltage
Generator Power Factor Average	 Generator Under Frequency
Generator Load (kWh, kVAh, kVAh)	 Generator Over Frequency

DISPLAY - GENSET ELECTRICAL VALUES	GENERATOR PROTECTIONS
DISPLAY - MAINS ELECTRICAL VALUES	 Emergency Stop
Mains Voltage (ph-N)	 Oil Sender Open Circuit
Mains Voltage (ph-ph)	 Overcurrent
Mains Frequency	 Underspeed
DISPLAY - ENGINE PARAMETERS	 Overspeed
Engine Speed	
Oil Pressure	
Coolant Temperature	
Engine Battery Volts	
Engine Run Hour	

CSHY-20	CSHY-30	CSHY-40	CSHY-45	CSHY-50	CSHY-60
YANMAR	YANMAR	YANMAR	YANMAR	YANMAR	YANMAR
4TNV84T-GGEA	4TNV98-GGEA	4TNV98T-GGEA	4TNV106-GGEA	4TNV106-GGEA	4TNV106T-GGEA
Direct Injection	Direct Injection	Direct Injection	Direct Injection	Direct Injection	Direct Injection
Turbo Charged	Naturally Aspirated	Turbo Charged	Naturally Aspirated	Naturally Aspirated	Turbo Charged
84x90	98x110	98x110	106X125	106X125	106X125
1995	3319	3319	4412	4412	4412
4	4	4	4	4	4
19.1	30.7	37.7	44.9	44.9	50.9
1500	1500	1500	1500	1500	1500
18.1	18.5	18.1	18	18	18
Diesel Fuel ASTM 2D	Diesel Fuel ASTM 2D	Diesel Fuel ASTM 2D	Diesel Fuel ASTM 2D	Diesel Fuel ASTM 2D	Diesel Fuel ASTM 2D
7.4	10.5	10.5	14	14	14
2.7	4.5	4.2	6	6	6
12V- 40	12V- 40	12V- 40	12V- 55	12V- 55	12V- 55
Coolant Cool	Coolant Cool	Coolant Cool	Coolant Cool	Coolant Cool	Coolant Cool
Forced Feed	Forced Feed	Forced Feed	Forced Feed	Forced Feed	Forced Feed
Electric Starter	Electric Starter	Electric Starter	Electric Starter	Electric Starter	Electric Starter
50%- 2.66 / 75% - 3.72 / 100% - 4.89	50%- 3.65 / 75% - 5.36 / 100% - - 6.94	50%- 4.91 / 75% - 6.87 / 100% - 9.05	50%-5.5 / 75% - 7.7 / 100% - 10.4	50%-5.5 / 75% - 7.7 / 100% - 10.4	50% - 6.7 / 75% - 9.6 / 100% - 12.6
Leroy Somer	Leroy Somer	Leroy Somer	Leroy Somer	Leroy Somer	Leroy Somer
LSAP 40H	LSAP 42.3C	LSAP 42.3F	LSAP 42.3 G	LSAP 42.3 H	LSAP 42.3 K
20/16	30/24	40/32	45/36	50/40	55/44
400	400	400	400	400	400
28.8	43.3	57.7	65	72	80
400	400	400	400	400	400
±1%	±1%	±1%	±1%	±1%	±1%
0.8 pf (lag)	0.8 pf (lag)	0.8 pf (lag)	0.8 pf (lag)	0.8 pf (lag)	0.8 pf (lag)
4	4	4	4	4	4
Class-H	Class-H	Class-H	Class-H	Class-H	Class-H
IP - 23	IP - 23	IP - 23	IP - 23	IP - 23	IP - 23
R - 120	R - 120	R - 120	R - 120	R - 120	R - 120
87.1/87.6/86.9/83.2	85.7/87.4/88/85.4	88.6/89.8/89.5/87.8	89/90.2/90.6/88.5	89.5/90.7/91.1/89.3	90.1/91.1/91.5/89.9
2100X1000X1325	2100X1000X1325	2100X1000X1325	2600x1100x1550	2600x1100x1550	2600x1100x1550
PU FOAM	PU FOAM	PU FOAM	PU FOAM	PU FOAM	PU FOAM
Powder Coated	Powder Coated	Powder Coated	Powder Coated	Powder Coated	Powder Coated
Inside Enclosure	Inside Enclosure	Inside Enclosure	Inside Enclosure	Inside Enclosure	Inside Enclosure
12VDC, maintenance free	12VDC, maintenance free	12VDC, maintenance free	12VDC, maintenance free	12VDC, maintenance free	12VDC, maintenance free
100	100	100	250	250	250
65dBA±2	65dBA±2	65dBA±2	65dBA±2	65dBA±2	65dBA±2

Exclusion/Optional

- Transportation & Transit Insurance
- Unloading & Shifting of DG Set at Site
- Civil Foundation at Site
- Power & Control Cabling outside Acoustic Enclosure
- Earthing of Equipment (DG Set & Panel) at Site
- Exhaust Pipe Extension
- Any kind of Statutory

Approval Warranty: Standard manufacturer warranty against any manufacturing defects for 1 years, from the date of dispatch or 2000 Hrs. from date of commissioning, whichever is earlier, only for prime power application.

Telecom Range



SUPER SILENT



FREQUENCY



CUSTOMIZED SOLUTION



1000 LTR INTEGRATED FUEL TANK



REMOTE MONITORING



WATERCOOLED

TECHNICAL SPECIFICATION

GENSET MODEL	GENERATOR OUTPUT			ENGINE MODEL	NO OF CYLINDERS	ASPIRATION	ENGINE DISPLACEMENT (LITERS)	FUEL CONSUMPTION (75% LOAD LITERS/HR)	SILENT TYPE			APPROX WEIGHT (KG)
	PRIME		STANDBY						ALTERNATOR (LEROY-SOMER)	IN BUILT FUEL TANK(LITERS)	DIMENSIONS (MM) (LXWXH)	
	KVA	KW										
CSHY-9T	8	6.4	9	3TNV76GGEA	3	NA	1.116	1.8	LSAP 40 C2	1000	1800x1000x2300	880
CSHY-13T	13	10.4	14	3TNV88GGEA	3	NA	1.642	2.5	LSAP 40 E	1000	1800x1000x2300	850
CSHY-20T	20	16	22	4TNV84T-GGEA	4	TC	1.995	3.7	LSAP 40 H	1000	2100x1000x2300	1200
CSHY-30T	30	24	33	4TNV98-GGEA	4	NA	3.319	5.4	LSAP 42.3E	1000	2100x1000x2300	1250
CSHY-40T	40	32	45	4TNV98T-GGEA	4	TC	3.319	6.9	LSAP 42.3E	1000	2100x1000x2300	1350
CSHY-45T	45	36	50	4TNV106 GGEA	4	NA	4.412	7.7	LSAP 42.3G	1000	2350x1100x2100	1550
CSHY-50T	49	39.2	54	4TNV106 GGEA	4	NA	4.412	8.4	LSAP 42.3H	1000	2350x1100x2100	1600
CSHY-60T	57	45.6	63	4TNV106T GGEA	4	TC	4.412	9.6	LSAP 42.3K	1000	2350x1100x2100	1700

Lighting Tower

Mobile Light Tower (5.5~8.5kVA)

- Telescopic mast with horizontal and tilting option
- Lamp option (Halogen/MH/LED) in various ratings
- Toe hook for easy transportation
- Equipped with ergonomics 4 jacks for better fixing
- Auxiliary power outlet
- 2 wheels trolley option available



*The weights are approximate.

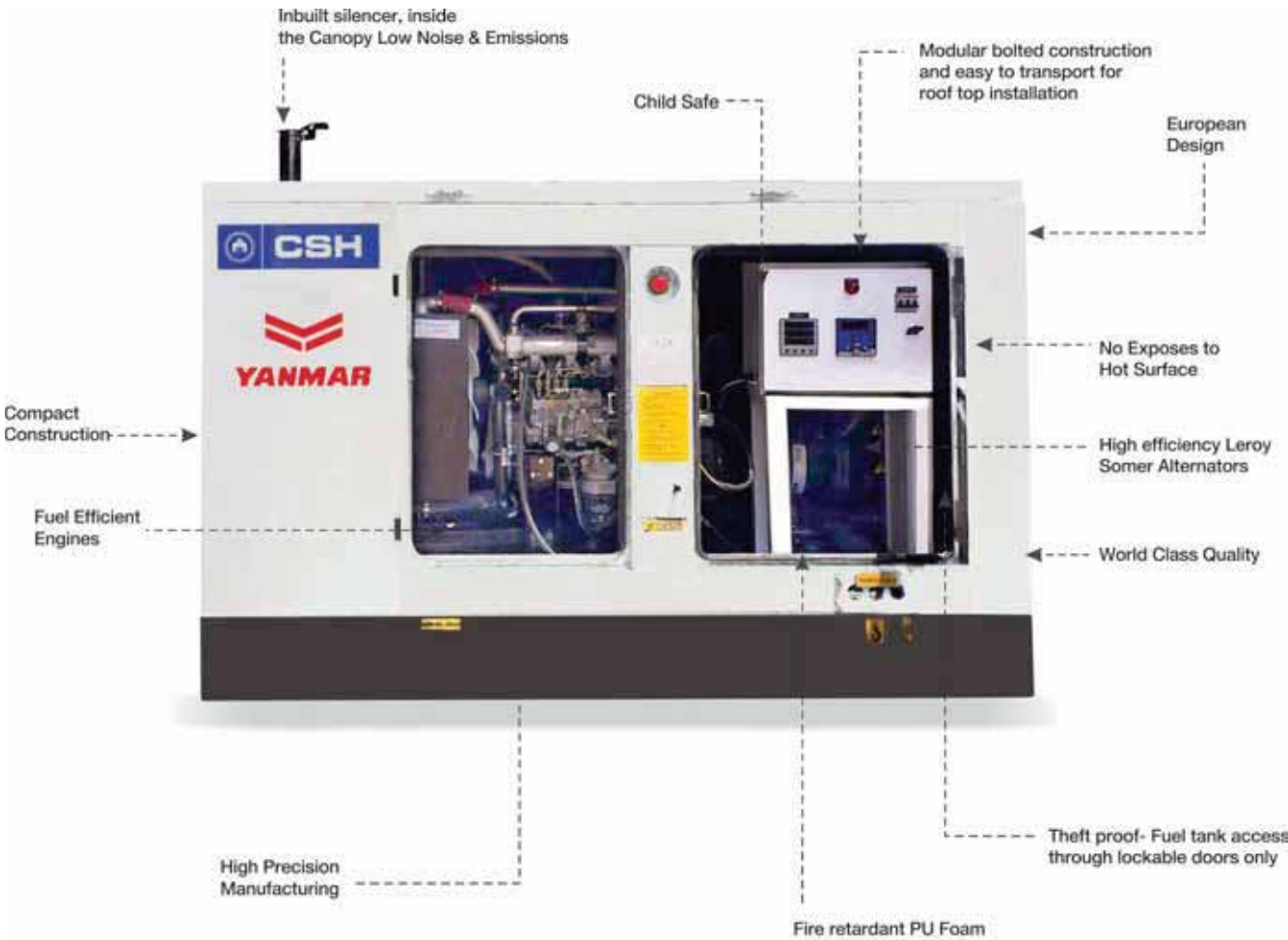
Ambient reference conditions:
1.000 mbar, 25°C, 30% relative humidity. Rating according to ISO 3046.

1- P.R.P. Prime Power – ISO 8528: prime power is the maximum power available during a variable power sequence, which may be run for an unlimited number of hours per year, between stated maintenance intervals. The permissible average power output during a 24 hours period shall not exceed 80% of the prime power. 10% overload available for governing purposes only.

2- Standby power (ISO 3046 Fuel Stop power): power available for use at variable loads for limited annual time (500h), within the following limits of maximum operating time: 100% loads 25h per year - 90% loads 200h per year. No overload available. Applicable in case of failure of the main in areas of reliable electrical network.

3- NA= Natural aspirated. TC= Turbocharged.

Manufacturing Facilities





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