

Part – A3

Portable Generator sets

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1. SCOPE

This Part-A3 document lays down the applicability and requirements, system & procedure for compliance to the rules vide notification no. GSR 804(E.) dated 3-Nov-2022 on emission limits for Portable Generator sets (PI engines below 19kW and up to 800 cc displacement) application, issued by Ministry of Environment, Forests & Climate change, Government of India.

Portable Generator sets running on,

- Gasoline fuel
- Dedicated alternate fuels
- Bi-fuel run either on Gasoline or on any one of the alternate fuels*

*Alternate fuels - Natural Gas/ Bio-CNG, LPG

Following standards has been referred while drafting this system & procedure.

Sr No.	Standard	Title
1	ISO 8178-1 :2017 ISO 8178-1 :2020	Reciprocating internal combustion engines — Exhaust emission measurement — Part 1: Test-bed measurement systems of gaseous and particulate emission
3	ISO 8178-4: 2017 ISO 8178-4: 2020	Reciprocating internal combustion engines — Exhaust emission measurement — Part 4: Steady-state and transient test cycles for different engine application
4	ISO 8178-7:2015	Reciprocating internal combustion engine-Exhaust emission measurement-Part-7: Engine family determination
5	IS 14599 :1999 (Reaffirmed 2019)	Automotive vehicles- performance requirements (Measurement of Power, SFC, Opacity) of positive and compression ignition engines- Method of test
6	40 CFR Part 1039	US EPA Regulation: 40 CFR Part 1039 - Control of emissions from new and in-use nonroad compression-ignition engines
7	40 CFR Part 1065	US EPA Regulation: 40 CFR Part 1065 – Engine testing procedures

2. DEFINITION & ABBREVIATIONS

2.1 DEFINITIONS

1. “**Approval of a genset (genset family)**” means the approval of portable genset type/portable genset family with regards to the level of the gaseous emission pollutants by the genset;
2. “**Declared electrical power output (VA)**” means rated gross electrical power declared by manufacturer for type approval at declared rated speed;
3. “**Mechanical power output (kW)**” means mechanical power at engine crank shaft output at rated speed which is calculated as $V \times A / 1000 \times \text{Alternator efficiency}$;
4. “**Internal combustion engine (ICE)**” means an engine, which works on the either compression-ignition principle or positive ignition principle utilising liquid, gaseous or combination of both fuels;
5. “**Emissions-related defect**” means a deviation from normal production tolerances in design, materials, system or assembly that affects any parameter, specification or component belonging to the emission control system. A missing component may be considered to be an emission-related defect;
6. “**Emission control system**” means the exhaust after treatment system, the electronic management controllers of the engine system (if utilized) and any emission related component of the engine system in the exhaust which supplies an input to or receives an output from these controllers and when applicable the communication interface between the engine system electronic control unit (ECU) and any other power train with respect to emissions management;
7. “**Engine system**” means the engine, the emission control system and the communication interface (hardware and messages) between the engine system electronic control unit (ECU) and any other power train;
8. “**Genset family**” means a manufacturer’s grouping of engine systems which, through their design have similar exhaust emission characteristics, all members of the family must comply with the applicable emission limit values described in Clause 3.1. Also refer ISO 8178-7;
9. “**Parent genset**” means a genset selected from genset family in such a way that its emissions characteristics will be representative for that genset family and that it complies with the requirements set out in ISO 8178-7
10. “**Genset type**” means a category of genset, which do not differ in such essential respects as genset characteristics as defined in ISO 8178-7
11. “**High idle speed**” High idle speed is the speed reached under governor control at full throttle condition.
12. “**Exhaust after treatment system**” means ‘a catalyst (oxidation or 3-way), or any other emission-reducing device that is installed downstream of the engine. This definition excludes exhaust gas recirculation, which, where fitted is considered an integral part of the engine system;
13. “**Power generating set or Genset**” means any equipment which is used for electric power generation in absence or failure of grid power utilizing engine system defined in this document as prime mover;
14. “**Percent load**” means the fraction of available current(A)/mechanical power at a rated engine speed.
15. “**Test Cycle**” means a sequence of test points each with a defined speed and torque to be followed by the engine during standardised emission assessment test. Also refer ISO 8178-4;

16. **For Domestic products**, Date of Manufacture means the date on which the engine is invoiced; This is in with consideration the production volume declaration for COP.
17. **For Imported products**, Date of Import means the date of payment of custom duties applicable to the Genset; This is with consideration with the import volume declaration for COP
18. **“Manufacturer”** means engine or Genset manufacturer, importer or, assembler (as noted in notification);
19. **“Applicable emission limit”** means an emission limit to which an engine is subject to for approval;
20. **“Constant speed engine”** means an engine whose type approval or certification is limited to constant-speed operation. Engines whose constant-speed governor function is removed or disabled are no longer constant-speed engines;
21. **“Constant speed operation”** means engine operation with a governor that automatically controls the operator’s demand to maintain engine speed, even under changing load. Governors do not always maintain exactly constant speed.
22. **“Engine governed speed”** means the engine operating speed when it is controlled by the installed governor;
23. **“Critical emission related components”** means the components which are designed primarily for emission control, that is, any exhaust after-treatment system, the electronic engine control unit and its associated sensors and actuators, fuel injection equipment and it’s integral control actuators;
24. **“Critical emission related maintenance”** means the maintenance to be performed on critical emission-related components;
25. **“Discrete mode”** means relating to a discrete mode type of steady-state test, as described in ISO 8178-4.
26. **“Electronic control unit (ECU)”** means an engine’s electronic device that uses data from engine sensors to control engine parameters as primary function. ECU may contain more functionality than stated above of interest;
27. **“Emission control strategy”** means a combination of an emission control system with one base emission control strategy and with one set of auxiliary emission control strategies, incorporated into the overall design of an engine or Genset into which the engine is installed;
28. **“Emission related maintenance”** means maintenance which substantially affects emissions, or which is likely to affect emissions performance deterioration of the vehicle or the engine and exhaust after treatment system during normal in-use operation;
29. **“Non-emission related maintenance”** means maintenance which does not substantially affect emissions, and which does not have a lasting effect on the emissions performance deterioration of the machine or the engine during normal in-use operation once the maintenance is performed;
30. **“Gaseous pollutant”** means carbon monoxide (CO), hydrocarbons (HC – assuming a ratio of C₁H_{1.85}) and oxides of nitrogen (NO_x), the last named being expressed in nitrogen dioxide (NO₂) equivalent; Actual CH ratio of the test fuel may be considered as per fuel specification certificate.
31. **“Oxides of Nitrogen (NO_x)”** means compounds containing only nitrogen and oxygen as measured by the procedures specified in this Regulation. Oxides of nitrogen are expressed quantitatively as if the NO is in the form of NO₂, such that an effective molar mass is used for all oxides of nitrogen equivalent to that of NO₂.

32. **“Hydrocarbon (HC)”** means Total Hydrocarbon (THC), non-methane hydrocarbon (NMHC) as applicable. Hydrocarbon generally means the hydrocarbon group on which the emission standards are based for each type of fuel and engine;
33. **“Non-methane hydrocarbons (NMHC)”** means the sum of all hydrocarbon species except methane;
34. **“Idle speed”** means the lowest engine speed with minimum load (greater than or equal to zero load), where an engine governor function controls engine speed. For engines without a governor function that controls idle speed, idle speed means the manufacturer-declared value for lowest engine speed possible with minimum load. Note that warm idle speed is the idle speed of a warmed-up engine.
35. **“Portable Generator”** Electric Generator is defined as Portable if it suits the definition and satisfies the following condition.
- A portable generator is the combination of an electrical generator and an engine (prime mover) mounted together to form a single piece of equipment. This combination is also called an engine-generator set or a gen-set which usually can be moved, pulled, pushed by a person, and not build permanently into a structure such as power house or station.
- Portable Electric Generator, a generator which satisfy the following condition-
- Power output is up to 19 kW & up to 800 cc engine displacement
 - Power by PI air cooled engine
 - It is on Hand-cart mounted units
36. **“Placing on the market”** means the action of making available a product covered by this Regulation on the market of a country applying this Regulation, for payment or free of charge, with a view to distribution and/or use in the country
37. **“Type approval”** means the approval of portable genset type/portable genset family with regard to its emissions measured in accordance with the procedures specified in this Regulation;

2.2 Abbreviations

A	Ampere
BSFC	Brake-specific fuel consumption
BIS	Bureau of Indian Standards
CPCB	Central Pollution Control Board
C ₁	Carbon 1 équivalent hydrocarbon
cc	Cubic Centimetre
CH ₄	Methane
C ₂ H ₆	Ethane
C ₃ H ₈	Propane
CNG	Compressed Natural Gas
CO	Carbon monoxide
CO ₂	Carbon dioxide
COP	Conformity of Production
COP-Year	Period starting 1 st July of preceding year till 30 th June of subsequent year
ECM	Electronic control module
IS	Indian Standard
GOEM	Genset Original Equipment Manufacturer
HC	Hydrocarbon
H ₂ O	Water
ISO	International Organization for Standardization
LPG	Liquefied Petroleum Gas
NMHC	Non-methane hydrocarbon
NO _x	Oxides of nitrogen
NO	Nitric oxide
NO ₂	Nitrogen dioxide
O ₂	Oxygen
PI	Positive Ignition (Engine)
PPM	Part per million
RMS	Root-mean square
S	Sulphur
THC	Total hydrocarbonos
RHC	Reactive Hydrocarbones
V	Voltage

3 Exhaust Emission Limits, Applicability and Requirement

3.1 Exhaust Emission Limits

The emissions of the carbon monoxide, the emissions of hydrocarbons and the emissions of the oxides of nitrogen obtained during emission certification and conformity of production emission test/s conducted in accord with in Annexure 4 of this regulation shall not exceed the amount shown in Table 1 below:

Table 1
Emission limits for Portable Genset engines

Class	Engine displacement (cc)	CO (g/kWh)	NOx +THC NOx + NMHC NOx + RHC (g/kWh)	Test Cycle
1	Up to 99 cc	250	10	D1-3-mode test cycle as specified in ISO 8178 Part 4
2	> 99 and up to 225 cc	250	8	
3	> 225 cc	250	6	

Notes:

- 1) The test shall be done on resistive load bank.
- 2) The testing shall be done as per test procedures mentioned in Annexure 4.
- 3) Test method shall be as specified in ISO 8178: Part 1 & 4, Reciprocating internal combustion engines — Exhaust emission measurement; Steady-state and transient test cycles for different engine applications. The measurement mode shall be D1-3 mode cycle specified under ISO 8178: Part 4 (Weighting Factor of 0.3 for 100 percent load, 0.5 for 75 percent load and 0.2 for 50 percent load). Detail procedure is laid down in Annexure 4 of this document.
- 4) Every manufacturer, importer or assembler (hereafter referred as manufacturer) of the genset manufactured or imported into India shall obtain Type Approval and comply with Conformity of Production (COP) requirements of their product(s) for emission limits which shall be valid for next COP year.
- 5) The above mentioned limit shall be applicable to Type approval and Conformity of Production (COP) carried out by authorized test agencies.
The term 'COP year' means the period from 1st July of a preceding calendar year to 30th June of the following year
- 6) Specific provisions on total hydrocarbon (HC) limits for fully and partially gaseous-fuelled engines (This shall apply to dual fuel engines)
- 7) NOx + NMHC shall be measured in case of NG genset. NMHC shall be equal to 0.3×Total Hydrocarbon (THC) in case of NG. Alternatively, NMHC can be measured by subtracting CH₄ emission from THC.
NOx + RHC shall be measured in case of LPG genset and RHC is equal to 0.5×THC in case of LPG
- 8) Testing shall be on complete genset which includes silencer, air filter, alternator, canopy etc. the prototype shall be acceptable.

3.2 Rounding off

Determine the official emission result for each pollutant to at least one more decimal place than the applicable standard. then round the figure to the same number of decimal places as the emission standard. Compare the rounded emission levels to the emission standard for each emission-data engine. In the case of NOX+HC standards, add the results before rounding. Test report shall have both, the final rounded certificate emission result and test result before rounding for better clarity on the decision.

Use the following rounding convention

- i. If the first (left-most) digit to be removed is less than five, remove all the appropriate digits without changing the digits that remain. For example, 3.141593 rounded to the second decimal place is 3.14.
- ii. If the first digit to be removed is greater than five, remove all the appropriate digits and increase the lowest-value remaining digit by one. For example, 3.141593 rounded to the fourth decimal place is 3.1416.
- iii. If the first digit to be removed is five with at least one additional non-zero digit following the five, remove all the appropriate digits and increase the lowest-value remaining digit by one. For example, 3.141593 rounded to the third decimal place is 3.142.
- iv. If the first digit to be removed is five with no additional non-zero digits following the five, remove all the appropriate digits, increase the lowest-value remaining digit by one if it is odd and leave it unchanged if it is even. For example, 1.75 and 1.750 rounded to the first decimal place are 1.8; while 1.85 and 1.850 rounded to the first decimal place are also 1.8. Note that this rounding procedure will always result in an even number for the lowest-value digit.

Examples-

#		1	2	3	4	5	6
1	Measured value - HC+NOx	0.49	0.50	5.49	5.50	6.49	6.50
2	Emission Limit	6	6	6	6	6	6
3	Final rounded certificate emission value	0	1	5	6	6	7
4	Decision Pass/Fail	Pass	Pass	Pass	Pass	Pass	Fail

Note: Rounding Reference taken form US EPA Regulation 40 CFR -1039 and 40 CFR- 1065

3.3 Gross Power & Speed tolerance

The measured power and speed/frequency may differ from the power and speed/frequency declared by manufactured as specified below.

#	Gross Power Tolerance	Speed/Frequency Tolerance
Type Approval	± 5% at rated	± 2% at rated & all part load points
COP	± 6% at rated	

3.4 Compliance to Safety

All Genset run on dedicated Natural Gas (NG) or Liquefied Petroleum Gas (LPG) or Bio-CNG, Gasoline and Natural Gas (NG)/ Liquefied Petroleum Gas (LPG), shall meet Safety requirements prescribed in the SAFETY CODE OF PRACTICE as per specified in Part A4.

3.5 Additional requirement for variable speed portable generator sets

Additional requirement for variable speed portable generator set shall be applicable as set out details in Annexure 8 of this Regulation.

4 Type Approval Administrative Procedure

4.1 Genset type and Genset family

4.1.1. Genset type

The technical features of an Genset type shall be those defined in its information document drafted in accordance with the template set out in Annexure 1.

4.1.2. Genset family criteria

4.1.2.1. General

For type approval and conformity of production certification, the manufacturer genset range shall be divided into model families consisting of parent genset and its variant(s).

Genset family shall be the grouping of genset, which through their design are expected to have similar exhaust emission characteristic where member of the family shall comply with the applicable emission values.

Parent genset shall be the genset selected from the genset family, in such a way that it will incorporate those features which will adversely affect the emission level of the relevant exhaust emission.

4.1.2.2. Genset family formation & choice of the parent genset

The essential characteristic of the genset family, the parameters defining the genset family, the determination of a genset family and the criteria for choosing the parent genset shall be taken according to the guideline given in ISO 8178-7 Reciprocating internal combustion Engine-Exhaust Emission Measurement-Part-7: Engine family determination. However, the decision of selection of parent genset and family classification by the authorized test agency shall be final.

For identification, the manufacturer shall designate the families as F1, F2, F3.... Fn.

The manufacturer shall provide to the type approval authority the appropriate information relating to the emissions levels of the members of the genset family

4.2 Selection of Certifying Agency

4.2.1. Following test agencies are currently approved by the Nodal Agency Central Pollution Control Board (CPCB) for purpose of type approval and subsequently conformity of production compliance process and may be revised from time to time.

- a) Automotive Research Association of India (ARAI, Pune)
- b) International Centre for Automotive Testing (ICAT, Manesar)
- c) Indian Institute of Petroleum (IIP, Dehradun)

4.2.2. One supplier shall submit application for Type Approval to only one certification agency for all its families / models out of those approved.

4.2.3. The same certification agency shall be responsible for carrying out the verification of Conformity of Production (COP) for that manufacture

4.2.4. For a new OEM or importer, selection of technical agencies for type approval certification and subsequently conformity of production shall be applicant's choice among the technical agencies published by central pollution control board (CPCB) in paragraph 4.2.1 and as amended from time to time.

4.2.5. For any reason if any manufacturer wants to change the certification agency, he shall apply to the nodal agency well in advance with justifiable reason. The nodal agency, after consultation with the existing certification agency/ standing committee, may approve the change, if found justified. If approved, the nodal agency shall inform to the parties concerned.

- 4.2.6. On receipt of information for change in certification agency from the nodal agency, the previous certification agency shall authenticate all the relevant document of the model (type approval as well as COP verification) and forward the same to the new certification agency. The certification agency shall be responsible for carrying out the type approval testing and COP verification for the manufacturer, in future.

4.3 Application of type approval

- 4.3.1 The application shall be made in the format prescribed in **Appendix -1** and must be complete in all respect. Appendix -1 shall be submitted to nodal agency and on its written acceptance, genset specification related documents to be submitted to the test agency.
- 4.3.2 The application for approval of genset or genset family with regard to the level of the emission of gaseous pollutants shall be submitted by the genset manufacturer or by a duly accredited representative.
- 4.3.3 For each genset family, the manufacturer must submit an application to the certification agency, selected as above.
- 4.3.4 The application must be signed by the authorized representative of the manufacturer.
- 4.3.5 It shall be accompanied by the undermentioned documents and the following particulars:
- A description of the genset type comprising the particulars referred to in clause 4.1. of this Regulation and if applicable the particulars of the genset family as referred to in paragraph 4.1.3. to this Regulation. For the purpose of identification, the manufacturer shall designate the genset families as F1, F2, F3 Fn in consultation with technical agency;
- 4.3.6 Testing of the parent model, shall, normally, be sufficient for type approval of the family. The Testing agency has the option to carry out the testing of more than one model in the family to satisfy itself, subject to parent genset-concept as per ISO 8178-7.
- 4.3.7 Genset conforming to the genset type characteristics described in clause 4.1. shall be submitted to the Test Agency responsible for conducting the approval tests. If the Test Agency determines that the submitted genset does not fully represent the genset family described in clause 4.1, an alternative and, if necessary, an additional genset shall be submitted for test. A prototype can be submitted; however, it must be completely built up and conforming to the design to be productionized. Relevant authorised valid document for the alternator efficiency declaration shall be submitted.
- 4.3.8 During Type Approval test, the manufacturer shall submit the qualified emission test data of all the remaining variant genset, other than the parent genset, which is chosen for emission test by the test agency of the family along with all other documents.
- 4.3.9 At later stage if the manufacturer submits the application for type approval of a model, the Testing agency shall ascertain whether the model can be classified as belonging to a family of model(s) already certified. If the model does not belong to a family already certified, the Testing agency shall proceed with the testing of the model for type approval with issuance of new and unique genset emissions family certification upon qualification;
- 4.3.10 If the model belongs to a family already certified, the Testing agency shall decide whether the specific testing of the model is required. In case the specific testing of the model is not required, the type approval certificate for the family may be extended to include the model. In such case qualified emissions data shall be submitted to agency by manufacturer during application;
- 4.3.11 The Testing agency shall intimate its decision to the applicant within a fortnight of receipt of the application, indicating need and plan (schedule) of testing for type approval;
- 4.3.12 In case of alternate fuel (Natural Gas/Bio-CNG, LPG) running generator sets, manufacture to

ensure that the related genset components shall have been approved for safety compliance in advance and genset with certified components shall be submitted for type approved. Safety compliance certificates of all related components shall be submitted along with type approval application. Safety compliance shall meet requirements prescribed in the SAFETY CODE OF PRACTICE as per Part A4 of this Regulation. Manufacturer shall apply separately to test agency for safety compliance certification.

4.4 Type Approval

- 4.4.1. No person or agency shall sale, import or use genset in India without valid Type Approval Certificate and Conformity of production Certificate referred to in clause 4.5. and 5.4 of this Regulation;
- 4.4.2. In order to receive a type approval of genset type or genset family, the manufacturer shall demonstrate compliance, of the genset type or genset family with the provisions of this Regulation. The manufacturer shall also ensure the use of fuels as specified in Annexure 6.
- 4.4.3. All the type approval tests shall be conducted in the technical agency laboratory. In case the required test facilities are accredited by the technical agency, the type approval and / or COP tests can be carried out at manufacturer's laboratory also if reasons call for. In case the test is to be carried out at any overseas test facilities, the same shall be informed to the Nodal Agency by technical agency. The technical agency will submit a copy of accreditation letter highlighting the details of test facilities available in the manufacturer's laboratory to the Nodal Agency;
- 4.4.4. In case of the manufacturer approaches the technical agency for the first time, such manufacturer should complete the COP test(s) within three months from the commencement of commercial production or importation of 100 units whichever is earlier.
- 4.4.5. The Type Approval Authority shall put together an information package consisting of the information folder accompanied by the test report and all other documents added by the technical service or by the Type Approval Authority to the information folder in the course of carrying out their functions ('the information package'). The information package shall include an index listing its contents, suitably numbered or otherwise marked so as to clearly identify all the pages and the format of each document, in order to present a record of the successive steps in the management of the type approval, in particular the dates of revisions and updating;
- 4.4.6. The approval authority shall ensure that the information contained in the information package is available for a period of at least 10 years following the end of the validity of the type approval concerned;

4.5 Certificate of Type Approval and Validity

- 4.5.1 After verification of genset(s) for the type approval, the technical agency shall issue a type approval report to manufacturer within one month from date of testing completion indicating acceptance or rejection decision and reason thereof. If the genset(s) submitted for approval pursuant to clause 4.3. of this Regulation. Approval of that genset type(s) or genset family(ies) shall be granted by the technical agency through issue of Type Approval Certificate as per format prescribed in Annexure 2 along with report. Copy of certificate and report shall be forwarded to Nodal Agency by technical agency involved;
- 4.5.2 For the purposes of clarity and easing access to relevant data, the communication includes an addendum containing the most relevant information related with the type-approved genset type or genset family;
- 4.5.3 The certificate shall be deemed to be valid for the model(s) included herein, unless explicitly withdrawn by separate written order by the Nodal Agency;
- 4.5.4 The Type Approval certificate for a genset family issued to the manufacturer shall be valid for the same model(s) manufactured at any other manufacturing plant of the same manufacturer. The Nodal Agency or technical agency concern with type approval may visit the new plant to verify adequacy of the infrastructure;

- 4.5.5 Validity of Type Approval Certificate issued by type approval authority shall remain valid for 'current' COP-year enabling sales of such type approved genset family for that duration;
- 4.5.6 Validity of Type Approval Certificate issued by type approval authority shall remain valid further as long as following conditions are met:
- i) Till the genset specifications change as mentioned in Annexure 1 and modification related clauses described in clause 4.6 below;
 - ii) Till the further amendments to the notification;
 - iii) Till COP is not missed / Till COP procedure compliance per clause 5 is obtained within prescribed timeframe as listed in clause 5.3.10.
- 4.5.7 In case manufacturer has not sold gensets in two subsequent COP-year period after immediate type approval and has done appropriate 'Zero volume' declaration seeking COP exemption to nodal agency, and for resuming sale for third year of such genset family, manufacture to conduct COP test before making any sell or a new fresh type approval application and subsequent process needs to be carried out. Refer clause 5.5 for COP certification.

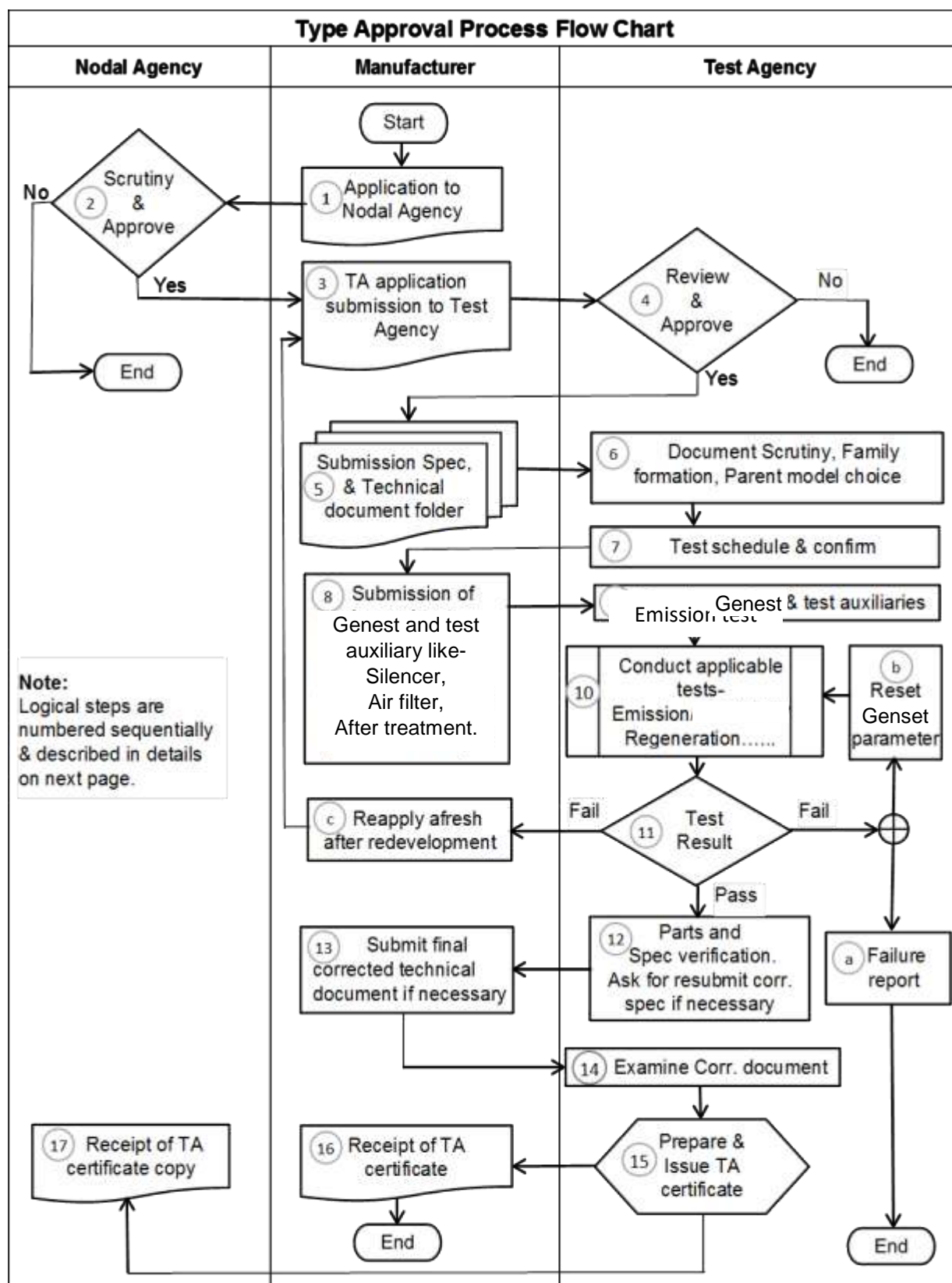
4.6 Modification and Extensions of approved type

- 4.6.1. If genset type or genset family is type approved and valid, manufacturer may approach type approval certificate issuing technical agency for modifications pertaining to parent or any genset type in the certified genset emissions family. Such modifications shall be ascertained by manufacturer utilizing guidelines described in clause 4.6.5
- 4.6.2. Manufacturer shall submit technical document in line with type approval procedure prescribed in this Regulation;
- 4.6.3. Subjected to scrutiny of manufacture's application, technical agency shall approve or seek more data pertaining but not limited to genset architecture, parameters, similarity with existing genset type from emissions and performance perspective along with evidences. Decision of technical agency will remain finally binding for allowing such amendments to existing type approval certificate of a genset family through extension(s) vs asking manufacturer to type approve as new genset family or new genset type;
- 4.6.4. Technical agency retains all rights to ask manufacture to demonstrate modified genset type for emissions conformity through applicable type approval test procedures. Submission of manufacturer run emissions data with valid test facility and procedure followed is mandatory where changes are directly or indirectly pertaining to emission affecting components, genset and after treatment system control algorithms and genset performance specifications.
- 4.6.5. Following generic rules may be utilized as example for extensions of type approval certificate:
- 4.6.5.1. **No emission test requirements necessary:**
- (a) change to part numbers declared through type approval documentation that is not emission affecting;
 - (b) part number change of emission affecting component that is just an administrative change supported with due declarations (proto to production part number change as an example);
- 4.6.5.2. **Emission test compliance required:**
- (a) performance or specification or source change of a component declared through type approval documentation that is emissions affecting. This applies to any such component in genset and after treatment system including software;
 - (b) emissions strategy changes such as but not limited to fuelling timing, fuelling qty,
 - (c) addition of alternate source component that is emission affecting with or without part number change;

Changes as mentioned in above clause 4.6.5.1 and 4.6.5.2 may be verified during COP and not mandatorily confirmed by additional if requested by manufacturer. However, final decision will be with Test Agency.

- 4.6.5.3. In the event of an extension the Test Agency shall establish an updated communication denoted by an extension number that shall be incremental in accordance with the number of successive extensions previously granted. That communication shall clearly show the reason for the extension and the date of extension.

4.7. Type Approval Process Flow-chart



Following are the logical steps for the type approval process flow chart described in brief stepwise

1. Application to nodal agency (CPCB) in the form of affidavit seeking permission for type approval of Genset family through submission provided as draft specimen in Appendix 1.
2. Upon written approval of nodal agency to manufacturer and chosen technical agency; (*This could be decision making node with "Yes" / "No" loop*)
3. Submit type approval certification application to chosen test agency. Based on provisions such application can be written or online through their secured portal;
4. Obtain technical agency approval (*This could be decision making node with "Yes" / "No" loop with NO means, provide additional data*)
5. Upon agencies application scrutiny and negotiations, submit detailed technical documentation as per requirements described in Annexure 1;
6. Obtain documentation approval from technical agency, family formation, choice of parent genset, provide additional data
7. Obtain test plan/schedule from technical agency
8. Upon approval from technical agency plan for providing genset test auxiliaries like -Silencer, air filter, after treatment systems.
9. Upon receipt of genset along with auxiliary technical agency examine the adaptability in test cell, make necessary modification in exhaust line, mounts, etc, if required.
10. Conduct applicable tests-
Conduct emissions test to qualify (*This could be decision making node with "Pass" / "Fail" loop. "Fail" means, a) current TA application is closed out with failure report b) adjust. reset genset parameter for retest or c) further manufacturer may re-apply afresh after redevelopment*)
11. Review of all test results with manufactures and decision about compliance, in case of failure manufacture have three options to proceed a, b, & c, act accordingly.
12. Technical agency carries out part verification of critical genset components and take final review of technical document and ask manufacture to resubmit if necessary
13. Manufacture submit the corrected technical document if found necessary
14. Examine corrected document submitted in line with the requirement
15. Technical agency prepares technical report based on tests;
16. Technical agency issues type approval certificate to manufacturer;
17. Technical agency forwards a copy of type approval certificate to nodal agency

End

Appendix – 1

Application to Nodal Agency. Specimen for Submission of Affidavit & Profile details of manufacturer

Part - A

NOTARISED AFFIDAVIT ON NON-JUDICIAL STAMP PAPER

[To be submitted to the Nodal Agency by a supplier approaching for the first time for TA]

I,, Chairman / President / Managing Director / Partner / CEO / COO / Proprietor of M/s, having Registered Office at engaged in manufacturing / import of Portable Generator sets with manufacturing facilities / ware house at:

iii)

iv)

am authorized to swear this affidavit for and on behalf of the above named Company. I do hereby solemnly affirm and declare as under:

1. That the deponent is well conversant with the facts and competent to swear this affidavit.
2. That the deponent declares that M/s are manufacturer / importer of Portable generator sets in the brand name

iii)

iv)

(Strike out if not applicable)

3. That the deponent declares that M/s are importer of Portable generator sets from M/s i) (ii) M/s (Complete address)
(Strike out if not applicable)

4. That the deponent declares that M/s will obtain Type Approval / Conformity of Production verification only from (Name of the Certification Agency) and will not approach any other Certification Agency for Type Approval / Conformity of Production verification for any of their portable generator sets models, without prior permission from the nodal agency.

5. That the deponent declares that none of the Chairman, Managing Director, Partner, Director, Proprietor, Board Member in M/s has been involved with a Company / Firm which has manufactured and sold non-compliant portable genset.

6. That the deponent declares that M/s will manufacture / import and sell only compliant Portable generator sets

(Name & signature with Co. stamp)

(DEPONENT)

VERIFICATION

Verified at on thisof20..... that the contents of the above affidavit are true and correct to the best of my knowledge and belief and nothing has been concealed therein.

Place:

Date.....

(Name & Signature with Co. Seal)

(DEPONENT)

Part - B

FORMAT FOR SUBMISSION OF PROFILE AND DETAILS OF THE SUPPLIER

A. Company details

- Name of the Company
- Type of Company: Proprietor / Partnership / Private Ltd / Public Ltd
- Name of the Proprietor / Partners / Directors (submit relevant documents)
- Importer / manufacturer
- Registered Office Address with phone number
- Contact Address with phone number, fax number, email etc.
- Name and designation of the authorized person for submission of documents and to deal with the certification agency
- Plant addresses and contact details, in case of manufacturer
- Ware house address, in case of importer (This cannot be changed without prior intimation to Nodal Agency and Certification Agency)
- Name of the company from whom to import and its contact details, in case of importer
- Plant details, from where to import
- Authenticated Copies of following documents to be submitted
 - ix) Manufacturing License from Directorate of Industries / Department of Industry (in case of Manufacturer), IEC Code (in case of importer)
 - x) VAT and CST/GST Registration
 - xi) Excise Registration, in case of manufacturer
 - xii) Consent from State Pollution Control Board/ Pollution Committee
- No. of employees
- Engineers (if any)
- Last year Turn-over
- Any other business

B. Details of Genset (Proposed) manufactured / assembled / imported

Sr No	Model Names	Nos. produced /imported in current year	Nos. expected to be produced / imported in the next year
a			
b			
c			
d			

C. Details of Infrastructure

D. Land: Owned / Rented

Area (m2):

E. Covered Area

F. Machinery for manufacture

- e)
- f)
- g)
- h)

G. Testing facility equipment's

- d) Load bank type and capacity
- e) Measuring Instruments
- f) Any other

H. Quality Control

- 6. Quality Control In charge
- 7. Quality Procedure:
ISO Certified since when (Enclose a Copy of Operating Procedure)
- 8. Pre-delivery Inspection Procedure on Gensets (including records maintained)
- 9. System of serial numbering and marking on Genset and their sub-systems – e.g. all Enclosures, etc.)
- 10. Any other

Date:

Place:

SIGNATURE OF THE
(Chairman /President / Managing Director
/ Partner / CEO / COO / Proprietor)

SEAL OF THE COMPANY

---End---

5 Conformity of Production Administrative Procedure

5.1 General

- 5.1.1. Conformity of Production (COP) compliance is designed to ensure manufacture's compliance and control towards a type approved genset family to statistically ensure genset sold under such emission certification does meet required emissions.
- 5.1.2. COP process compliance also ensures type approval certificate validity and hence right to produce and sale genset by a manufacturer owing such type approval certification for the next COP-year. Such provision is administratively provided by issuing Conformity of Production Certificate;
- 5.1.3. Each manufacture shall subject it's genset model range to the verification of COP, every year. For this, the year shall mean the period from 1st July of the calendar year to 30th June of the succeeding calendar year;

5.2 Verification of Conformity of Production (COP)

5.2.1 COP of domestically manufactured genset families

- 5.2.1.1 the verification of COP shall be done once in a COP-year as per plan described in following 'Table 1'

Table 1

Number of families to be tested for verification of COP for domestic manufactures

Total number of families of the domestic manufacturer	Total number of families to be tested per year
1 – 3	1
4 – 7	2
8 – 11	3
12 – 15	4
>15	5

5.2.2 COP of imported genset families

Imported genset shall be subjected to the verification of COP once for every 1000 units per family imported or once a year, whichever is earlier.

5.3. Sample size, Decision and Other Criteria for verification of COP

- 5.3.1 In case of genset defined in clauses 5.2.1.and 5.2.2. above, testing shall be done on sample(s) randomly selected by certification agency from the production line / import warehouse.
- 5.3.2 Minimum quantity of 25 numbers or one day's average production volume of the genset model selected by technical agency, whichever is more shall be made available for random selection. The limit shall be minimum 10 units in case of import. Averaging of production volume will be based on total working days at time of selection.
- 5.3.3 If the manufacturer is not of Indian origin, the manufacturer should establish a base office in India, which is to be declared in the initial application submitted to Nodal Agency as per Appendix 1 This base office will be responsible for Type Approval and COP compliance;
- 5.3.4 The manufacturer shall request the certification agency when they would like to make random selection of genset(s) and to seek their schedule/availability for completing the COP test;

- 5.3.5 COP verification shall be carried out for each plant of the domestic manufacturer. For imported genset, the COP testing shall be carried out on the genset manufactured for each country of origin irrespective of genset family being same;
- 5.3.6 The certification agency shall intimate to the manufacturer the schedule (month) of sampling / testing. The manufacturer shall inform the production/ import plan for the month in which the technical agency wants to carry out the COP, to the technical agency. If the manufacturer has a problem due to particular reasons such as the particular model is not likely to be scheduled for production / import at that time, or enough number of gensets may not be available for random selection; the time schedule may be modified based on mutual convenience of the manufacturer and the technical agency;
- 5.3.7 The manufacturer shall complete all COP activities (such as random selection, initial running-in, emission testing and documentation) at least one month before the end of COP-year. The COP certificate shall not be issued in case of non-adherence to above schedule unless such schedule attainment is due to unavoidable reasons such as but not limited to test facility downtime, extended COP process encountered.
- 5.3.8 Following 'Table 2' gives the deadlines for the respective COP-year for the COP activities. However, manufacturer can take early action on each activity to ensure compliance.

Table 2

Sr. No	Activity Description	Last Date
1	Submission of production / import plan / actual details to technical agency	1 st March
2	Random Selection	1 st April
3	Submission of genset and subsequent testing (Including extended COP if any)	31 st May
4	Completion of documentation and COP Certificate issuance	30 th June

However, the above schedule shall be preponed, subjected to mutual agreement between test agency and manufacturer keeping in view financial year closing and other reasonable cause.

- 5.3.9 The manufacturer shall inform the technical agency regarding the stoppage of production of a specific model, in case this has not been anticipated at the start of the COP period. This shall be intimated well in advance so that COP selection of the genset can be completed by the technical agency before stoppage of production. Manufacture is held accountable for ensuring COP is conducted and samples are made available per requirements of this Regulation;
- 5.3.10 The manufacturer shall provide all the assistance required by the technical agency for completing the tests;
- 5.3.11 The latest updated technical specifications, procedure of pre-delivery inspection (PDI), running-in and servicing of the genset, shall also be submitted before the genset selection, if there have been revisions after the previous COP / type approval;
- 5.3.12 Pre-delivery inspection as per owner's instruction manual / service manual will be carried out by the manufacturer as per procedure declared at the time of type approval and as amended and intimated to concern technical agency from time to time for the selected genset(s), under the control of technical agency;
- 5.3.13 The running-in of the genset(s) shall be carried out as per the manufacture's recommendation submitted during the type approval and as amended and intimated to the concern technical agency from time to time, for genset(s) under control of the technical agency. Running-in may also be carried out at genset manufacture's place under the control of technical agency provided adequate facilities are available. After such running-in procedure, manufacture will be permitted to carry out all the adjustments recommended in their owner's / service manual and as amended and intimated the concern technical agency from time to time published with technical agency, under the control of the technical agency;

- 5.3.14 In case of failure of any major component during the running-in or testing, the technical agency may permit to replace component only once; which has failed and which does not affect the performance and emission of the genset. Such decision is entirely with technical agency. In case of failure of emission affecting component, random selection of genset at manufacture's plant or warehouse shall be done afresh. If for such randomly selected genset (second time) or a replaced component fails again, it shall be reported to the nodal agency by the concern technical agency and agency shall await instructions from the nodal agency for further action;
- 5.3.15 The manufacture shall submit the randomly selected genset(s) to technical agency within four weeks (8 weeks in case of import subjected to last date as mentioned in clause 5.3.8. – Table 2) of completion of running-in for emission compliance test;
- 5.3.16 The technical agency should endeavor to complete the required testing of selected genset(s) within four weeks after submission of genset(s);
- 5.3.17 The testing shall be done as per applicable procedures and specifications described in Annexure 4

5.3.18 Sampling plan for COP

- 5.3.18.1 The number of samples to be tested shall be minimum as necessary, as given in Table 3 to arrive at a decision on whether the production unit complies with applicable emission limits;
- 5.3.18.2 A sample said to have failed for particular criteria pollutant if the test result of the sample for the criteria pollutant exceeds emission limit;
- 5.3.18.3 The production units of all models in the family shall be deemed to comply with the emission limits if the number of failed samples as defined in clause 5.3.18.2 above for each criteria pollutant is less than or equal to the pass decision number appropriate to the cumulative number of samples tested for that criteria pollutant as given in Table 3;
- 5.3.18.4 The production units of all models in the family shall be deemed to be non-complying with the emission limits if the number of failed samples as defined in clause 5.3.18.2 above for each criteria pollutant is more than or equal to the fail decision number appropriate to the cumulative number of samples tested as given in Table 3;

Table 3

Sampling plan and decision criteria for the verification of COP

Cumulative Samples	Pass decision	Fail decision	Cumulative Samples	Pass decision	Fail decision
	No. of failure			No. of failure	
1	(^a)	(^b)	16	6	11
2	(^a)	(^b)	17	7	12
3	(^a)	(^b)	18	7	12
4	0	(^b)	19	8	13
5	0	(^b)	20	8	13
6	1	6	21	9	14
7	1	7	22	10	14
8	2	7	23	10	15
9	2	8	24	11	15
10	3	8	25	11	16
11	3	8	26	12	16
12	4	9	27	12	17
13	5	10	28	13	17
14	5	10	29	14	17

15	6	11		30	16	17
<p>(^a) : Series not able to pass at this stage (^b) : Series not able to fail at this stage Note: ix) COP compliance or non-compliance decision is on the basis of number of failures within the respective cumulative samples tested. x) During successive testing, the decision which reached first is the final. xi) Minimum 4 samples are required to test to reach pass decision xii) Minimum 6 samples are required to test to reach fail decision</p>						

5.3.18.5 Once a compliance or non-compliance decision is made for a particular criteria pollutant, the result of testing of subsequent samples for that criteria pollutant shall not influence the decision;

5.3.19 Gross Power failure during COP

5.3.19.1 For verifying the conformity of production, if anyone selected genset does not meet the gross power and rated speed limit as applicable, another four gensets will be taken from the series at random and be tested as per this part. All these selected gensets shall meet the limit values specified. One genset shall be subjected to the emission test for the conformance of production.

5.3.19.2 If further same failure is noted in any of the additionally selected samples of clause 5.3.19.1 the production shall be considered as non-compliance and the provision of clause 5.8, shall be put into effect.

5.4 Certificate of Conformity of Production (COP) and It's Validity

5.4.1 After verification for COP, the certification agency shall issue a COP verification report to the manufacturer within one month of the date of testing completion , indicating compliance or non-compliance. In case of compliance, the technical agency shall issue a COP certificate to the manufacturer as per format prescribed in Annexure 2 along with report. At the end of COP year, details of COP & the Copies of certificate as well as report shall also be forwarded to the Nodal Agency;

5.4.2 Certificate of conformity of production is required to commence the production and sale of portable generator sets in immediately next COP-year. Validity of current COP certificate shall be till successful compliance of COP test in next COP-year

5.4.3 The COP certificate will be issued at the end once all the numbers of genset samples demanded as per the production plan submitted become tested successfully. Intermediate COP certificate i.e at each sample tested shall not be issued, However the test data report will be issued at every test sample.

5.5 COP Discontinuity

5.5.1 If there is no production or import of model(s) of a particular genset family for two consecutive years immediately after obtaining type approval or immediately after obtaining COP certificate, the type approval certificate for that particular genset family becomes invalid. In case the manufacturer wants to manufacture or import genset model(s) of such particular genset family, then the manufacture shall approach Nodal Agency and technical agency to obtain a new Type Approval certificate afresh following stated procedure;

5.5.2 If there is no production or import of model(s) of a particular genset family for two consecutive years immediately after obtaining type approval and if the COP test is requested for the third year, then the supplier shall approach Nodal Agency to obtain approval for the extension of validity of

Type Approval. This is applicable only for a new manufacturer and in case no genset(s) sale has happened post type approval;

5.6 Exemption from COP

In the following cases, genset family(ies) shall be exempted from COP process.

- 5.6.1 If Type Approval obtained in the last quarter (Apr–Jun) of COP year. This clause is not applicable to the manufacturer as mentioned in clause 4.4.4.
- 5.6.2 In case of no production or import, the manufacturer shall submit a declaration to technical agency and Nodal Agency for 'No production or import' of a particular family models for every COP-year;
- 5.6.3 The COP test shall be conducted by technical agency for the next COP-year, upon receipt of declaration by the manufacturer that there was no production or import during current COP-year;
- 5.6.4 Declaration in this regard should be submitted before end of third quarter of the current COP-year; (i.e 31st March). In case, if produced after 31st March, COP is applicable.
- 5.6.5 Any genset manufactured for purpose of export outside India. COP exemption shall apply for such volumes and COP test exemption shall apply if all such genset(s) produced are exported;
- 5.6.6 Any domestically manufactured genset intended for the purpose of sample (Maximum number of 4 units per genset family) only and not for sale in India;
- 5.6.7 Any genset imported for the purpose of sample testing, bench making and not intended for any commercial sale (Maximum number of 4 units per year);
- 5.6.8 Any genset imported for the round robin or laboratory correlation tests. Such genset shall be exported back within 12 months from the date of import; or it should be scrapped and a scrap certificate shall be provided.
- 5.6.9 For obtaining exemptions regarding clauses 5.6.2, 5.6.6, 5.6.7 and 5.6.8, the manufacturer shall obtain written approval from Nodal Agency. Nodal agency should endeavor to respond within 4 week after the receipt of application.
- 5.6.10 COP exemption shall be maximum up to three consecutive COP year, to resume sell from fourth year a fresh type approval shall to be conducted.
- 5.6.11 After obtaining exemption as per 5.6.2, manufacturer shall first conduct COP before making any sell.

5.7 Production Definitely Discontinued

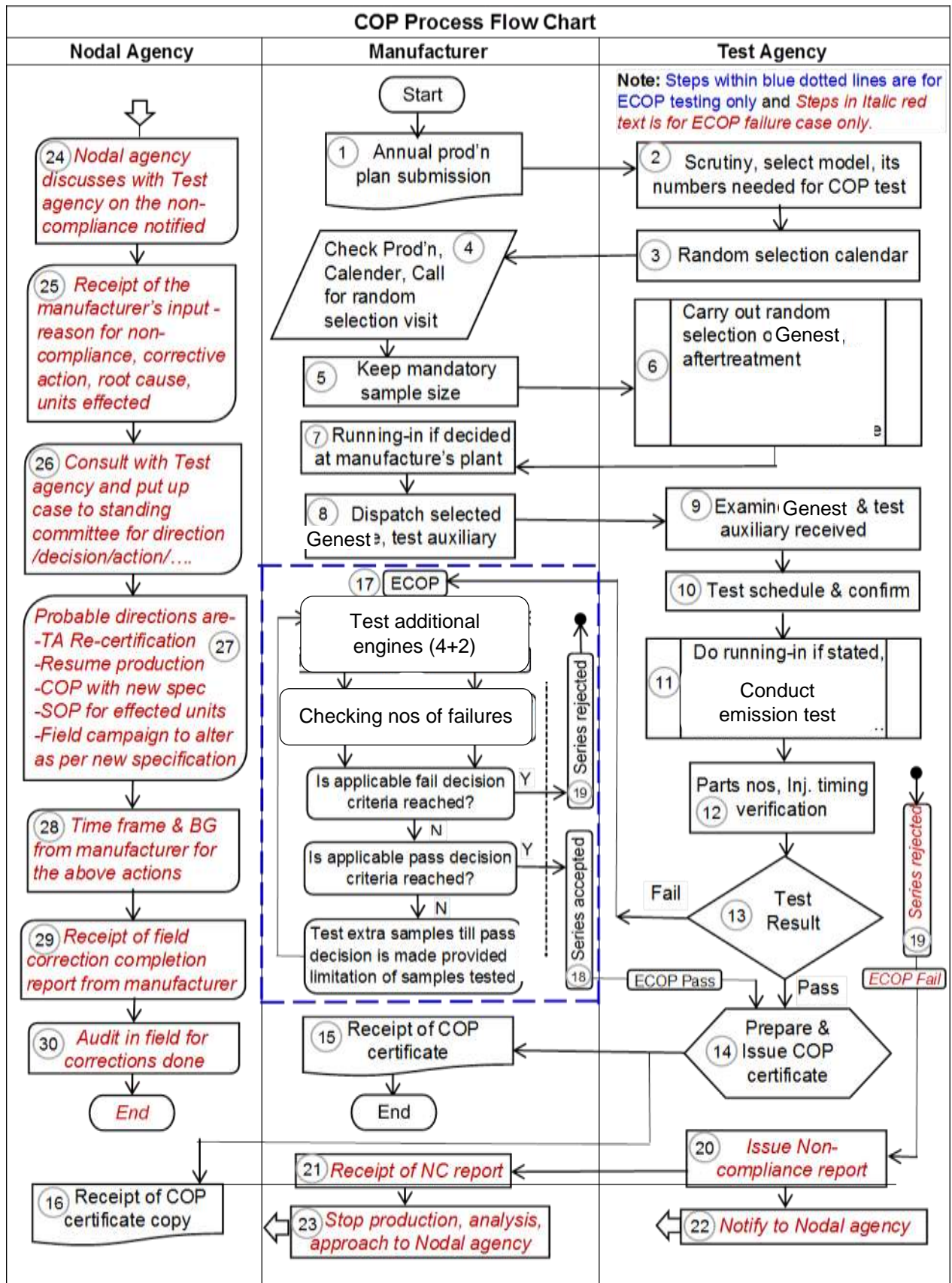
- 5.7.1 If manufacturer decides to discontinue production / withdraw type approval certificate of a specific genset family or multiple families from a specific plant or all plants, the manufacturer shall so inform to Test Agency involved in type approvals and COP compliance at least three month before the stoppage of production;
- 5.7.2 In such case, the manufacturer shall ensure COP compliance for the genset family(ies) from every manufacturing plant before the production of the genset family(ies) is discontinued following COP compliance process described in clauses 5 of this Regulation;
- 5.7.3 Upon receiving the relevant communication, the Test Agency shall inform the manufacturer the acceptance of the communication and provide an acceptance letter.

5.8 Consequences of non compliance

- 5.8.1 If the COP verification report of the technical agency for a model family indicates non-compliance, the manufacturer must stop manufacturing with immediate effect;

- 5.8.2 Further, the manufacturer must analyze the reasons for non-compliance, plan to take corrective actions in design, production line and units already produced and submit a report to the nodal agency with a copy to concern technical agency within four weeks of the receipt of the COP verification report;
- 5.8.3 If the manufacturer is unable to diagnose the reasons for non-compliance within stipulated time, this shall be clearly stated in the report;
- 5.8.4 Based on the diagnostics and corrective action plan submitted by the manufacturer, the Nodal Agency in consultation with technical agency and if both decide to, in consultation with standing committee, may take any of the following actions:
 - 5.8.4.1 Allow continuation of production or import of all models in the family if it is satisfied with the corrective actions planned or taken by the manufacturer and ability to meet emission norms;
 - 5.8.4.2 Allow continuation of production or import of some or all other models of the genset family if it determines that the reasons for non-conformance of the tested model are not relevant to these models; with or without additional verification of COP in due course;
 - 5.8.4.3 Stop production or import of some or all other models of the genset family till compliance is demonstrated by the supplier, through a re-verification of COP. In case of imported model(s), the non-compliant genset should be sent back to the original destination;
- 5.8.5 The manufacturer shall be given an opportunity to explain its views before taking final decision;
- 5.8.6 It is responsibility of the manufacturer to ensure at his cost that the modifications are carried out such as field retro fitment campaigns within period specified by the Nodal Agency on all products produced as well as sold / dispatched in the period between the dates from which the COP became due and re-verification of COP or as decided by the Nodal Agency, in consultation with standing committee;
- 5.8.7 Nodal Agency with help from Technical agency shall audits compliance in field on random basis for corrections done and issues closure letter to manufacturer
- 5.8.8 Further, to avoid such non-compliances again in future, additional precautionary measures shall be initiated to strengthen the process after re-certification & resuming the production with new modified spec;

5.9 COP Process Flow Chart



Following are the logical steps for the COP process flow chart described in brief stepwise-

COP cycle shall end with either -

- I. COP compliance with regular sample testing (Steps 1-16)
- II. COP compliance with extended samples testing (.... Steps 17-18)
- III. COP non-compliance after extended testing (.... Steps 19-30)

CASE I:

1. Manufacturer with valid Type Approval and COP certification submits annual estimated production/import volume data to technical agency involved in the format provided within two months of start of new COP-year.
2. Technical agency, based on the production/import volumes, communicates to manufacturer, the genset type chosen and the number of samples needed for COP compliance test for all genset families of that manufacturer within one month of submission of above production volume data;
3. Technical agency also communicates to the manufacturer plan for COP genset random selection based on manufacture's input above;
4. Manufacturer coordinates adhering to technical agency provided or negotiated plan and coordinates for genset random selection at manufacturing plants/warehouses/sales points for imported genset as the case may be.
5. At the point of selection as mentioned in Sr 4, manufacturer provides with minimum required sample size for random selection;
6. Technical agency representative carries out random selection and does note emission critical component part and serial numbers. Provides with appropriate seal for avoiding tampering of assembly parameters further;
Technical agency representative randomly selects after treatment system if applicable;
7. Decision, if running-in is carried out at manufacturer's location or technical agency location;
If running-in is agreed to be carried out at manufacture's facility, running-in shall be started in presence of technical agency representative.
8. Genset along with arranged after treatment shall be transported to technical agency test location;
9. Upon receipt of genset along with auxiliaries, technical agency examines the adaptability in test cell, make necessary modification in exhaust line, mounts, etc, if required.
10. Technical agency communicates the test schedule to manufacture for his witness
11. Technical agency carries out genset qualification and emissions test per applicable procedure and shares results with manufacturer;
12. Technical agency carries out critical component type/part numbers, injection timing verification and match with type approved document, in case any change noted, manufacturer to provide the declaration in this regard, till time COP certificate will be on hold.
13. Review of test result & decision on compliance;
14. If COP compliance is obtained, Technical agency prepared the compliance certificate within 4 weeks from the date of testing. Genset & after treatment, test auxiliary is returned to the manufacturer;
15. Technical agency issue compliance certificate to manufacturer
16. Technical agency forwards a copy of compliance certificate to Nodal agency

CASE II:

17. **ECOP:** If non-compliance observed after testing (at Stage No 13), process begins from extended random selection of genset(s) as per preferred options prescribed in clause 5.3.18.
 - 17.1 For establishing the compliance minimum 4 samples are mandatory to be tested and all 4 samples should pass.
 - 17.2 If some samples failed, the additional new more samples, are required to be tested, the numbers depend on the number of samples failed earlier,
 - 17.3 Initially test 2 more new gensets
 - 17.4 In the cumulative samples (4-originally tested + 2 new), note the numbers of failed samples
 - a) According to the appropriate clause does the number of failed samples agree with the criteria for failing the series
 - b) According to the appropriate clause does the number of failed samples agree with the criteria for passing the series
 - 17.5 If, answers of a & b are NO, then; continue the testing on additional samples till pass decision is made provided limitation of samples tested as applicable (30 numbers)
18. If during testing if the pass decision criteria is reached, the series is deemed to be compliance and COP certificate is issued (then continue from Stage14-16)

CASE III:

19. If during testing if the fail decision criteria is reached, the series is deemed to be non-compliance; Or if Manufacturer opts to declare non-compliance without availing total number of samples allowed to be tested, the series is deemed to be non-compliance
20. Technical agency prepares the COP failure report
21. Technical agency issue COP failure report to manufacturer
22. Technical agency informs nodal agency about COP non-compliance of said genset family
23. Manufacturer stops production or import of the said non-compliant genset family;
Manufacturer informs nodal agency about non-conformity, stoppage of production and dispatch and their plan for failure investigation within 4 weeks of receipt of COP verification report or COP failure intimation
24. Nodal agency discusses with test agency in details on the non-compliance notified.
25. Nodal agency replies to the manufacturer about their inputs on timelines by which compliance shall be obtained as well as failure root cause and corrective action plan submission. Nodal agency also informs about any financial penalty or assurance required from the manufacturer;
Manufacturer submits root cause analysis and corrective action plans to nodal agency in consultation with technical agency;
26. Nodal agency in consultation with technical agency reviews manufacture's submissions and decides if such case shall be put forth for standing committee review and guidance if found necessary depending upon the severity of the failure.
If decided to represent at standing committee, nodal agency brings this issue to standing committee and allows manufacture to represent their submissions. If standing committee agrees / approves manufacturer's submission and plan then;
27. Nodal Agency can also decide on their own & shall take following decision:
 - 27.1 Gives written permission to technical agency to proceed with re-verification of COP with improvements implemented by manufacturer and also type approval re-certification as the case may be.

- 27.2 Manufacturer offers genset sample and technical documentation to technical agency and complies with COP;
- 27.3 Technical agency issues compliance certificate or type approval certificate if newly approved as an option;
- 27.4 Manufacture begins production after obtaining new Type Approval or COP compliance certificate;
- 27.5 Manufacturer completes corrective actions on genset dispatched during period of COP and COP failure date;
- 28. Manufacturer complies with 'financial assurance related' documents asked by Nodal Agency;
- 29. Manufacturer submits corrective action / campaign report with adequate evidences to Nodal Agency
- 30. Nodal Agency with help from Technical agency audits compliance in field for corrections done and issues closure letter to manufacturer;

End

ANNEXURE – 1

Information document-Template for submission of portable genset technical specification

1.0	NAME & ADDRESS OF THE GENSET MANUFACTURER / IMPORTER – Type approval certificate holder.	
2.0	AUTHORISED CONTACT PERSON DETAILS- Name, Designation, Email, Contact number	
2.1	GENSET CATEGORY – Indigenous or Imported	
2.2	ADDRESS OF THE MANUFACTURING PLANT/S	
3.0	PRODUCT CATEGORY	
4.0	MODEL NAME / BRAND NAME	
5.0	GENSET CANOPY TYPE: HALF /FULL	
6.0	CLASS OF THE GENSET AS SPECIFIED IN THE REGULATION	
7.0	MODEL FAMILY DESIGNATION ASSIGNED TO THE MODEL	
8.0	GENSET OUTPUT SPECIFICATIONS	
8.1	No. of phases	
8.2	Rated voltage (V)	
8.3	Rated current (A)	
8.4	Rated frequency (Hz)	
8.5	Overall efficiency of the alternator % (Submit relevant document)	
8.6	Max. output declared by manufacturer with tolerance (VA)	
9.0	Alternator Make	
9.1	No. of Poles used	
10.0	PRODUCTION / IMPORT PLAN (SCHEDULE) AND ESTIMATED VOLUME PER ANNUM	
11.0	DESCRIPTION OF THE GENSET ENGINE	
11.1	Make	
11.2	Type	

11.3	Working principle, Four stroke / Two stroke	
11.4	Bore (mm)	
11.5	Stroke (mm)	
11.6	Number of cylinders	
11.7	Engine Displacement (cc)	
11.8	Compression ratio (with the tolerance)	
11.9	Max. power of the Engine (kW)@ rpm	
11.10	Drawings of combustion chamber and piston crown	
11.11	Minimum cross-sectional area of inlet and outlet ports (mm ²)	
12.0	COOLING SYSTEM	
12.1	Liquefied / air cooling Liquefied cooling: Max. temp. at Engine Outlet	
12.2	Engine Lub oil Temperature: Minimum: Maximum:	
12.3	Characteristics of air-cooling system	
12.4	Blower: Characteristics of make(s) and type (s)	
12.5	Air ducting (standard production)	
12.6	Temperature regulating system	
12.7	Intake system	
12.8	Intake manifold description	
12.9	Air filter: Make & Type	
12.10	Device for recycling crank-case gases: Description and diagrams	
13.0	ADDITIONAL ANTI-POLLUTION DEVICES	
13.1	Catalytic Converter	
	a) Make:	
	b) Type:	
	c) I.D:	
	d) Substrate Dimension:	
	e) Loading:	
	f) CPSI:	
13.2	Secondary air Injection system details	
	a) Make:	
	b) Type:	
	c) I.D:	

	c) Quantity of valve	
14.0	Fuel feed system	
	a) Make:	
	b) Type:	
	c) I.D:	
14.1	Carburetor Air screw settings (specify the tolerance)	
14.2	Jet size: a) Main Jet: b) Pilot jet:	
14.3	Carburetor Venturi Diameter (mm)	
14.4	Float-chamber level	
14.5	Mass of float in grams.	
14.6	Float needle	
14.7	Dimensions mixture duct	
14.8	Manual / automatic choke, closure setting	
14.9	Fuel Feed (By fuel injection/Carburation) including details of NG/LPG kit and Cylinder details to be specified: Gas Air mixer Make /Type: Gas Air mixer diameter: No. of holes: System description Working principle: intake manifold / direct injection / injection pre-chamber / swirl chamber	
14.10	Fuel Injection System:	
	a) Make	
	b) Type	
	c) I.D No.	
	d) Injection timing	
	e) Injection advance curve	
14.11	a) Injectors:	
	b) Make	
	c) Type	
	d) Opening pressure (specify tolerance)	
14.12	Governor /ECU/Controller	
	a) Make	
	b) Type, Mechanical /Electronic/Hydraulic	
	c) ID. No.	
	d) Max. speed without load / min	

	e) Idle speed	
14.13	Exhaust Gas Recirculation (EGR) System	
	a) Make	
	b) Type (Internal/External/cooled/uncooled/progressive OFF/Electrical/Vacuum based/Other) ON	
	c) ID No.	
14.14	Other Pollution Control Device	
	a) Make	
	b) Type (Give Complete Details of the system with necessary drawings)	
	c) ID No	
14.15	Cold start device	
	a) Make	
	b) Type	
	c) System description	
14.16	Starting aid	
	a) Make	
	b) Type	
	c) System description	
15.0	VALVE TIMING OR EQUIVALENT DATA	
	Maximum lift of inlet valve, (mm) Maximum lift of Exhaust Valve, (mm) Angles of Valves (w.r.t. top dead center) a) Inlet valve opening angle (IVO) b) Inlet Valve Closing angle (IVC) c) Exhaust valve opening angle (EVO) d) Exhaust valve Closing angle (EVC)	
16.0	Description of reed valves if any (with dimensional drawing)	
16.1	Description (with dimensional drawing) of inlet ports, scavenging and exhaust, with corresponding timing diagram	
17.0	IGNITION	
	a) Ignition system	
	b) Make	
	c) Type	
	d) Ignition timing (specify the tolerance)	

	e) Contact point gap and dwell-angle (specify the tolerance)	
	f) Spark plug – Make Type Gap setting Spark seat temperature at max. output	
18.0	EXHAUST SYSTEM	
	Description and diagrams	
	Specify the Back Pressure (kPa) at rated power	
19.0	SETTING AND LIMIT DECLARED BY THE MANUFACTURER	
	Lubricating Oil Temperatures Deg C Minimum / Maximum	
	Please specify if any	
	Please specify if any	
19.0	LUBRICATION SYSTEM	
	a) Description of systems	
	b) Position of lubricant reservoir	
	c) Feed system (pump, injection into intake, mixing with fuel, etc.)	
	d) Lubricating pump	
	e) Make	
	f) Type	
	g) Lub oil mixed with fuel	
	h) Oil Percentage in fuel	
	i) Lubricant Used	
	j) Make	
	k) Type	
20.0	ADDITIONAL INFORMATION ON TEST CONDITIONS	
	Please specify if any	
	Please specify if any	
21.0	Ignition coil	
	a) Make	
	b) Type	
22.0	Ignition condenser	
	a) Make	
	b) Type	
23.0	Radio interference suppression equipment	

	a) Make	
	b) Type	
24.0	Details of LPG / CNG Kit	
24.1	a) Kit Manufacturer Name	
	b) Kit Manufacturer Address	
24.2	Cylinders	
	a) No. Of Cylinders	
	b) Type of Cylinders	
	c) Cylinder Sr.No	
	d) Make	
	e) Water Capacity (litres)	
	f) Working Pressure (kg/cm ²)	
	g) Approval reference of DOE	
24.3	Multifunctional valve	
	a) Make	
	b) ID	
	c) Sr. No	
24.4	Fuel Line	
	a) High pressure pipe diameter (ID/OD)	
	b) Low pressure pipe diameter (ID/OD)	
24.5	Shut Off Valve (Solenoid Valves)	
	a) Make	
	b) Type	
	c) Operation Voltage	
24.6	Fuel selection switch	
	a) Make	
	b) Type	
24.7	Regulator	
	a) Make	
	b) Type	
24.9	Gas-Air Mixer/Injector	
	a) Make	
	b) Type	
25.0	Attachments to be Enclosed	
25.1	Combustion Chamber (Piston Crown) Drawing	

25.2	Valve Timing Diagram
25.3	Oxidation Catalyst Layout and drawing along with specifications
25.4	Air Intake system layout (from air-filter to intake manifold)
25.5	Exhaust system layout which includes catalyst position/location
25.6	Others. Please specify

Note:-

1. Strike out whichever is not applicable
2. In addition to the names of the manufacturers of items mentioned above, the manufacturers shall inform the test agency that carries out the type approval, the names of new alternate manufacturers for these items as and when they are being introduced.

Test Agency:	Manufacturer	Document No. (indicating also revision status)
Signature	Signature	
Name	Name	
Designation	Designation	Revision date
Date	Date	Sheet No.

ANNEXURE – 2

Specimen Copy for Type Approval and COP certificate

a) Type Approval Certificate Format

Type Approval Certificate No: _____

Date: dd-mm-yyyy

Cert	Rep.	Spec.	Drg.	Total

CERTIFICATE OF TYPE APPROVAL

for

COMPLIANCE TO MASS EMISSION NORMS FOR

**Gasoline or Dedicated NG or LPG or Bio-CNG or BI Fuel- Gasoline and NG/LPG/Bio-CNG fuel run
PORTABLE GENERATOR SETS**

1. In order to establish compliance to the provisions of **mass emission limits**, applicable as on date, documental verification /necessary testing was carried out on the following Portable **Generator set model(s)**, submitted by the manufacture/importer

Portable Generator Set Supplier: _____		Portable Generator Set Manufacturer: _____	Test Report Reference: _____	
Generator Set Model(s)/Brand Name		Type	Family	Category
Parent	Variants			

2. It is certified that the above mentioned Generator Set model(s) comply with the emission limits applicable for Gasoline, dedicated NG or LPG or Bio-CNG or BI fuel- gasoline and NG/LPG/Bio-CNG fuel run genset, as prescribed under the following rules notified by Ministry of Environment & Forest and Climate Change, Govt. of India:

Notification	Date	Rule.No	Description	Date Of Compliance of Emission Norms
G.S.R. 804(E)	GSR 804(E.) dated 3-Nov-2022	Rule ,1986, in schedule I, Serial number 88 and 95	Mass Emission Norms for Gasoline, Dedicated NG or LPG or Bio-CNG, BI fuel- Gasoline and NG/LPG/Bio-CNG fuel	

3. Validity of the Certificate:

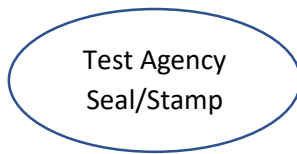
This Type Approval Certificate is valid till	1.Further amendment to notification No. GSR 804(E.) dated 3-Nov-2022
	2.No change in technical specification of the Generator Set specified
	3.Explicitly the Type Approval Certificate withdrawn by the Generator Set manufacturer/Supplier /Assembler/Importer

4. Conformity of Production (COP) requirements:

COP test shall be carried out once in a year (between the period 1st July of Calendar year to 30st June of succeeding calendar year

Note: Refer overleaf for disclaimer.

Authorized Signatory
(Head)
Certification Laboratory



Authorized Signatory
(Head)
Certification Body

Place of Issue: dd-mm-yyyy

b) COP Certificate Format

COP Certificate No. _____

Date: dd-mm-yyyy

Cert	Rep	Total

CERTIFICATE OF CONFORMITY OF PRODUCTION (COP) FOR THE YEAR yy-yy

For

COMPLIANCE TO MASS EMISSION NORMS FOR

**Gasoline or Dedicated NG or LPG or Bio-CNG or BI Fuel- Gasoline and NG/LPG/Bio-CNG fuel run
PORTABLE GENERATOR SETS**

Company Name: _____

1. Based on the verification of documents and trials conducted on portable genset model manufactured by and randomly selected from their (plant address___), It is certified that the portable genset model of families FXX complies with the provisions of Verification of the Conformity of Production (COP) as per para 5.0 of CPCB procedure (System & Procedure for Compliance to Emission Limits for Gasoline, dedicated NG or LPG or Bio-CNG, BI fuel- Gasoline and NG/LPG as per requirements of Rule 88 and 95 of Environment (Protection) Rule 1986, of GSR 804(E.) dated 3-Nov-2022 notified by Ministry of Environment, Forests and Climate Change Govt. of India.
2. This certificate covers the genset families and its models as listed in below table, declared by the manufacturer to have been produced / planned to be produced, during the stipulated period from 1st July to 30th June.

Sr. No.	Family	Model	Manufacturing Plant	Manufacturing Period	COP Year	Reference Type Approval Certificate No.

3. Validity of Certificate:

- a) This COP certificate is valid up to 30th Jun yyyy. Validity of this certificate is subjected to completion of next COP before 1st July yyyy for the production of portable genset model/s during the period 1st July to 30th Jun once.
- b) As confirmed by the manufacturer this COP certificate is issued for the planned production during the manufacturing period.

4. Disclaimer: Refer overleaf for disclaimer

Authorized Signatory
(Head)
Certification Laboratory



Authorized Signatory
(Head)
Certification Body

Enclosure: Test report No.: _____ **dated dd-mm-yyyy**

Place of Issue: dd-mm-yyyy

ANNEXURE – 3

Labelling Requirements

A3.1. The genset or the product must be affixed with a conformance label meeting the following requirements.

A3.1.1. General Requirement

- i. The label shall be durable and legible;
- j. The label shall be affixed on a part necessary for normal operation of the genset or the product and not normally requiring replacement during the life of the genset or the product;
- k. All the information mentioned in the conformance label must be in English language;

A3.1.2. Conformance Labelling Content Requirement

- q. Name of Genset manufacturer or product importer
- r. Manufacturing plant address from where Genset is manufacture
- s. Genset Model name;
- t. Rated maximum output of Genset in kVA
- u. Genset Unique Identification Number (Serial Number, etc.);
- v. Date of manufacturing and in case of import, date of import of Genset product; format in mm/yy shall be acceptable.
- w. Type Approval certificate number;
- x. Statement that 'this engine or product conforms to the Environment Protection Rule 1986;

Compliance name plate model

Manufacturer	<input type="text"/>		
Mfg. Plant	<input type="text"/>		
Genset Model	<input type="text"/>	Rated output (kVA)	<input type="text"/>
Genset Sr No	<input type="text"/>	Date of Mfg.	<input type="text"/>
Type Approval Cert. No.	<input type="text"/>		
This genset or product conforms to the Environment Protection Rule 1986			

ANNEXURE– 4

Test equipment, Test fuel, Test procedure & Test result calculation

1.0 Overview

The test facility to be used shall be of the certification agencies or any other facility approved by these certification agencies. The test Lab at Test Agency/ Engine Manufacturer Lab/ Third party Lab shall be accredited as per the requirement of ISO/IEC-17025 (NABL-National Accreditation Board for Testing and Calibration Laboratory) compliance for the related GSR/S&P/ISO-8178 Standards. The tests shall be carried out under the control of the certification agencies.

For portable genset, test shall be done on resistive load bank

2.0 Test Fuel

The reference fuel or commercially available fuel as prescribed by Govt. of India in CMVR document, Gasoline, or NG or LPG or Bio-CNG as applicable shall be used for testing. As per the choice of manufacturer, fuel spec reference or commercial may be used. As specified in this document no other fuel, other than stipulated by CPCB, shall be used to start and run the genset without consent from CPCB.

3.0 Test equipment

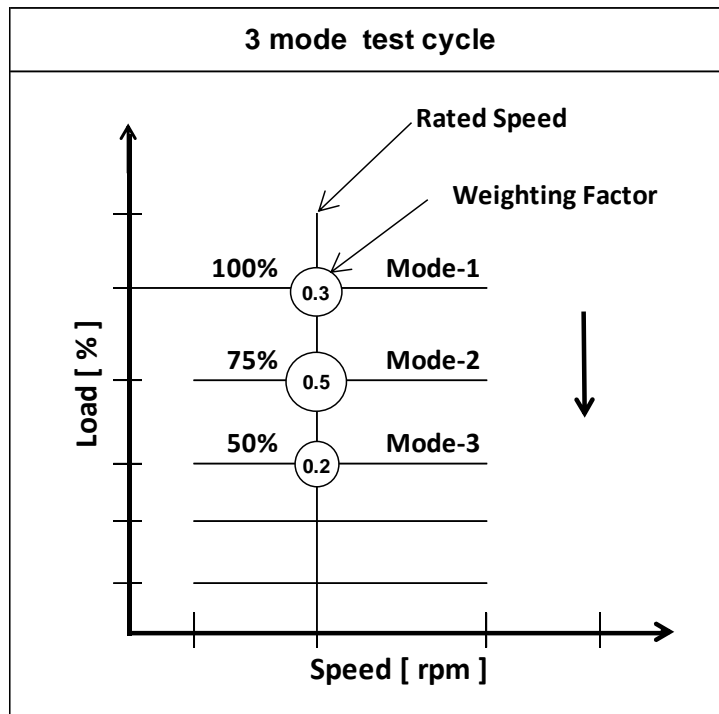
Test equipment & other relevant technical details to be used shall be as per following standards, except where it is mentioned, specifically, in this document.

ISO 8178 – 1 2017, 2020: Reciprocating internal combustion engines — Exhaust emission measurement — Part 1: Test-bed measurement systems of gaseous and particulate emission

4.0 Emission test cycle using resistive load bank

Emissions from the portable gensets powered by SI engine (up to 800 cc displacement) shall be tested using Resistive Load Bank as per following 3-mode test cycle. (Reference ISO 8178-Part-4)

Mode No.	Load current	Frequency	Weighting Factor
1	Maximum output declared by the manufacturer of the genset (tolerance $\pm 5\%$ for TA and $\pm 6\%$ for COP)	50 +1Hz	0.3
2	75% of Mode 1	50 +1Hz	0.5
3	50% of Mode 1	50 +1Hz	0.2



5.0 Specification of the equipment and set up

- a) The equipment and setup necessary for testing of exhaust emissions of genset as per method prescribed herein, consists of:
- b) Resistive load bank for electrical loading of the genset, equipped with voltmeter, ammeter, and frequency meter for measurement of the load.
- c) Exhaust gas analysers for measurement of molar concentrations of CO, CO₂, HC, NO_x and O₂.
- d) Arrangement for sampling raw or dilution (CVS) exhaust gases, their conditioning for and transfer to analysers.
- e) Apparatus for measurement of fuel consumption rate.
- f) Instruments for measurement of:
 - Ambient air pressure and humidity
 - Genset engine inlet air and other temperatures
 - Temperatures of exhaust sample
- g) Instrumentation and set up for measurement of genset engine inlet air flow rate
- h) Requirement of type, accuracy, calibration etc. of these equipment

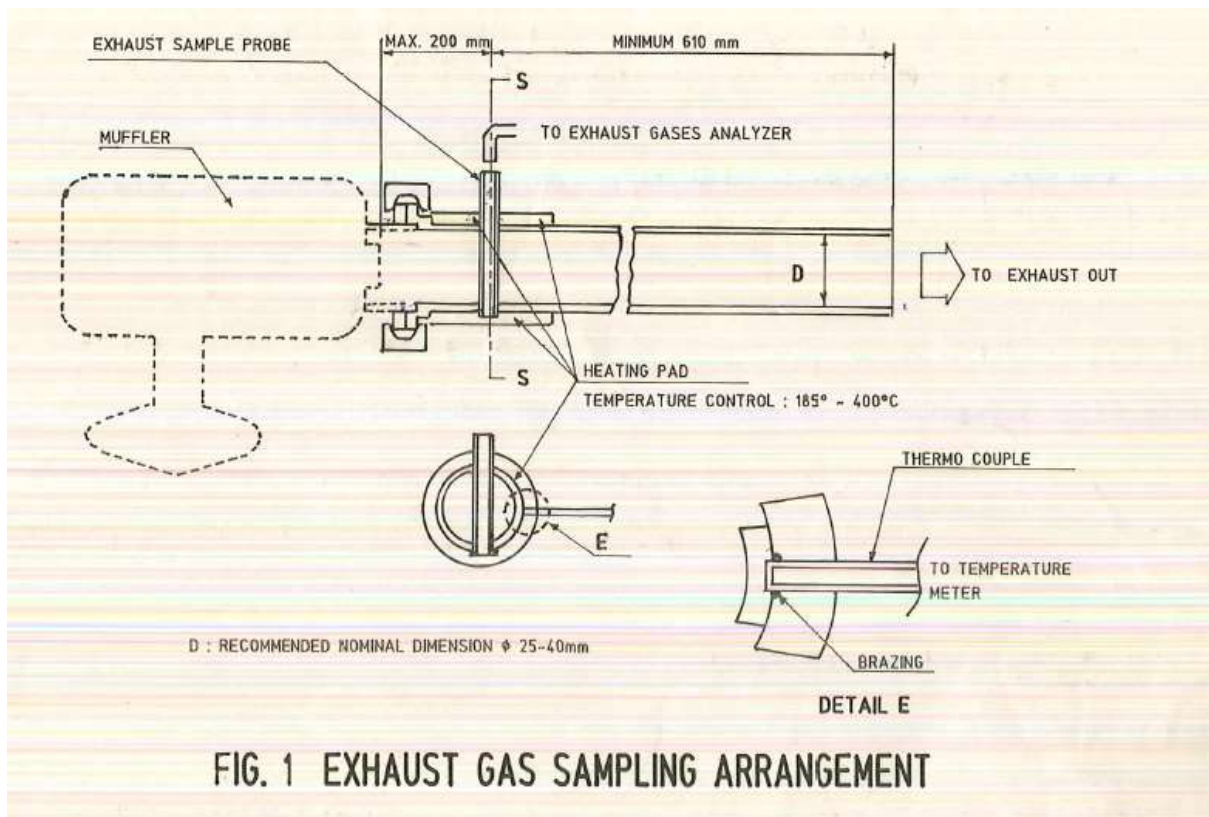
6.0 Resistive Load Bank

- a) The load bank shall be a single phase (for single phase Gensets only) or 3 phase load circuit, with each phase consisting of:
 - A combination of stable resistive elements of appropriate rating, wired such that the total load current is adjustable to any value up to 125% of max. full throttle current per phase of the genset under test with accuracy of ± 0.1 Amp.
 - i. The resistive elements shall be capable of withstanding continuous energisation at 150% of the rated voltage of the genset without overheating.
 - ii. The ratings of other circuit elements such as switches, cords etc., shall be consistent with the highest current / voltage to which they may be subjected to in actual operation.
 - A voltmeter, frequency meter and ammeter for measuring the output voltage and frequency of the genset and the total load current respectively.

- i. Voltmeter and ammeter shall be AC RMS meters, direct acting analogue/ digital type conforming to IS 1248 (part 2), accuracy class 0.5. The range and rating shall be appropriate for the genset output to be measured.
 - ii. Frequency meter shall be direct acting analogue (pointer)/ digital type conforming to IS 1248 (part 4), accuracy class 1. The range of frequency meter shall be 45 - 65 Hz.
 - iii. The meters should be calibrated once in a year. The calibration must be traceable to within the specified accuracy with respect to NPL/International standard.
- b) The entire circuit shall be housed in a suitable enclosure for safety and convenience of operation. The configuration shall ensure that under normal conditions:
- i. Accidental touches to live/ hot parts are not possible.
 - ii. There shall be no possibility of short-circuiting. The insulation resistance between each independent conducting path and between conducting path and body of the enclosure shall be $10 \mu\Omega$ min. Further, the insulation system shall withstand 1500 V AC for 1 minute without breakdown and shall be consistent with the maximum temperature to which it may be subjected in operation.
 - iii. The resistive elements and the enclosure do not overheat. If necessary, a cooling fan of adequate capacity shall be provided.

7.0 The Exhaust sampling setup

The Exhaust sampling arrangement shall consist of an extension pipe fitted with an exhaust sample probe connected with the outlet of the normal exhaust system supplied with the product (genset) has shown in fig. 1 & fig.2



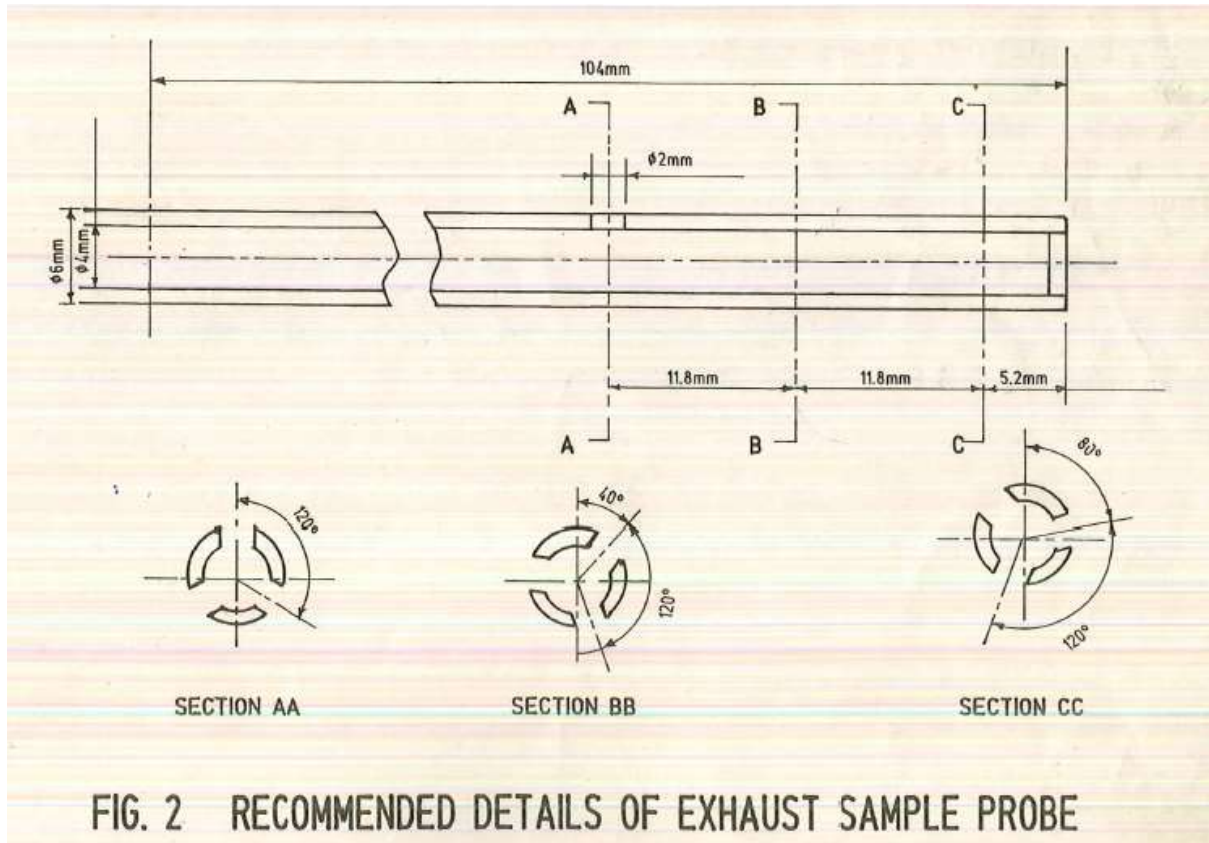


FIG. 2 RECOMMENDED DETAILS OF EXHAUST SAMPLE PROBE

8.0 Test condition

- i. The ambient temperature throughout the test shall be within 10 to 40 deg C.
- ii. The absolute ambient temperature (designated as T & expressed in Kelvin) and dry atmospheric pressure (designated as Ps & expressed in kPa) must meet the following condition for a test to be valid.

$$1. \quad 0.93 \leq Fa = (99/Ps) \times (T / 298)^{0.7} \leq 1.07$$

(Reference for the test condition taken form ISO-8178 and IS-14599)

9.0 Power Correction Factor

The power correction factor is the coefficient by which the measured power must be multiplied to determine the engine power under the reference atmospheric conditions specified as below

$$P_{\text{corr}} = \alpha \times P_{\text{obs}}$$

Where,

P_{corr} is the corrected power (i.e., power under reference atmospheric conditions)

α is the correction factor

P_{obs} is the measured (observed) power (test power)

Reference atmospheric conditions:

Temperature (T): 298K, Dry pressure (Pso): 99kPa

Note: The dry pressure is based on a total pressure of 100 kPa and water Vapour pressure of 1kPa.

Test atmospheric conditions:

The atmospheric conditions during the test shall be the following

Temperature (T): Between 283 K and 313 Pressure (P): Between 80 kPa and 110 kPa

Determination of correction factor:

(The tests may be carried out in air -conditioned tests rooms where the atmospheric conditions may be controlled)

The power correction factor α for Positive Ignition Engines (Naturally aspirated or supercharged) obtained by applying the formula:

The correction Factor (α) is obtained by applying the formula:

$$\alpha = (99 / P_s)^{1.2} \times (T/298)^{0.6}$$

Where,

P_s = the dry atmospheric pressure in kPa, that is the total barometric pressure minus water vapour pressure

T= the absolute temperature in Kelvin (K) at the engine air inlet

The formula applies to carburetted engines and to other engines where the management system is designed to maintain relatively constant fuel / air ratio as ambient conditions change.

(The references for Power correction factor are taken from IS-14599)

10.0 Declared rated corrected Power

The gross declared corrected power of the engine shall be measured at rated speed/frequency of the genset. The measured power and speed may differ from the power and speed declared by the manufacturer as specified below.

a) For Type Approval:

- $\pm 5\%$ at the rated power point

b) For Conformity of Production:

- $\pm 6\%$ of the type approved figure

Declared rated speed/ frequency at rated power point shall vary within $\pm 2\%$

11.0 Test Procedure

➤ **Preparations and Pre-Checks**

- a) Check and confirm that the equipment and test setup confirm to the specifications
- b) Carry out the pre-test calibration and other checks as specified
- c) Install thermocouples or other suitable temperature measuring devices to monitor the temperatures, which constitute criteria of thermal stability as specified by the manufacturer.
- d) Subject the Genset to running in, as per the manufacturer's recommendation, to stabilize its emission characteristics. During and after running-in normal maintenance, as specified by the manufacturer, shall be carried out.
- e) Run the Genset at mode 1 of test cycle as specified and note the corresponding maximum output and fuel consumption. Repeat the check after installation of exhaust sampling set up. If the drop in maximum output or increase in fuel consumption rate, due to installation of exhaust sampling system is greater than 5%, modify the exhaust sampling arrangement keeping in mind the essential requirements specified.

➤ **Emission test**

- a) Run the genset and adjust the load, engine speed and throttle as per mode 1 of test cycle specified in Annexure 4. Run the genset for a sufficient period of time to achieve thermal stability

- (Engine temperature to remain within a band of 10 deg C for 10 minutes). Genset shall be warm up/run as per manufacturer's recommendation to achieve thermal stability,
- b) After achieving thermal stability, initiate the measurement of fuel consumption rate, air flow rate (optional) and emissions:
 - A minimum of 3 readings of fuel consumption rate shall be taken and the duration of each measurement must be minimum 30 seconds. Average of the 3 readings shall be reported.
 - Emission values of each specie shall be monitored / recorded for a continuous period of 2 minutes. Average value of the period shall be reported.
 - Record the appropriate load data
 - c) Repeat a to b for modes 2 & 3 respectively
 - d) The following guidelines must be strictly observed during the testing:
 - Modes shall be performed in the numerical order specified in the test cycle (Annexure 4)
 - In case of doubt in any mode, may be repeated before switching over to the next mode.
 - The load and the engine speed must be maintained as per the test cycle during the period of measurement of emissions, fuel consumption and load. If this requirement is not met, the mode is void and must be completely repeated.
 - If a delay of more than one hour occurs between the end of one mode and the beginning of another mode, the test is void and must be completely repeated.
 - If at any time, during a mode the test equipment malfunctions or the specifications cannot be met, the test is void and must be aborted. Corrective action should be taken and the test restarted.

12.0 Determination of cycle weighted average specific emissions - g/kWh

a) Calculation of emission mass flow rate g/hr

Mass emission rate g/hr shall be calculated as per procedure given in ISO-8178-1 & 4. Caron balance method may be used in case air-flow meter not used considering the availability, simplicity and difficulties for accurate air flow measurement for such small capacity engines. Appropriate dry-wet correction factor & humidity correction factor shall be applied as per formula given in ISO ISO-8178-1 & 4.

b) Calculation of engine power generated during each mode

$$Pi = \frac{V \times A}{1000} \times \eta$$

Where,

Pi – Power in-kW

V -Genset output voltage in volts

A- Load Current in Amps

η - Alternator efficiency, as declared by the supplier

c) Cycle weighted average specific emissions- g/kWh

The specific emissions e_{gas} [g/kWh] are calculated as follows:

$$e_{\text{gas}} = \frac{\sum_{i=1}^{n_{\text{mode}}} (\dot{m}_{\text{gas}i} \times f_{\text{WF}i})}{\sum_{i=1}^{n_{\text{mode}}} (P_i \times f_{\text{WF}i})}$$

where

$\dot{m}_{\text{gas}i}$ is mean emission mass flow rate for the mode i [g/h];

P_i is engine power for the mode i [kW] with P_i

$f_{\text{WF}i}$ is weighting factor for the mode i [-].

13.0 Remark

All other specifications shall also be subject to review as and when necessary based on the experience gained in implementation of emission testing as prescribed in this document.

ANNEXURE – 5

Additional requirement for emission control strategy

Portable genset which rely on the use any external devices, use of regent, or exhaust after treatment devise to reduce emissions, shall ensure the correct operation of emission control measures. In this regard as of now no such emission strategy data is available for the positive ignition portable genset engine category (below 19 kW & upto 800cc engine displacement). However, in future when ample data is available on emission control strategy, the emission control measures requirement will be laid down accordingly.

ANNEXURE – 6

Technical characteristics of fuels prescribed for approval tests and to verify conformity of production tests

The commercially available fuel as prescribed by Govt. of India in CMVR document, Gasoline or NG or Bio-CNG and LPG as applicable shall be used for testing. As specified in this document no other fuel, other than stipulated by CPCB, shall be used to start and run the genset without consent from CPCB. As per the choice of manufacturer, fuel spec reference or commercial may be used.

Following are the fuel specification form CMVR BSVI document

1) Gasoline fuel specification

Specification of Commercial Gasoline Fuel

Characteristics	Unit	Requirements	
		Regular	Premium
Color, visual		Orange	Red
Density @ 15 ⁰ C	Kg/m ³	720-775	720-775
Distillation :			
a) Recovery up to 70 ⁰ C (E 70)	% volume	10-55 (summer) 10-58 (other month)	10-55 (summer) 10-58 (other month)
b) Recovery up to 100 ⁰ C (E 100)	% volume	40-70	40-70
c) Recovery up to 150 ⁰ C (E 150)	% volume	75 min	75 min
d) Final Boiling Point (FBP), max	⁰ C	210	210
e) Residue, max	% volume	2	2
Research Octane Number (RON) min		91	95
Motor Octane Number (MON), min		81	85
Gum content (solvent washed), max	mg/100ml	4	4
Oxidation Stability, min	minutes	360	360
Sulphur, total, max	mg/kg	10	10
Lead content (as Pb), max	g/l	0.005	0.005
Reid Vapour Pressure (RVP) @ 38 ⁰ C, max	kPa	67	67
Vapour Lock Index (VLI)			
a) Summer, max		1050	1050
b) Other months, max		1100	1100
Benzene Content, max	% volume	1	1
Copper strip corrosion for 3 hrs @ 50 ⁰ C, max	rating	Class 1	Class 1
Olefin content, max	% volume	21	18
Aromatics content, max	% volume	35	35
Oxygen content, max	% mass	3.7	4.5
Oxygenates Content			
a) Methanol, max	% volume	3	3
b) Ethanol, max	% volume	10	10
c) Iso-propyl alcohol, max	% volume	10	10
d) Iso-Butyl alcohol, max	% volume	10	10
e) Tertiary-butyl alcohol, max	% volume	7	7
f) Ethers containing 5 or more carbon atoms per molecule, max	% volume	15	15
g) Other oxygenates, max	% volume	8	8
Note:			
<ol style="list-style-type: none"> 1. Test methods and other provisions and details along with the requirements as given above shall be issued by Bureau of Indian Standards. 2. The Aromatics content, (max) shall be permitted up to 40% in North Eastern States till 01.04.2023 			

Technical specification for Reference fuel E-5

Parameter	Unit	Limits ¹		Test method
		Minimum	Maximum	
Research octane number, RON		95.0	-	EN25164/prENISO5164
Motor octane number, MON		85.0	-	EN25163/prENISO5163
Density at 15°C	kg/m ³	743	756	ENISO 3675/ENISO12185
Vapour pressure	kPa	56.0	60.0	ENISO 13016-1(DVPE)
Water content	%v/v		0.015	ASTME 1064
Distillation:				
–Evaporated at70°C	%v/v	24.0	44.0	ENISO3405
–Evaporated at100°C	%v/v	48.0	60.0	ENISO 3405
–Evaporated at150°C	%v/v	82.0	90.0	ENISO 3405
–Final boiling point	°C	190	210	ENISO 3405
Residue	%v/v	—	2.0	ENISO 3405
Hydro-carbon analysis:				
–Olefins	%v/v	3.0	13.0	ASTMD1319
–Aromatics	%v/v	29.0	35.0	ASTMD1319
–Benzene	%v/v	-	1.0	EN12177
–Saturates	%v/v	Report		ASTM1319
Carbon/hydrogen ratio		Report		
Carbon/oxygen ratio		Report		
Induction period ²	minutes	480	-	ENISO 7536
Oxygen content ⁴	%m/m	Report		EN1601
Existent gum	mg/ml	-	0.04	ENISO 6246
Sulphur content ³	mg/kg	-	10	ENISO 20846/ENISO20884
Copper corrosion		-	Class 1	ENISO 2160
Lead content	mg/l	-	5	EN237
Phosphorus content	mg/l	-	1.3	ASTMD3231
Ethanol ⁵	%v/v	4.7	5.3	EN1601/EN 13132

¹ The values quoted in the specifications are "truevalues". For establishing the limit values, the terms of ISO4259:2006 (Petroleum products— Determination and application of precision data in relation to methods of test) have been applied and for fixing a minimum value, a minimum difference of 2 R above zero has been taken into account; for fixing a maximum and minimum value, the minimum difference is 4R (R=reproducibility).

Notwithstanding this measure, which is necessary for technical reasons, the fuel manufacturer shall nevertheless aim at a zero value where the stipulated maximum value is 2R and at the mean value when quoting maximum and minimum limits. Should it be necessary to clarify whether a fuel meets the requirements of the specifications, the terms of ISO4259:2006 shall be applied.

- ²The fuel may contain oxidation inhibitors and metal deactivators normally used to stabilize refinery petrol streams, but detergent/dispersive additives and solvent oils shall not be added.
- ³The actual sulphur content of the fuel used for the type I test shall be reported.
- ⁴Ethanol meeting the specification of prEN15376 is the only oxygenate that shall be intentionally added to the reference fuel.
- ⁵There shall be no intentional addition to this reference fuel of compounds containing phosphorus, iron, manganese or lead.

2) Alternate Fuel specification: Natural Gas/Bio-CNG, LPG

2.1 Liquefied Petroleum Gas

LPG				
<i>Parameter</i>	<i>Unit</i>	<i>Fuel A</i>	<i>Fuel B</i>	<i>Test method</i>
Composition:				EN 27941
C ₃ -content	per cent v/v	30 ± 2	85 ± 2	
C ₄ -content	per cent v/v	Balance ¹	Balance ¹	
< C ₃ , > C ₄	per cent v/v	Maximum 2	Maximum 2	
Olefins	per cent v/v	Maximum 12	Maximum 15	
Evaporation residue	mg/kg	Maximum 50	Maximum 50	EN 15470
Water at 0 °C		Free	Free	EN 15469
Total sulphur content including odorant	mg/kg	Maximum 10	Maximum 10	EN 24260, ASTM D 3246, ASTM 6667
Hydrogen sulphide		None	None	EN ISO 8819
Copper corrosion strip (1h at 40 °C)	Rating	Class 1	Class 1	ISO 6251 ²
Odour		Characteristic	Characteristic	
Motor octane number ³		Minimum 89.0	Minimum 89.0	EN 589 Annex B
Notes:				
¹ Balance shall be read as follows: balance = 100 - C ₃ - <C ₃ - >C ₄ .				
² This method may not accurately determine the presence of corrosive materials if the sample contains corrosion inhibitors or other chemicals which diminish the corrosivity of the sample to the copper strip. Therefore, the addition of such compounds for the sole purpose of biasing the test method is prohibited.				
³ At the request of the engine manufacturer, a higher MON could be used to perform the type approval tests.				

2.2. Type: Natural Gas/ Bio-methane

2.2.1. Specification for reference fuels supplied with fixed properties (eg from a sealed container)

As an alternative to the reference fuels set out in this paragraph, the equivalent fuels in paragraph 2.1.2. of this Annex may be used

Natural Gas/ Bio-methane					
Characteristics	Units	Basis	Limits		Test method
			minimum	maximum	
Reference fuel G_R					
Composition:					
Methane		87	84	89	
Ethane		13	11	15	
Balance ¹	per cent mole	—	—	1	ISO 6974
Sulphur content	mg/m ^{3 2}	—		10	ISO 6326-5
Notes: ¹ Inerts + C ₂₊ ² Value to be determined at standard conditions 293.2 K (20 °C) and 101.3 kPa.					
Reference fuel G₂₃					
Composition:					
Methane		92.5	91.5	93.5	
Balance ¹	per cent mole	—	—	1	ISO 6974
N ₂	per cent mole	7.5	6.5	8.5	
Sulphur content	mg/m ^{3 2}	—	—	10	ISO 6326-5
Notes: ¹ Inerts (different from N ₂) + C ₂₊ C ₂₊ ² Value to be determined at 293.2 K (20 °C) and 101.3 kPa.					
Reference fuel G₂₅					
Composition:					
Methane	per cent mole	86	84	88	
Balance ¹	per cent mole	—	—	1	ISO 6974
N ₂	per cent mole	14	12	16	
Sulphur content	mg/m ^{3 2}	—	—	10	ISO 6326-5
Notes: ¹ Inerts (different from N ₂) + C ₂₊ C ₂₊ ² Value to be determined at 293.2 K (20 °C) and 101.3 kPa.					
Reference fuel G₂₀					

Composition:					
Methane	per cent mole	100	99	100	ISO 6974
Balance ⁽¹⁾	per cent mole	—	—	1	ISO 6974
N ₂	per cent mole				ISO 6974
Sulphur content	mg/m ³ ⁽²⁾	—	—	10	ISO 6326-5
Wobbe Index (net)	MJ/m ³ ⁽³⁾	48.2	47.2	49.2	
<p>⁽¹⁾ Inerts (different from N₂) + C₂ + C₂+</p> <p>⁽²⁾ Value to be determined at 293.2 K (20 °C) and 101.3 kPa.</p> <p>⁽³⁾ Value to be determined at 273.2 K (0 °C) and 101.3 kPa.</p> <p>Note – In absence of availability of reference fuel for testing, commercial available fuel as notified under CMVR shall be used for testing</p>					

2.2.2. Specification for reference fuel supplied from a pipeline with admixture of other gases with gas properties determined by on-site measurement

As an alternative to the reference fuels in this paragraph the equivalent reference fuels in paragraph 2.2.1. of this Annex may be used.

2.2.2.1. The basis of each pipeline reference fuel (GR, G20, ...) shall be gas drawn from a utility gas distribution network, blended, where necessary to meet the corresponding lambda-shift (S_λ) specification in Table A.5-1, with an admixture of one or more of the following commercially (the use of calibration gas for this purpose shall not be required) available gases:

- (a) Carbon dioxide;
- (b) Ethane;
- (c) Methane;
- (d) Nitrogen;
- (e) Propane.

2.2.2.2. The value of S_λ of the resulting blend of pipeline gas and admixture gas shall be within the range specified in Table A.5-1 for the specified reference fuel.

Table A.5-1
Required range of S_λ for each reference fuel

Reference fuel	Minimum S _λ	Maximum S _λ
G _R ²	0.87	0.95
G ₂₀	0.97	1.03
G ₂₃	1.05	1.10
G ₂₅	1.12	1.20

¹ The engine shall not be required to be tested on a gas blend with a Methane Number (MN) less than 70. In the case that the required range of S_λ for G_R would result in an MN less than 70 the value of S_λ for G_R may be adjusted as necessary until a value of MN no less than 70 is attained.

2.2.2.3. The engine test report for each test run shall include the following:

- (a) The admixture gas(es) chosen from the list in paragraph 2.2.2.1. of this Annex;
- (b) The value of S_λ for the resulting fuel blend;
- (c) The Methane Number (MN) of the resulting fuel blend.

ANNEXURE – 7

Compliance to Safety code of practice for alternate fuel generator sets

All Genset run on dedicated Natural Gas (NG) or Liquid Petroleum Gas (LPG), Gasoline and Natural Gas (NG) or Gasoline and Liquid Petroleum Gas (LPG), shall meet Safety requirements prescribed in the SAFETY CODE PRACTICE published by CPCB (Refer PART A4 of this regulation)

ANNEXURE – 8

Additional requirement for variable speed portable generator sets

As of now, no such related data is available for variable speed portable generator sets, hence additional requirement for variable speed portable generator will be formulated in future when ample data is available.

****END****