

Type Approval Certificate No ARAI/MoEF/DGTA/IMP/SKL-F9/2019-03

Date: 22nd November 2019

**CERTIFICATE
OF
TYPE APPROVAL**
FOR
**COMPLIANCE TO MASS EMISSION & SMOKE NORMS
FOR GENSET DIESEL ENGINE (up to 800 kW)**

Cert	Rep	Spec	Drg	Total
1	2	6	4	13 Pgs

1. In order to establish compliance to the provisions of mass emission and smoke limits, applicable as on date, documental verification/ necessary testing was carried out on the following parent engine model(s), submitted by the manufacturer / supplier referred below:

Engine Importer (Type Approval Certificate Owner)		Engine Manufacturer		Test Report Reference	
M/s. SKL (INDIA) PVT. LTD. C 2117, Oberoi Garden Estate, Chandivali, Andheri East, Mumbai - 400072		M/s. Motorenfabrik HATZ GmbH & Co KG 94099 Ruhstorf, Germany		PTE/DGTA/IMP/SKL-F9/2019/04 dt. 8 th November 2019	
		Engine Manufacturing Plant			
		M/s. Motorenfabrik HATZ GmbH & Co KG 94099 Ruhstorf, Germany			
Engine Model/s		Family	Gross Engine Power	Compliance of Norms w.e.f.	
Parent	1B40	F9	6.1 kW @ 3000 rpm	1 st July 2014	

2. It is certified that the above mentioned engine models comply with the emission limits applicable for Genset Diesel Engines (upto 800 kW), as prescribed under the following Rules, notified by Ministry of Environment & Forests, Govt. of India :

Rule No.	Description	Notification	Date
95	Emission limits for new diesel engine up to 800 kW for generator set (Genset) application.-	GSR 771(E)	11 th December 2013
		GSR 232(E)	31 st March 2014

3. Validity of the Certificate :

This Type Approval Certificate is Valid till	1. The validity of existing emission norms under Notification No. GSR 771(E) dt. 11 th December 2013 & GSR 232(E) dt. 31 st March 2014 or until further amendment in the MoEF rule, whichever is earlier.
	2. No change in technical specification of the engine specified
	3. Explicitly the Type Approval Certificate withdrawn by the engine supplier
	4. Till CoP is not missed

4. Conformity of Production (CoP) requirements:

1. COP test shall be carried out every year (between the period 1 st July and 30 th June) as per "System & Procedure for Compliance to emission limits for diesel engines" or further amended in the notification
2. As the above-mentioned engine models comply with the mass emission and smoke limits effective from 1 st July 2014, COP compliance shall be verified against these limits

Note : Refer overleaf for disclaimer.

AUTHORISED SIGNATORY




A. A. BADUSHA
SR. DEPUTY DIRECTOR & HEAD
HOMOLOGATION MANAGEMENT, REGULATION &
VEHICLE EVALUATION, ARAI, PUNE.

Place of Issue : Pune



AUTHORISED SIGNATORY



A. V. MANNIKAR
SR. DEPUTY DIRECTOR,
ARAI, PUNE.

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(APX /21426)

TYPE APPROVAL EMISSION TEST REPORT

ANNEXURE TO TYPE APPROVAL CERTIFICATE NO -		ARAI/MoEF/DGTA/IMP/SKL-F9/2019-03						
Objective of the Test		Type Approval Test -						
		Mass emission & smoke test on Genset Diesel Engine as per GSR 771(E) dated 11.12.2013 & GSR 232 (E) dated 31.03.2014						
Report No.	PTE/DGTA/IMP/SKL-F9/2019/04	Report Date	08-Nov-19	Date of Test	20-May-19			
Ref. Apex No & date	APX/19-20/21426 Dt.23.04.2019			Test Site	HATZ, GERMANY TC-13			
Engine Importer	M/s. SKL (India) Private Limited, C 2117, Oberoi Garden Estate, Chandivali, Andheri East, Mumbai-400 072							
Engine Manufacturer	M/s. Motorenfabrik HATZ GmbH & Co KG, 94099 Ruhstorf, Germany							
Manufacturing Plant	M/s. Motorenfabrik HATZ GmbH & Co KG, 94099 Ruhstorf, Germany							
Engine Model Tested	1B40	Engine Sr. No.	1101814049102	Family	F9	Parent	1B40	6.1 kW
						Variant/s	-	-
Brief Specification of Parent Engine "1B40"								
DI / IDI	DI	NA / TC / TC-IC	NA	WC / AC	AC			
INLINE / V	INLINE	No. of Valves/Cyl	2	Compression Ratio	21.4. ± 0.5			
Bore x Stroke	88 X 76 mm	No. of Cylinders	1	Swept Volume	0.462 ltr			
Rated Speed	3000 rpm	Rated Power	6.1 kW	Static Injection Timing	11.5 ± 1			
F.I.P.	Make	Bosch	Type	F725	Sr. No.	***		
Injector	Make	New Diesel	Type	Multihole	Type No.	Holder No.: NKLL49M16010 Nozzle No.: 40137 (Stanadyne)		
Catalyst	Make	Emitec	Type	Metallic, Inbuild in Silencer ID/No. 0250 4200 (Silencer with DOC)	Sr. No.	***		
Test Procedure Reference	<p>"System & Procedure for Compliance to Emission Limits for New Diesel Engines (up to 800 kW) for Genset Application" published by CPCB</p> <p>a) Measurement of CO, HC, NOx & PM as per D2-5 Mode Cycle of ISO-8178 (Part 1), 2006</p> <p>b) Measurement of exhaust gas smoke (m⁻¹) as per ISO-8178 (Part 3), 1994</p> <p>c) Test diesel fuel as per the specifications given in GSR 771 (E) dated 11.12.2013</p> <p>Note: Any amendment in existing test procedure may call for retesting, if necessary.</p>							
Test Equipment Used		Make	Model					
Dynamometer		SIEMENS, GERMANY	TRANSIENT;SIMOVERT 1PH7137-2HF03-0CJ3					
Exhaust gas analysis system		HORIBA	MEXA-7100 DEGR					
Particulate measurement system		NOVA	NOVA; MICROTROL 6					
Air flow meter		ABB	SENSY FLOW DN40;7962635					
Fuel consumption meter		AVL	FUEL EXACT;PLU 300 FF					
Smokemeter		AVL	439					
Intake air conditioning system		***	***					
Weighing micro balance		SARTORIUS	SE2-F					
Summary of Test Results : Engine Model "1B40"								
Corr. Power	6.0 kW @ 3000 rpm		Obs. Inj. Timing	12° BTDC				
Emissions	NOx + HC	CO	PM	Max. Smoke				
	(g/kW-hr)			(m ⁻¹)				
Test Results	6.30	0.94	0.186	0.07				
Limits (01.07.2014) : upto 19 kW	7.5	3.5	0.3	0.7				
Conclusion	Mass emission and smoke values are within the specified limits in force from 01.07.2014 (Power range upto 19 kW) as per GSR 771(E), dated 11 th December 2013 & GSR 232 (E), dated 31 st March 2014 issued by Ministry of Environment & Forests (MoEF), Govt. of India.							
B. H. MELAGE (MANAGER)		S. K. JAIN (MANAGER)		Dr. P. G. BHAT (GM)		N. V. MARATHE (SR.DD)		
Enclosure	1) Annexure I - Test Result Reference Sheet No. : DGT-SKL.04							

ANNEXURE - I
MISSION PERFORMANCE RESULTS
THE AUTOMOTIVE RESEARCH ASSOCIATION OF INDIA, PUNE

POWERTRAIN ENGINEERING, ARAI, PUNE

ANNEXURE TO REPORT NO: PTE/DGT/IMP/ISKL-F9/2019/04

Dated : 8-Nov-2019

REF. SHEET NO : DGT-SKL.04

DATE :	20-05-2019	TEST SITE :	HATZ,GERMANY/TEST CELL NO. 13	TEST STANDARD :	ISO-8178	TEST NO. :	13
ENGINE MANUFACTURER	Motorenfabrik HATZ GmbH & Co KG	BORE x STROKE (mm)	88	76	DYNAMOMETER	SIMENS,GERMANY;TRANSIENT;SIMOVERT-1PH7137-2HF03-0CJ3	
ENGINE MODEL	1B40	NO. OF CYLINDERS	1		DYNO CONSTANT	9549.3	
ENGINE SERIAL NO.	1101814049102	CUBIC CAPACITY	0.462	Litre	F.C. METER	AVL;FUEL EXACT;PLU 300 FF	
ENGINE TYPE	DJ,LINE,AC,NA	RATED SPEED	3000	rpm	EMISSION ANALYZER	HORIBA,MEXA-7100D EGR	
FIP MAKE & TYPE	BOSCH, F725	FUEL	COMMERCIAL DIESEL		COND. AIR SYSTEM	ABB,SENSY FLOW DN40;7962635	
FIP SERIAL NO.	***	SULPHUR CONTENT OF FUEL	< 300 ppm		AIR FLOW METER	NOVA; MICROTROL 6	
INJECTOR MAKE & TYPE	NEW DIESEL, MULTIHOLE	SMOKE METER	AVL 439		P.M. EQUIPMENT		

Sr No	Speed (rpm)	Torque (N-m)	Fuel Flow Rate (kg/h)	Power Obs. (kW)	BSFC Obs. (g/kWh)	Fuelling (mm ³ /Str)	T _{Air In} (°C)	RH (%)	P _{Baro} (kPa)	Air Flow Rate (kg/h)	Air Fuel Ratio (-)	Fa (-)	P _{AID} (-mm H2O)	P _{Exh Back Set} (mm Hg)	P _{Exh Back Declared} (mm Hg)	P _{Manifold} (bar)	T _{Manifold} (°C)
1	3000	18.8	1.55	5.9	262.4	20.6	21.2	57.5	96.5	39.6	25.5	1.03	36.6	35.9	-	-	-
2	3000	14.1	1.22	4.4	275.4	16.2	21.1	56.8	96.5	40.2	33.0	1.03	37.1	32.9	-	-	-
3	3000	9.4	0.93	3.0	314.9	12.4	21.1	56.3	96.5	40.8	43.9	1.03	37.7	30.9	-	-	-
4	3000	4.7	0.69	1.5	467.2	9.2	21.1	57.3	96.5	41.0	59.4	1.03	37.8	29.0	-	-	-
5	2997	1.9	0.54	0.6	906.0	7.2	21.1	56.3	96.5	41.3	76.5	1.03	38.2	28.6	-	-	-

Sr No	NOx (Wet) (ppm)	CO (Dry) (ppm)	HC (Wet) (ppm)	CO ₂ (Dry) (%)	O ₂ (%)	Smoke (m ⁻¹)	Dry-Wet Corr. Factor (-)	Humidity Corr. Factor (-)	NOx Corr. (g/h)	CO Corr. (g/h)	HC Corr. (g/h)	Weight Factor (-)	NOx* WF (-)	CO * WF (-)	HC *WF (-)	Power *WF (-)	Power Corr. Factor (-)
1	464.5	18.5	12.6	7.53	9.48	0.065	0.91	0.987	30	0.7	0.3	0.05	1.5	0.03	0.01	0.3	6.0
2	367.5	23	22.4	5.83	12.10	0.038	0.927	0.987	23.8	0.9	0.4	0.25	5.96	0.21	0.11	1.11	4.5
3	253.2	35.2	33.2	4.42	14.25	0.020	0.941	0.993	16.6	1.3	0.7	0.3	4.99	0.4	0.2	0.49	3.0
4	168.4	56.9	76.2	3.27	15.99	0.008	0.952	0.991	11	2.2	1.5	0.3	3.31	0.65	0.46	0.44	1.5
5	104.5	346.5	197.9	2.50	17.13	0.001	0.96	0.989	6.9	13.4	4	0.1	0.69	1.34	0.4	0.06	0.6

WEIGHTED SUM = 16.45 2.63 1.18 2.8

WEIGHTED MASS EMISSIONS AS PER 5-MODE CYCLE

NOx : 5.88 (g/kWh) HC : 0.42 (g/kWh)

MAX. ALLOWABLE INTAKE DEPRESSION DECLARED BY MANUFACTURER : 0.36 ± 0.2 kPa
 MAX. ALLOWABLE EXHAUST BACK PRESSURE DECLARED BY MANUFACTURER : 4 ± 0.5 kPa
 MAX. ALLOWABLE INTAKE MANIFOLD TEMPERATURE DECLARED BY MANUFACTURER (IN CASE OF TC-IC) : **** deg C

PARTICULATE MEASUREMENT :

(a) PARTICULATE MASS (mg) = 1.593
 (b) Misam TOTAL (gm) = 1026.7
 (c) Geof WEIGHTED AVERAGE (kg/h) = 329.9
 (d) PM Correction Factor for Humidity (kp) = 1.019

REMARK :

- THIS IS A TYPE APPROVAL TEST
- SIT (BTDC) : 12 DEG BTDC
- INJECTOR : MAKE- NEW DIESEL; HOLDER NO: NKLL49M16010, NOZZLE MAKE: STANADYNE NO: 40137
- FUEL INJECTION PUMP : BOSCH; BOSCH ID NO: F 725 CN PUMP
- CATALYST : EMITEC, INBUILD IN SILENCER, SILENCER WITH DOC ID/NO. 0250 4200
- NO LOAD RPM -3196 RPM. OVERLOAD RPM : NA (NO OVER LOAD ALLOWED)

NOx + HC	6.30	(g/kWh)
CO	0.94	(g/kWh)
PM	0.186	(g/kWh)
MAX. SMOKE	0.07	m ⁻¹

[Signature]
BHM
TEST ENGINEER

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REVIEWER

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HOD, PTE