



Pursuant to the authority vested in the Air Resources Board by Health and Safety Code Division 26, Part 5, Chapter 2; and pursuant to the authority vested in the undersigned by Health and Safety Code Sections 39515 and 39516 and Executive Order G-02-003;

IT IS ORDERED AND RESOLVED: The engine and emission control systems produced by the manufacturer are certified as described below for use in on-road motor vehicles with a manufacturer's GVWR over 14,000 pounds. Production engines shall be in all material respects the same as those for which certification is granted.

MODEL YEAR	ENGINE FAMILY	ENGINE SIZES (L)	FUEL TYPE ¹	STANDARDS & TEST PROCEDURE	INTENDED SERVICE CLASS ²	ECS & SPECIAL FEATURES ³	DIAGNOSTIC ⁶
2010	ASZXH05.23FB	5.2	Diesel	Diesel	LHDD	DDI, TC, CAC, ECM, EGR, OC, PTOX, SCR-U	EMD
PRIMARY ENGINE'S IDLE EMISSIONS CONTROL ⁵		ADDITIONAL IDLE EMISSIONS CONTROL ⁵					
30g		N/A					
ENGINE (L)		ENGINE MODELS / CODES (rated power, in hp)					
5.2		4HK1TC / 523FB (190)					

¹ =not applicable; GVWR=gross vehicle weight rating; 13 CCR xyz=Title 13, California Code of Regulations, Section xyz; 40 CFR 86.abc=Title 40, Code of Federal Regulations, Section 86.abc; ² L=liter; hp=horsepower; kw=kilowatt; hr=hour; ³ CNG/LNG=compressed/liquefied natural gas; LPG=liquefied petroleum gas; E85=85% ethanol fuel; MF=multi fuel a.k.a. BF=bi fuel; DF=dual fuel; FF=flexible fuel; ⁴ L/M/H HDD=light/medium/heavy heavy-duty diesel; UB=urban bus; HDO=heavy duty Otto; ⁵ ECS=emission control system; TWC/OC=three-way/oxidizing catalyst; NAC=NOx adsorption catalyst; SCR-U / SCR-N=selective catalytic reduction - urea / - ammonia; WU (prefix) =warm-up catalyst; DPF=diesel particulate filter; PTOX=periodic trap oxidizer; HO2S/O2S=heated/oxygen sensor; HAFS/AFS=heated/air-fuel-ratio sensor (a.k.a., universal or linear oxygen sensor); TBI=throttle body fuel injection; SFI/MFI=sequential/multi port fuel injection; DGI=direct gasoline injection; GCARB=gaseous carburetor; IDI/DDI=indirect/direct diesel injection; TC/SC=turbo/super charger; CAC=charge air cooler; EGR / EGR-C=exhaust gas recirculation / cooled EGR; PAIR/AIR=pulsed/secondary air injection; SPL=smoke puff limiter; ECM/PCM=engine/powertrain control module; EM=engine modification; 2 (prefix)=parallel; (2) (suffix)=in series; ⁶ ESS=engine shutdown system (per 13 CCR 1956.8(a)(6)(A)(1)); 30g=30 g/hr NOx (per 13 CCR 1956.8(a)(6)(C)); APS =internal combustion auxiliary power system; ALT=alternative method (per 13 CCR 1956.8(a)(6)(D)); Exempt=exempted per 13 CCR 1956.8(a)(6)(B) or for CNG/LNG fuel systems; N/A=not applicable (e.g., Otto engines and vehicles); EMD=engine manufacturer diagnostic system (13 CCR 1971); OBD=on-board diagnostic system (13 CCR 1971.1);

Following are: 1) the FTP exhaust emission standards, or family emission limit(s) as applicable, under 13 CCR 1956.8; 2) the EURO and NTE limits under the applicable California exhaust emission standards and test procedures for heavy-duty diesel engines and vehicles (Test Procedures); and 3) the corresponding certification levels, for this engine family. "Diesel" CO, EURO and NTE certification compliance may have been demonstrated by the manufacturer as provided under the applicable Test Procedures in lieu of testing. (For flexible- and dual-fueled engines, the CERT values in brackets [] are those when tested on conventional test fuel. For multi-fueled engines, the STD and CERT values for default operation permitted in 13 CCR 1956.8 are in parentheses.).

in g/bhp-hr	NMHC		NOx		NMHC+NOx		CO		PM		HCHO	
	FTP	EURO	FTP	EURO	FTP	EURO	FTP	EURO	FTP	EURO	FTP	EURO
STD	0.14	0.14	0.20	0.20	*	*	15.5	15.5	0.01	0.01	*	*
FEL	*	*	*	*	*	*	*	*	*	*	*	*
CERT	0.00	0.00	0.17	0.07	*	*	0.03	0.00	0.002	0.002	*	*
NTE	0.21		0.30		*		19.4		0.02		*	

⁴ g/bhp-hr=grams per brake horsepower-hour; FTP=Federal Test Procedure; EURO=Euro III European Steady-State Cycle, including RMCSET=ram mode cycle supplemental emissions testing; NTE=Not-to-Exceed; STD=standard or emission test cap; FEL=family emission limit; CERT=certification level; NMHC/HC=non-methane/hydrocarbon; NOx=oxides of nitrogen; CO=carbon monoxide; PM=particulate matter; HCHO=formaldehyde; (Rev.: 2007-02-26)

BE IT FURTHER RESOLVED: Certification to the FEL(s) listed above, as applicable, is subject to the following terms, limitations and conditions. The FEL(s) is the emission level declared by the manufacturer and serves in lieu of an emission standard for certification purposes in any averaging, banking, or trading (ABT) programs. It will be used for determining compliance of any engine in this family and compliance with such ABT programs.

BE IT FURTHER RESOLVED: Except in vehicle applications exempted per 13 CCR 1956.8(a)(6)(B), engines in this engine family certified under 13 CCR 1956.8(a)(6)(C) [30 g/hr NOx] and section 35.B.4 of the incorporated "California Exhaust Emissions Standards and Test Procedures for 2004 and Subsequent Model Heavy-Duty Diesel Engines and Vehicles" adopted Dec. 12, 2002, as last amended Sep. 1, 2006, shall be provided with an approved "Certified Clean Idle" label that shall be affixed to the vehicle into which the engine is installed.

BE IT FURTHER RESOLVED: That the listed engine models have been conditionally certified pending submission of clean idle emission data which complies with 13 CCR 1956.8(a)(6)(C) [30 g/hr NOx] and section 35.B.4 of the incorporated "California Exhaust Emissions Standards and Test Procedures for 2004 and Subsequent Model Heavy-Duty Diesel Engines and Vehicles" adopted Dec. 12, 2002, as last amended Sep. 1, 2006. The required test data shall be submitted within 30 days from date this Executive Order was signed. If the manufacturer fails to provide compliant emission test data within the aforementioned period, this Executive Order is hereby null and void and all engines sold under this Executive Order are hereby deemed as uncertified engines.

BE IT FURTHER RESOLVED: For the listed engine models the manufacturer has submitted the materials to demonstrate certification compliance with 13 CCR 1965 (emission control labels) and 13 CCR 2035 et seq. (emission control warranty).

Engines certified under this Executive Order must conform to all applicable California emission regulations. The Bureau of Automotive Repair will be notified by copy of this Executive Order.

Executed at El Monte, California on this 9th day of July 2010.

Annette Hebert, Chief
Mobile Source Operations Division

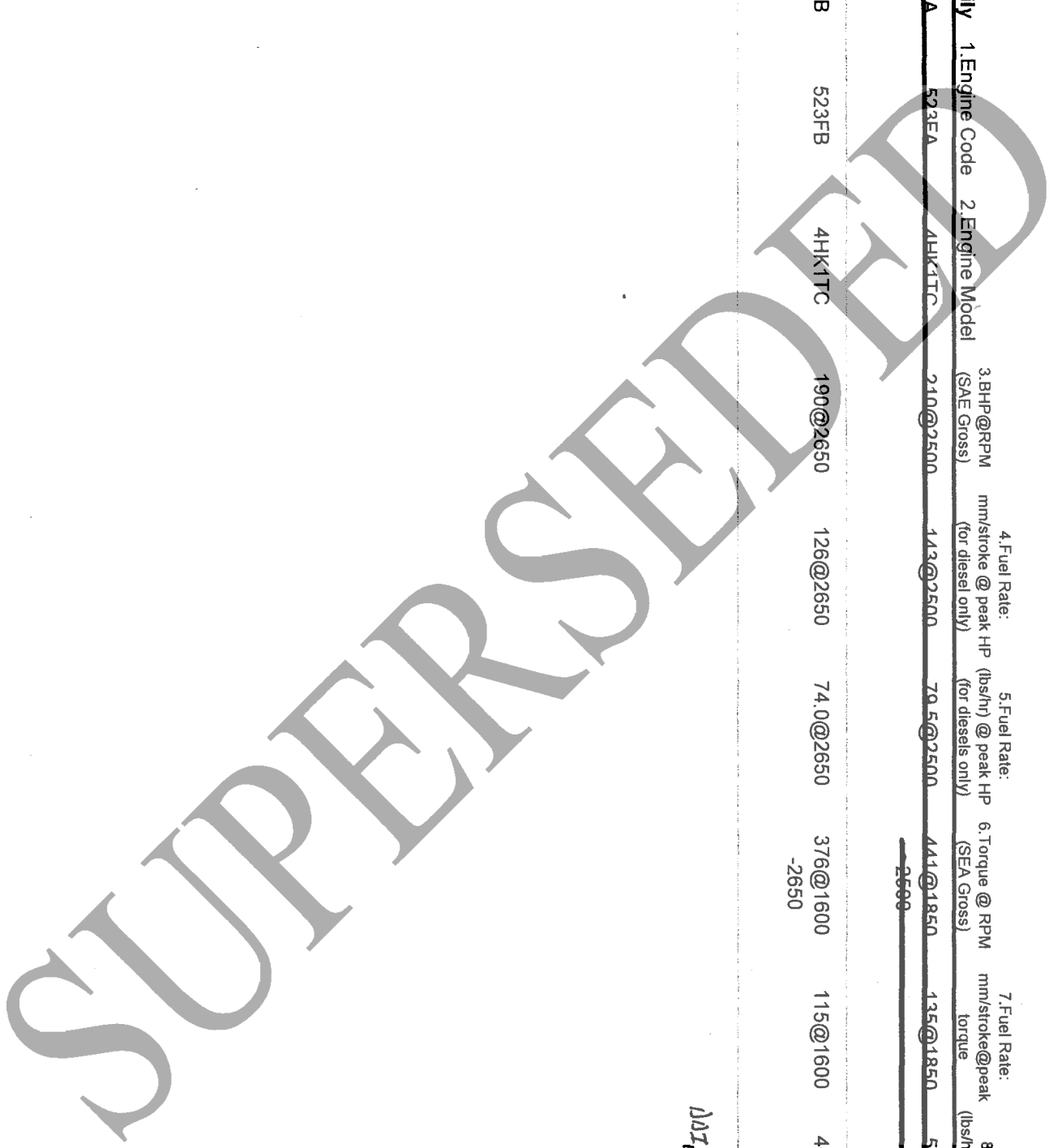
Engine Model Summary Template

Engine Family 1. Engine Code 2. Engine Model 3. BHP@RPM (SAE Gross) 4. Fuel Rate: mm/stroke @ peak HP (for diesel only) 5. Fuel Rate: mm/stroke @ peak HP (for diesels only) 6. Torque @ RPM (SEA Gross) 7. Fuel Rate: mm/stroke@peak torque (lbs/hr)/@peak torque 8. Fuel Rate: (lbs/hr)/@peak torque 9. Emission Control Per SAE J1930

~~ASZXH05.23EA 523EA 4HK1TC 210@2500 113@2500 79.5@2500 441@1850 135@1850 55.0@1850 DEL EGR, CAC, TC, PCV, OC, PTOX, VAF, EM, SCR~~

ASZXH05.23FB 523FB 4HK1TC 190@2650 126@2650 74.0@2650 376@1600 -2650 115@1600 40.5@1600 *DFI, EGR, CAC, TC, PCV, OC, PTOX, VAF, EM, SCR*

DDI, TC, CAC, EGR, OC, PTOX, SCR



V1.2EZ -3/07

Family Information Form-Template

Manufacturer:

Engine category:

Cert contact:

- 1. Model Year: **2010**
- 2. Carry over: **No**
If yes, list the previous family:
- 3. Process Code: **New Submission**
Date EPA Fee Paid: **10/22/2009**
- 4. EPA Standard Engine Family: **ASZXH05.23FB**
- 5. Mfr's Family Name: **N/A**
- 6. Engine Cycle: **Diesel**
- 7. Displacement(s) (CID or Liters): **5.2 Liters**
- 8. Engine Configuration: **L-4**
Use the following format: V-8 or I-6

- Applicable Regulations
- Part 89
 - Part 1039
 - Part 60 only certified to requirements of Part 1039
 - Part 60 only certified to requirements of Part 89
 - Part 60 and Part 1039
 - Part 60 and Part 89
- } Nonroad
} Stationary only
} Stationary Nonroad

9. Emission Control & Aftertreatment:
- Electronic control
 - Engine Modification
 - 3WCatalyst
 - Smoke puff limiter
 - Passive DPF
 - Active DPF
 - EGR
 - NOx adsorber

- Lean NOx
- SCR
 - DOC
 - None
 - Other

19. Plant Contact: **0.020**
Takashi Oodaira Official Manager, Quality Assurance Planning, ISUZU MOTORS LTD. Telephone (03)5471-1111

20. Plant Location:
ISUZU MOTORS LTD. 8 Tsuchidana, Fujisawa-shi, Kanagawa-ken 252-8501, Japan

Check all that apply

If Other Describe:

SCR, EGR, OC, PCC

21. ABT Information: Check all that apply
- In the split family program
 - NMHC+NOx
 - PM
 - NA
 - NOx

- 10. Fuel Type: **Diesel**
- 11. Fuel System Type: **Electronic Direct Injection**
- 12. Method Of Aspiration: **Single Stage Turbo**
Turbocharger Type: **VGT**
Aftercooling: **Air to Air**

DDI TC, CAC

22. Family Emission Limits:
- PM**
 - NOx**
 - NMHC + NOx**
- Units: g/bHp-hr

- 13 Useful Life Period: **10 years / 110,000 miles**
- 14. Deterioration Factor Type
A. Gaseous Exhaust: **Multiplicative**
B. Smoke: **NA**

23. Nonroad Engine Equipment Types:
- | | | |
|----------------|-------------------|----------------------|
| Crane | Dozer | Generator Set |
| Loaders | Pump | NA |
| Tractor | Compressor | Other... |

- 15. Intended Service Class: **LHDD**
If CFF, Select which category: **CFF/ULEV**

16. Projected Sales :
- FED
 - CA
 - TOTAL

- 17. Estimated Production Period: Start **5/7/10** End **12/31/2010**

- 18. Sales Area: Fed Cal 50 St

*Are: z.evans
zll*

Babak 7-1-10

24. Auxiliary Emission Control Devices:

emission control?

AECD	Sensed	PARAMETER	Controlled	VMT	TONS/ENGINE	
Warm Up	Intake air temperature	Injection timing , main	Please			Yes
DPF	Mass air flow sensor	EGR, Intake throttle ,	refer to			Yes
EGR	Intake manifold	EGR	separate			Yes
Overheat	Fuel temperature sensor	coolant temperature, fuel	AECD			Yes
SCR	Coolant temperature sensor	DEF Injection	Submission			Yes
						Yes
						Yes
						Yes
						Yes
						Yes
						Yes

Exam
Engin
Warr
White
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Acce
Altitu
Air H
Over
PTO
Rege

25. Adjustable Parameters:

Parameter	Adjustable Range (or N/a)	Tamper Resistance Method (or N/a)
N/A		

26. OBD

OBD Approval date:

OBD Approval Method:

Examples: letter from EPA , verbal from EPA, E.O. covers it

27. Maintenance Interval

Alternate Maintenance Int.?

Yes

If yes, describe

DEF refill interval

28. Is this engine family using the Delegated Assembly flexibility described in 85.1713?

Yes No

If yes, attach plan in a container field on technical description page

29. Comments:

Note

Test Information Form

Manufacturer: Isuzu Motors Limited
Engine category: On-highway HDDE
Cert contact: ISUZU Manufacturing Services

1. EPA Standard Engine Family: ASZXH05.23FB	9. Torque (ft-lb) @ 441 @
2. Process Code: New Submission	Engine RPM: 1850-2500
3. Test Data Set: 1	10. WAIVERS: CO PM Smoke Idle Co
4. Engine Code: 523FA-1	No No Yes NA
5. Engine Model: 4HK1TC	11. Cold Start? No
6. Displacement(s) (cid Or Liters): 5.2 Liters	12. Certification Fuel: Diesel (Part 86.1313-2007(b)-Table N07-2)
7. Engine I.d. Number: 4HK1-767699	13. Special Test Device No
8. Rated HP @ 210 @	14. Test Procedure: On-Hwy Diesel
Rated RPM: 2500	

15. Crankcase emissions (CCEs)

- CCEs routed into the air inlet system
 CCEs routed into the exhaust upstream of aftertreatment
 CCEs measured separately from exhaust emissions.

If the CCEs are measured separately list them in the tech. description (item 13) and account for them in the test results listed below.

16. Official Test Results Date: **10/24/2009**

	DFs		
	Test 1	Test 2	Test 3
HC/OMHCE			1.000
NMHC/OMNMHCE	0.00		
HC + NOx			
CARBON MONOXIDE	0.01		3.286
OXIDE OF NITROGEN	0.15		1.133
PARTICULATE	0.002		1.000
FORMALDEHYDE			
ACCELERATION (%opacity)			
LUGGING (Gen) (%opacity)			
PEAK (%opacity)			
IDLE CO %			
CO2	570		

17. Adjustment Factors

	DPF			
	EFL	EFH	UAF	DAF
HC/OMHCE	0.001	0.000	0.000	0.001
CARBON MONOXIDE	0.006	0.000	0.000	0.006
OXIDE OF NITROGEN	0.151	0.288	0.003	-0.134
PARTICULATE	0.002	0.009	0.000	-0.007

Frequency Factor

NOx Adsorber, etc
Strategy

EFL	EFH	UAF	DAF

Frequency Factor

**18. Certification Levels
(Rounded Test Results)**

Units-- g/bHp-hr --Units

STDs
g/BHP-hr g/kW-hr

FELs

HC/OMHCE
 NMHC/OMNMHCE
 NMHC + NOx
 CARBON MONOXIDE
 OXIDE OF NITROGEN
 PARTICULATE
 FORMALDEHYDE
 ACCELERATION (%opacity)
 LUGGING (Gen) (%opacity)
 PEAK (%opacity)
 IDLE CO%

0.0 (0.00)
0.0 (0.03)
0.2 (0.17)
0.00 (0.002)

0.14

15.5

0.20

0.01

SUPERSEDED

Supplemental Test Information Form

Manufacturer: **Isuzu Motors Limited**

Engine category: **On-highway HDDE**

- | | |
|--|---|
| 1. EPA Engine Family: ASZXH05.23FB | 9. Torque (ft-lb) @ 441 |
| 2. Process Code: New Submission | Engine RPM: 1850-2500 |
| 3. Test Data Set: 1 | 10. WAIVERS: <u>CO</u> <u>PM</u> <u>Smoke</u> |
| 4. Engine Code: 523FA-1 | No No Yes |
| 5. Engine Model: 4HK1TC | 11. Cold Start? No |
| 6. Displacement(s) (cid Or Liters): 5.2 Liters | 12. Certification Fuel: Diesel (Part 86.1313-2007(b)-Table N07-2) |
| 7. Engine I.d. Number: 4HK1-767699 | 13. Special Test Device @ |
| 8. Rated HP @ 210 | 14. Test Procedure: Supplemental Euro III AND TLRT |
| Rated RPM: 2500 | |

15. Supplemental Euro III Test Information

		Mystery Points	
		% Speed % Load	
Test Date: 10/24/2009	A Speed: 1775 (RPM)	A Speed Max Torque: 431 (ft-lbs)	
N _{lo} Speed: 1428 (RPM)	B Speed: 2122 (RPM)	B Speed Max Torque: 441 (ft-lbs)	
N _{hi} Speed: 2815 (RPM)	C Speed: 2468 (RPM)	C Speed Max Torque: 441 (ft-lbs)	

16. Supplemental Euro III Modal Results (g/bhp-hr):

ESC Test Point

	1	2	3	4	5	6	7	8	9	10	11	12	13	Myst 1	Myst 2	Myst 3
HC/OMHCE																
NMHC/OMNMHCE																
HC + NOx																
CO																
NOx																
Formaldehyde																
RPM																
Torque (ft - lbs)																
CO2																

17. Adjustment Factors

DPF

	EFL	EFH	UAF	DAF
HC/OMHCE	0.000	0.000	0.000	0.000
CARBON MONOXIDE	0.000	0.000	0.000	0.000
OXIDE OF NITROGEN	0.056	0.108	0.002	-0.050
PARTICULATE	0.002	0.004	0.000	-0.002

Frequency Factor

NOx Adsorber, etc

Strategy

	EFL	EFH	UAF	DAF

Frequency Factor

18. Weighted Composite Results (g/bhp-hr):

19. Deterioration Factors:

20. Certification Levels (g/bhp-hr):

HC/OMHCE					
NMHC/OMNMHCE	0.00		1.000		0.0 (0.00)
HC + NOx		X			
CO	0.00		3.286	=	0.0 (0.00)
NOx	0.06		1.133		0.1 (0.07)
Formaldehyde					
PM (Composite only)	0.002		1.000		0.00 (0.002)
CO2	532.24				
DF Type:		Multiplicative		Same DFs as test page	Limits

21. Transient Load Response Limit Results (g/bhp-hr):

	HC	NOx	PM	Beginning Load (ft-lbs)	Sample Interval Length
Lowest NTE Speed					
15% ESC Speed	0.00	0.02	0.01	202.39	720.00
25% ESC Speed	0.00	0.02	0.00	186.60	720.00
50% ESC Speed	0.00	0.01	0.00	156.07	720.00
75% ESC Speed	0.00	0.01	0.00	132.32	720.00
100% ESC Speed	0.00	0.01	0.00	132.32	720.00

SUPERSEDED