

Performance Number: DM7772

Change Level: 03

SALES MODEL:	C15	COMBUSTION:	DIRECT INJECTION
BRAND:	CAT	ENGINE SPEED (RPM):	2,100
MACHINE SALES MODEL:	TH35	PEAK TORQUE SPEED (RPM):	1,400
ENGINE POWER (BKW):	444.0	ASPIRATION:	TA
PEAK TORQUE (NM):	2,719.0	AFTERCOOLER TYPE:	ATAAC
COMPRESSION RATIO:	18	AFTERCOOLER CIRCUIT TYPE:	JW+OC, AC
RATING LEVEL:	INDUSTRIAL E	INLET MANIFOLD AIR TEMP (C):	49
PUMP QUANTITY:	1	JACKET WATER TEMP (C):	99
FUEL TYPE:	DIESEL	TURBO CONFIGURATION:	SINGLE
MANIFOLD TYPE:	DRY	TURBO QUANTITY:	1
GOVERNOR TYPE:	ELEC	TURBOCHARGER MODEL:	GTA5008BS-53T-1.41
CAMSHAFT TYPE:	STANDARD	CERTIFICATION YEAR:	2006
IGNITION TYPE:	CI		
INJECTOR TYPE:	EUI		
REF EXH STACK DIAMETER (MM):	152		
MAX OPERATING ALTITUDE (M):	2,438		

INDUSTRY	SUBINDUSTRY	APPLICATION
INDUSTRIAL	GENERAL INDUSTRIAL	INDUSTRIAL
OIL AND GAS	LAND DRILLING	INDUSTRIAL
INDUSTRIAL	MATERIAL HANDLING	INDUSTRIAL
INDUSTRIAL	CONSTRUCTION	INDUSTRIAL
INDUSTRIAL	AGRICULTURE	INDUSTRIAL
INDUSTRIAL	MINING	INDUSTRIAL
OIL AND GAS	WELL SERVICING	INDUSTRIAL
OIL AND GAS	LAND PRODUCTION	INDUSTRIAL
INDUSTRIAL	FORESTRY	INDUSTRIAL

General Performance Data

ENGINE SPEED	ENGINE POWER	ENGINE TORQUE	BRAKE MEAN EFF PRES (BMEP)	BRAKE SPEC FUEL CONSUMPTN (BSFC)	VOL FUEL CONSUMPTN (VFC)
RPM	BKW	NM	KPA	G/BKW-HR	L/HR
2,100	444	2,019	1,668	232.1	121.5
2,000	444	2,120	1,752	228.1	118.3
1,900	444	2,232	1,844	223.0	116.4
1,800	444	2,355	1,946	218.6	114.4
1,700	439	2,464	2,036	215.0	111.6
1,600	429	2,561	2,116	220.3	110.7
1,500	416	2,649	2,189	220.3	107.4
1,400	398	2,717	2,245	221.5	102.4
1,300	361	2,651	2,190	218.9	92.3
1,200	296	2,352	1,943	222.2	78.0
1,100	259	2,247	1,856	215.2	66.4

ENGINE SPEED	ENGINE POWER	INLET MFLD PRES	INLET MFLD TEMP	EXH MFLD TEMP	EXH MFLD PRES	ENGINE OUTLET TEMP	COMPRESSOR OUTLET PRES	COMPRESSOR OUTLET TEMP
RPM	BKW	KPA	DEG C	DEG C	KPA	DEG C	KPA	DEG C
2,100	444	172.9	48.7	696.7	162.8	561.7	183	176.4
2,000	444	174.9	47.5	682.5	152.9	554.0	184	172.6
1,900	444	177.1	46.7	684.8	145.5	558.6	186	172.0
1,800	444	180.1	46.2	687.8	139.2	564.1	188	172.1
1,700	439	180.3	45.3	691.3	130.7	569.9	188	170.9
1,600	429	184.3	44.4	707.2	124.9	584.6	191	171.4
1,500	416	184.8	43.4	716.9	117.5	595.3	191	172.0
1,400	398	184.1	42.2	715.3	109.7	590.5	189	172.2
1,300	361	176.7	40.5	694.4	100.1	569.4	181	170.9
1,200	296	145.0	37.0	705.1	74.6	585.9	147	155.6
1,100	259	105.1	33.4	712.7	50.0	609.8	108	131.6

General Performance Data (Continued)

ENGINE SPEED	ENGINE POWER	WET INLET AIR VOL FLOW RATE	ENGINE OUTLET WET EXH GAS VOL FLOW	WET INLET AIR MASS FLOW RATE	WET EXH GAS MASS FLOW RATE	ENGINE OUTLET WET EXH VOL FLOW RATE	ENGINE OUTLET DRY EXH VOL FLOW RATE
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		RATE				(0 DEG C AND 101 KPA)	(0 DEG C AND 101 KPA)
RPM	BKW	M3/MIN	M3/MIN	KG/HR	KG/HR	M3/MIN	M3/MIN
2,100	444	37.5	108.7	2,601.8	2,705.0	35.5	32.2
2,000	444	36.6	104.9	2,534.4	2,634.9	34.6	31.4
1,900	444	35.4	102.0	2,450.0	2,548.9	33.5	30.3
1,800	444	34.1	98.7	2,352.6	2,449.9	32.2	29.1
1,700	439	32.5	94.6	2,238.2	2,332.9	30.7	27.6
1,600	429	31.4	93.0	2,159.4	2,253.4	29.6	26.6
1,500	416	29.7	89.0	2,037.4	2,128.7	28.0	25.1
1,400	398	27.9	83.2	1,914.5	2,001.7	26.3	23.6
1,300	361	25.4	73.7	1,738.6	1,817.0	23.9	21.4
1,200	296	20.9	61.4	1,420.0	1,486.2	19.5	17.5
1,100	259	16.3	49.4	1,105.6	1,162.0	15.3	13.5

Heat Rejection Data

ENGINE SPEED	ENGINE POWER	REJECTION TO JACKET WATER	REJECTION TO ATMOSPHERE	REJECTION TO EXH	EXH RECOVERY TO 177C	FROM OIL COOLER	FROM AFTERCOOLER	WORK ENERGY	LOW HEAT VALUE ENERGY	HIGH HEAT VALUE ENERGY
RPM	BKW	KW	KW	KW	KW	KW	KW	KW	KW	KW
2,100	444	167	86.2	515	312	65.2	92.8	444	1,225	1,305
2,000	444	158	95.2	496	298	64.1	88.6	444	1,204	1,282
1,900	444	152	87.0	485	292	62.7	85.8	444	1,177	1,253
1,800	444	151	79.5	472	285	61.4	82.8	444	1,154	1,229
1,700	439	149	72.1	455	276	59.7	78.6	439	1,121	1,194
1,600	429	153	84.2	454	277	59.8	76.6	429	1,123	1,197
1,500	416	150	83.0	438	270	58.0	73.2	416	1,090	1,161
1,400	398	146	92.2	411	251	55.8	69.6	398	1,048	1,117
1,300	361	132	84.4	359	215	50.0	63.4	361	939	1,000

Emissions Data

DIESEL

RATED SPEED NOMINAL DATA: 2100 RPM

ENGINE POWER	BKW	444	333	222	111	44.4
PERCENT LOAD	%	100	75	50	25	10
TOTAL NOX (AS NO2)	G/HR	1,695	1,015	569	560	407
TOTAL CO	G/HR	922	535	211	368	256
TOTAL HC	G/HR	25	33	59	34	39
TOTAL CO2	KG/HR	328	264	196	93	54
PART MATTER	G/HR	77.9	49.3	31.6	119.1	54.9
TOTAL NOX (AS NO2) (CORR 5% O2)	MG/NM3	1,214.1	899.8	680.1	1,369.7	1,691.4
TOTAL CO (CORR 5% O2)	MG/NM3	661.0	476.7	252.0	908.8	1,063.7
TOTAL HC (CORR 5% O2)	MG/NM3	16.1	25.5	61.3	70.5	141.5
PART MATTER (CORR 5% O2)	MG/NM3	46.3	37.2	33.2	261.4	206.1
TOTAL NOX (AS NO2) (CORR 5% O2)	PPM	591	438	331	667	824
TOTAL CO (CORR 5% O2)	PPM	529	381	202	727	851
TOTAL HC (CORR 5% O2)	PPM	30	48	114	132	264
TOTAL NOX (AS NO2)	G/HP-HR	2.87	2.29	1.92	3.78	6.86
TOTAL CO	G/HP-HR	1.56	1.21	0.71	2.48	4.31
TOTAL HC	G/HP-HR	0.04	0.08	0.20	0.23	0.66
PART MATTER	G/HP-HR	0.13	0.11	0.11	0.80	0.92
TOTAL NOX (AS NO2)	LB/HR	3.74	2.24	1.26	1.23	0.90
TOTAL CO	LB/HR	2.03	1.18	0.46	0.81	0.56
TOTAL HC	LB/HR	0.06	0.07	0.13	0.07	0.09
TOTAL CO2	LB/HR	724	581	432	204	119
PART MATTER	LB/HR	0.17	0.11	0.07	0.26	0.12
OXYGEN IN EXH	%	9.3	11.4	13.5	14.7	16.6
DRY SMOKE OPACITY	%	2.7	1.9	1.1	11.4	5.2
BOSCH SMOKE NUMBER		1.61	1.26	0.71	3.45	2.36

RATED SPEED POTENTIAL SITE VARIATION: 2100 RPM

ENGINE POWER	BKW	444	333	222	111	44.4
PERCENT LOAD	%	100	75	50	25	10
TOTAL NOX (AS NO2)	G/HR	1,831	1,096	615	605	440
TOTAL CO	G/HR	1,724	1,000	394	689	478
TOTAL HC	G/HR	47	63	112	63	74
PART MATTER	G/HR	151.8	96.1	61.7	232.2	107.0
TOTAL NOX (AS NO2) (CORR 5% O2)	MG/NM3	1,311.3	971.8	734.5	1,479.3	1,826.7
TOTAL CO (CORR 5% O2)	MG/NM3	1,236.1	891.4	471.2	1,699.5	1,989.2
TOTAL HC (CORR 5% O2)	MG/NM3	30.4	48.2	115.9	133.2	267.3
PART MATTER (CORR 5% O2)	MG/NM3	90.3	72.6	64.7	509.6	401.9
TOTAL NOX (AS NO2) (CORR 5% O2)	PPM	639	473	358	721	890
TOTAL CO (CORR 5% O2)	PPM	989	713	377	1,360	1,591
TOTAL HC (CORR 5% O2)	PPM	57	90	216	249	499
TOTAL NOX (AS NO2)	G/HP-HR	3.10	2.47	2.08	4.08	7.41
TOTAL CO	G/HP-HR	2.92	2.25	1.33	4.64	8.06
TOTAL HC	G/HP-HR	0.08	0.14	0.38	0.43	1.24
PART MATTER	G/HP-HR	0.26	0.22	0.21	1.57	1.80
TOTAL NOX (AS NO2)	LB/HR	4.04	2.42	1.36	1.33	0.97
TOTAL CO	LB/HR	3.80	2.20	0.87	1.52	1.05
TOTAL HC	LB/HR	0.10	0.14	0.25	0.14	0.16
PART MATTER	LB/HR	0.33	0.21	0.14	0.51	0.24

Regulatory Information

CHINA STAGE II		2010 - 2015			
THIS ENGINE HAS BEEN TESTED IN ACCORDANCE WITH THE PROVISIONS OF THE PEOPLE'S REPUBLIC OF CHINA NATIONAL STANDARD #GB 20891-2007, AND COMPLIES WITH THE STATED LIMITS OF CO, HC, NOX, AND PM FOR STAGE II					
Locality	Agency	Regulation	Tier/Stage	Max Limits - G/BKW - HR	
CHINA	CHINA	NON-ROAD	STAGE II	CO: 3.5 NOx: 6.0 HC: 1.0 PM: 0.20	

EPA TIER 3		2005 - 2010			
GASEOUS EMISSIONS DATA MEASUREMENTS PROVIDED TO THE EPA ARE CONSISTENT WITH THOSE DESCRIBED IN EPA 40 CFR PART 89 SUBPART D AND ISO 8178 FOR MEASURING HC, CO, PM, AND NOX. THE "MAX LIMITS" SHOWN BELOW ARE WEIGHTED CYCLE AVERAGES AND ARE IN COMPLIANCE WITH THE NON-ROAD REGULATIONS.					
Locality	Agency	Regulation	Tier/Stage	Max Limits - G/BKW - HR	
U.S. (INCL CALIF)	EPA	NON-ROAD	TIER 3	CO: 3.5 NOx + HC: 4.0 PM: 0.20	

EU STAGE IIIA		2006 - 2010			
GASEOUS EMISSION DATA MEASUREMENTS ARE CONSISTENT WITH THOSE DESCRIBED IN EU 97/68/EC, ECE REGULATION NO. 96 AND ISO 8178 FOR MEASURING HC, CO, PM, AND NOX. GASEOUS EMISSION VALUES ARE WEIGHTED CYCLE AVERAGES AND ARE IN COMPLIANCE WITH THE NON-ROAD REGULATIONS.					
Locality	Agency	Regulation	Tier/Stage	Max Limits - G/BKW - HR	
EUROPE	EU	NON-ROAD	STAGE IIIA	CO: 3.5 NOx + HC: 4.0 PM: 0.20	

IMO II		2011 - ----			
GASEOUS EMISSIONS DATA MEASUREMENTS ARE CONSISTENT WITH THOSE DESCRIBED IN REGULATION 13 OF REVISED ANNEX VI OF MARPOL 73/78 AND ISO 8178 FOR MEASURING HC, CO, PM, AND NOX. THIS ENGINE CONFORMS TO INTERNATIONAL MARINE ORGANIZATION'S (IMO) MARINE COMPRESSION-IGNITION EMISSION REGULATIONS.					

Altitude Derate Data

STANDARD

ALTITUDE CORRECTED POWER CAPABILITY (BKW)

AMBIENT OPERATING TEMP (C)	0	5	10	15	20	25	30	35	40	45	50	55	60	NORMAL
ALTITUDE (M)														
0	444	444	444	444	444	444	444	444	444	444	444	444	444	444
250	444	444	444	444	444	444	444	444	444	444	444	444	444	444

500	444	444	444	444	444	444	444	444	444	444	444	444	444	444
750	444	444	444	444	444	444	444	444	444	444	444	444	444	444
1,000	444	444	444	444	444	444	444	444	444	444	444	444	444	444
1,250	444	444	444	444	444	444	444	444	444	444	444	444	444	444
1,500	444	444	444	444	444	444	444	444	444	444	444	444	444	444
1,750	444	444	444	444	444	444	444	444	444	444	444	441	435	444
2,000	444	444	444	444	444	444	444	444	444	441	434	427	421	444
2,250	444	444	444	444	444	444	444	440	433	427	420	414	407	444
2,500	444	444	444	444	444	440	433	426	419	413	406	400	394	444
2,750	444	444	444	441	433	426	419	412	406	399	393	387	381	444
3,000	444	442	434	426	419	412	405	399	392	386	380	374	369	439
3,250	435	427	419	412	405	398	392	385	379	373	368	362	356	427
3,500	420	413	405	398	392	385	379	373	367	361	355	350	345	415
3,750	406	399	392	385	378	372	366	360	354	349	343	338	333	404
4,000	392	385	378	372	366	359	353	348	342	337	332	327	322	392
4,250	379	372	365	359	353	347	341	336	330	325	320	315	311	381
4,500	366	359	353	347	341	335	330	324	319	314	309	304	300	370

Cross Reference

Test Spec	Setting	Engine Arrangement	Engineering Model	Engineering Model Version	Start Effective Serial Number	End Effective Serial Number
OK4928	PP5370	2543835	E708	-	JRE00001	JRE14596
NAP	NAP	3271014	PS025	-	JRE00001	JRE14596
NAP	NAP	3271014	PS025	-	MCW00001	MCW12417
NAP	NAP	3271014	PS037	-	JRE00001	JRE14596
NAP	NAP	3271014	PS037	-	MCW00001	MCW12417
OK4928	PP5370	3592103	E708	-	JRE00001	JRE14596
OK4928	PP5370	3592103	E708	-	MCW00001	MCW12417
OK4928	PP5370	3592103	MS049	-	JRE00001	JRE14596
OK4928	PP5370	3592103	MS049	-	MCW00001	MCW12417
NAP	NAP	3592106	PS025	-	JRE00001	JRE14596
NAP	NAP	3592106	PS025	-	MCW00001	MCW12417
NAP	NAP	3592106	PS037	-	JRE00001	JRE14596
NAP	NAP	3592106	PS037	-	MCW00001	MCW12417
OK4928	PP5370	3626461	E708	-	JRE00001	JRE14596
OK4928	PP5370	3626461	E708	-	MCW00001	MCW12417
4150258	PP6644	3857691	NAP	NAP	MCW00001	MCW12417
OK4928	PP5370	4253533	E708	-	MCW00001	MCW12417
4581483	PP7790	5099214	EE383	-	PK500001	
4486278	PP7727	5181546	EE383	-	PK500001	PK500126
4150760	NAP	6187123	PT125	-	HNR00001	
4150760	NAP	6197274	PG125	-	HNR00001	

Performance Parameter Reference

Parameters Reference:DM9600-14 PERFORMANCE DEFINITIONS

PERFORMANCE DEFINITIONS DM9600

APPLICATION:

Engine performance tolerance values below are representative of a typical production engine tested in a calibrated dynamometer test cell at SAE J1995 standard reference conditions. Caterpillar maintains ISO9001:2000 certified quality management systems for engine test Facilities to assure accurate calibration of test equipment. Engine test data is corrected in accordance with SAE J1995. Additional reference material SAE J1228, J1349, ISO 8665, 3046-1:2002E, 3046-3:1989, 1585, 2534, 2288, and 9249 may apply in part or are similar to SAE J1995. Special engine rating request (SERR) test data shall be noted.

PERFORMANCE PARAMETER TOLERANCE FACTORS:

- Power +/- 3%
- Torque +/- 3%
- Exhaust stack temperature +/- 8%
- Inlet airflow +/- 5%
- Intake manifold pressure-gage +/- 10%
- Exhaust flow +/- 6%
- Specific fuel consumption +/- 3%
- Fuel rate +/- 5%
- Specific DEF consumption +/- 3%
- DEF rate +/- 5%
- Heat rejection +/- 5%
- Heat rejection exhaust only +/- 10%

PERFORMANCE DATA[DM7772]

Heat rejection CEM only +/- 10%

Heat Rejection values based on using treated water.

Torque is included for truck and industrial applications, do not use for Gen Set or steady state applications.

On C7 - C18 engines, at speeds of 1100 RPM and under these values are provided for reference only, and may not meet the tolerance listed.

On 3500 and C175 engines, at speeds below Peak Torque these values are provided for reference only, and may not meet the tolerance listed.

These values do not apply to C280/3600. For these models, see the tolerances listed below.

C280/3600 HEAT REJECTION TOLERANCE FACTORS:

Heat rejection +/- 10%

Heat rejection to Atmosphere +/- 50%

Heat rejection to Lube Oil +/- 20%

Heat rejection to Aftercooler +/- 5%

TEST CELL TRANSDUCER TOLERANCE FACTORS:

Torque +/- 0.5%

Speed +/- 0.2%

Fuel flow +/- 1.0%

Temperature +/- 2.0 C degrees

Intake manifold pressure +/- 0.1 kPa

OBSERVED ENGINE PERFORMANCE IS CORRECTED TO SAE J1995 REFERENCE AIR AND FUEL CONDITIONS.

REFERENCE ATMOSPHERIC INLET AIR

FOR 3500 ENGINES AND SMALLER

SAE J1228 AUG2002 for marine engines, and J1995 JAN2014 for other engines, reference atmospheric pressure is 100 KPA (29.61 in hg), and standard temperature is 25deg C (77 deg F) at 30% relative humidity at the stated aftercooler water temp, or inlet manifold temp.

FOR 3600 ENGINES

Engine rating obtained and presented in accordance with ISO 3046/1 and SAE J1995 JANJAN2014 reference atmospheric pressure is 100 KPA (29.61 in hg), and standard temperature is 25deg C (77 deg F) at 30% relative humidity and 150M altitude at the stated aftercooler water temperature.

MEASUREMENT LOCATION FOR INLET AIR TEMPERATURE

Location for air temperature measurement air cleaner inlet at stabilized operating conditions.

REFERENCE EXHAUST STACK DIAMETER

The Reference Exhaust Stack Diameter published with this dataset is only used for the calculation of Smoke Opacity values displayed in this dataset. This value does not necessarily represent the actual stack diameter of the engine due to the variety of exhaust stack adapter options available. Consult the price list, engine order or general dimension drawings for the actual stack diameter size ordered or options available.

REFERENCE FUEL

DIESEL

Reference fuel is #2 distillate diesel with a 35API gravity;

A lower heating value is 42,780 KJ/KG (18,390 BTU/LB) when used at 15 deg C (59 deg F), where the density is

850 G/Liter (7.0936 Lbs/Gal).

GAS

Reference natural gas fuel has a lower heating value of 33.74 KJ/L (905 BTU/CU Ft). Low BTU ratings are based on 18.64 KJ/L (500 BTU/CU FT) lower heating value gas. Propane ratings are based on 87.56 KJ/L (2350 BTU/CU Ft) lower heating value gas.

ENGINE POWER (NET) IS THE CORRECTED FLYWHEEL POWER (GROSS) LESS EXTERNAL AUXILIARY LOAD

Engine corrected gross output includes the power required to drive standard equipment; lube oil, scavenge lube oil, fuel transfer, common rail fuel, separate circuit aftercooler and jacket water pumps. Engine net power available for the external (flywheel) load is calculated by subtracting the sum of auxiliary load from the corrected gross flywheel output power. Typical auxiliary loads are radiator cooling fans, hydraulic pumps, air compressors and battery charging alternators. For Tier 4 ratings additional Parasitic losses would also include Intake, and Exhaust Restrictions.

ALTITUDE CAPABILITY

Altitude capability is the maximum altitude above sea level at standard temperature and standard pressure at which the engine could develop full rated output power on the current performance data set.

Standard temperature values versus altitude could be seen on TM2001.

When viewing the altitude capability chart the ambient temperature is the inlet air temp at the compressor inlet.

Engines with ADEM MEUI and HEUI fuel systems operating at conditions above the defined altitude capability derate for atmospheric pressure and temperature conditions outside the values defined, see TM2001.

Mechanical governor controlled unit injector engines require a setting change for operation at conditions above the altitude defined on the engine performance sheet. See your Caterpillar

PERFORMANCE DATA[DM7772]

December 5, 2023

technical representative for non standard ratings.

REGULATIONS AND PRODUCT COMPLIANCE

TMI Emissions information is presented at 'nominal' and 'Potential Site Variation' values for standard ratings. No tolerances are applied to the emissions data. These values are subject to change at any time. The controlling federal and local emission requirements need to be verified by your Caterpillar technical representative.

Customer's may have special emission site requirements that need to be verified by the Caterpillar Product Group engineer.

EMISSION CYCLE LIMITS:

Cycle emissions Max Limits apply to cycle-weighted averages only. Emissions at individual load points may exceed the cycle-weighted limit.

WET & DRY EXHAUST/EMISSIONS DESCRIPTION:

Wet - Total exhaust flow or concentration of total exhaust flow

Dry - Total exhaust flow minus water vapor or concentration of exhaust flow with water vapor excluded

EMISSIONS DEFINITIONS:

Emissions : DM1176

EMISSION CYCLE DEFINITIONS

1. For constant-speed marine engines for ship main propulsion, including,diesel-electric drive, test cycle E2 shall be applied, for controllable-pitch propeller sets test cycle E2 shall be applied.

2. For propeller-law-operated main and propeller-law-operated auxiliary engines the test cycle E3 shall be applied.

3. For constant-speed auxiliary engines test cycle D2 shall be applied.

4. For variable-speed, variable-load auxiliary engines, not included above, test cycle C1 shall be applied.

HEAT REJECTION DEFINITIONS:

Diesel Circuit Type and HHV Balance : DM9500

HIGH DISPLACEMENT (HD) DEFINITIONS:

3500: EM1500

RATING DEFINITIONS:

Agriculture : TM6008

Fire Pump : TM6009

Generator Set : TM6035

Generator (Gas) : TM6041

Industrial Diesel : TM6010

Industrial (Gas) : TM6040

Irrigation : TM5749

Locomotive : TM6037

Marine Auxiliary : TM6036

Marine Prop (Except 3600) : TM5747

Marine Prop (3600 only) : TM5748

MSHA : TM6042

Oil Field (Petroleum) : TM6011

Off-Highway Truck : TM6039

On-Highway Truck : TM6038

SOUND DEFINITIONS:

Sound Power : DM8702

Sound Pressure : TM7080

Date Released : 10/27/21