Perkins 1100D Series

Models NK, NL and NM

Engine Specification Manual
Mechanical FIE only

1104D-44
1104D-44T
1104D-44TA

Four cylinder diesel engines for agricultural, industrial, construction and material handling applications

Developed to meet EEC off-road mobile machinery Stage IIIA and EPA off-road Tier 3 legislation

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General information

Introduction

Mechanical FIE

The 1100D Series range of four cylinder engines is developed to meet EPA Tier 3 and EEC Stage IIIA off highway emissions legislation.

- EU Stage IIIA: 1104D-44, 1104D-44T and 1104D-44TA
- US EPA Tier 3: 1104D-44T and 1104D-44TA

This Engine Specification Manual is a publication of ratings and options to enable sales and application personnel to select and specify **1104D** Series engines with **Mechanical FIE** for a wide variety of industrial, construction, material handling and agricultural applications.

This is the only manual that should be used for specifying 1104D products with Mechanical FIE.

Included in the manual are:

- The range of ratings
- Information and drawings where available for the 1104D, 4 cylinder options
- Identification of carry over options from the 1100C product range.

Technical information is provided for guidance only, to assist with option selection.

Additional information to support this manual can be found on the **Perkins Product World** intranet site **https://ediscovery.cat.com/cda/layout?m=18305&x=7** and will include regular updates on:

- Latest option and rating information
- Option and accessory availability timing
- Generic engine builds.

How to use the manual

All the information needed to specify an engine for an application can be found in chapters 2 to 6. Use the chapters as follows:

The manual is designed to be user friendly and includes compatibility information and symbols in the options and accessories tables to assist the user to correctly specify an engine specification.

Chapter 2: The engine range

This chapter contains brief details of the power output of the 1104D Series engine (Mechanical FIE). Use the data in this chapter to determine which of the engines is required for the application.

Chapter 3: Engine specification

This chapter contains information that will guide the user in the process of specifying options and accessories necessary to complete a full engine specification. An option selection template can be found on page 10.

To identify the Customers' particular application, a table listing sub-application codes and descriptions is shown on page 8.

General arrangement drawings for different specifications will be included in this chapter.

Chapter 4: Options

This chapter shows the range of options for selection (refer to option availability timing, before making a selection). Miniature drawings of the options are also shown where available.

Chapter 5: Accessories

This chapter shows the range of accessories for selection (refer to accessory availability timing, before making a selection). Miniature drawings of the accessories are also shown where available.

To complete the specification of the engine, use the information shown in these chapters to select the options and accessories required for the application. Only one option or accessory can be selected from each group. Make a choice from each group even if it is "not required".

Chapter 6: Technical data

This chapter contains preliminary technical information for the engines in the range and is intended to assist the user of the manual to select options.

Creating an engine specification

1 The SPES method

Project engine specifications should be completed using **SPES** (Sales Project Engine Specification). When completing the SPES refer to the Sales Project Engine Specification Guide.

If it is established when specifying an engine that an option is required that is not listed in the Engine Specification Manual, a request should be made to the 1104D product team using the NORF process complete with business case.

A NORF request can be made using PF10006 which can be found on the intranet. The product team will assess the viability of introducing this requested option. Until this option has been approved, **NO** commitment should be made to the customer.

2 The Cameleon method

Project engine specifications selected from this manual can be created using the Perkins ‘Cameleon’ configurator. Specifications will be automatically checked for compatibility. Those which are confirmed as acceptable will be issued with a unique engine list number.

Using the ‘Cameleon’ computer system, engine specifications can be ordered simply and quickly for rapid response to customer demands.

Abbreviations and codes

Abbreviations

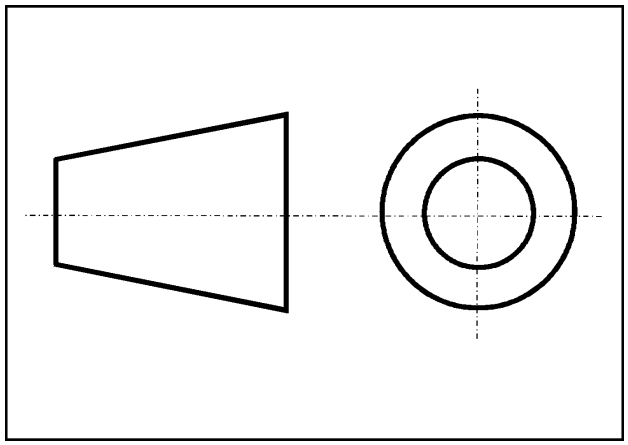
DC	Design change
ECR	Engineering Change Request
LHS	Left hand side, when viewed from the flywheel end of the engine
NA	Naturally aspirated
NORF	New option request form (part of revised DC process)
PDL	Perkins Data Link
PTO	Power take off
RHS	Right hand side, when viewed from the flywheel end of the engine
SAE	Society of Automotive Engineers
SPES	Sales Project Engine Specification
T	Direct injection Turbocharged
TA	Direct Injection Turbocharged Aftercooled

Drawing standards

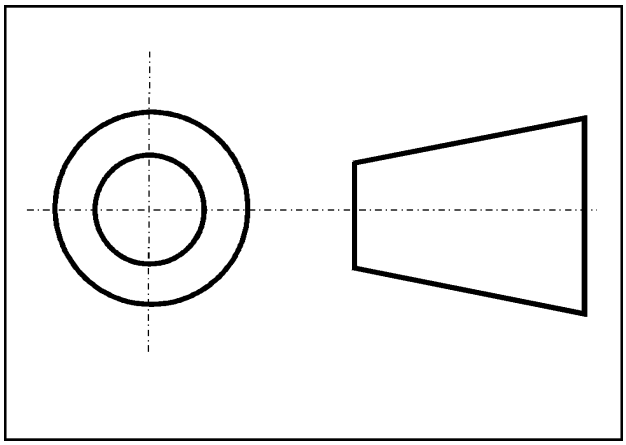
Ø	Diameter
XX	Rear face of cylinder block
X2X2	Rear face of cylinder block (engines with stressed cylinder block)
YY	Crankshaft centre line (horizontal)
ZZ	Crankshaft centre line (vertical)

Note: All dimensions are in mm unless otherwise stated.

First angle projection



Third angle projection



Engine type codes

Mechanical FIE	Engine type codes
1104D-44	NK
1104D-44T	NL
1104D-44TA	NM

2

The engine range

The 1100D Series range of four cylinder engines is developed to meet EPA Tier 3 and EEC Stage IIIA off highway emissions legislation. The Mechanical range specifically targets:

- EU Stage IIIA: 1104D-44, 1104D-44T and 1104D-44TA
- US EPA Tier 3: 1104D-44T and 1104D-44TA

The engines have been developed to ISO TR 14396.

This Engine Specification Manual covers 4 cylinder 1104D-44 **Mechanical FIE engines** only.

The full range of engines include naturally aspirated, turbocharged, and air to air aftercooled 4 cylinder variants.

The engines develop from 55,9 kW to 83,0 kW at speeds from 2200 to 2400 rev/min, and are suitable for most agricultural, industrial, construction, material handling applications.

Maximum intermittent ratings

Engine type	Maximum rating kW at rev/min
1104D-44	55,9 @ 2200 rev/min
1104D-44T	74.5 @ 2200 rev/min
1104D-44TA	83,0 @ 2300 rev/min

3

Engine specification

Mandatory specification requirements

- All engines must be specified using option codes.
- A selection **must** be made for **All** options even if the option is ‘not required’.
- Before selecting an option read carefully any notes relating to the option. These will indicate any restrictions if this option is chosen.
- If it is established when specifying an engine that an option is required that is not listed in this 1104D Series Engine Manual, then a NORF (part of the revised ECR (Engineering Change Request) process) must be raised, complete with justification to obtain approval.
- Where the * symbol appears, this represents any series of characters. For example S2*** represents any turbo option starting with S2.

Sub application codes

Agricultural

Application group/sub-application	Code
Tractors wheeled	AGR20
Tractors fast	AGR21
Special harvesters	AGR22
Combine harvesters	AGR24
Lawn and garden	AGR25
Sprayers	AGR26
Agricultural - other	AGR28
Wood chippers	AGR39
Forestry harvesters	AGR85

Industrial

Application group/sub-application	Code
Industrial - other	IND42
Snow blowers	IND43
Snow groomers	IND44
Compressors	IND50
Petroleum industry	IND59
Mining equipment	IND61
Locomotive/rail traction	IND75
Pump sets	IND84
Sweepers	IND87

Construction

Application group/sub-application	Code
Self propelled drills	CON29
Excavators	CON30
Backhoe loaders	CON31
Wheeled shovel loaders	CON32
Bulldozer	CON33
Scrapers	CON34
Graders	CON35
Dumpers	CON36
Trenchers	CON37
Skid steer loaders	CON38
Mini excavators	CON41
Pavers	CON51
Road rollers	CON53
Construction - other	CON69

Material handling

Application group/sub-application	Code
Aircraft baggage handlers	MAT14
Telescopic handlers	MAT40
Cranes	MAT54
Access platforms	MAT68
Forklift trucks	MAT70
Rough terrain, forklift trucks	MAT71
Towing tractors	MAT72
Side loaders	MAT73
Straddle carriers	MAT76

Option selection procedure

To assist with the process of selecting options and accessories, an option selection template is included, see “Option selection template” on page 11.. Copy this form, then follow the sequence of the option groups to prepare the engine specification. Once the specification has been drafted, it can be transferred to the engine order form, which is available from Perkins.

To enable the specification to be processed, additional information is required relating to the application into which the engine is to be installed.

Listed below are the additional questions which need to be completed to enable the specification to proceed.

Application form

Question			Range	Selection (one per question)
1	Sub application code		See page 8	
2	Emission standard		EPA Tier 3	
			EEC Stage IIIA	
3	Voltage		12	
			24	
4	Maximum altitude		Up to 600 metres	
			Up to 2250 metres	
			Up to 3000 metres	
5	Maximum ambient temperature		°C	
6	Minimum start temperature		°C	
7	Expected oil change period		Up to 500 hours	
8	Average load factor		See page 10	
9	Average usage (per year)		Hours	
10	Expected engine life (years)		Years	
11	Special fuel requirements		Diesel (1)	
12	Front end drive - timing case	PTO LHS	Nm	
		PTO RHS	Nm	
13	Front end inertia, including crankshaft pulley		kg m²	
14	Rear end inertia, including flywheel		kg m²	
15				
16	PTO torque from crankshaft pulley		Nm	

(1). Max. 20% bio fuel.

Option and accessory selection

Before selecting an option, read carefully any notes relating to the option as these will indicate any restrictions if the option is chosen. A selection must be made for all options and accessories, even if the option is “not required”.

Main options

A selection of one option code must be made from each of the option sections A through to Y. Put the correct codes onto the order form in the following manner:

Lubricating oil fillers and breather	H	0	2	1	1
Lubricating oil filters and coolers	J	0	1	4	1

Accessory options

A selection of one option code must be made from each of the option sections ZA through to ZZ. Put the correct codes onto the order form in the following manner:

Mountings	Z	C	0	0	1
Heater/starter switch	Z	E	0	0	2

Machine load factor

To enable the machine load factor to be calculated two methods are illustrated below to assist with the calculation. The first, to establish load factor, is based on fuel usage. The second, to estimate load factor, is based on operating conditions.

Method 1 - To establish machine load factor

- Fuel used over a one hour period of normal operation - A litres
- Fuel used over a one hour period at maximum rating - B litres
- Typical Machine Load Factor is:

$$\frac{A \cdot Litres}{B \cdot Litres} \times 100 = C \quad \%$$

If it is not possible to calculate the load factor by this method, an alternative approach is to use method 2.

Method 2 - To estimate machine load factor

For a machine working in normal operating conditions use the following example to estimate the load factor based on estimated operating times.

Note: These times will vary depending on machine type.

- Example using four cylinder power curve TBA
- Maximum available cycle power at 2400 rev/min = 129,5 kW
- Worked example based on estimated operating times.

	Duration %		Power kW		Weighted power
Maximum rated speed power	20	x	129,5	=	25,9
Maximum torque speed power	40	x	95,0	=	38,0
Idle speeds (high/low power)	40	x	0	=	0,0
	100				63,9

- Estimated machine load factor is:

$$\frac{63,9}{129,5} \times 100 = 49\ \%$$

If further assistance is required please contact Perkins Applications department.

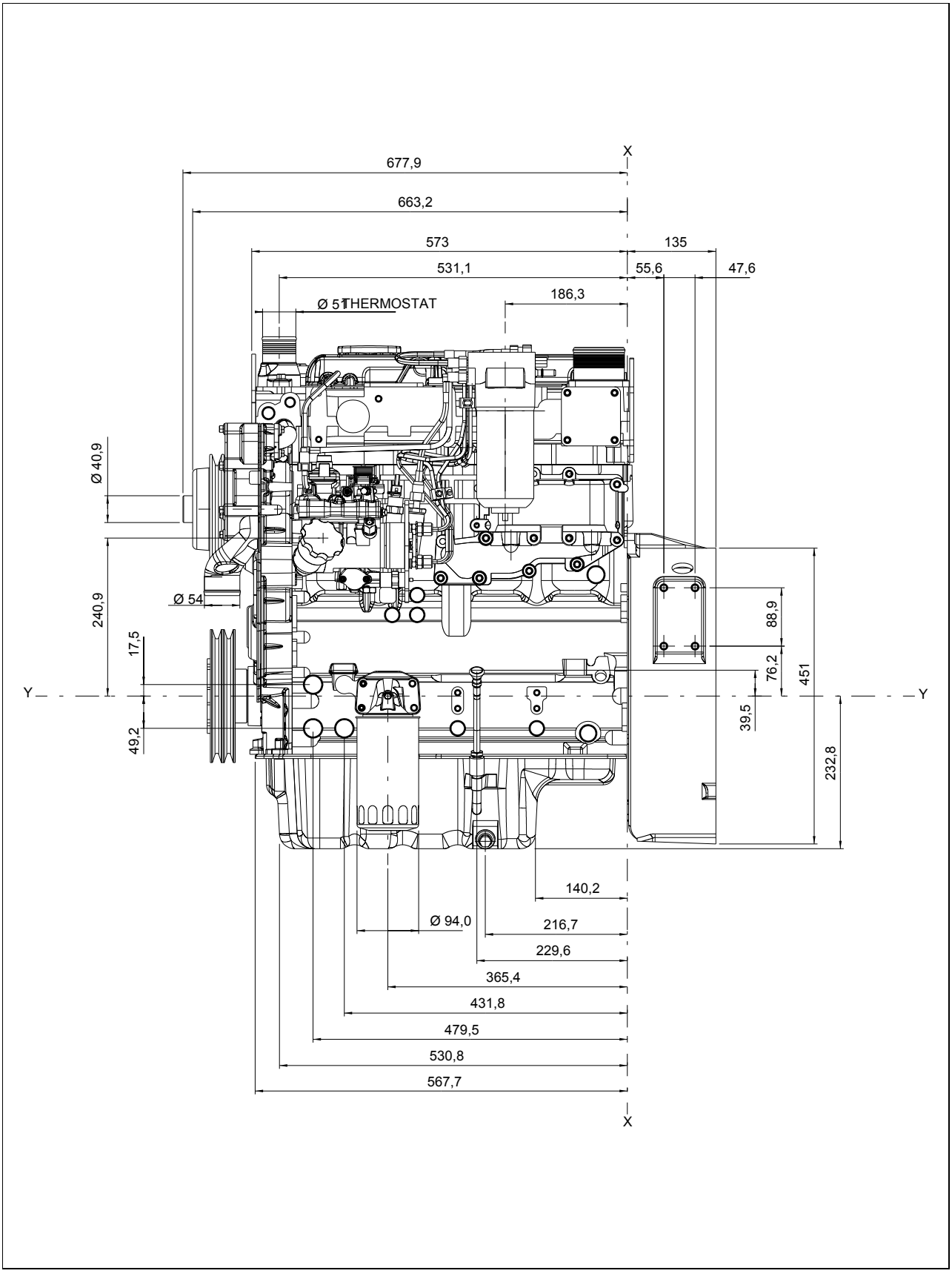
Option selection template

	Option group		Ref. code	Description
	A	Rating		Option selection needed
	AM	ECM		Option selection needed
Front end	F	Fan drive		Option selection needed
	K	Crank pulley		Option selection needed
	M	Fan and extensions		Option selection needed
	N	Alternator		Option selection needed
	NL	Alternator branding		Option selection needed
	P	Belt driven auxiliaries		Option selection needed
	Q	Timing case and gear driven auxiliaries		Option selection needed
Back end	B	Adaptor plate		Option selection needed
	C	Flywheel housing		Option selection needed
	D	Flywheel and starter ring		Option selection needed
	E	Starter motor		Option selection needed
	EL	Starter motor branding		Option selection needed
Aspiration	S	Tubocharger, manifold		Option selection needed
	SD	Turbocharger exhaust hardware		Option selection needed
	T	Induction connections		Option selection needed
	U	Exhaust manifolds		Option selection needed
	UD	Exhaust hardware		Option selection needed
Oil	G	Lubricating oil sump		Option selection needed
	ZG	Sump drain		Option selection needed
	H	Lubricating oil fillers and breathers		Option selection needed
	HL	Breather branding		Option selection needed
	HD	Timing case oil fillers		Option selection needed
	J	Lubricating oil filter and cooler		Option selection needed
	JD	Lubricating oil filter branding		Option selection needed
	R	Balancer		Option selection needed
Fuel	V	Fuel filter secondary		Option selection needed
	VD	Fuel filter secondary branding		Option selection needed
	ZB	Fuel systems		Option selection needed
	ZV	Fuel filter primary		Option selection needed
Coolant	L	Coolant pump and thermostat housing, outlet connection		Option selection needed
	ZM	Radiator		Option selection needed
	ZZ	Cab heater connections		Option selection needed
Controls	W	Cold start aid		Option selection needed
	ZE	Heater switch		Option selection needed
	ZJ	Lubricating oil pressure switch		Option selection needed
	ZL	Coolant temperature gauge and sender		Option selection needed
	ZN	Engine wiring harness		Option selection needed
Dress	X	Lifting eyes		Option selection needed
	Y	Paint		Option selection needed
	ZC	Engine mountings		Option selection needed
	ZY	Emissions labels		Option selection needed

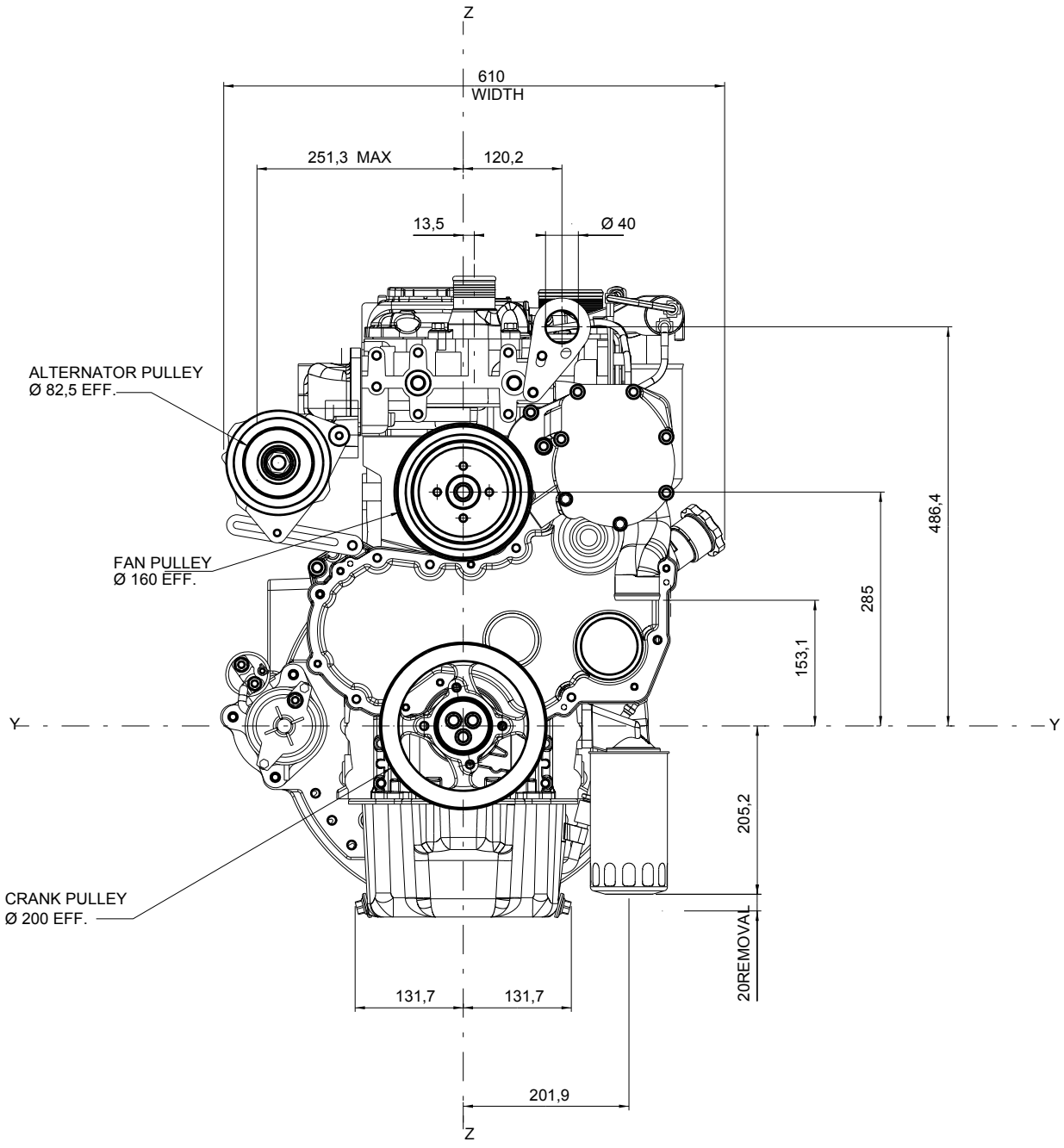
General arrangement drawings

Naturally aspirated

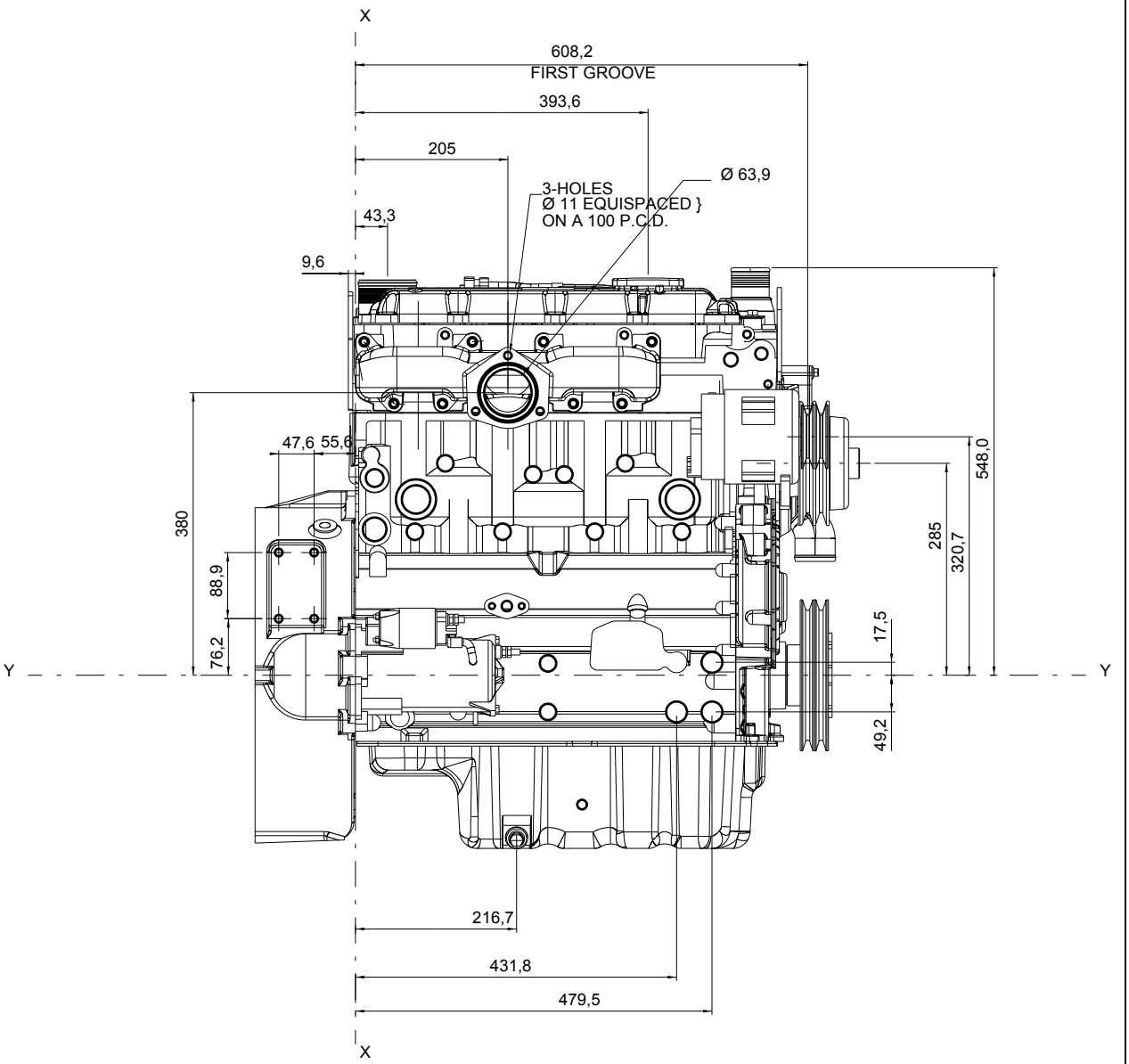
1104D-44 - Left view



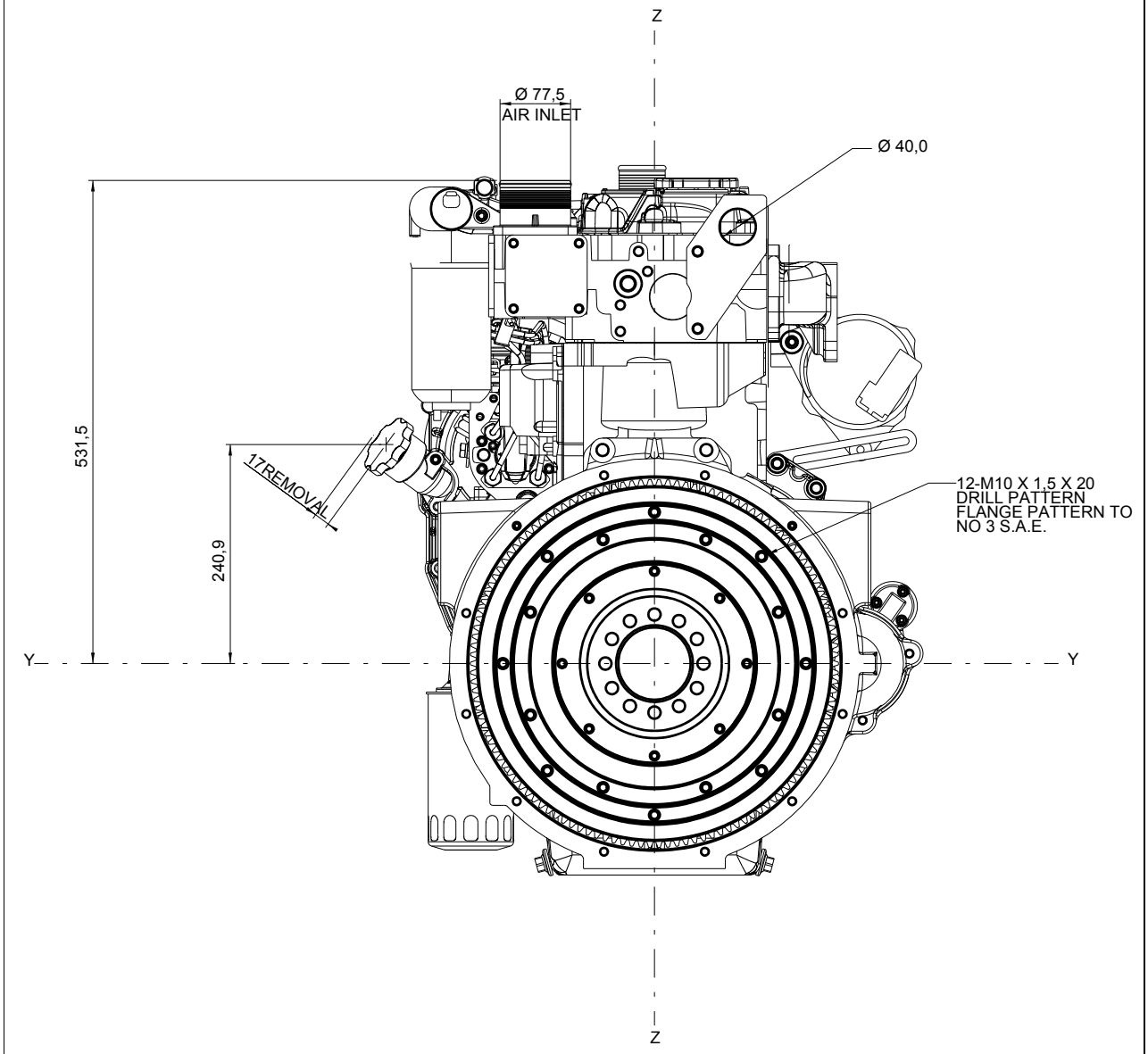
1104D-44 - Front view



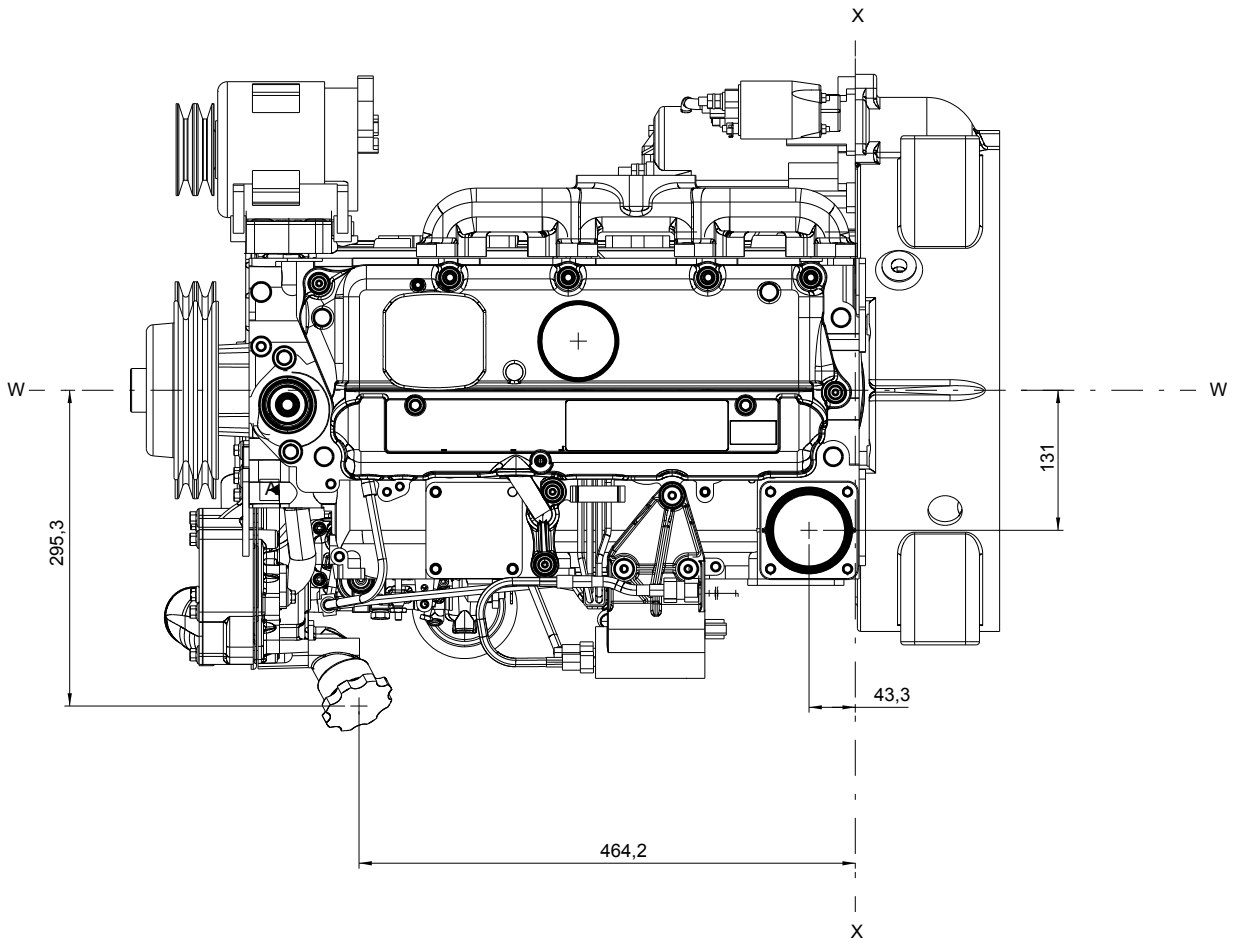
1104D-44 - Right view



1104D-44 - Rear view

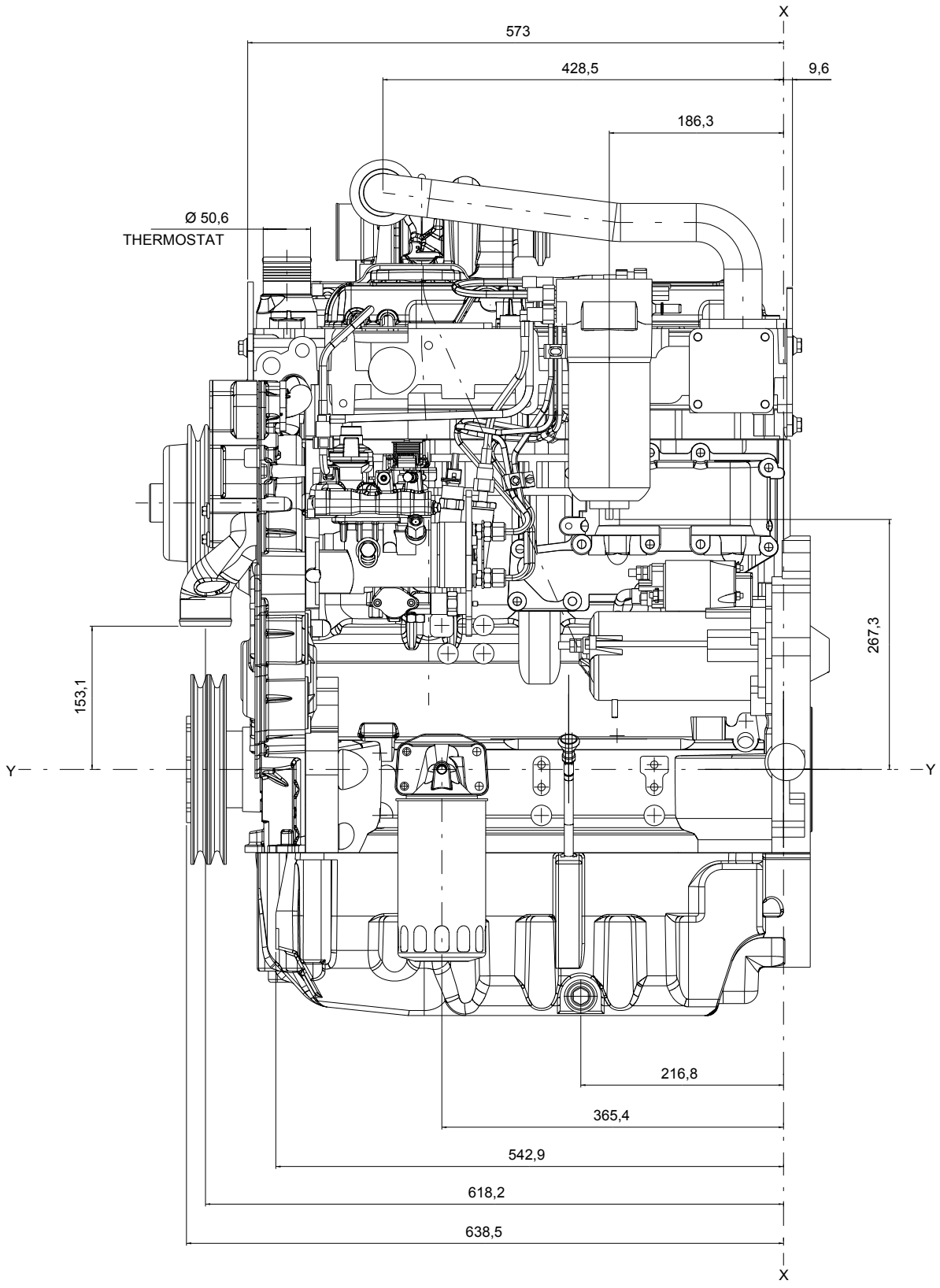


1104D-44 - Plan view

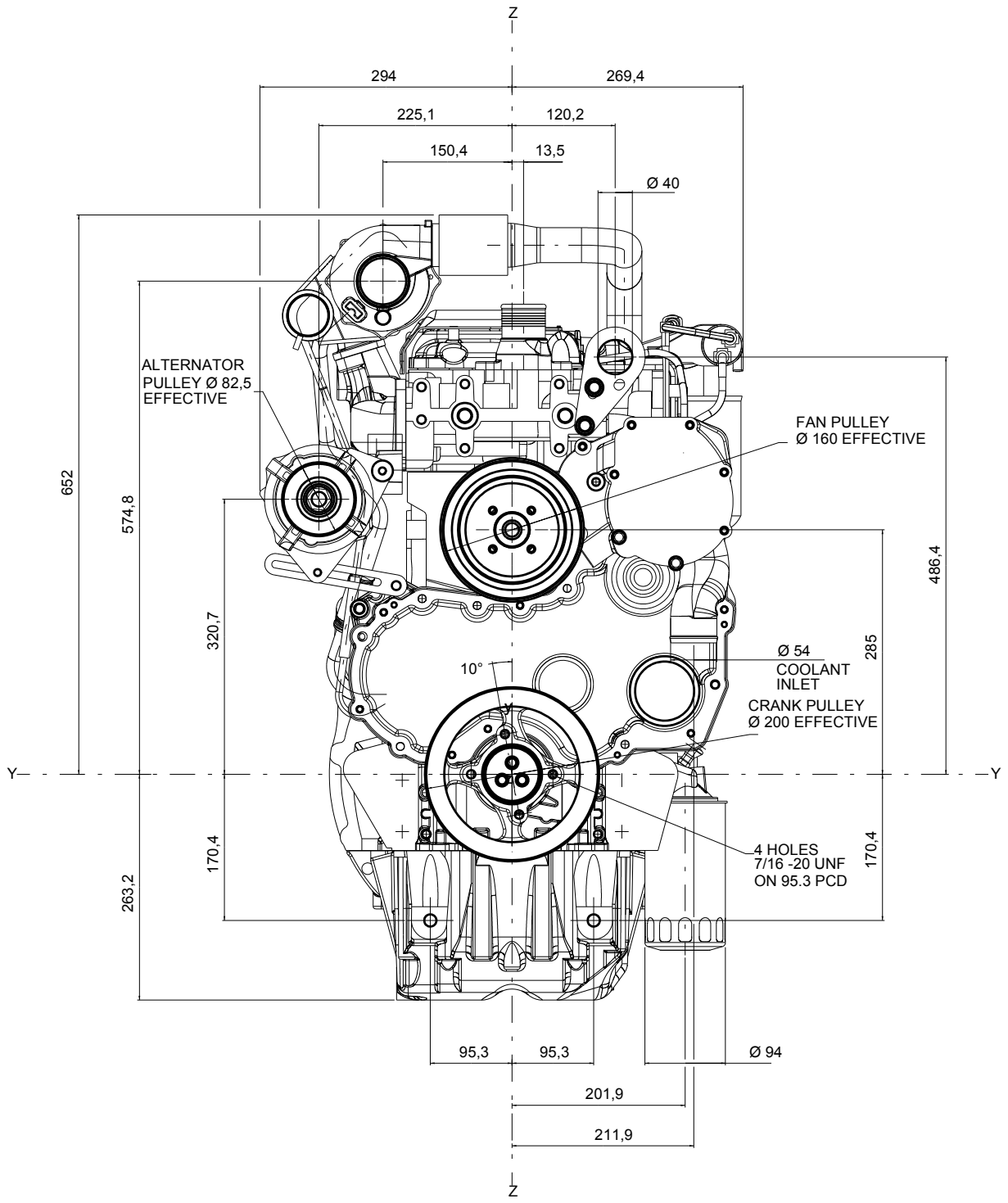


Top mounted turbocharger engines

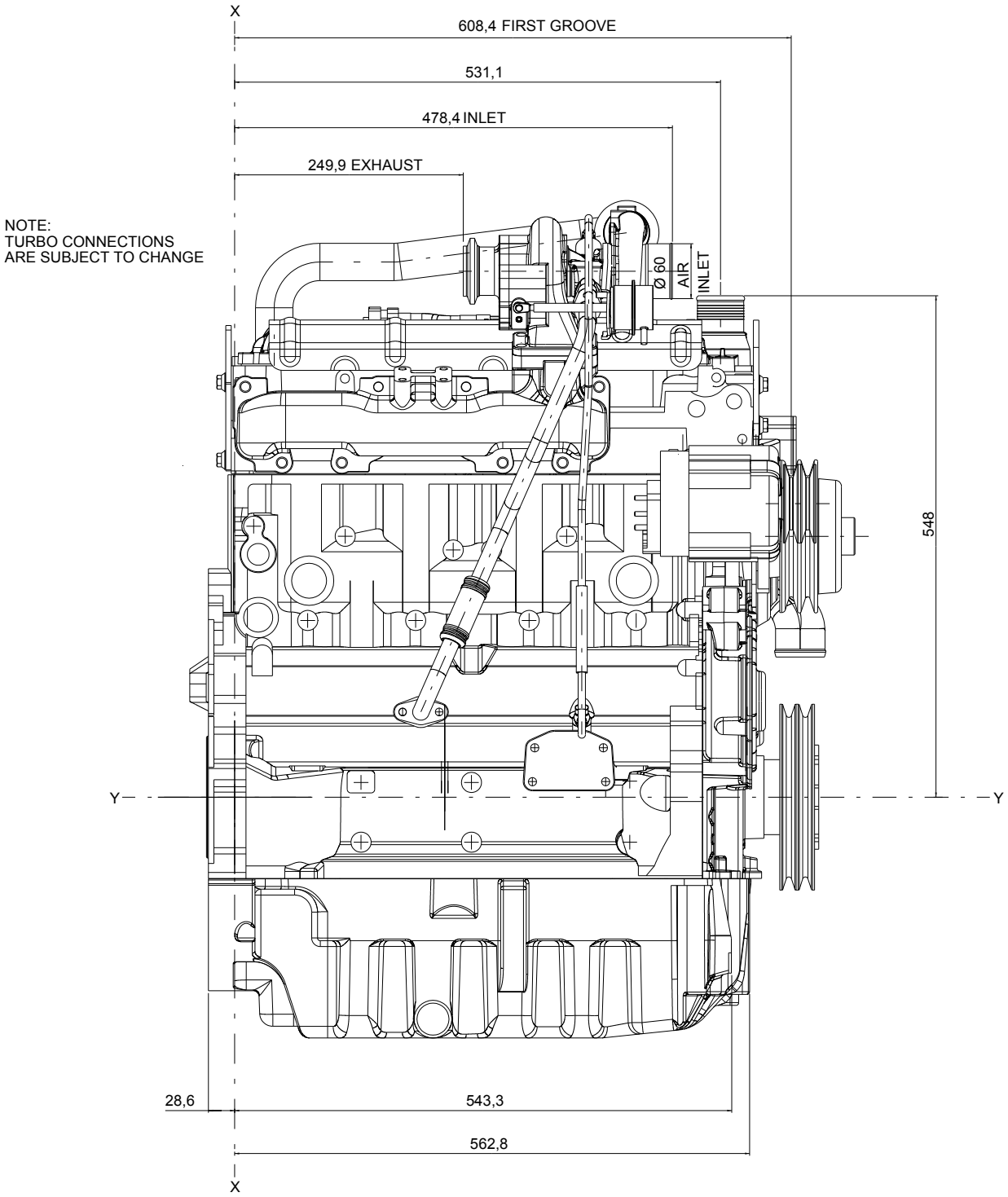
1104D-44T - Left view



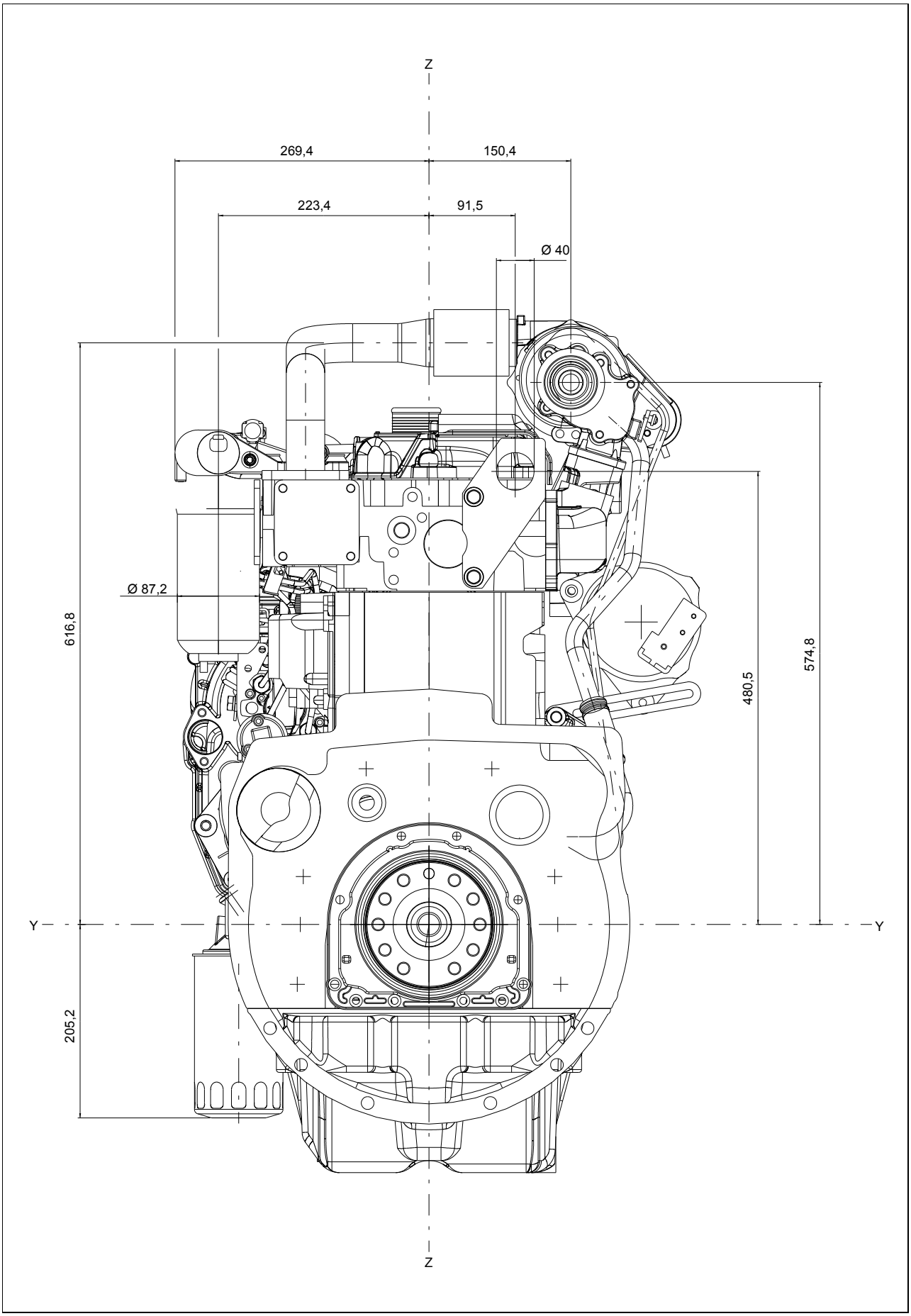
1104D-44T - Front view



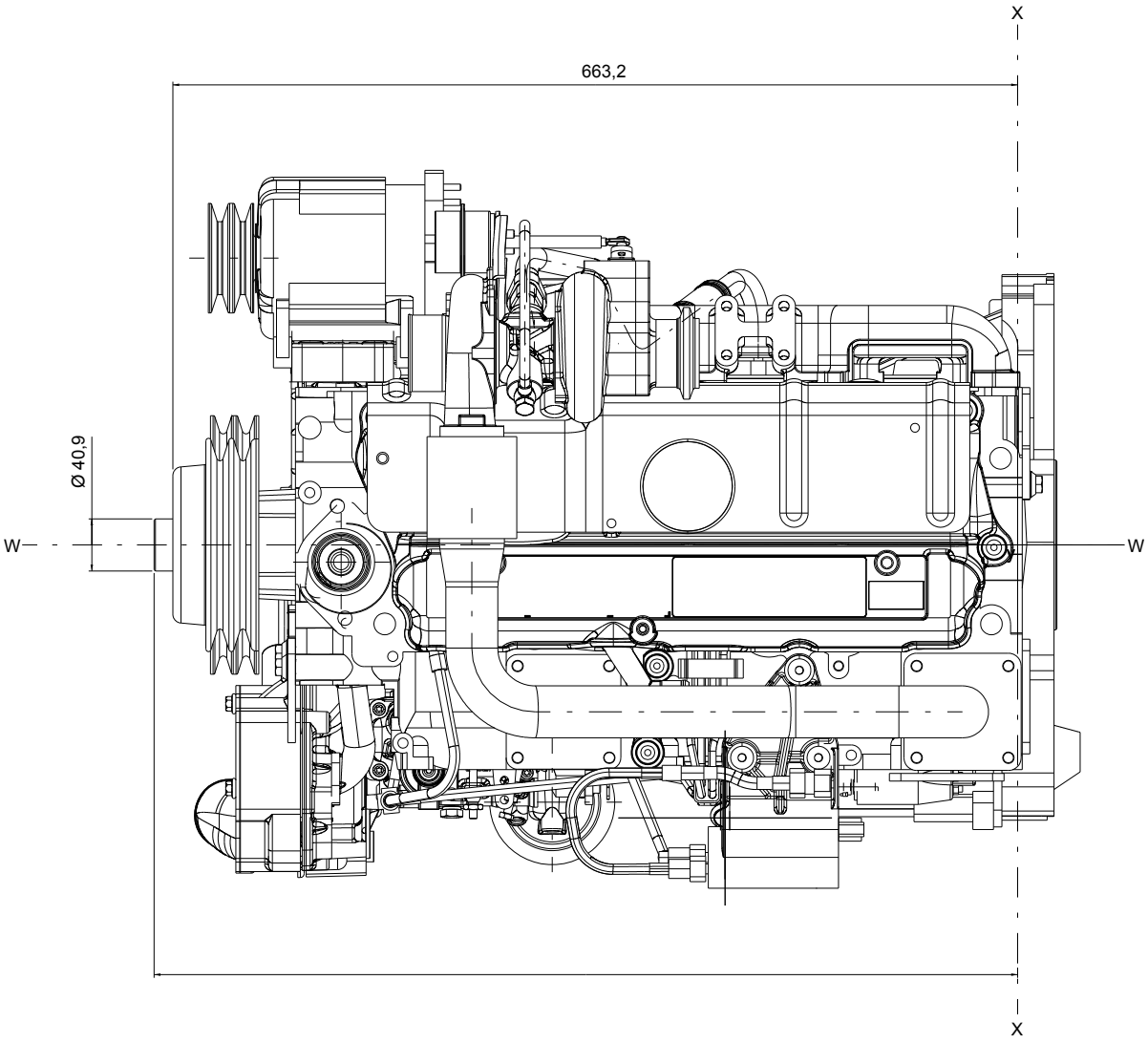
1104D-44T - Right view



1104D-44T - Rear view

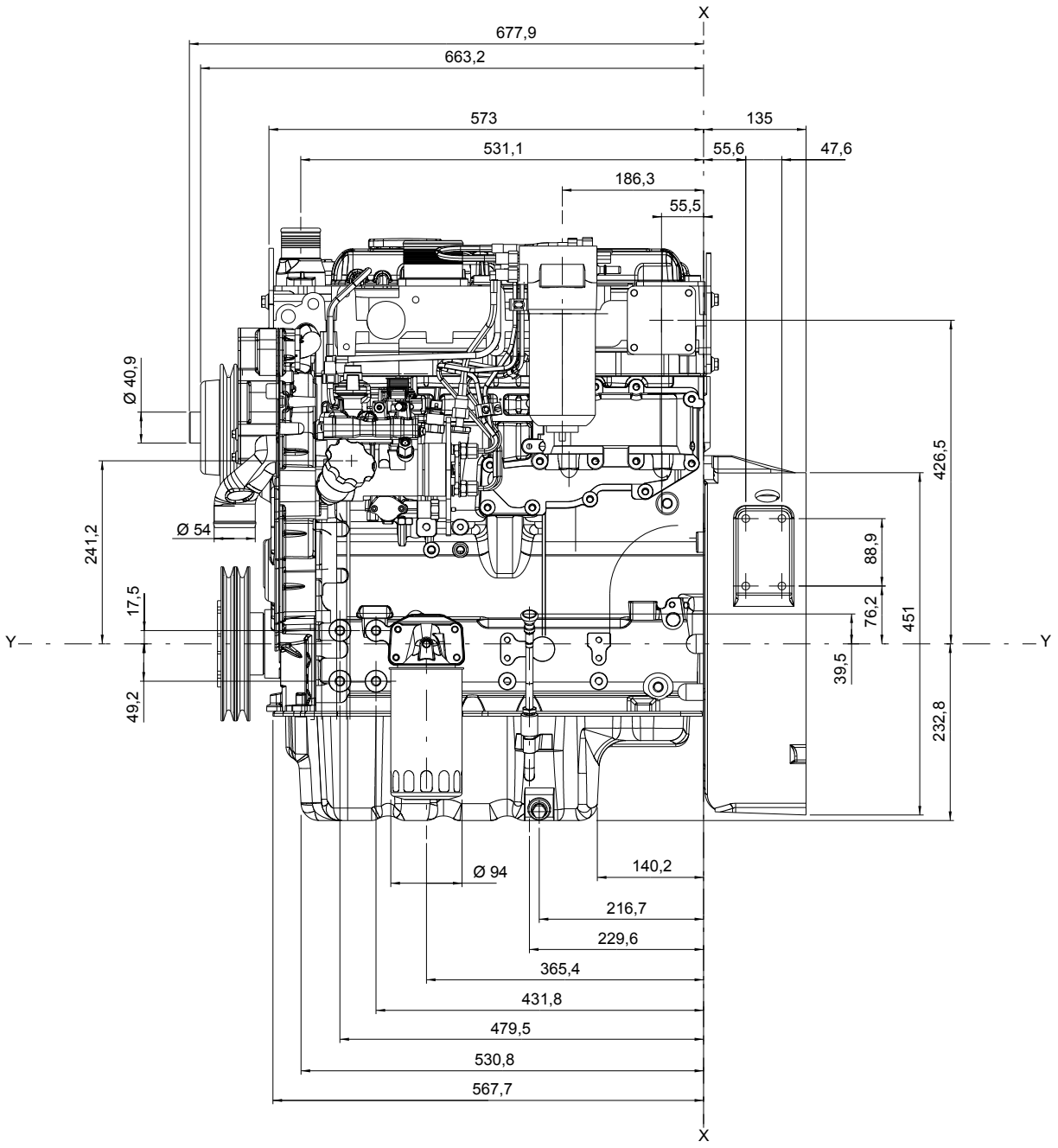


1104D-44T - Plan view

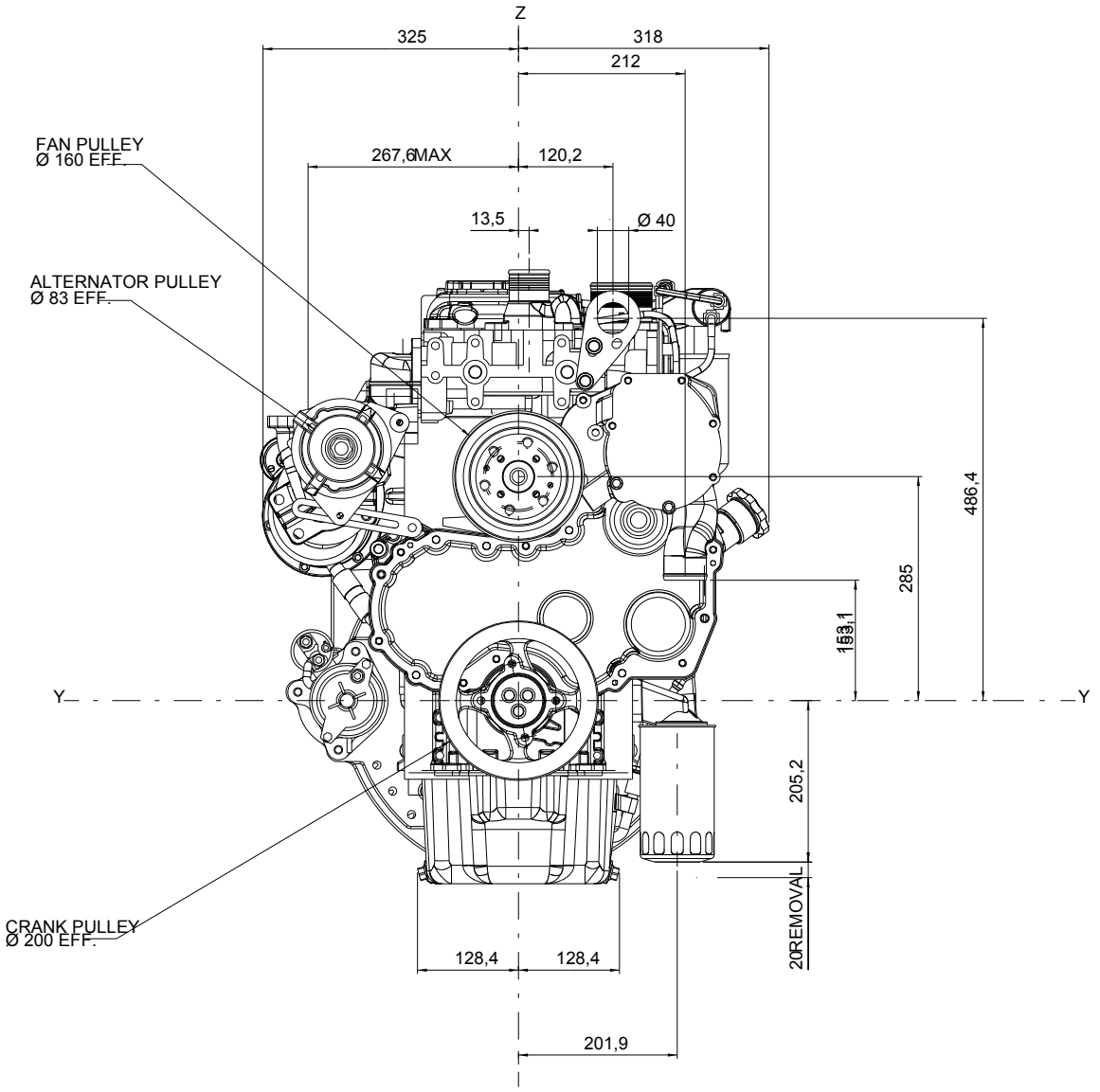


Side mounted turbocharger engines

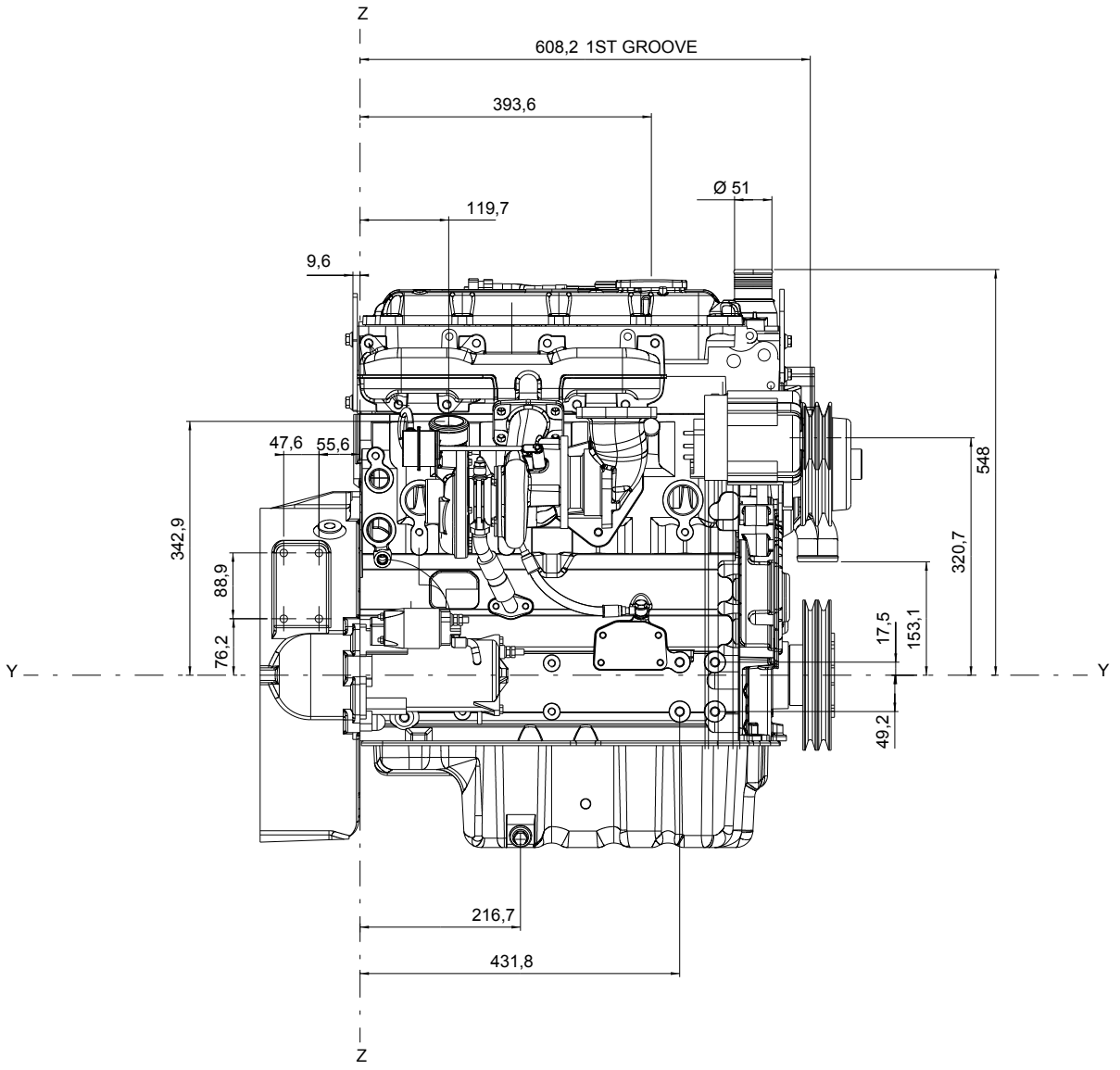
1104D-44TA - Left view



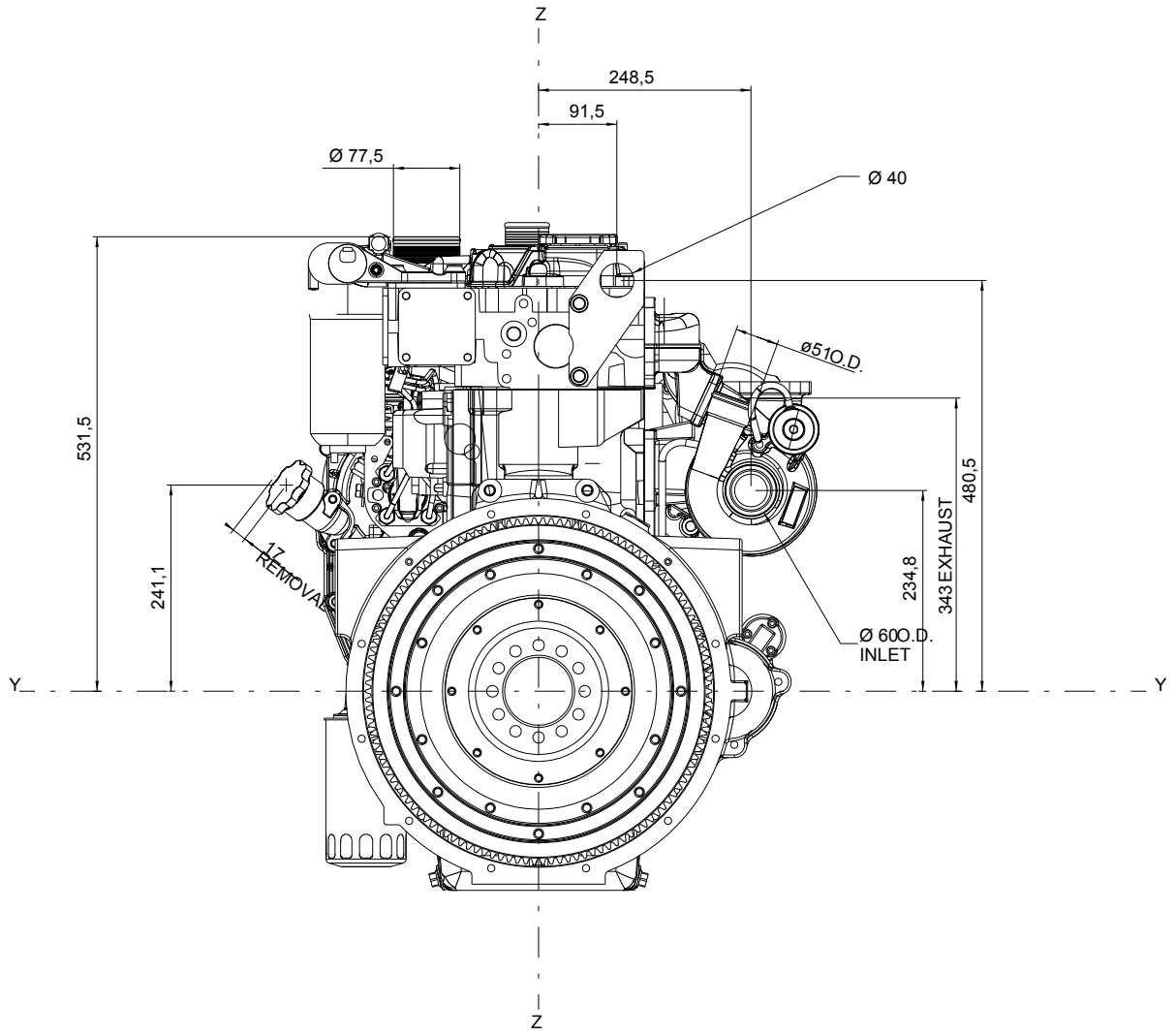
1104D-44TA - Front view



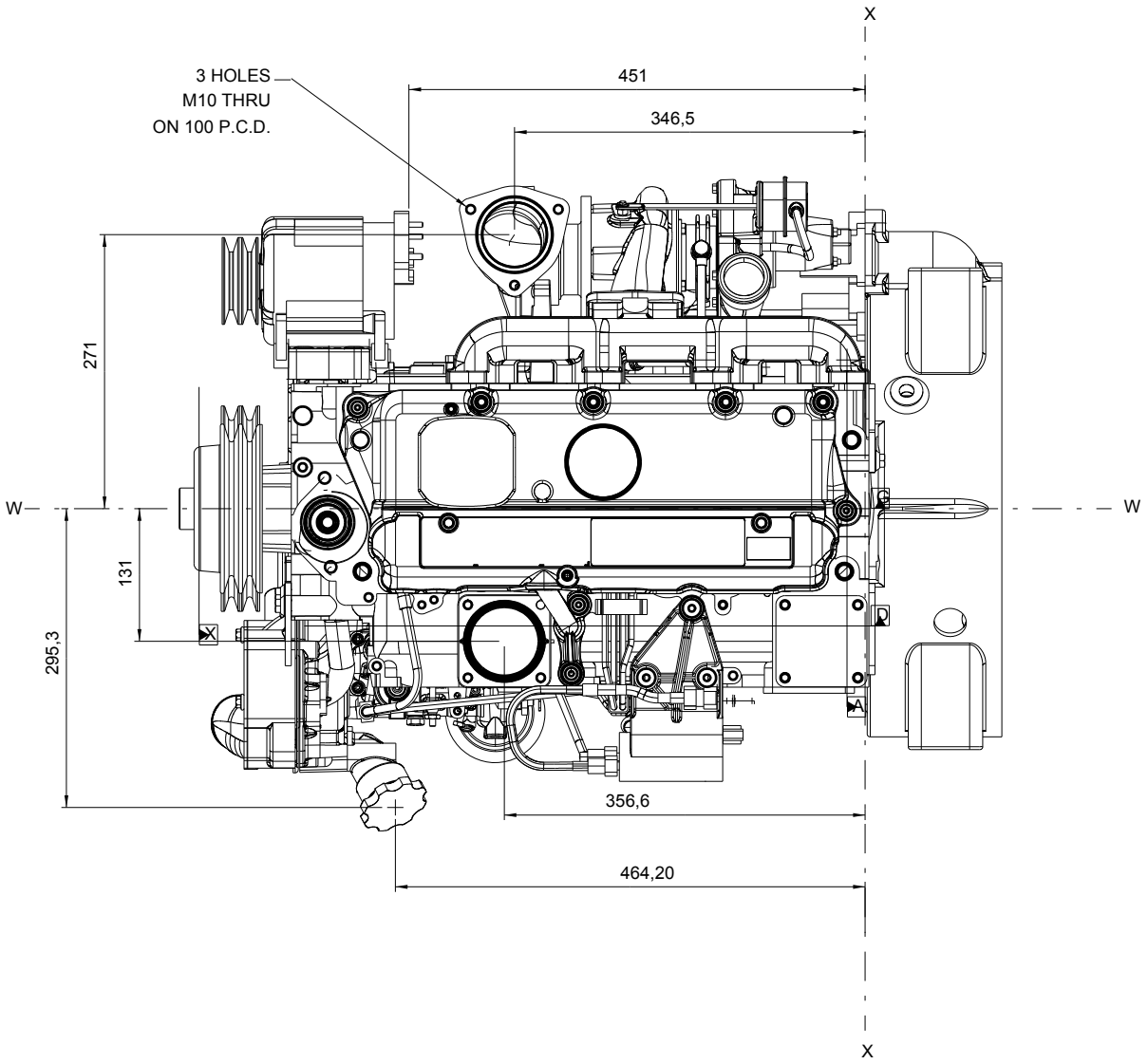
1104D-44TA - Right view



1104D-44TA - Rear view



1104D-44TA - Plan view



4

Options

Mechanical options

Introduction

This chapter contains all information relating to the options for the **1104D Mechanical FIE** engine range.

Before specifying an option read carefully any notes relating to the option as these will indicate any restrictions if this option is chosen.

Any notes relating to option selection and compatibility are only correct at the date of publication. Be aware that both product offerings and option compatibilities are subject to change or withdrawal at any time.

Maximum intermittent ratings

Naturally aspirated - non-balanced

Engine type	Max. rating kW (bhp) @ rev/min (1)	Torque Nm @ rev/min	Max. TBU %	Power curve	Option code
1104D-44	55.9 @ 2200	265 @ 1700	9.05	T2968	A0102

1. Intermittent is defined as cyclic power and/or speed, with maximum power being utilised for no more than one hour in any two hour period and the average load not exceeding the mechanical sign-off of the engine.

Naturally aspirated - balanced

Engine type	Max. rating kW (bhp) @ rev/min (1)	Torque Nm @ rev/min	Max. TBU %	Power curve	Option code
1104D-44	54.0 @ 2200	261 @ 1700	11.06	T2969	A0104

1. Intermittent is defined as cyclic power and/or speed, with maximum power being utilised for no more than one hour in any two hour period and the average load not exceeding the mechanical sign-off of the engine.

Notes:

- All ratings are available for 12 and 24 volt systems (24 volt systems use a dropper resistor on the Fuel injection shut off solenoid and the cold start advance
- All standard mechanical ratings are available with low idles of either 800 or 1000 rev/min, offered in 50 rev/min increments
- All ratings to ISO 14396 gross
- For power curves, see “Power curves” on page 167.
- Inlet restriction 3.0 kPa, exhaust back pressure 10 kPa (both at rated speed)
- All ratings approved to a maximum altitude of 600 metres
- The 1104D-44 product ***WILL NOT*** be certified to EPA Tier 3 emissions legislation
- The 1104D-44 ***WILL BE*** certified to EU Stage IIIA emissions legislation.

Turbocharged - non-balanced

Engine type	Max. rating kW (bhp) @ rev/min (1)	Torque Nm @ rev/min	Max. TBU %	Power curve	Option code
1104D-44T	57,5 @ 2200	309 @ 1400	24.10	T3060	A0202
	57,5 @ 2300	309 @ 1400	29.29	T3060	A0216
	57,5 @ 2400	309 @ 1400	34.93	T3060	A0201
	62.5 @ 2400	354 @ 1400	42.17	T2970	A0203
	62.5 @ 2200	354 @ 1400	30.15	T2970	A0204
	62.5 @ 2300	354 @ 1400	36.68	T2970	A0218
	66.0 @ 2200	370 @ 1400	28.92	T3360	A0214
	66.0 @ 2300	370 @ 1400	35.53	T3360	A0215
	70.0 @ 2200	392 @ 1400	29.37	T2978	A0205
	70.0 @ 2300	392 @ 1400	35.17	T2978	A0220
	74.5 @ 2200	392 @ 1400	21.36	T3066	A0223 (2)
	74.5 @ 2300	392 @ 1400	26.86	T3066	A0222 (2)

1. Intermittent is defined as cyclic power and/or speed, with maximum power being utilised for no more than one hour in any two hour period and the average load not exceeding the mechanical sign-off of the engine.
2. Restricted to a maximum altitude of 2,250 m in heavy duty applications.

Turbocharged - balanced

Engine type	Max. rating kW (bhp) @ rev/min (1)	Torque Nm @ rev/min	Max. TBU %	Power curve	Option code
1104D-44T	55.5 @ 2200	307 @ 1400	27.39	T3061	A0207
	55.5 @ 2300	307 @ 1400	32.90	T3061	A0217
	55.5 @ 2400	307 @ 1400	38.91	T3061	A0206
	60.5 @ 2400	352 @ 1400	46.06	T2971	A0208
	60.5 @ 2300	352 @ 1400	40.24	T2971	A0219
	60.5 @ 2200	352 @ 1400	33.84	T2971	A0209
	72,0 @ 2300	390 @ 1400	29.57	T3067	A0224 (2)
	72,5 @ 2200	390 @ 1400	23.81	T3067	A0225 (2)
	68.0 @ 2200	390 @ 1400	32.20	T2979	A0210
	68.0 @ 2300	390 @ 1400	38.30	T2979	A0221

1. Intermittent is defined as cyclic power and/or speed, with maximum power being utilised for no more than one hour in any two hour period and the average load not exceeding the mechanical sign-off of the engine.
2. Restricted to a maximum of 2,250 m in heavy duty applications.

Notes:

- All ratings are available for 12 and 24 volt systems (24 volt systems use a dropper resistor on the Fuel injection shut off solenoid and the cold start advance
- All standard mechanical ratings are available with low idles of either 800 or 1000 rev/min, offered in 50 rev/min increments
- All ratings to ISO 14396 gross
- All ratings to EPA Tier 3 and EU Stage IIIA certification
- For power curves, see “Power curves” on page 167.
- Inlet restriction 5 kPa, exhaust back pressure 15 kPa (both at rated speed)
- All ratings approved to a maximum altitude of 3000 metres unless stated.

Turbocharged, air to air charge cooled - non-balanced

Engine type	Max. rating kW (bhp) @ rev/min (1)	Torque Nm @ rev/min	Max. TBU %	Power curve	Option code
1104D-44TA	70.0 @ 2200	395 @ 1400		T3500	A0326
	70.0 @ 2300	395 @ 1400		T3500	A0327
	74.5 @ 2200	410 @ 1400	26.54	T3056	A0306
	74.5 @ 2200	405 @ 1400		T3496	A0324
	74.5 @ 2300	410 @ 1400	32.26	T3056	A0320
	74.5 @ 2400	410 @ 1400	38.51	T3056	A0305
	83.0 @ 2200	418 @ 1400	16.11	T3058	A0307
	83.0 @ 2300	418 @ 1400	21.16	T3058	A0323

1. Intermittent is defined as cyclic power and/or speed, with maximum power being utilised for no more than one hour in any two hour period and the average load not exceeding the mechanical sign-off of the engine.

Turbocharged, air to air charge cooled - balanced

Engine type	Max. rating kW (bhp) @ rev/min (1)	Torque Nm @ rev/min	Max. TBU %	Power curve	Option code
1104D-44TA	68.0 @ 2200	393 @ 1400		T3055	A0328
	68.0 @ 2300	393 @ 1400		T3055	A0329
	74.9 @ 2200	412 @ 1400	26.77	T2972	A0310
	74.9 @ 2200	405 @ 1400		T3499	A0325
	81.0 @ 2200	416 @ 1400	18.18	T3059	A0315
	81.0 @ 2300	416 @ 1400	23.44	T3059	A0322

1. Intermittent is defined as cyclic power and/or speed, with maximum power being utilised for no more than one hour in any two hour period and the average load not exceeding the mechanical sign-off of the engine.

Notes:

- All ratings are available for 12 and 24 volt systems (24 volt systems use a dropper resistor on the Fuel injection shut off solenoid and the cold start advance
- All standard mechanical ratings are available with low idles of either 800 or 1000 rev/min, offered in 50 rev/min increments
- All ratings to ISO 14396 gross
- All ratings to EPA Tier 3 and EU Stage IIIA certification
- For power curves, see “Power curves” on page 167.
- Inlet restriction 5 kPa, exhaust back pressure 15 kPa (both at rated speed)
- All ratings approved to an altitude of 3000 metres
- An 87 kW (unbalanced) rating may be made available in 2008, subject to committed Customer interest. Please contact NPI Product Marketing (Peterborough) for further details.

ECM

Description	Option
Not required (mechanical engines only)	AM000

Adaptor plate

Description	Option
Not required	B0000

Flywheel housings

Non-stressed cylinder block

Description	Option
Not required, customer to supply housing with LHS starter (1)	C0050
Not required, customer to supply housing with RHS starter	C0051
Cast iron SAE 3, 156,4 mm (6.16 in) deep, RHS starter	C0001
Cast iron SAE 3, 135,0 mm (5.32 in) deep, RHS starter	C0002
Adaptor plate for combine harvesters, RHS starter	C0006
Cast iron SAE 3, 135,0 mm (5.32 in) deep, LHS starter (2)	C0010
Cast iron SAE 2, 156,4 mm (6.16 in) deep, LHS or RHS starter (2) (3)	C0021
Cast iron SAE 3, 156,4 mm (6.16 in) deep, RHS starter *as **C0001** less torque convertor access hole*	C0022
Cast iron SAE 3, 84,0 mm (3.31 in) deep, LHS starter (4) *for use as a non sealed housing*	C0026
Cast iron SAE 3, 135,0 mm (5.32 in) deep, RHS starter with adaptor to convert from SAE 3 to SAE 4	C0027
Cast iron SAE 3, 84,0 mm (3.31 in) deep, RHS starter	C0030
Cast iron SAE 3, 84,0 mm (3.31 in) deep, RHS starter *as **C0030** with different speed sensor tapping and different starter tappings*	C0031
Cast iron SAE 3, 81,0 mm (3.18 in) deep, LHS starter (2) *for use as a non sealed housing*	C0033
Cast iron SAE 3, 135,0 mm (5.32 in) deep, RHS starter (5)	C0036
Cast iron SAE 3, 156,4 mm (6.16 in) deep, RHS starter (5)	C0037

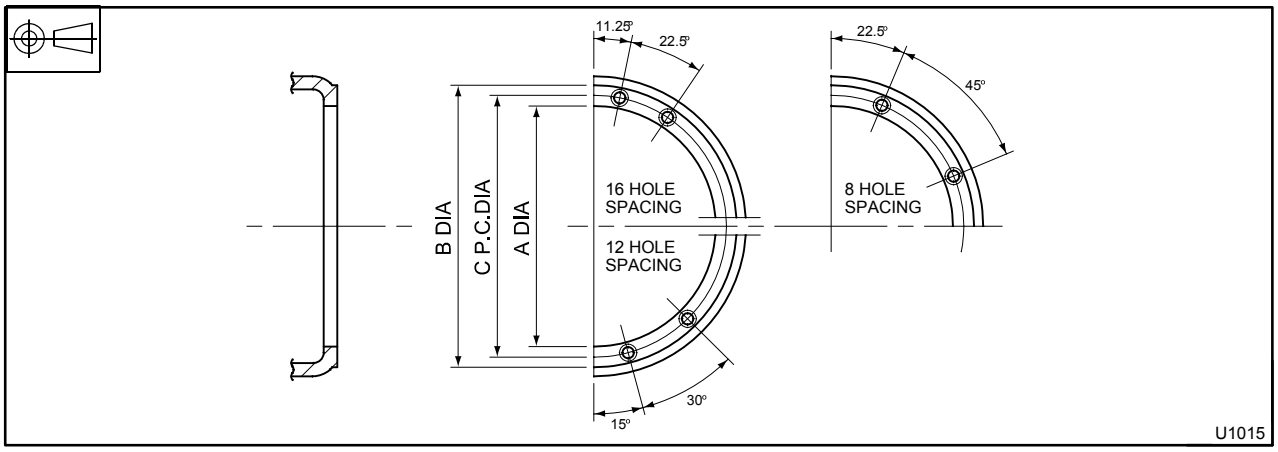
1. Incompatible with D0008/D0014/D0048/D0055/D0056/D0062/D0066/D0067/D0068.
2. Incompatible with J0021/J0060/J0061 when E0301 is selected.
3. Available with RHS starter only E0311 and E0201 only.
4. Compatible with flywheel D0000/D0008/D0014/D0048, incompatible with Q**38 when starter motor selected.
5. Incompatible with G03**.

Stressed cylinder block

Description	Option
Not required, starter spigot on LHS in block (1)	C1000

1. Incompatible with S3171, ZY004/ZY014/ZY024 when LHS starter selected.

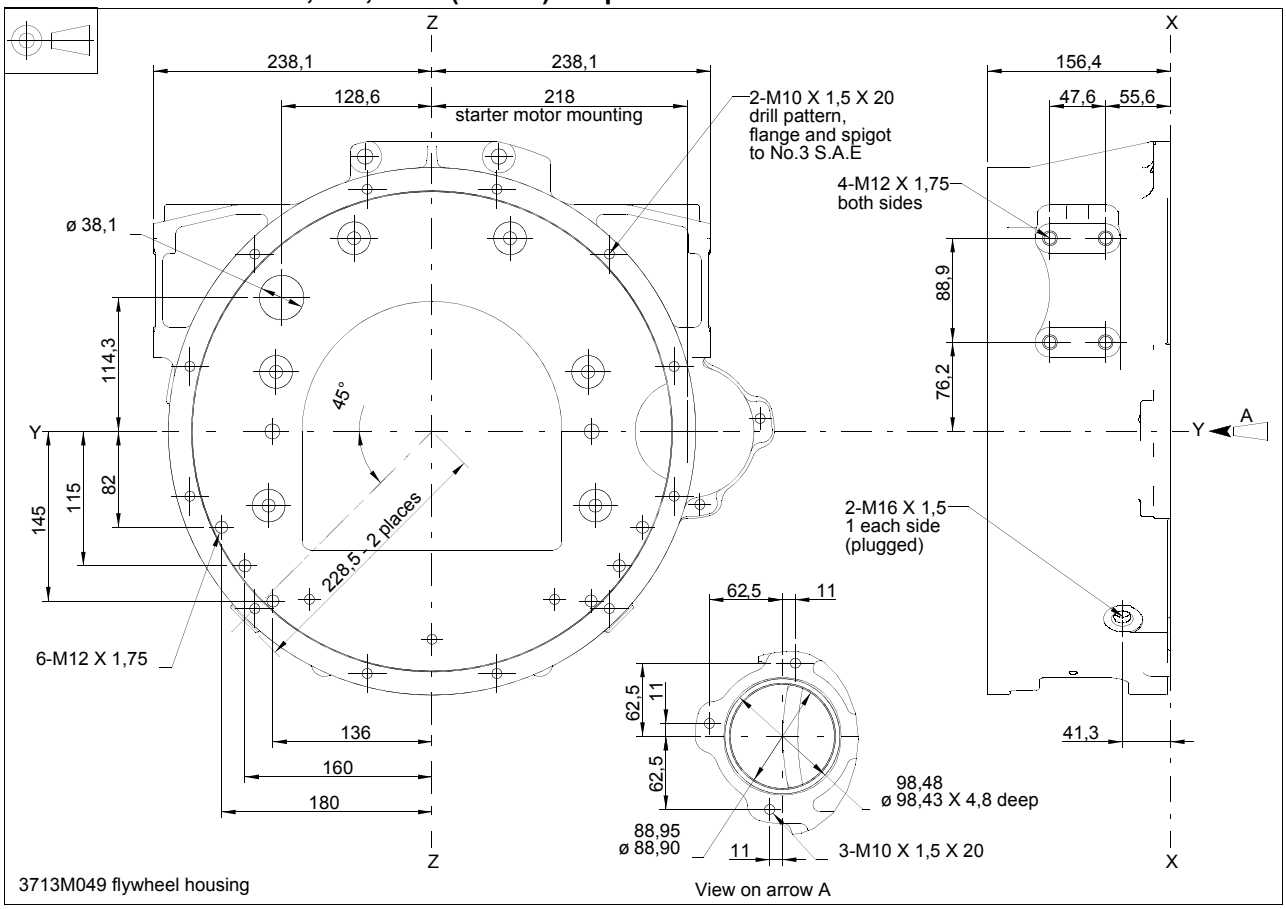
Flywheel housing design



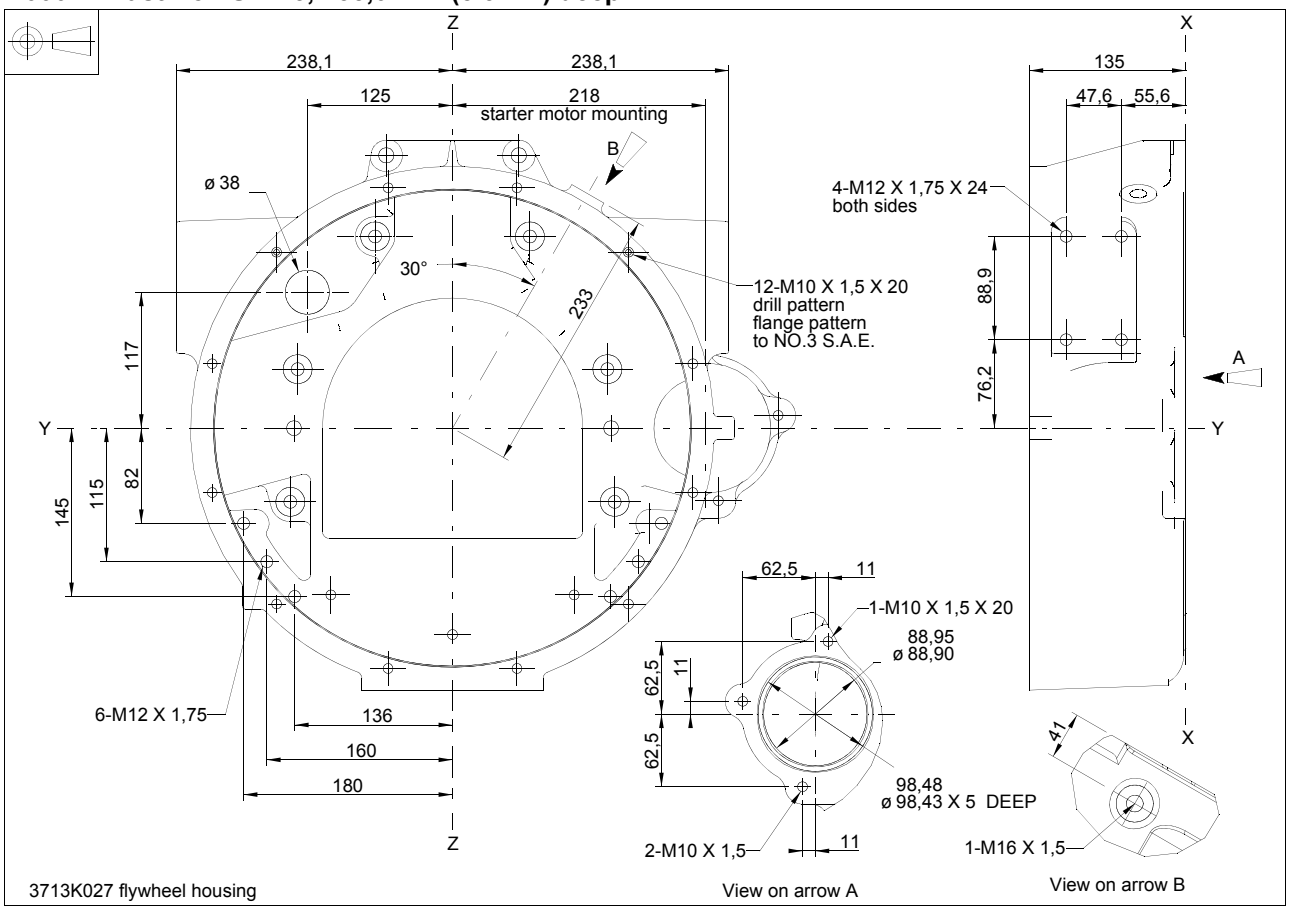
Note: If a bell housing or similar component is to fitted to a flywheel housing in this chapter, refer to the data in the table below.

SAE number	'A' diameter mm (in)		'B' diameter mm (in)	'C' diameter mm (in)	Tapped holes	
	Nominal size	Tolerance -0.000 to			Quantity	Size mm
3	409,6 (16.125)	+0,13 (+0.005)	450,9 (17.75)	428,6 (16.875)	12	10
2	447,7 (17.625)	+0,13 (+0.005)	489,0 (19.25)	466,7 (18.375)	12	10

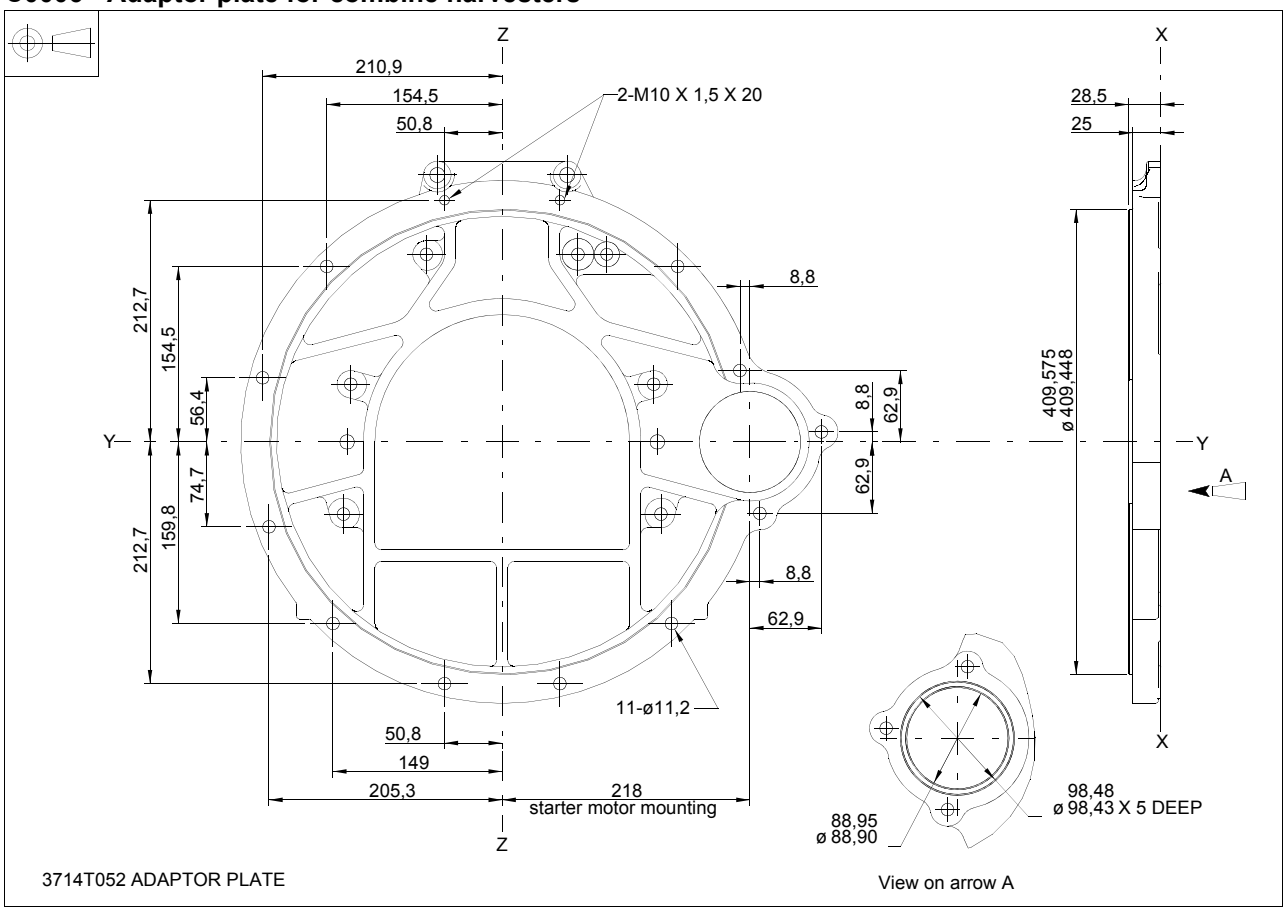
C0001 - Cast iron SAE 3, 156,4 mm (6.16 in) deep



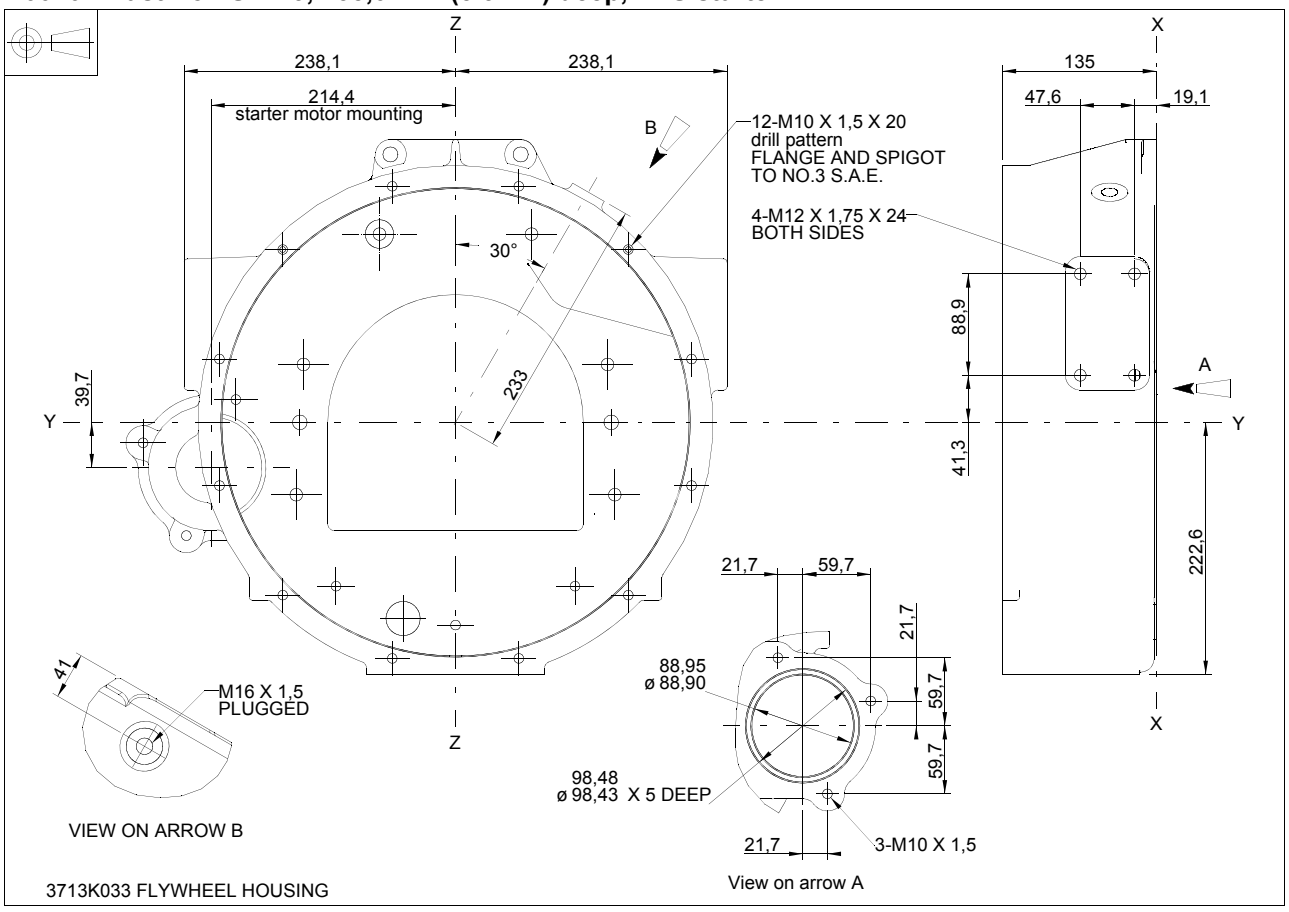
C0002 - Cast iron SAE 3, 135,0 mm (5.32 in) deep



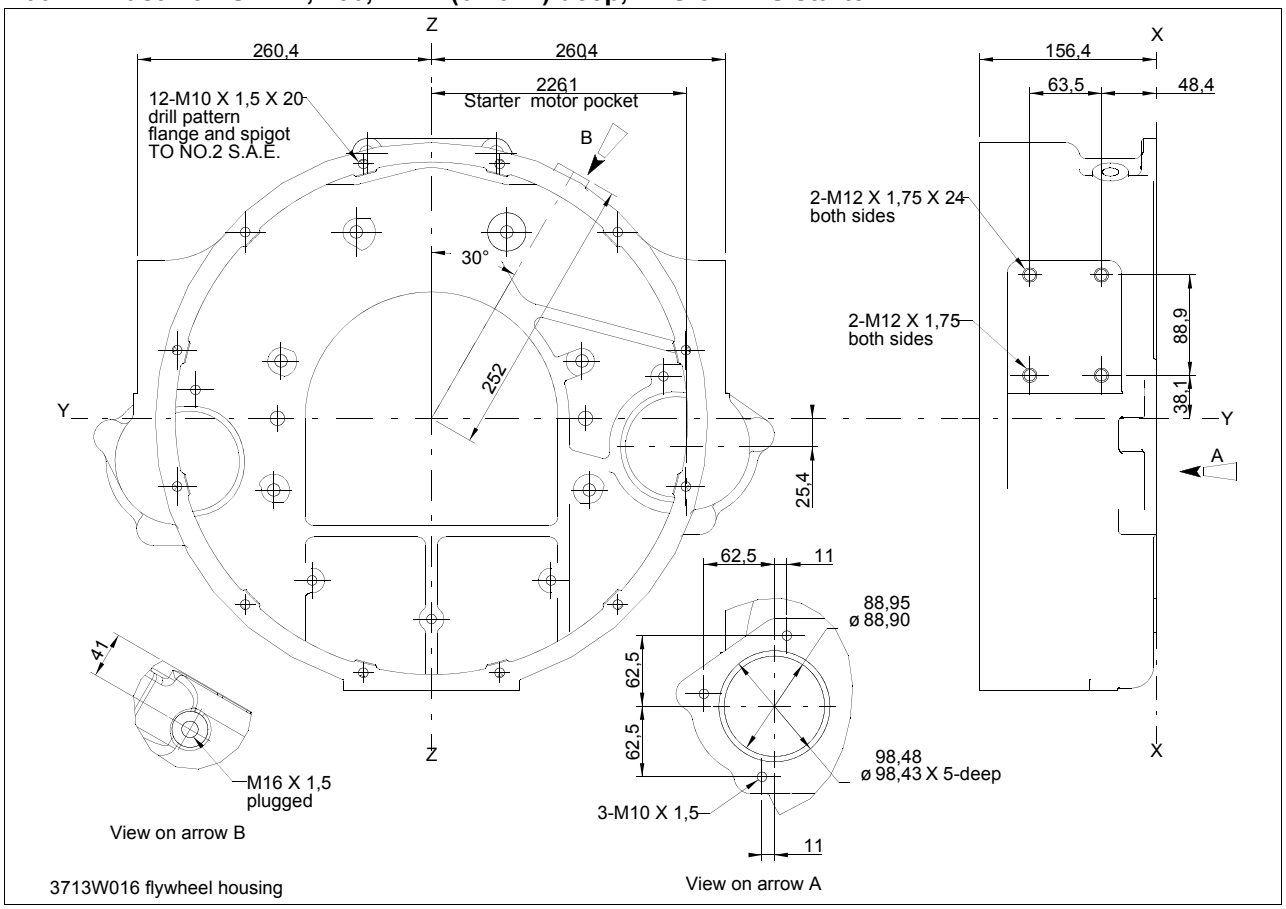
C0006 - Adaptor plate for combine harvesters



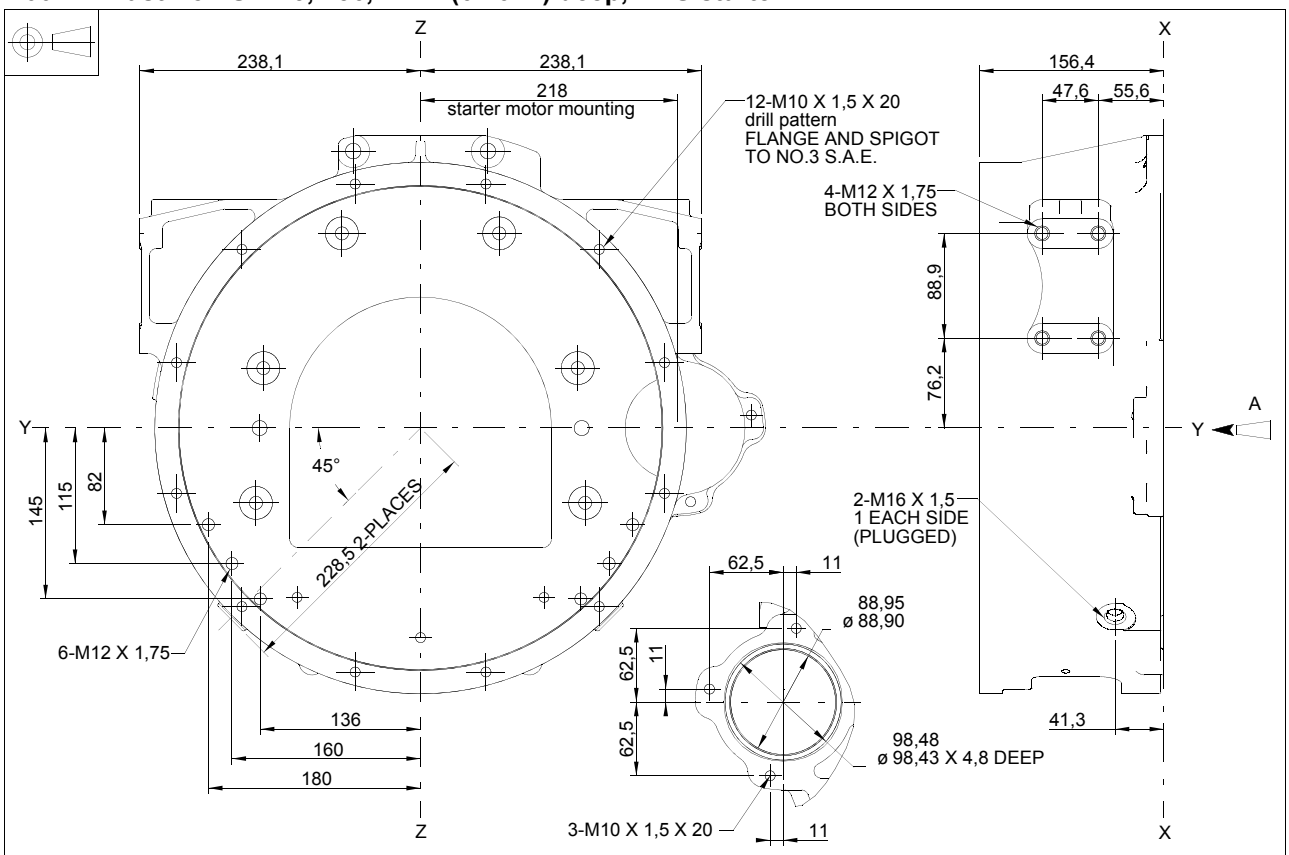
C0010 - Cast iron SAE 3, 135,0 mm (5.32 in) deep, LHS starter



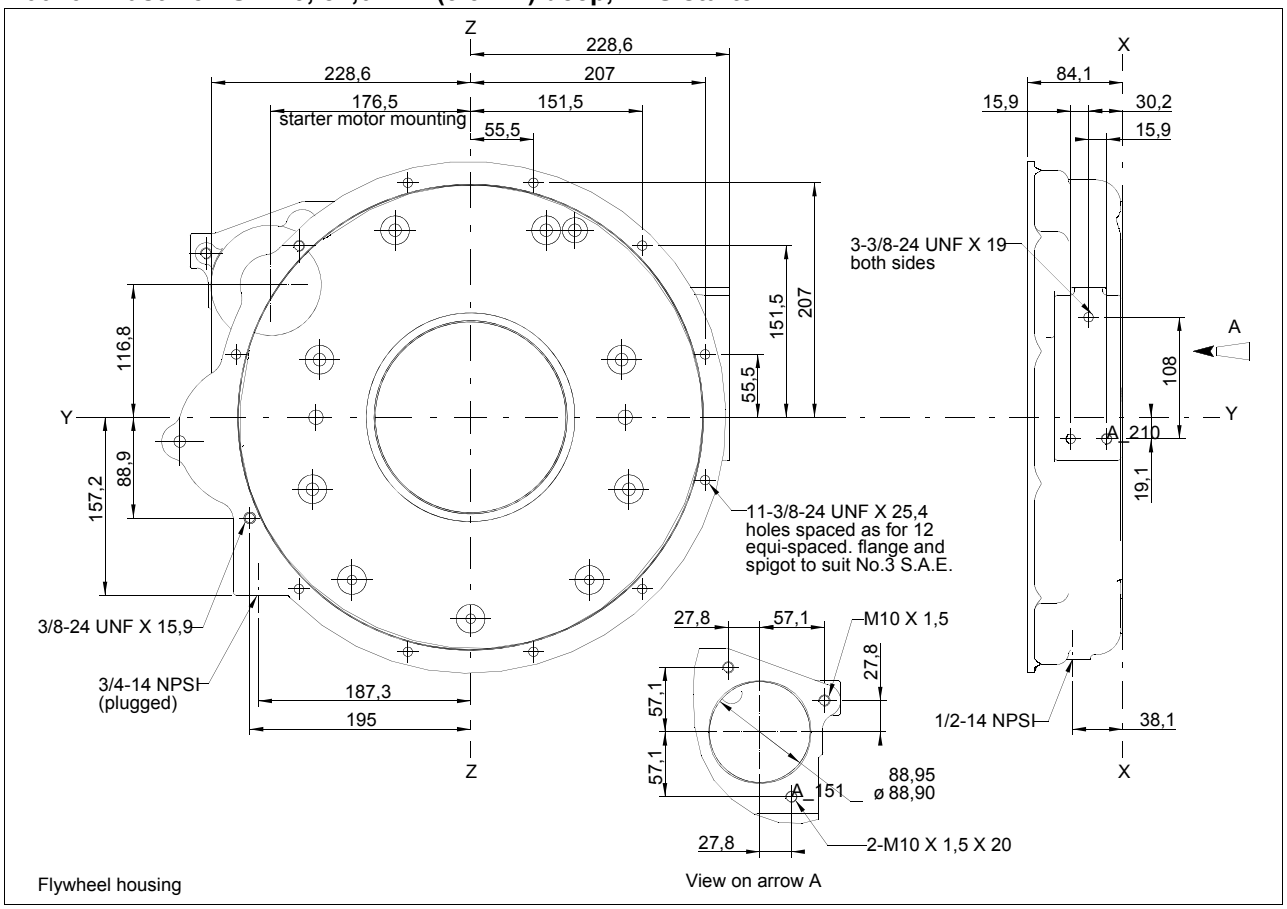
C0021 - Cast iron SAE 2, 156,4 mm (6.16 in) deep, LHS or RHS starter



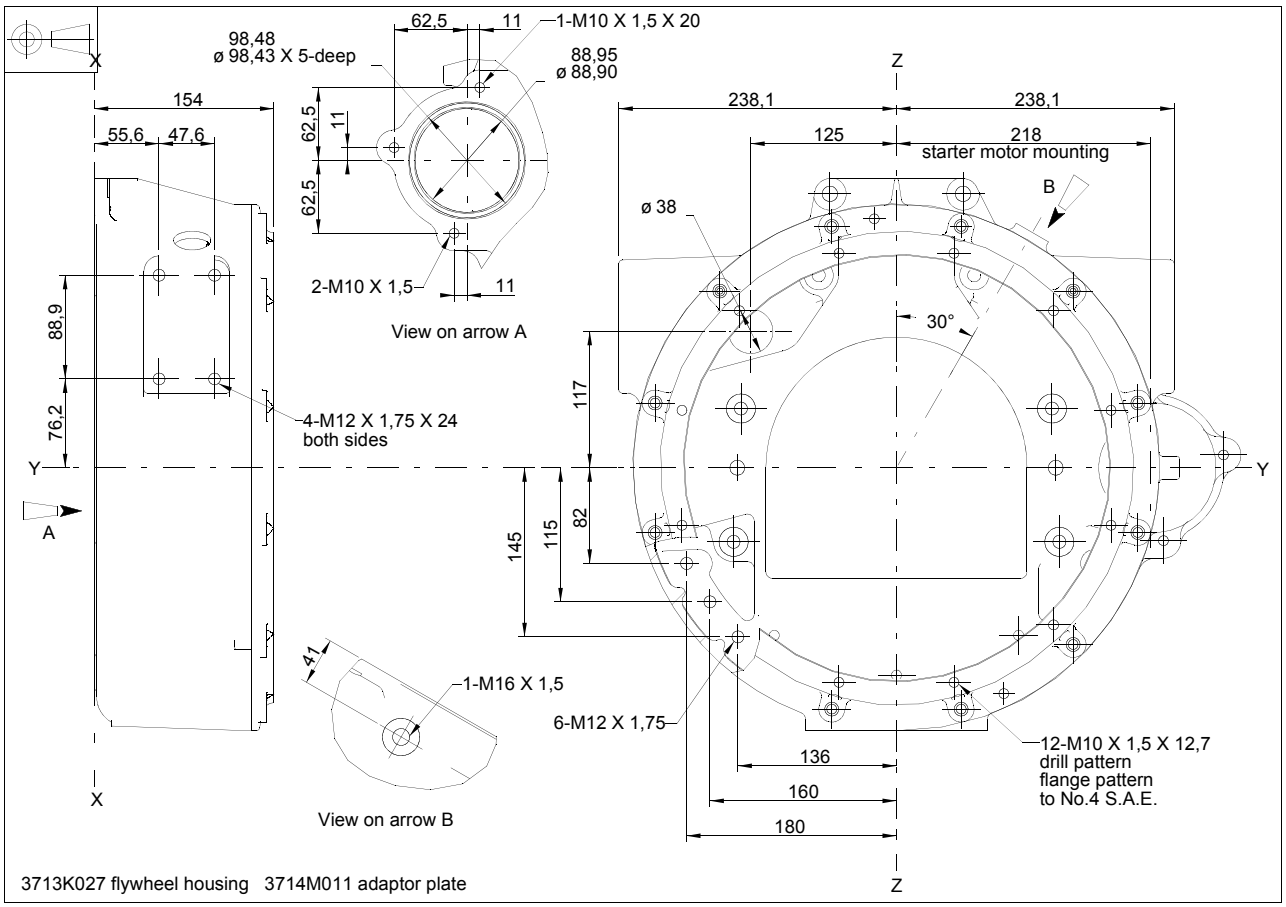
C0022 - Cast iron SAE 3, 156,4 mm (6.16 in) deep, RHS starter



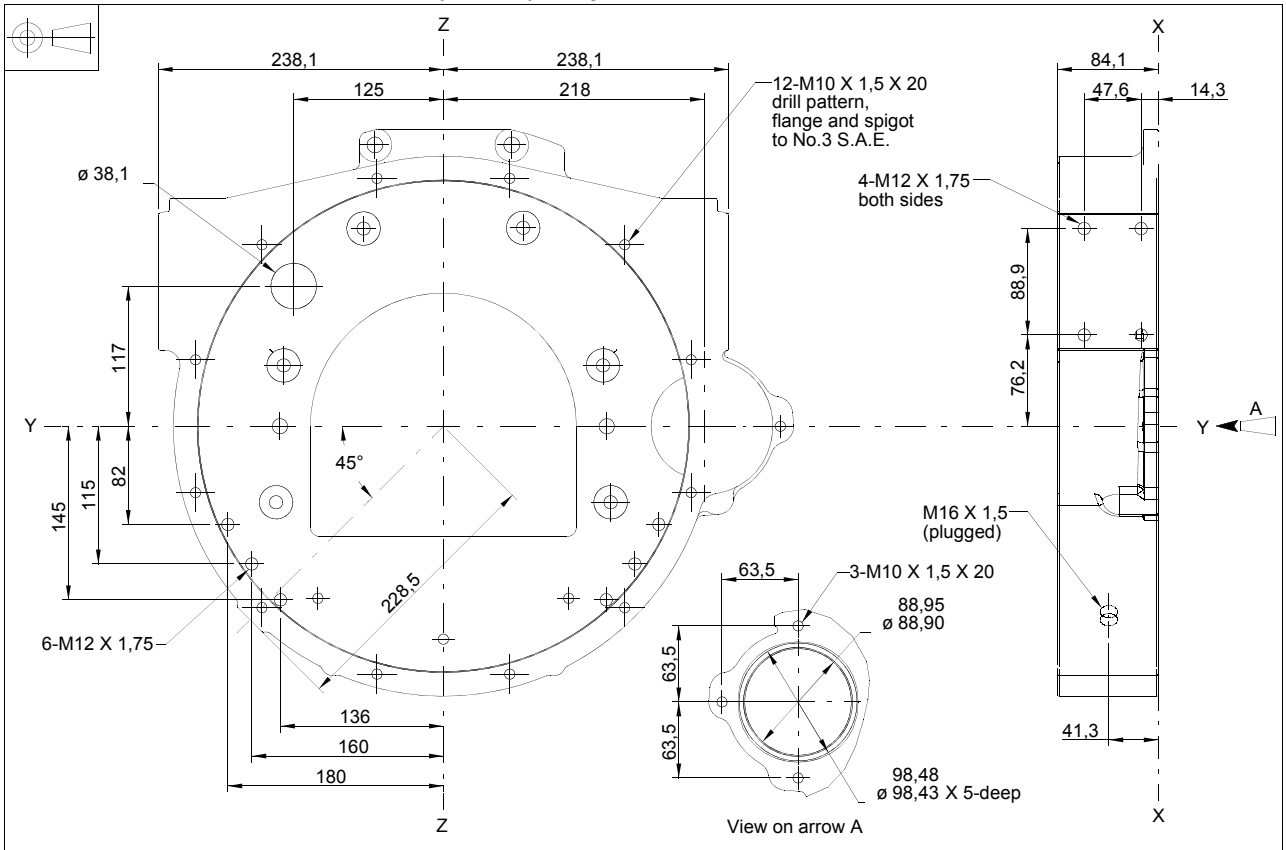
C0026 - Cast iron SAE 3, 84,0 mm (3.31 in) deep, LHS starter



C0027 - Cast iron SAE 3, 135,0 mm (5.32 in) deep, RHS starter, with adaptor to convert from SAE 3 to SAE 4

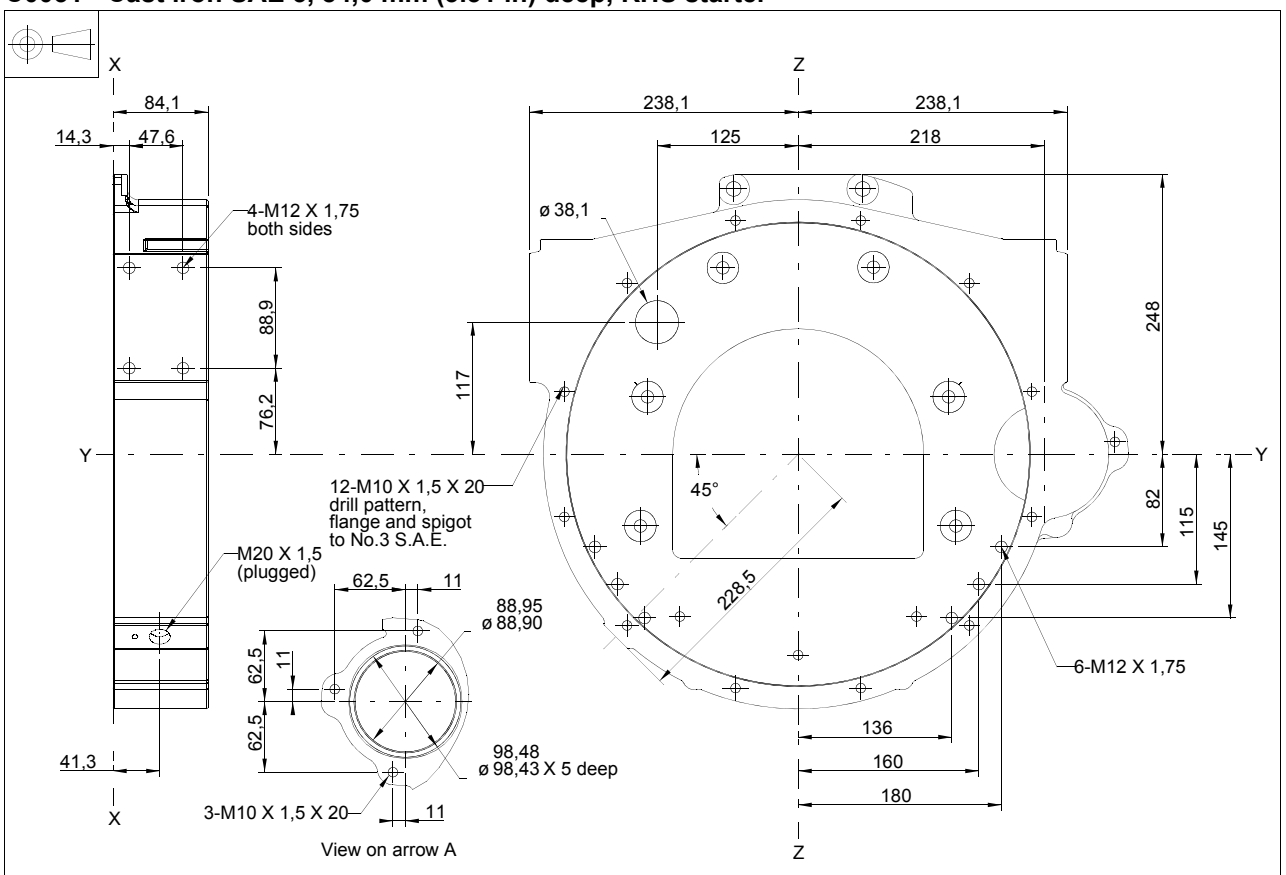


C0030 - Cast iron SAE 3, 84,0 mm (3.31 in) deep, RHS starter



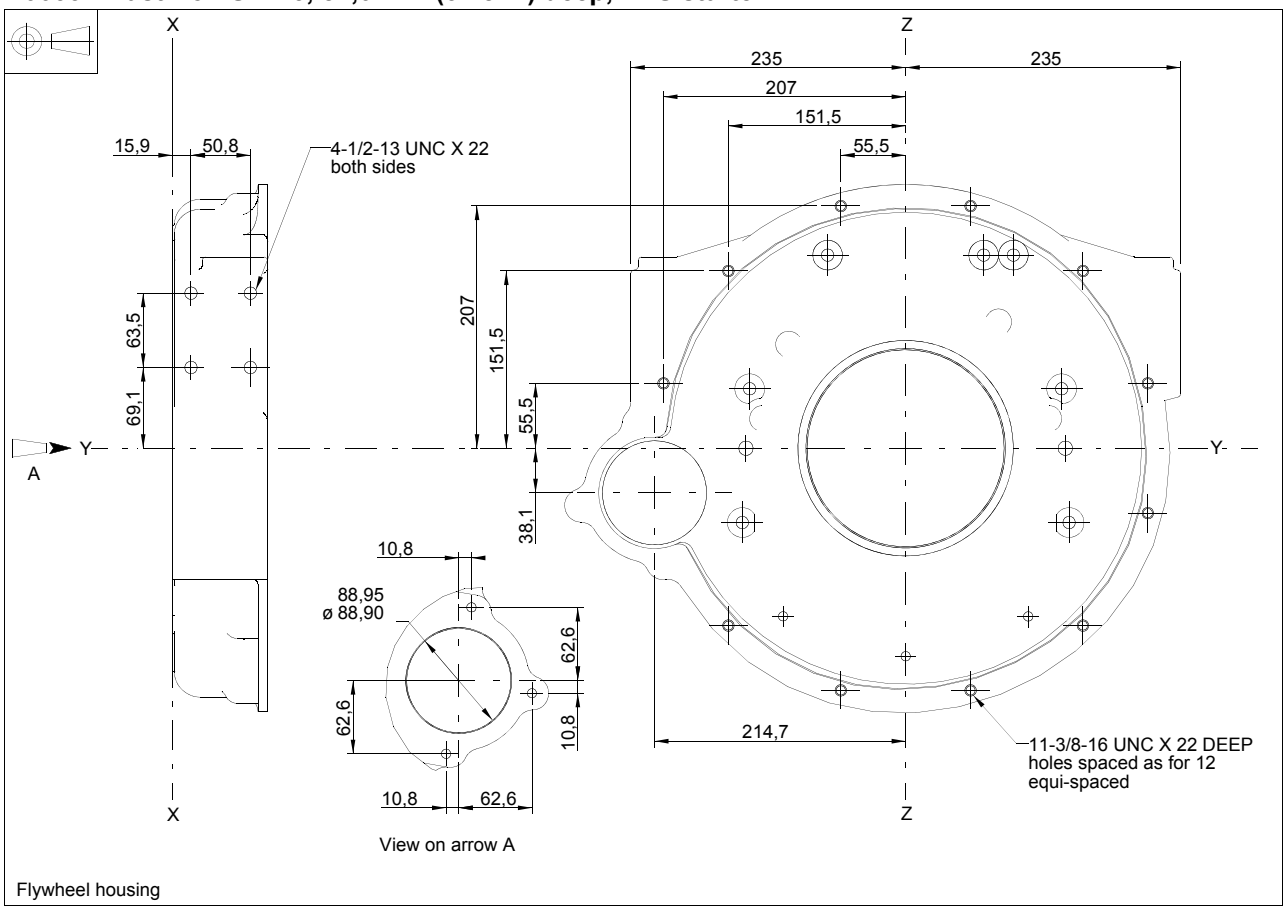
3713K065 flywheel housing

C0031 - Cast iron SAE 3, 84,0 mm (3.31 in) deep, RHS starter

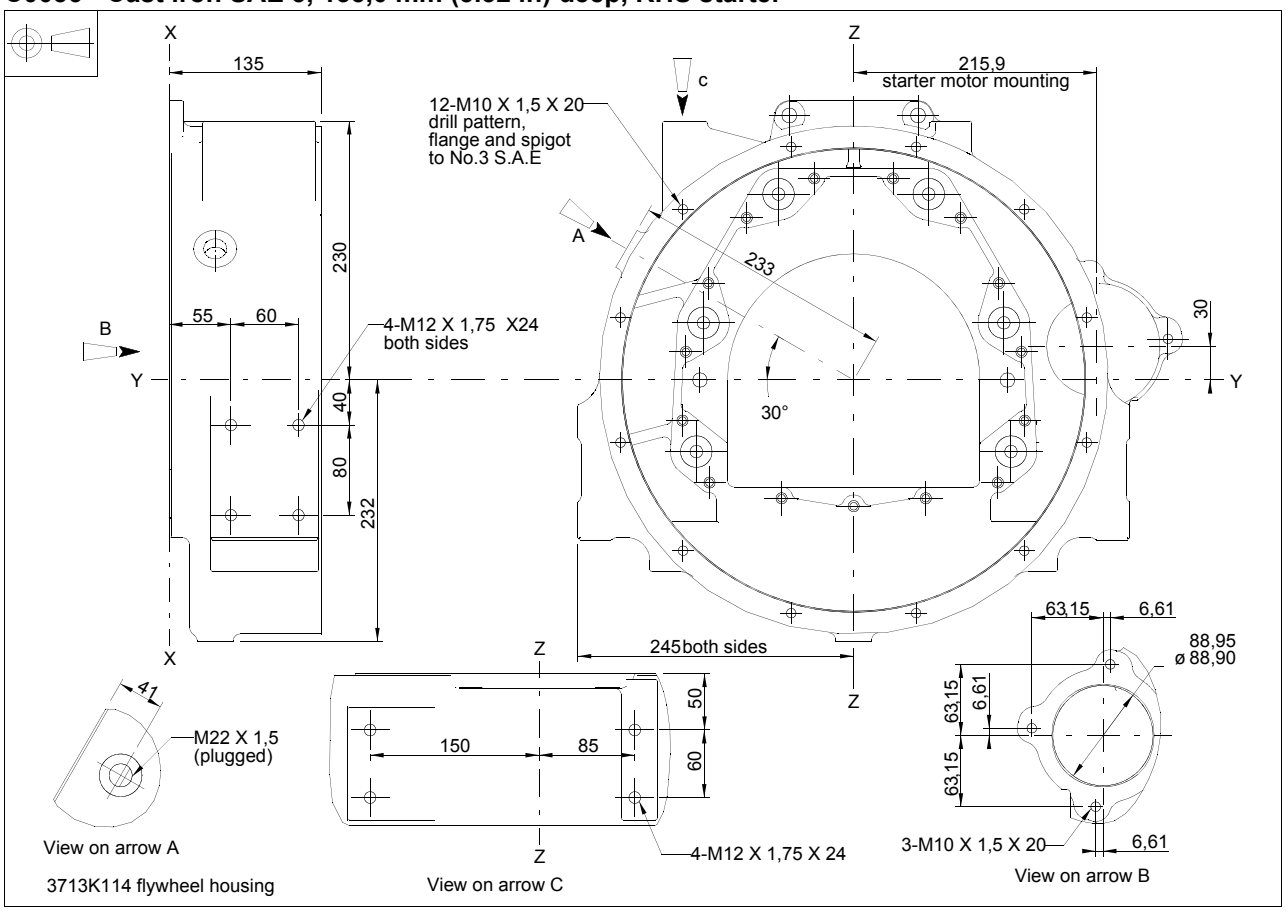


3713K066 flywheel housing

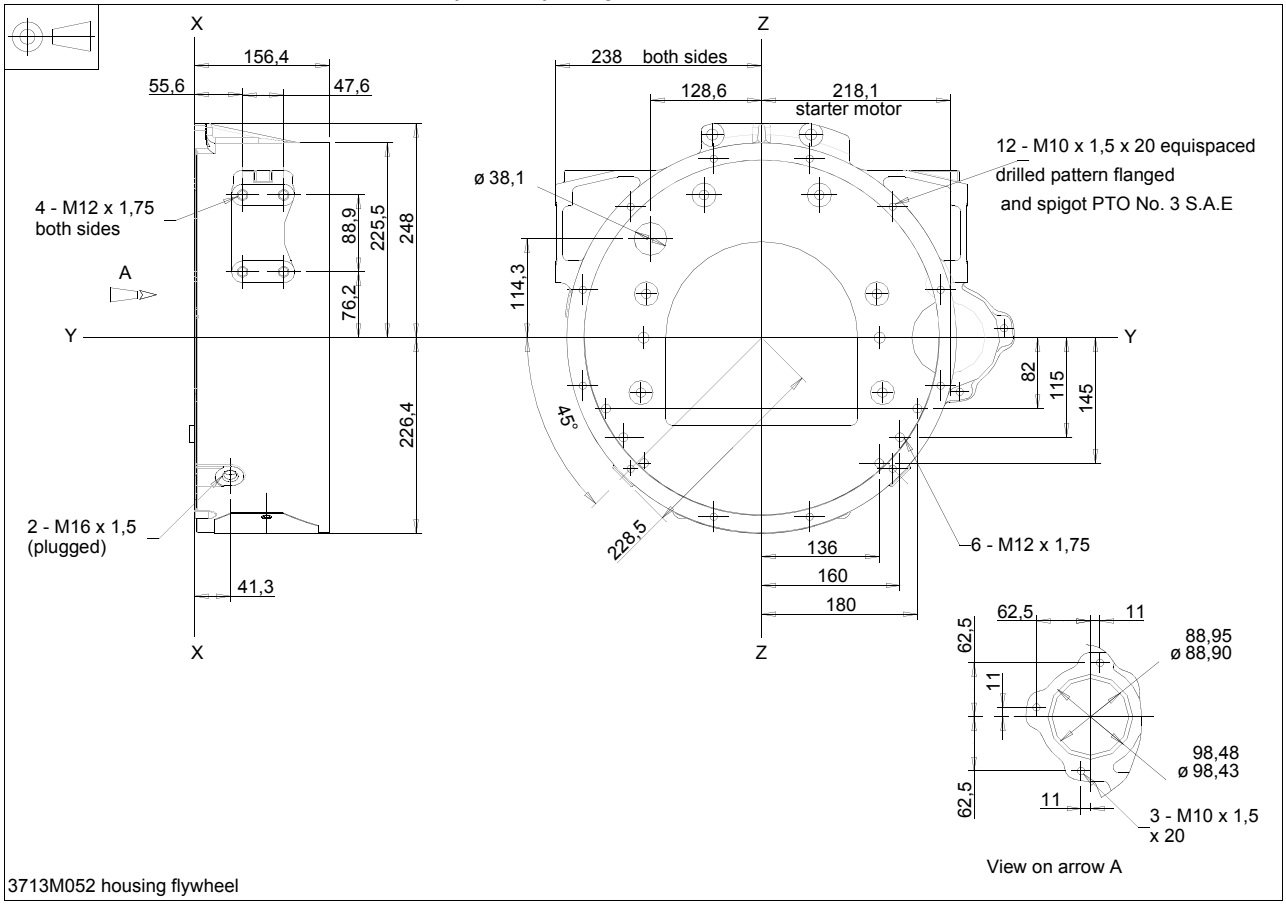
C0033 - Cast iron SAE 3, 81,0 mm (3.18 in) deep, LHS starter



C0036 - Cast iron SAE 3, 135,0 mm (5.32 in) deep, RHS starter



C0037 - Cast iron SAE 3, 156,4 mm (6.16 in) deep, RHS starter



3713M052 housing flywheel

Flywheels

Non-stressed cylinder block

Description	Option
Not required	D0000
For Centaflex couplings (1)	D0003
For SAE, Borg and Beck, twin disc clutches without pilot bearing housing	D0004
As D0004 but with pilot bearing housing	D0005
For 12/13 in American Borg and Beck clutches	D0006
For Clark 18000 torque converters	D0008
For Borg Warner torque converters	D0014
Non stressed flywheel "for 10 SAE light"	D0022
For Allison AT545 transmission	D0030
For SAE transmissions	D0044
For Spicer transmissions	D0045
For hydrostatic transmissions	D0046
For wet backend, 122 tooth starter ring (2)	D0048
For ZF auto transmissions	D0052
For various transmissions	D0053
For customer transmissions	D0061
For customer transmissions	D0063
For customer transmissions	D0064
For ZF115 transmissions	D0070
For use with ZFWG9 transmissions	D0092

1. Incompatible with C0026.
2. For use with flywheel housing C0026 only E0000/E0012/E0311 only, G10**/G06** only.

Notes:

- The masses and inertias shown on the drawings are for the flywheel only. Take the mass and inertia of all starter rings to be 1,82 kg (4 lb) and 0,073 kg m² (250 lb in²) respectively
- All the flywheels listed above are fitted with 126 tooth starter ring, except where indicated.

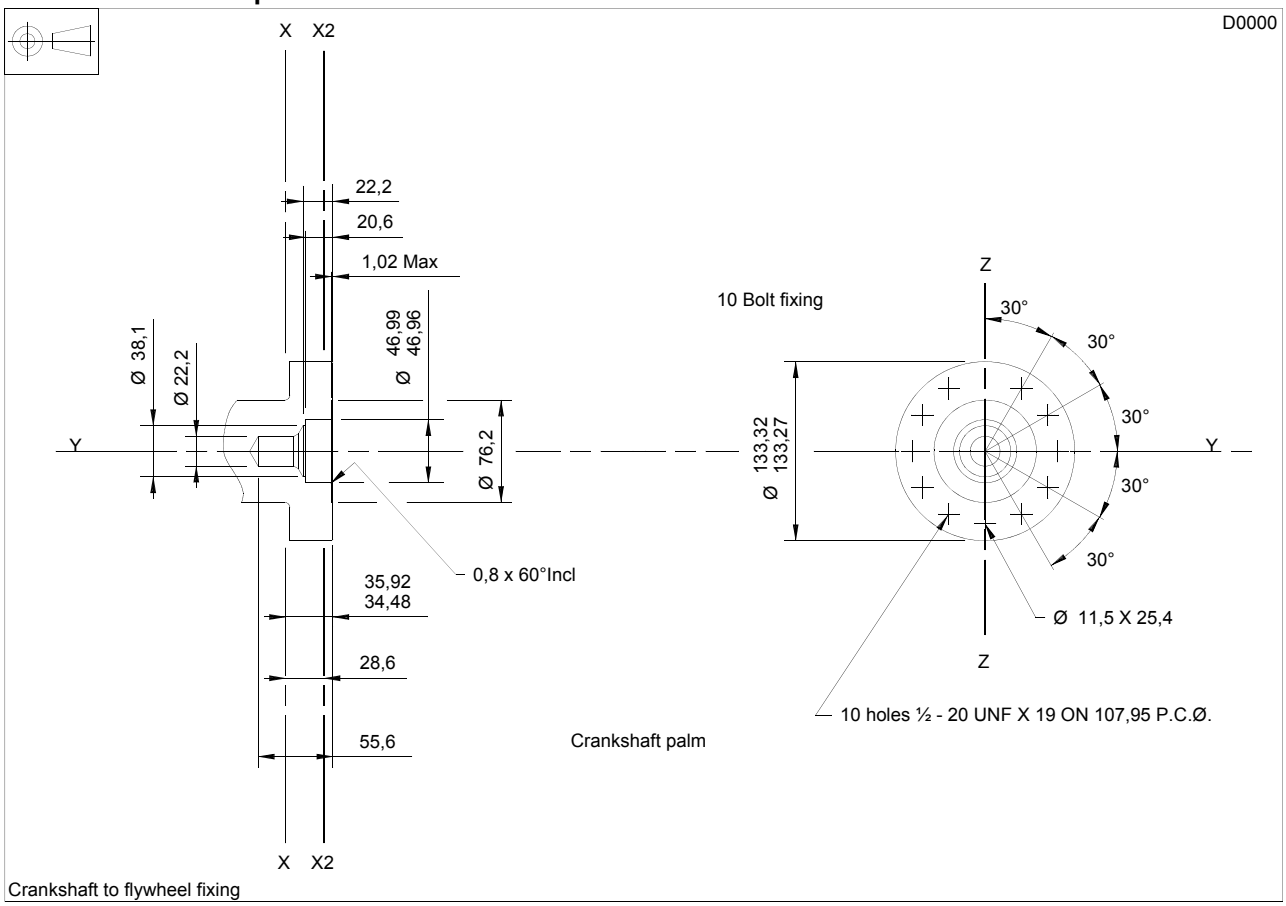
Stressed cylinder block

Description	Option
Not required	D0000
For Borg Warner torque converters	D0014
For customer transmissions	D0055
For customer transmissions	D0056
For customer transmissions	D0062
For customer transmissions	D0063
For customer transmissions	D0065
For customer transmissions	D0066
For customer transmissions	D0067
For customer transmissions	D0068
For customer transmissions	D0069

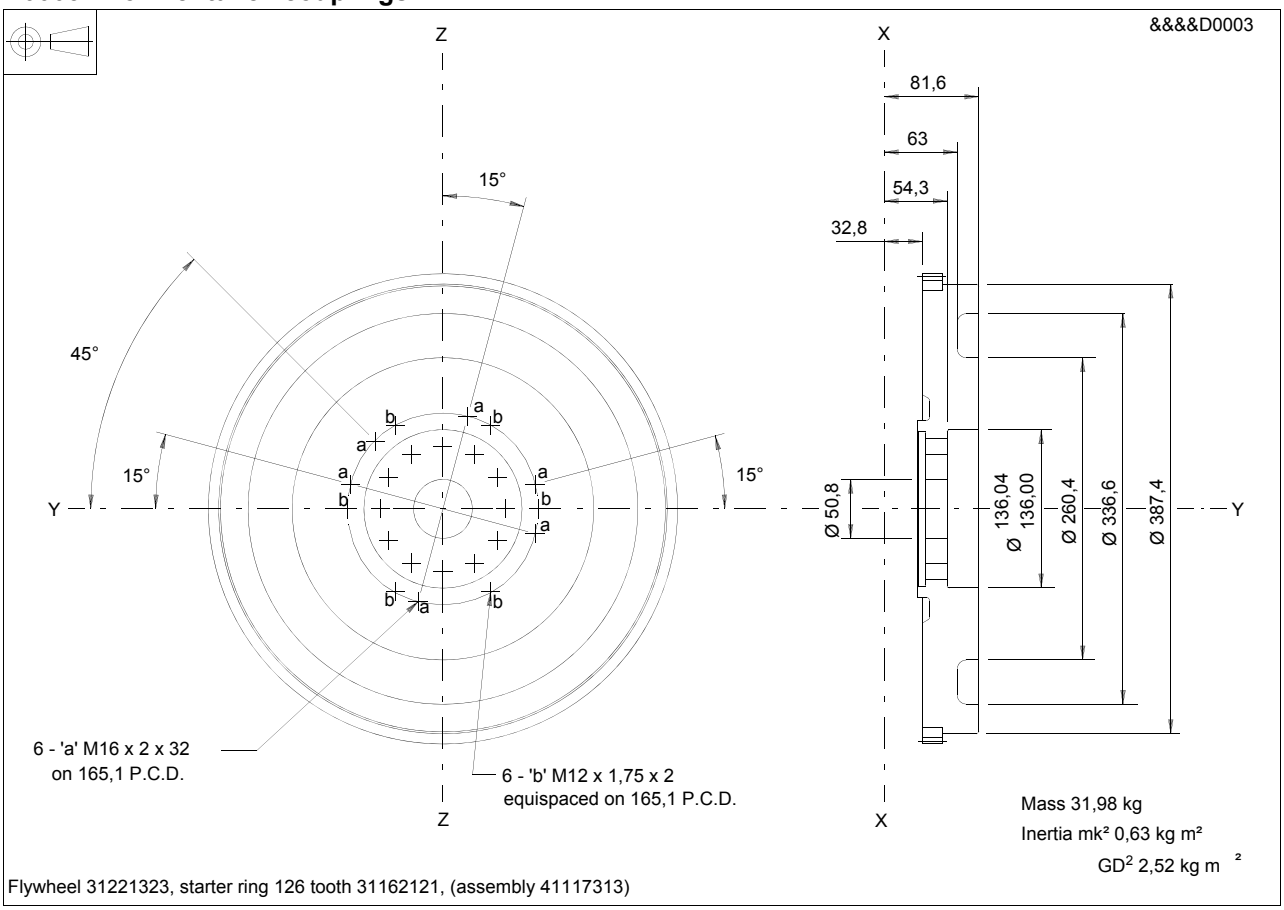
Notes:

- The masses and inertias shown on the drawings are for the flywheel only. Take the mass and inertia of all starter rings to be 1,82 kg (4 lb) and 0,073 kg m² (250 lb in²) respectively
- All the flywheels listed above are fitted with 115 tooth starter ring, except where indicated.

D0000 - Crankshaft palm

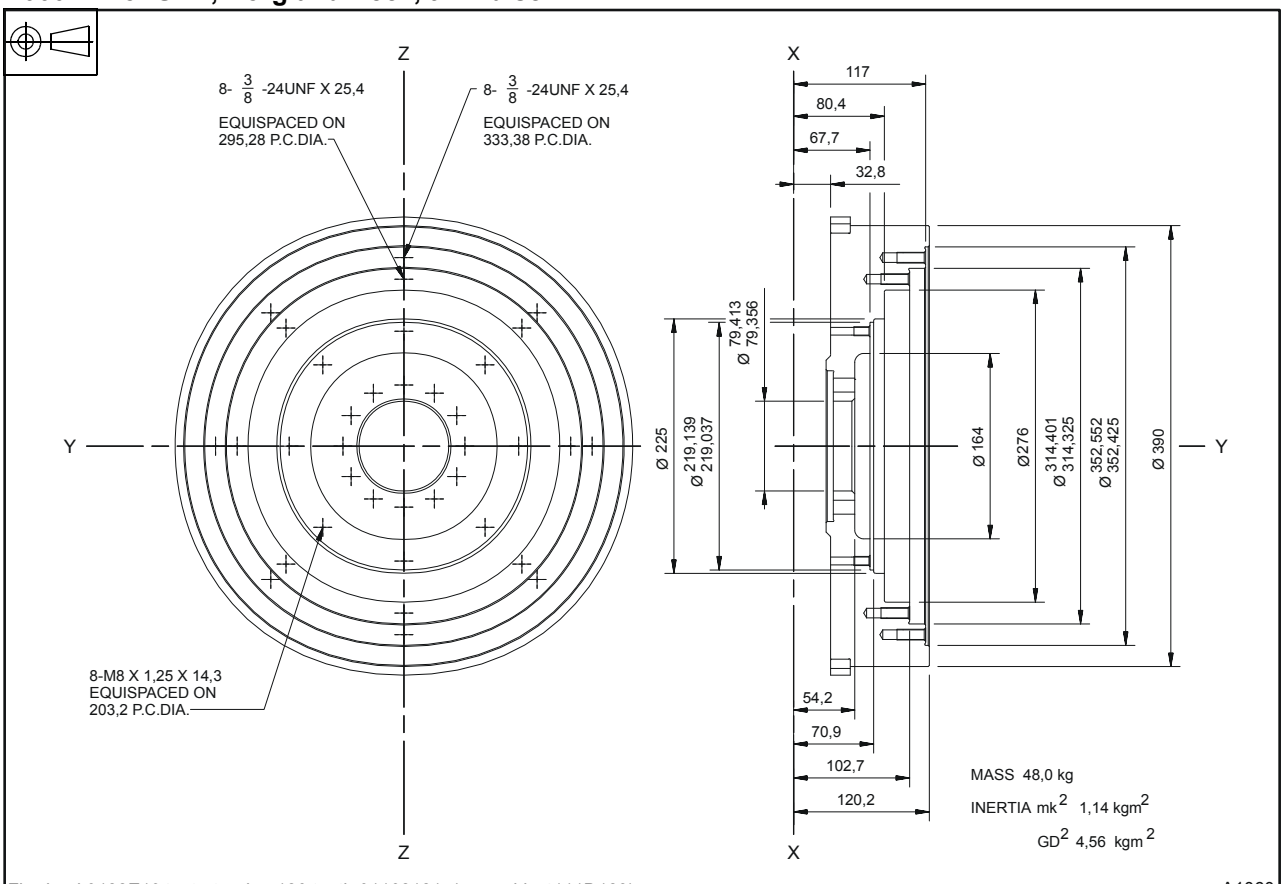


D0003 - For Centaflex couplings



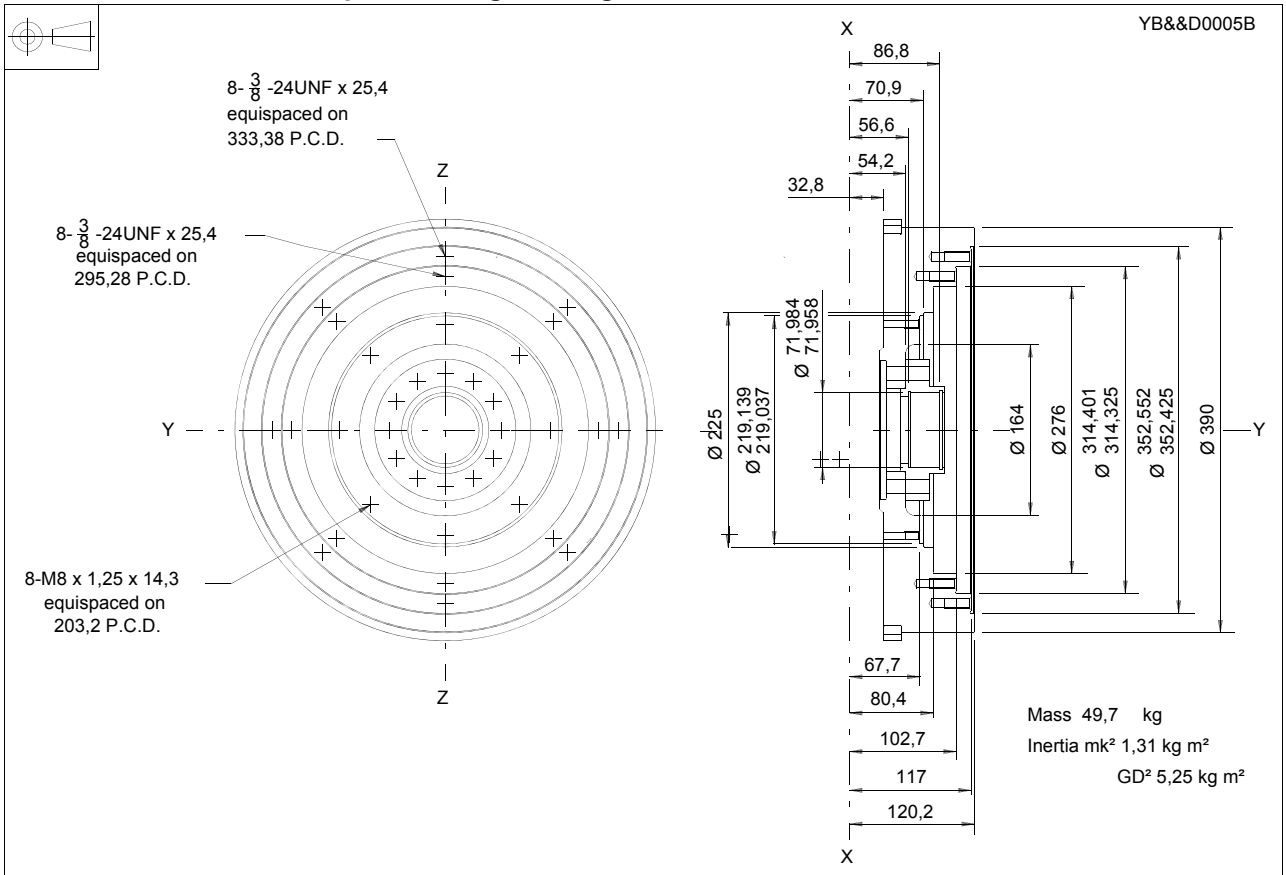
Flywheel 31221323, starter ring 126 tooth 31162121, (assembly 41117313)

D0004 - For SAE, Borg and Beck, twin disc



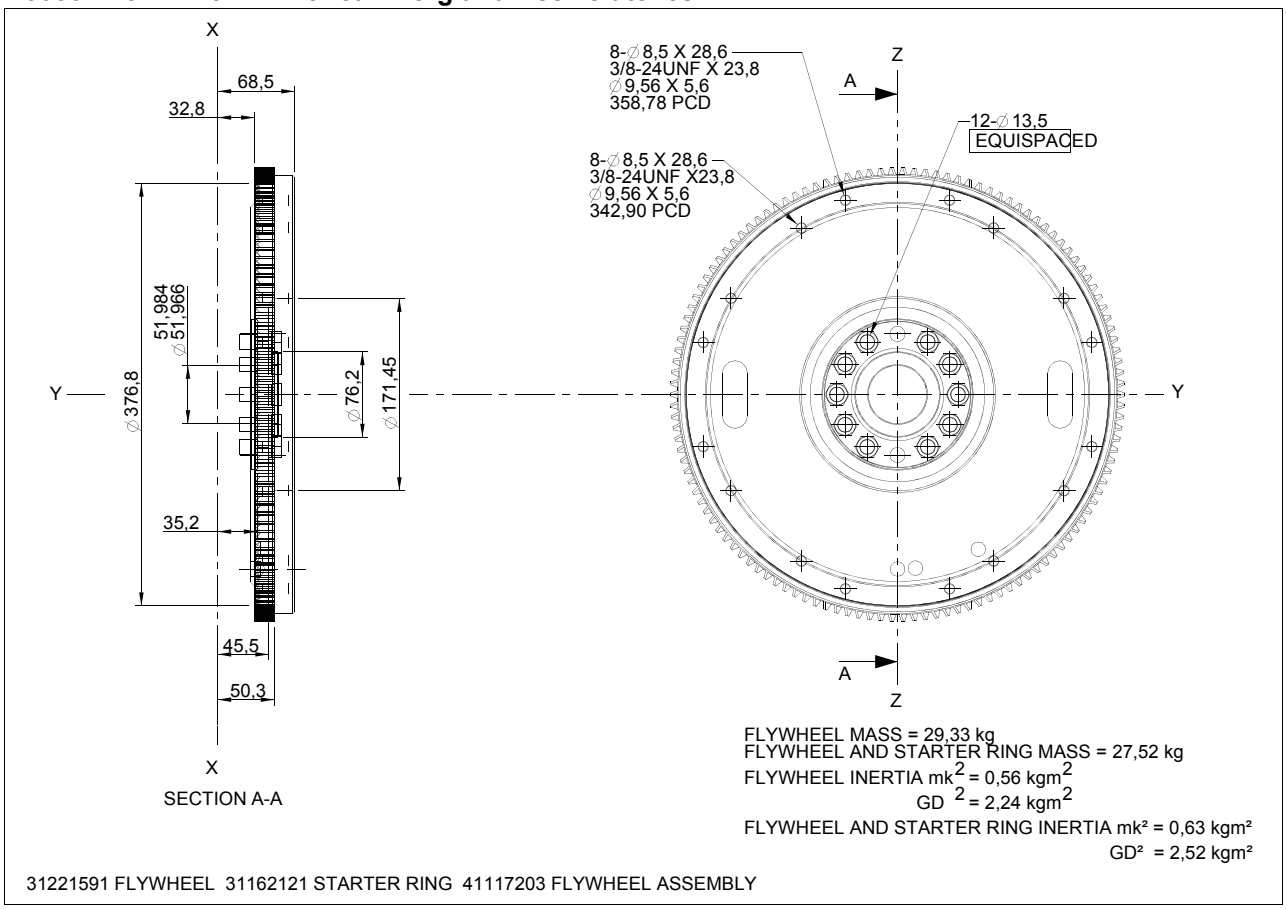
Flywheel 3122E134, starter ring 126 tooth 31162121, (assembly 4111D128) A1060

D0005 - As D0004 but with pilot bearing housing



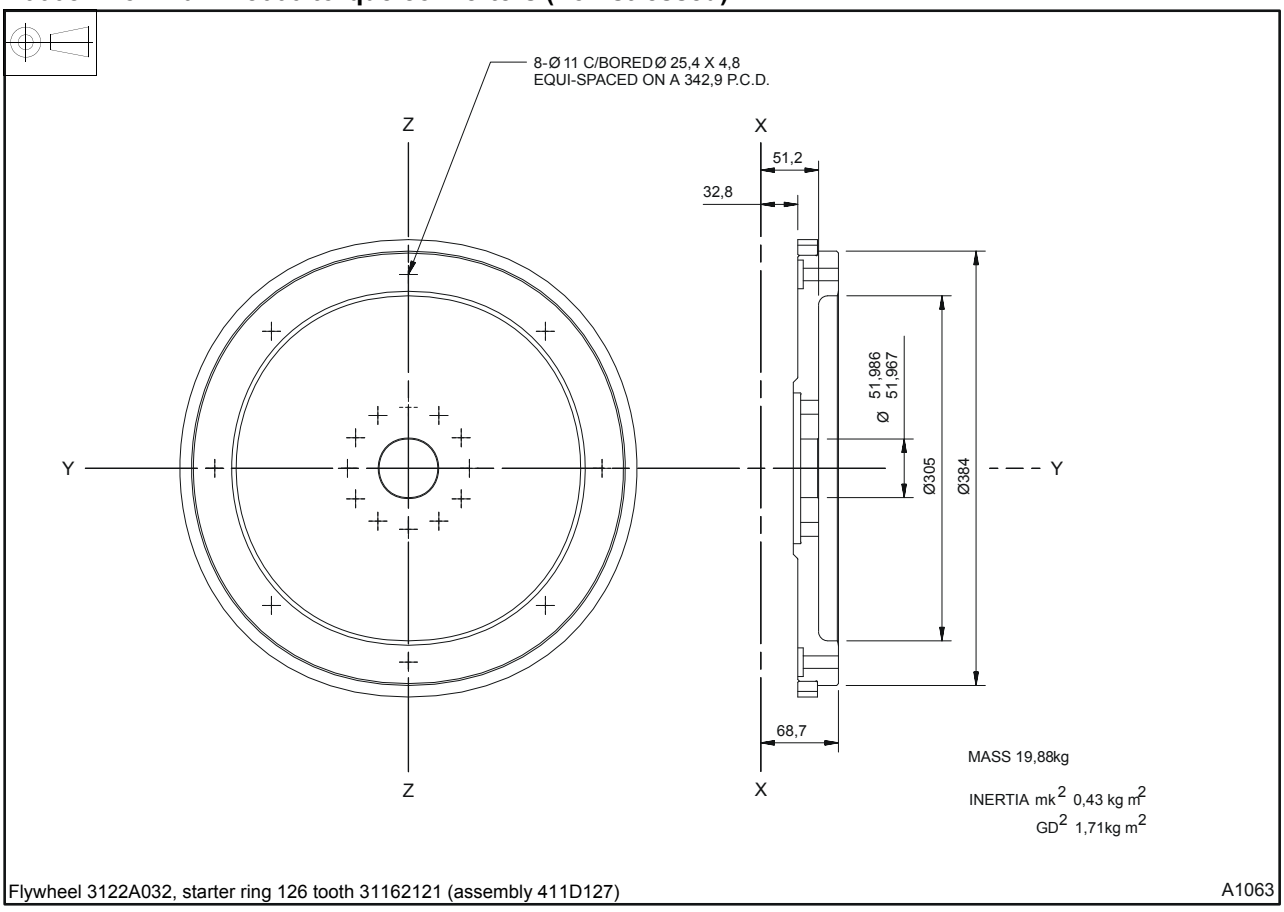
Flywheel 3122E134, with pilot housing 3743H011, starter ring 126 tooth 31162121, (assembly 4111D128)

D0006 - For 12/13 in American Borg and Beck clutches



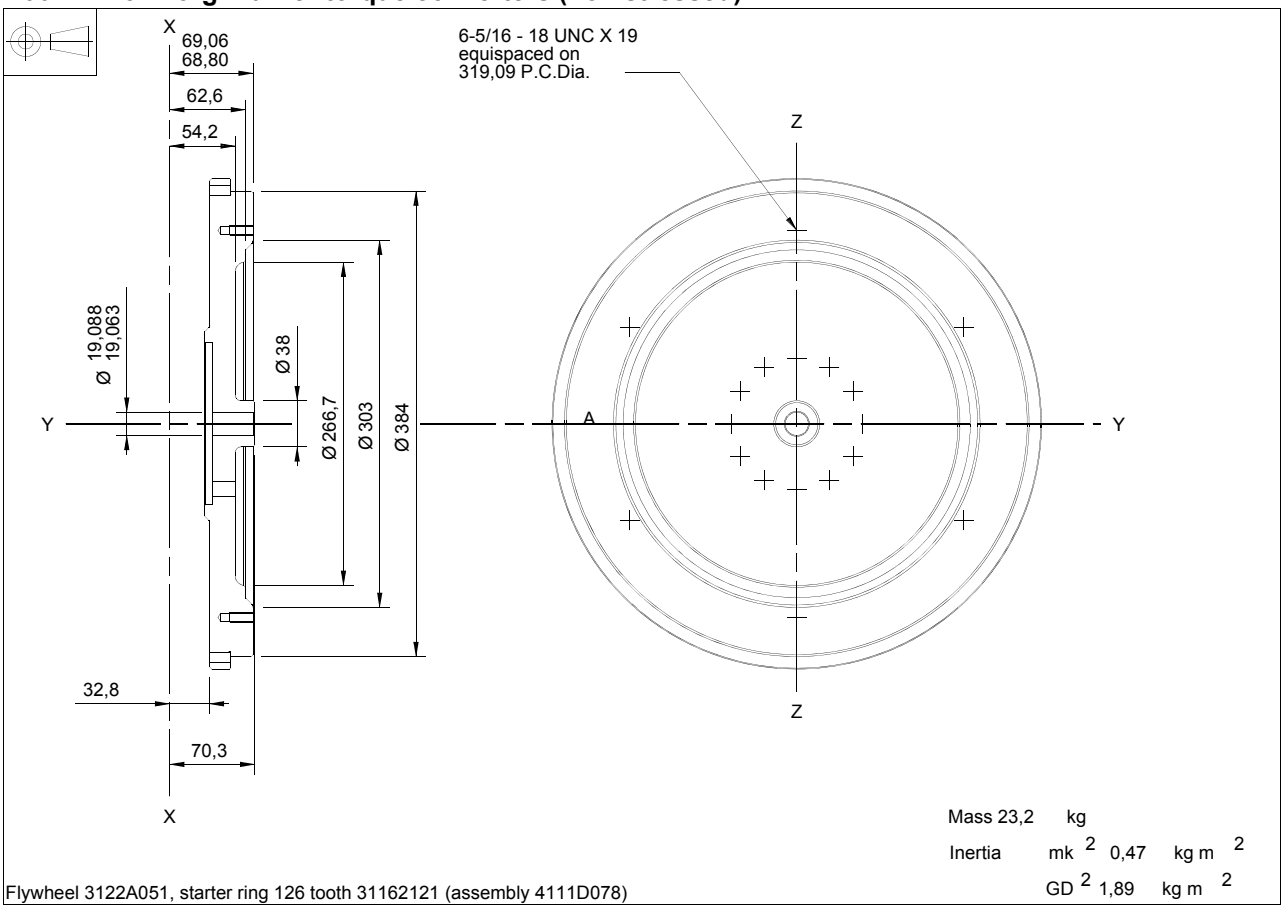
31221591 FLYWHEEL 31162121 STARTER RING 41117203 FLYWHEEL ASSEMBLY

D0008 - For Clark 18000 torque converters (non stressed)



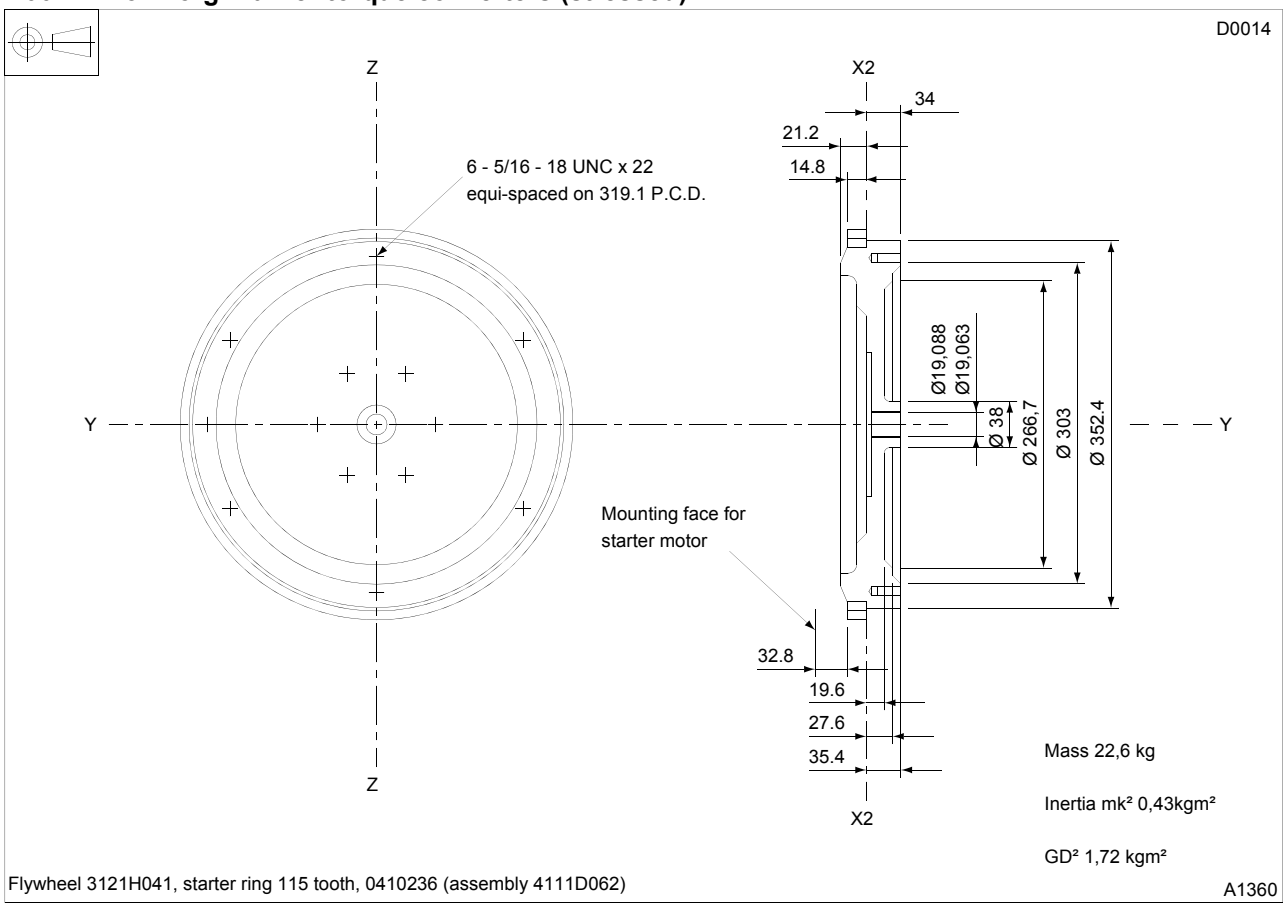
Flywheel 3122A032, starter ring 126 tooth 31162121 (assembly 411D127) A1063

D0014 - For Borg Warner torque converters (non stressed)



Flywheel 3122A051, starter ring 126 tooth 31162121 (assembly 4111D078)

D0014 - For Borg Warner torque converters (stressed)



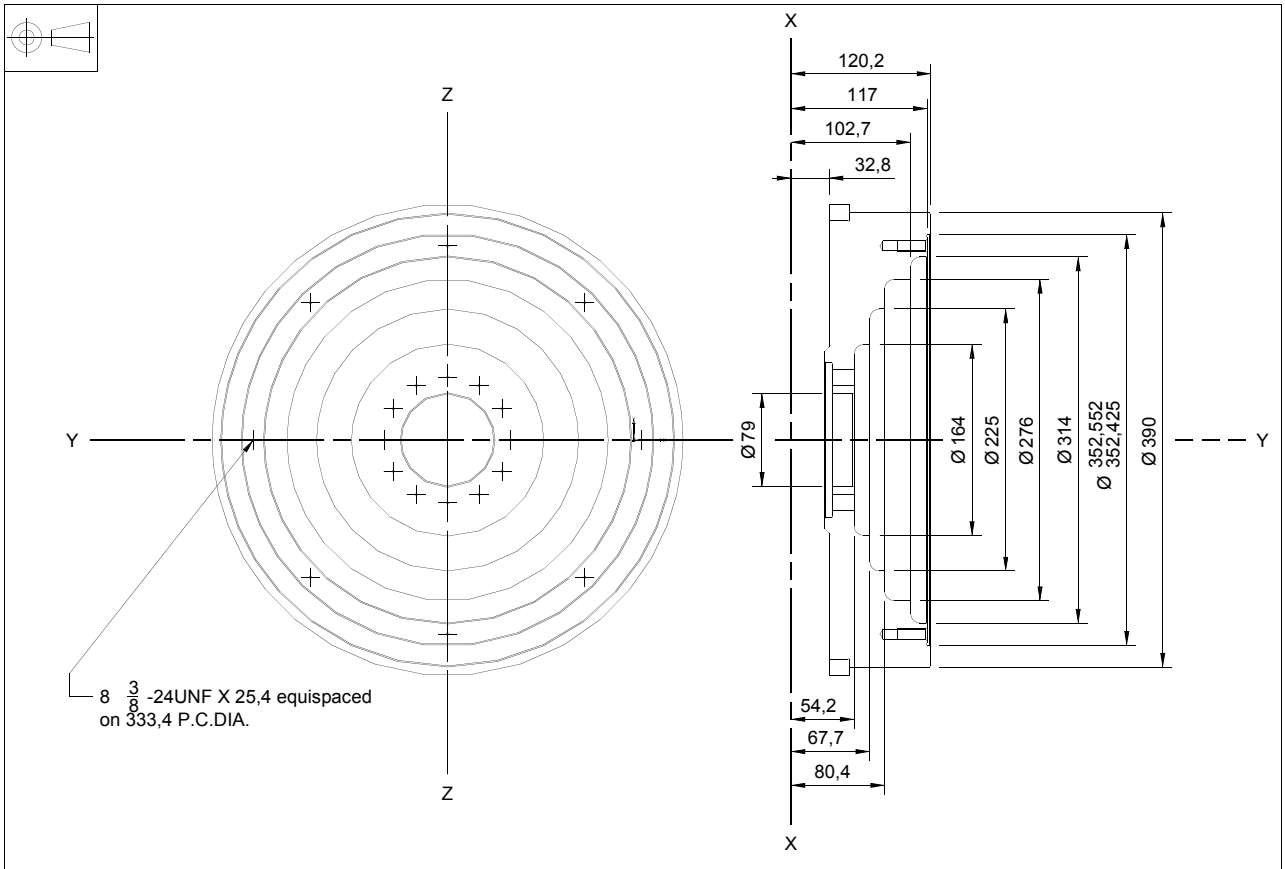
D0022 - Non stressed flywheel "for 10 SAE light"

Drawing not available at time of print

D0030 - For Allison AT545 transmissions

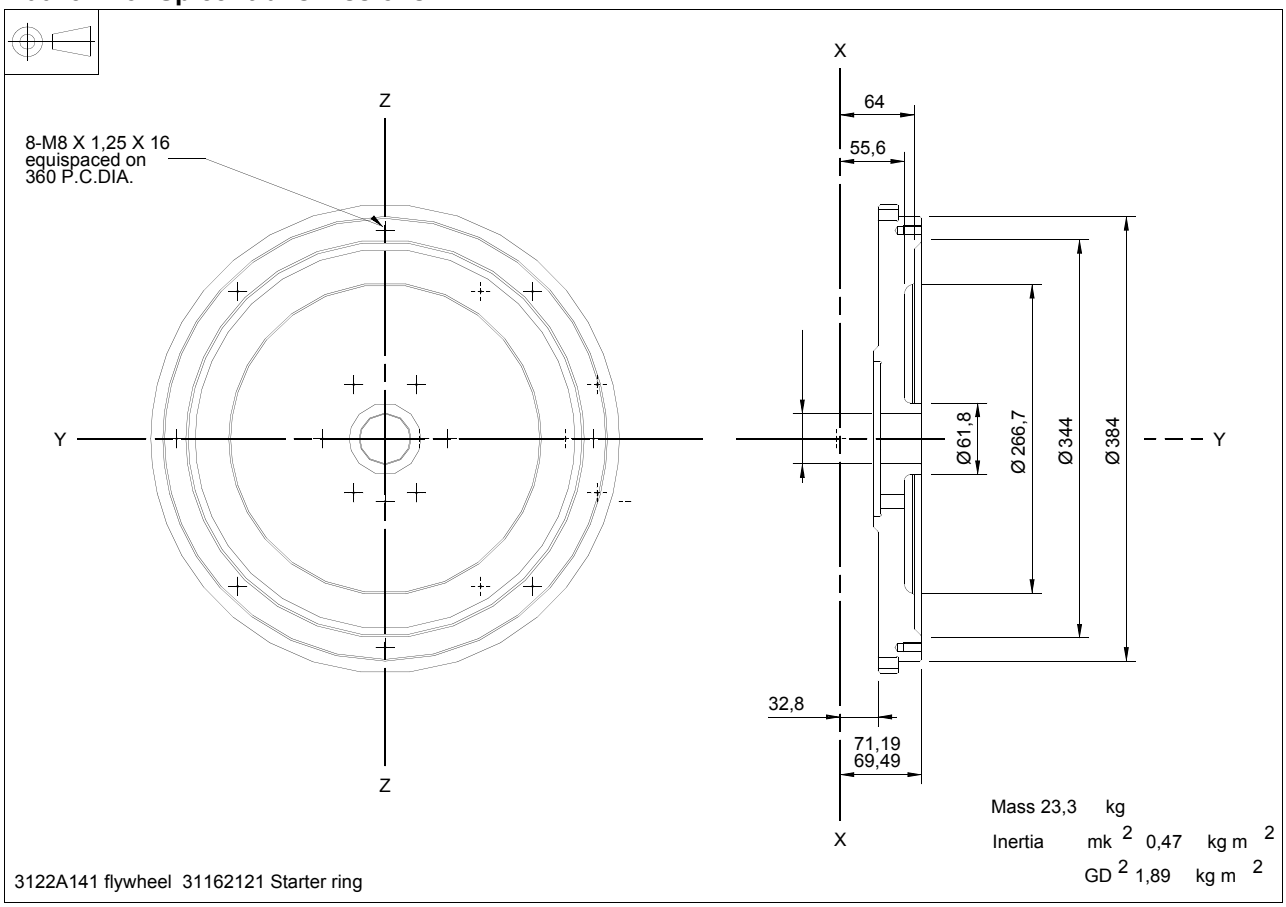
Drawing not available at time of print

D0044 - For SAE transmissions



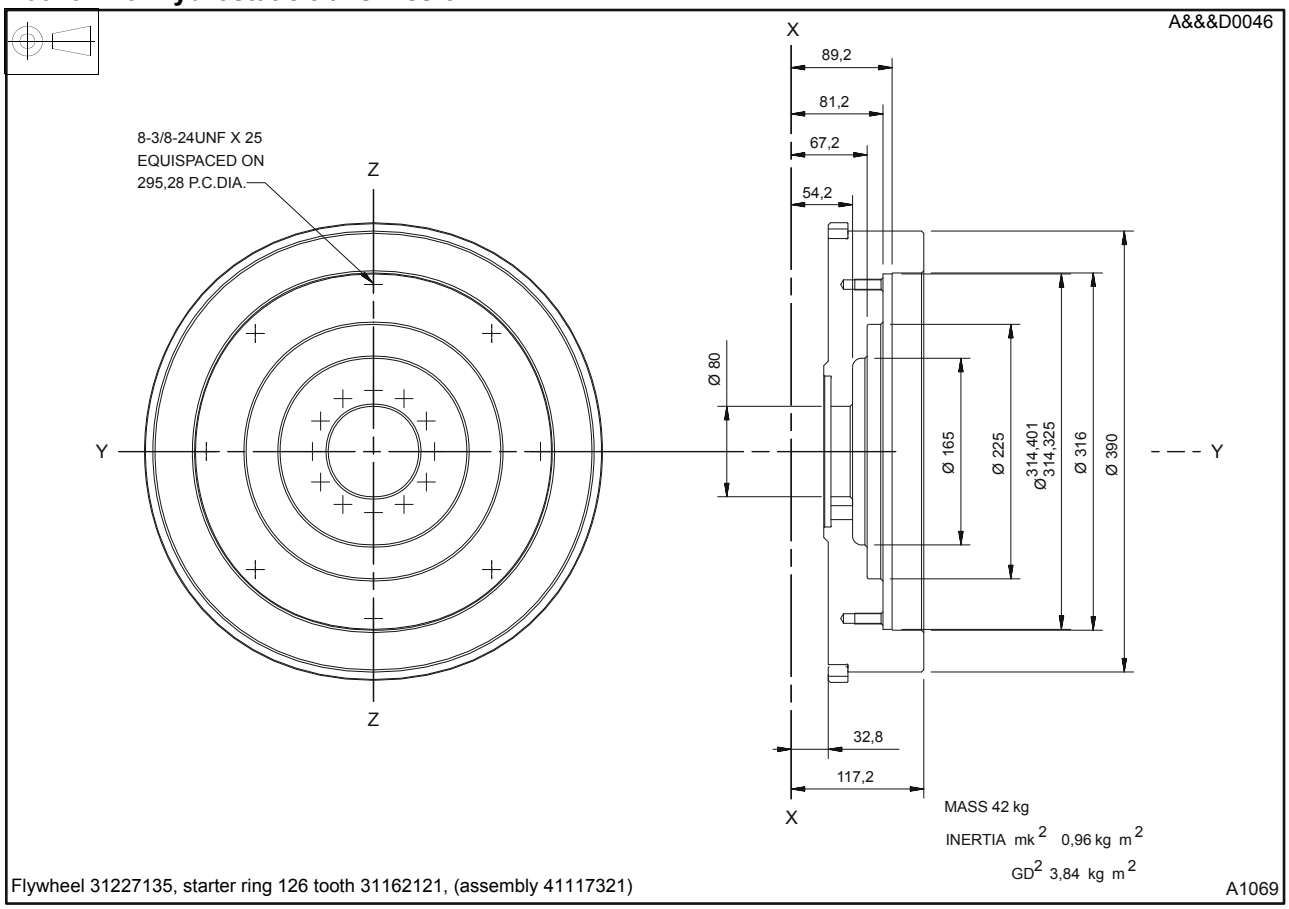
3122E136 flywheel, 31162121 starter ring.

D0045 - For Spicer transmissions



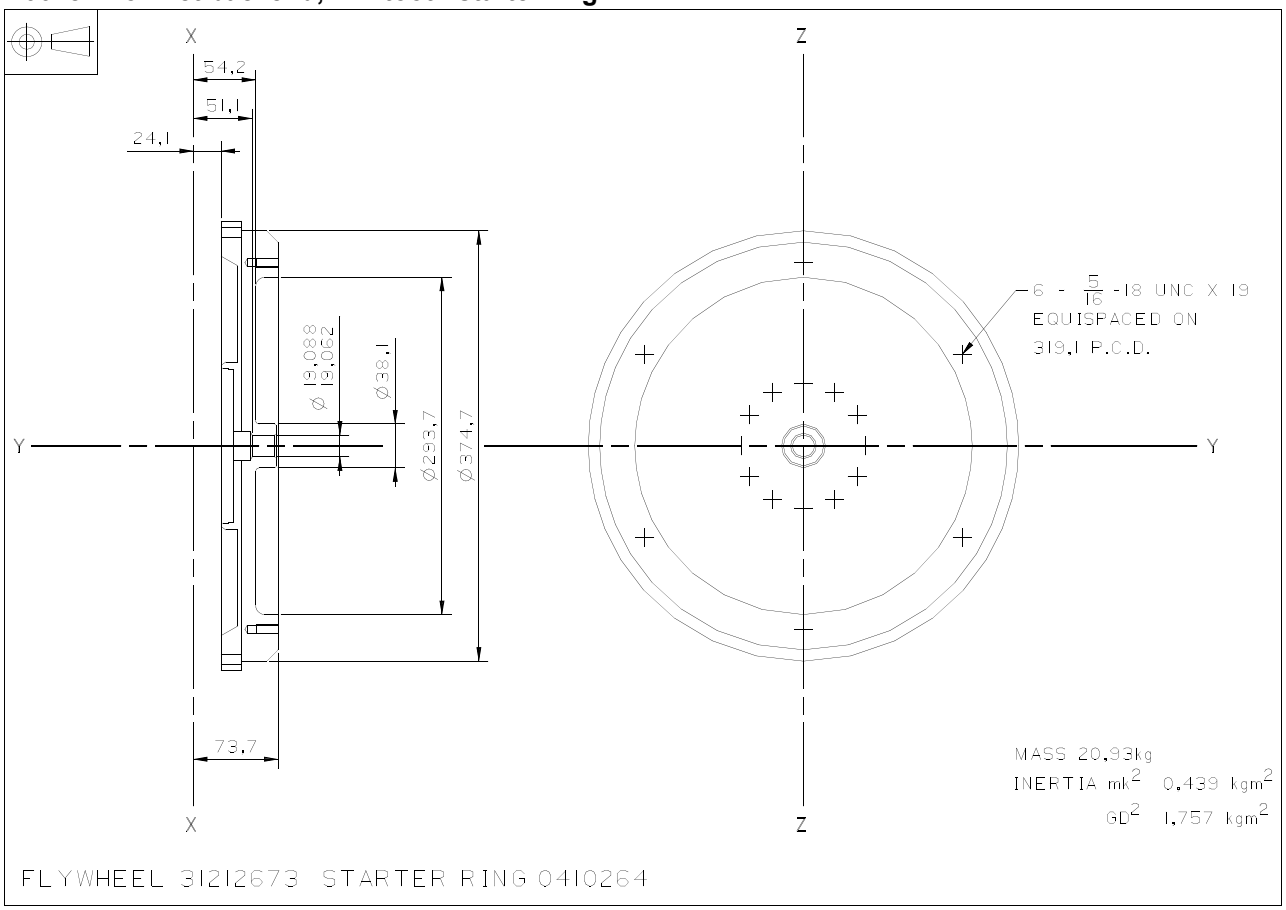
3122A141 flywheel 31162121 Starter ring

D0046 - For hydrostatic transmission

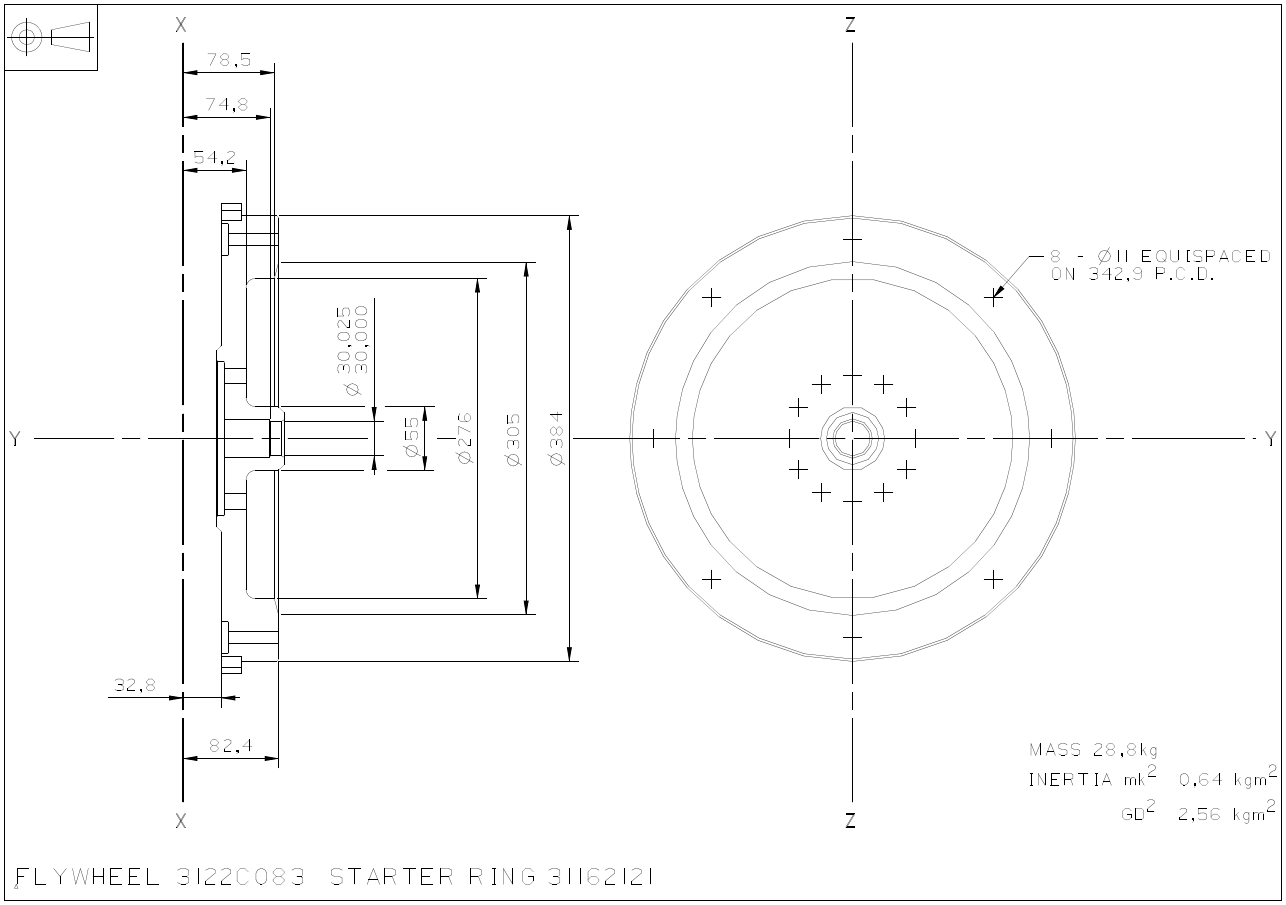


Flywheel 31227135, starter ring 126 tooth 31162121, (assembly 41117321)

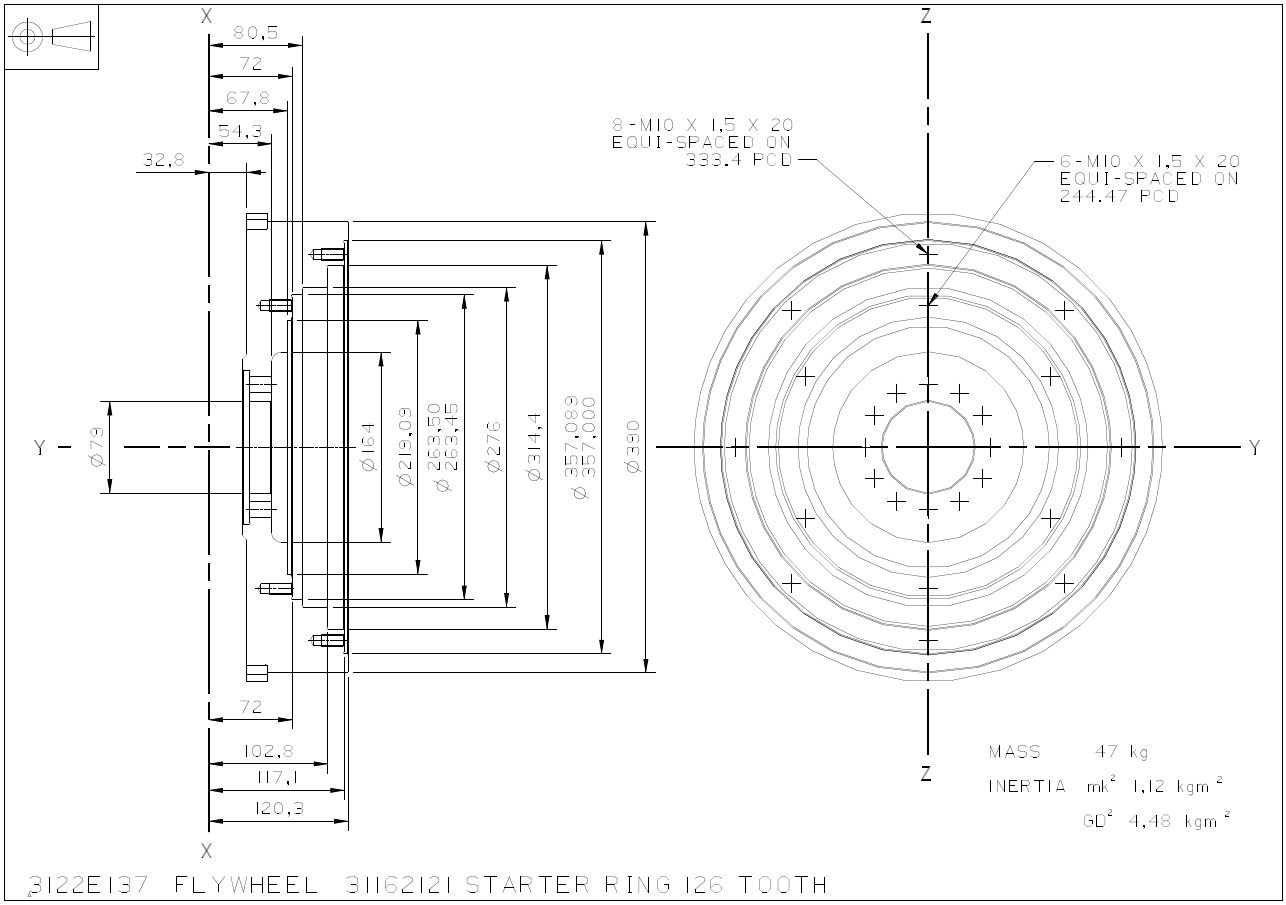
D0048 - For wet backend, 122 tooth starter ring



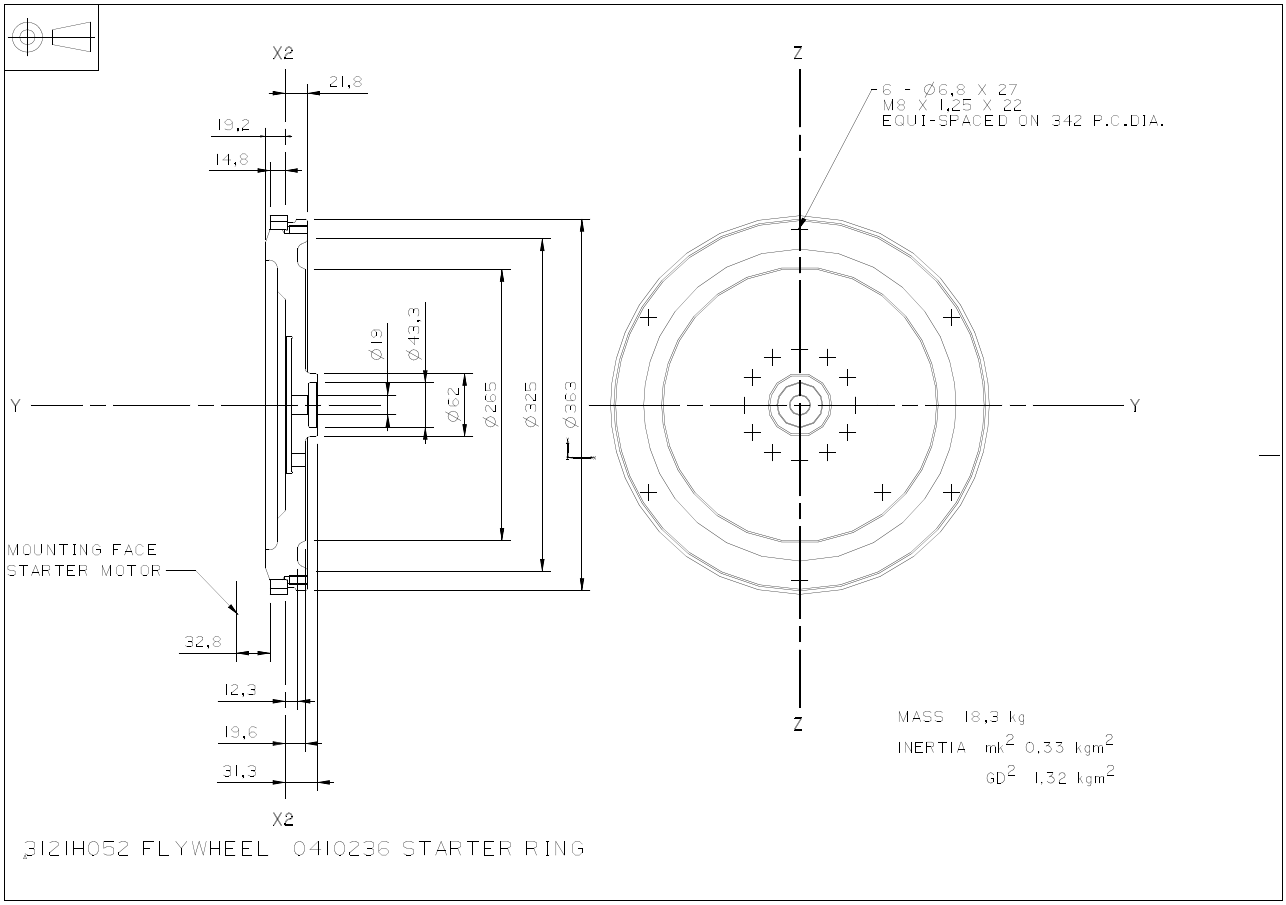
D0052 - For ZF auto transmissions



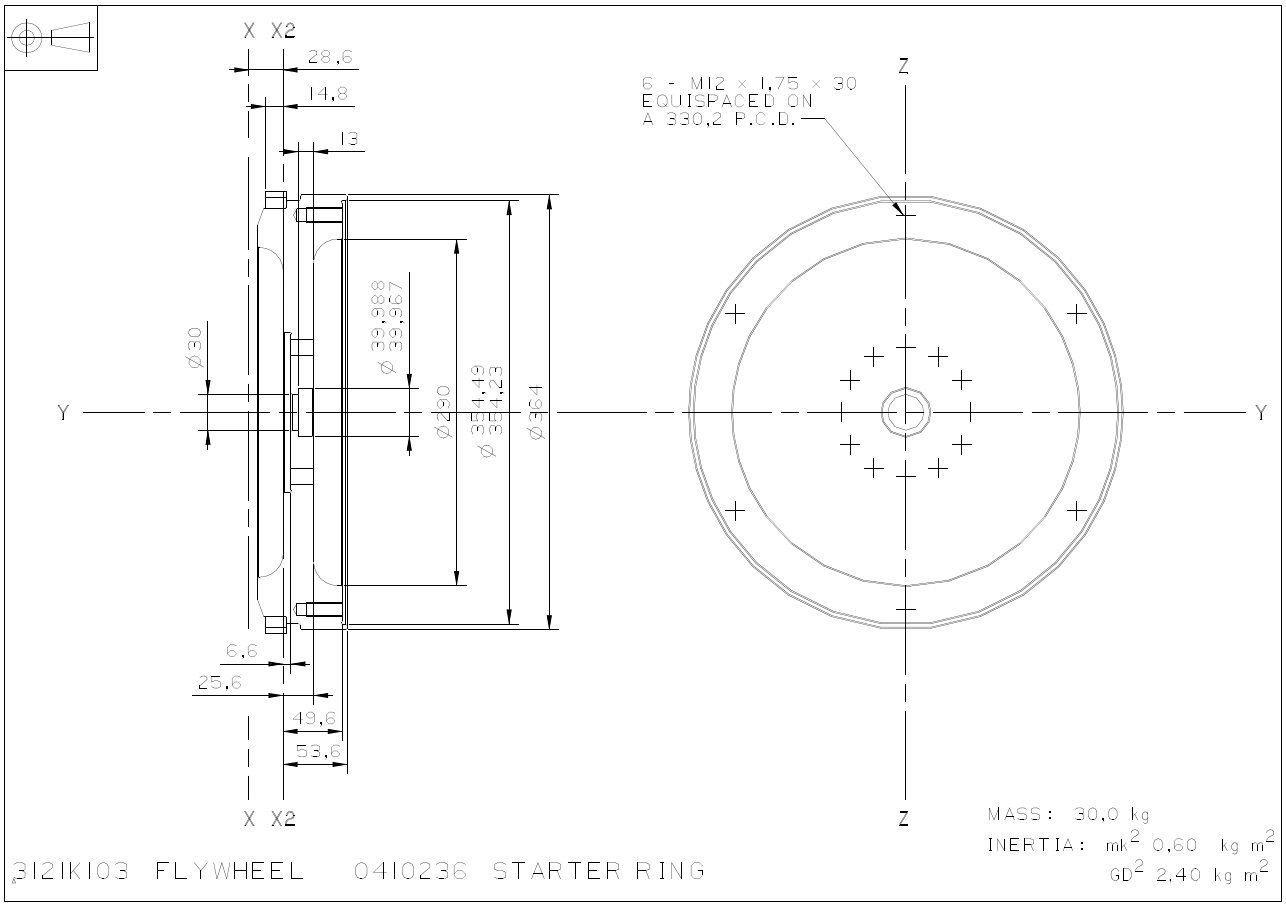
D0053 - For various transmissions



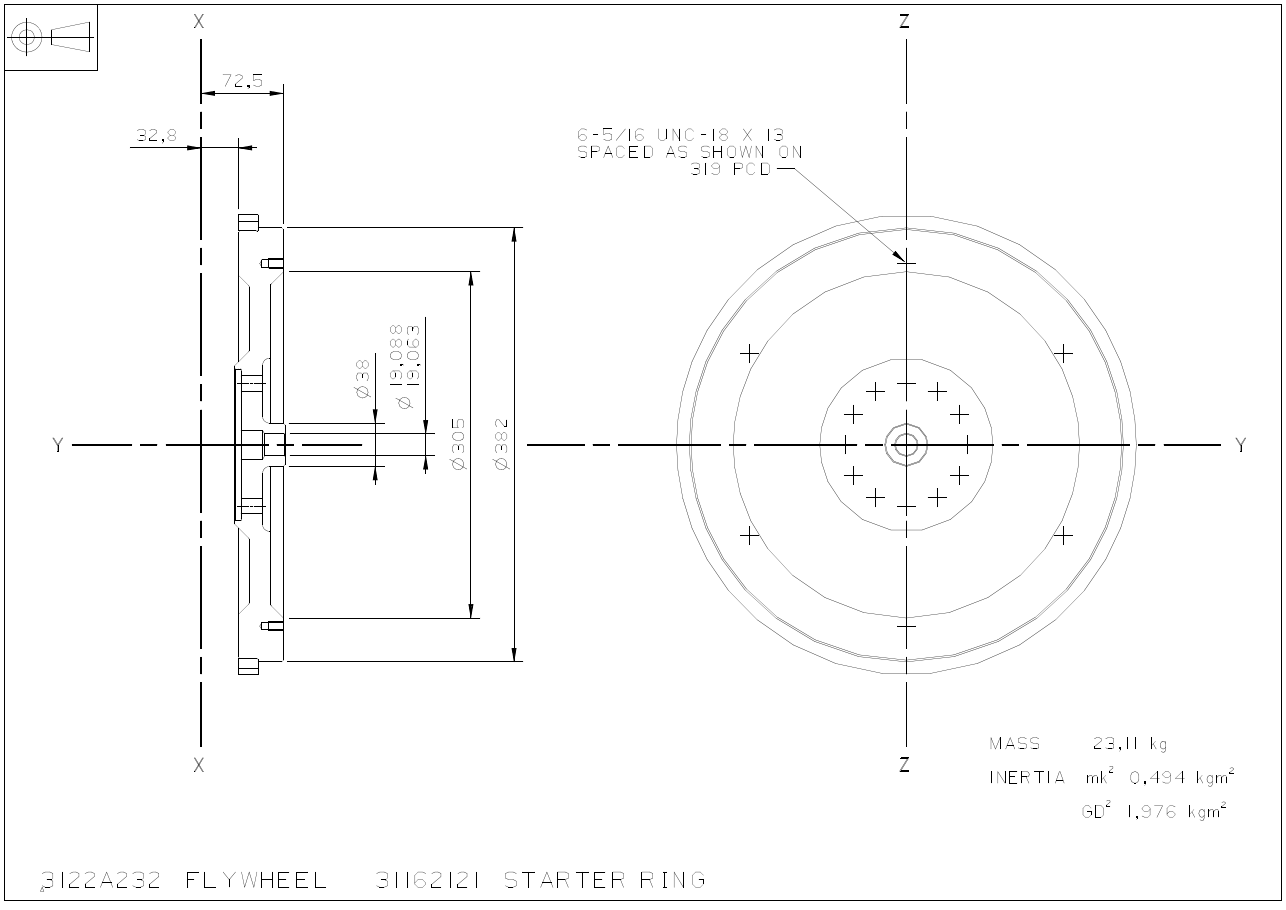
D0055 - For customer transmission



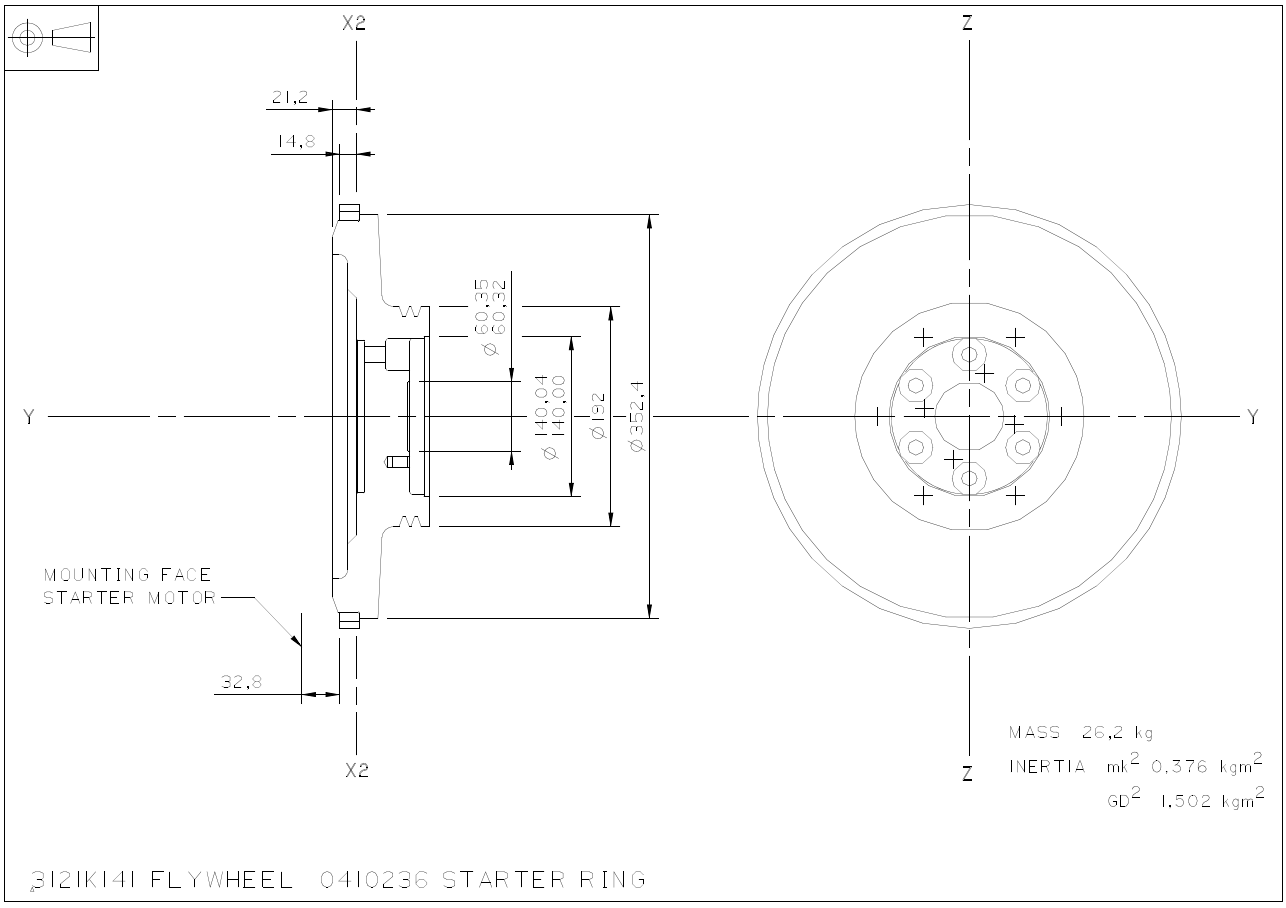
D0056 - For customer transmission



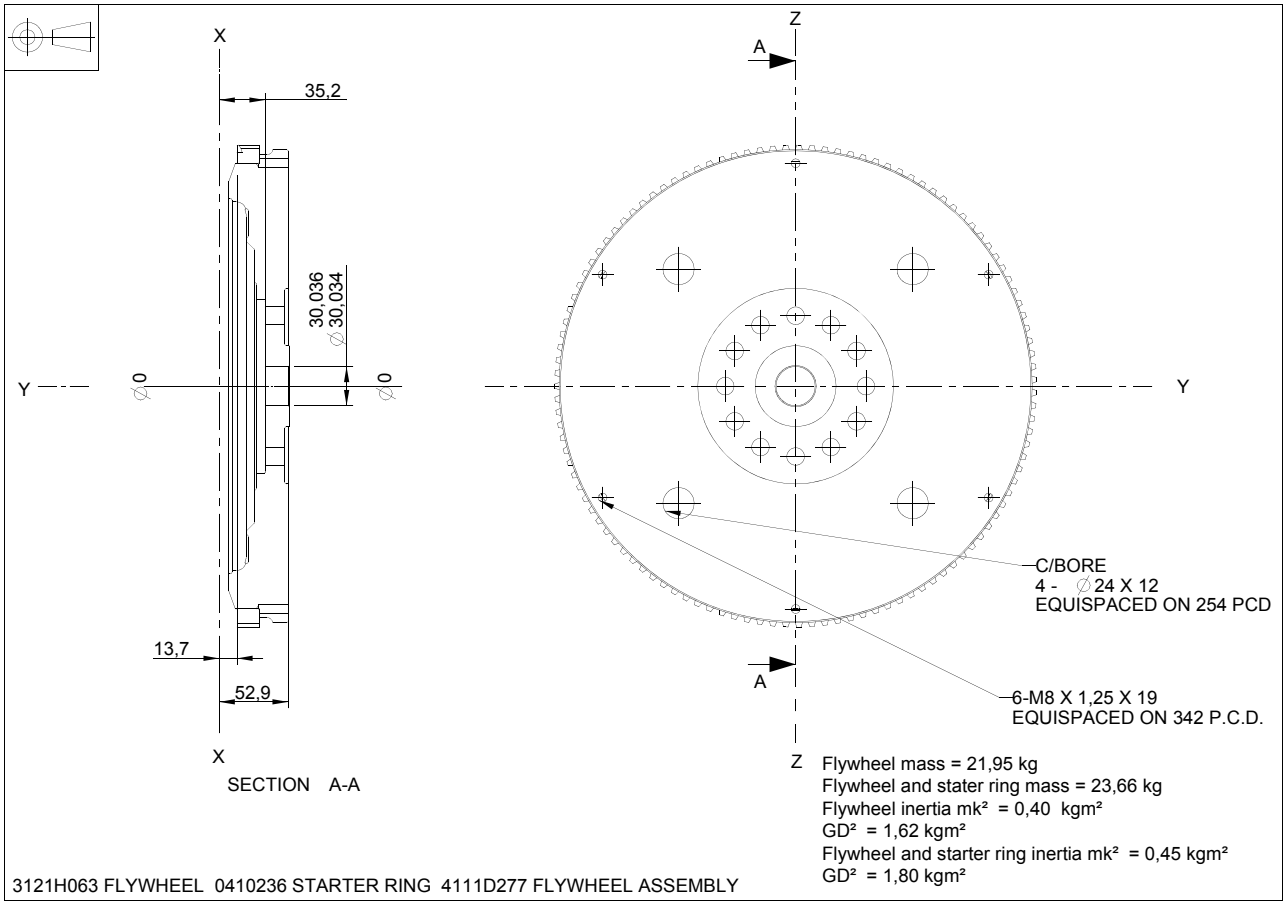
D0061 - For customer transmission



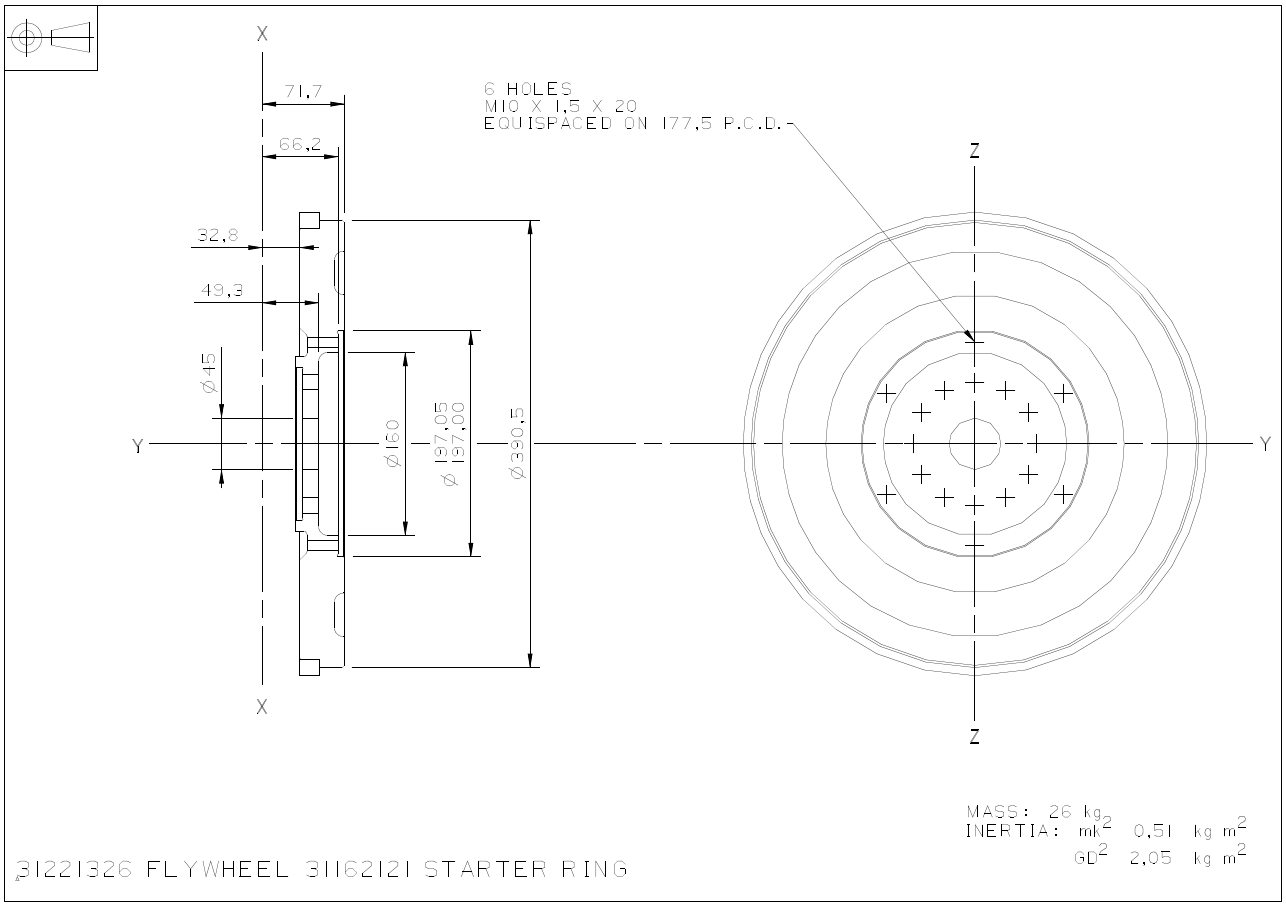
D0062 - For customer transmission



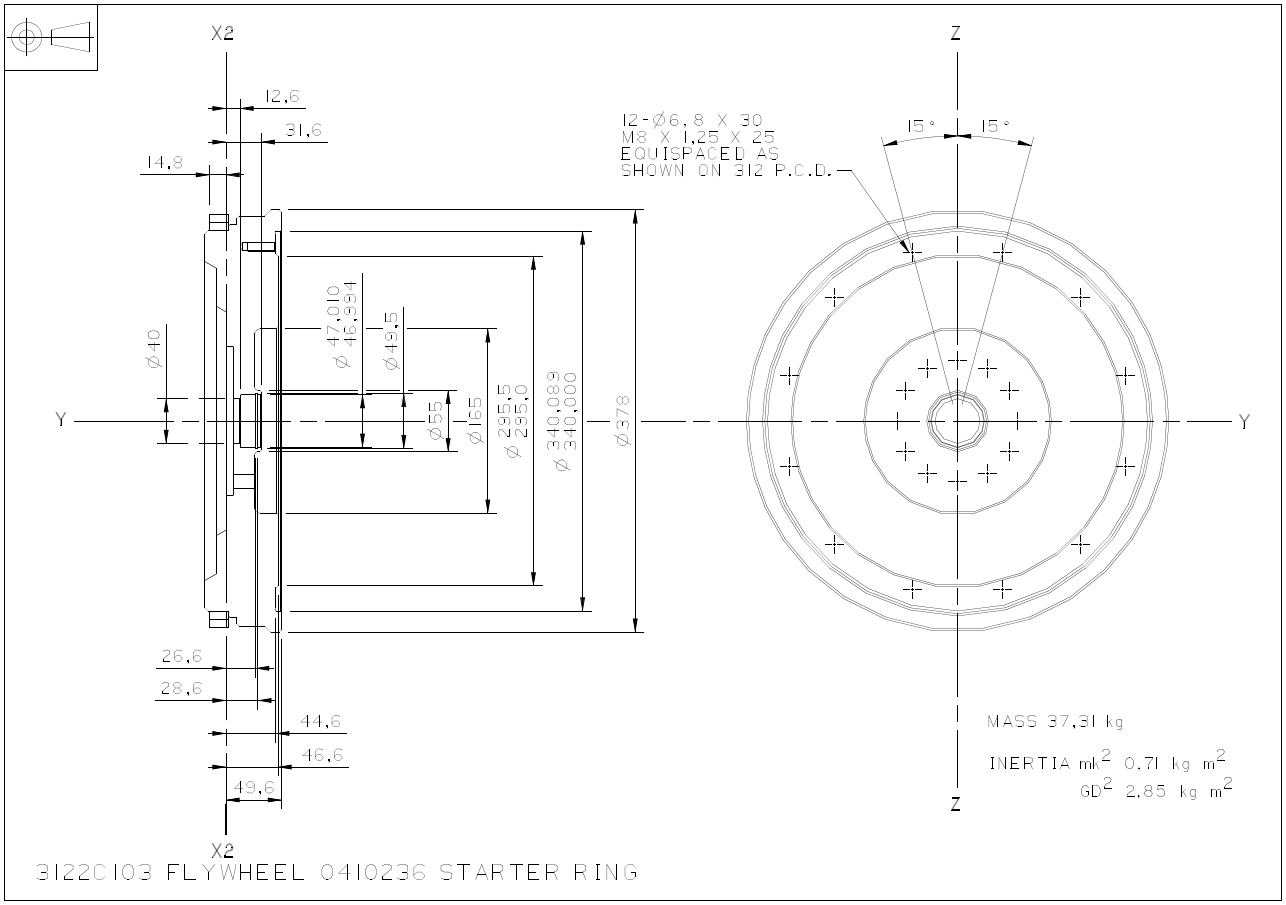
D0063 - For customer transmission



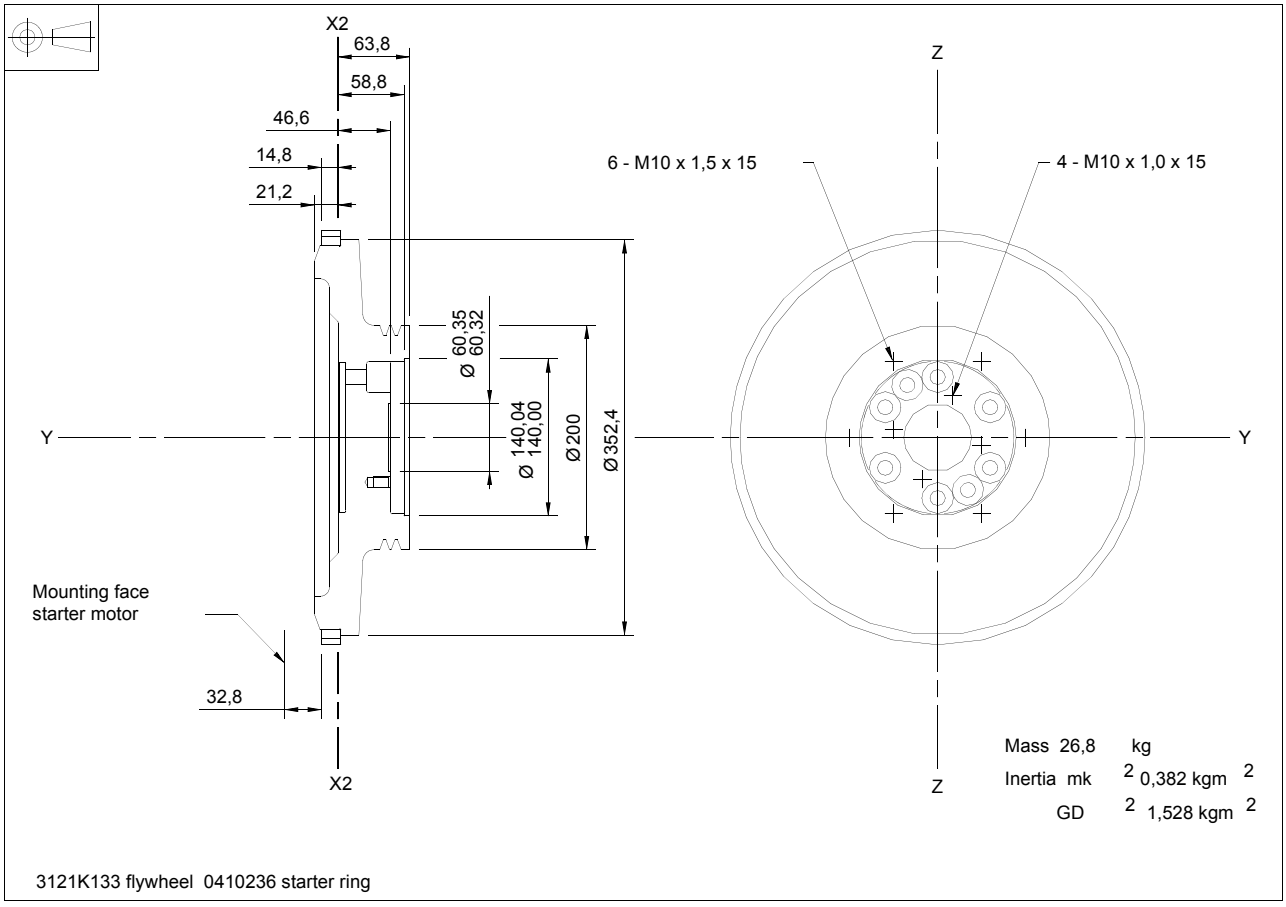
D0064 - For customer transmission



D0065 - For customer transmission

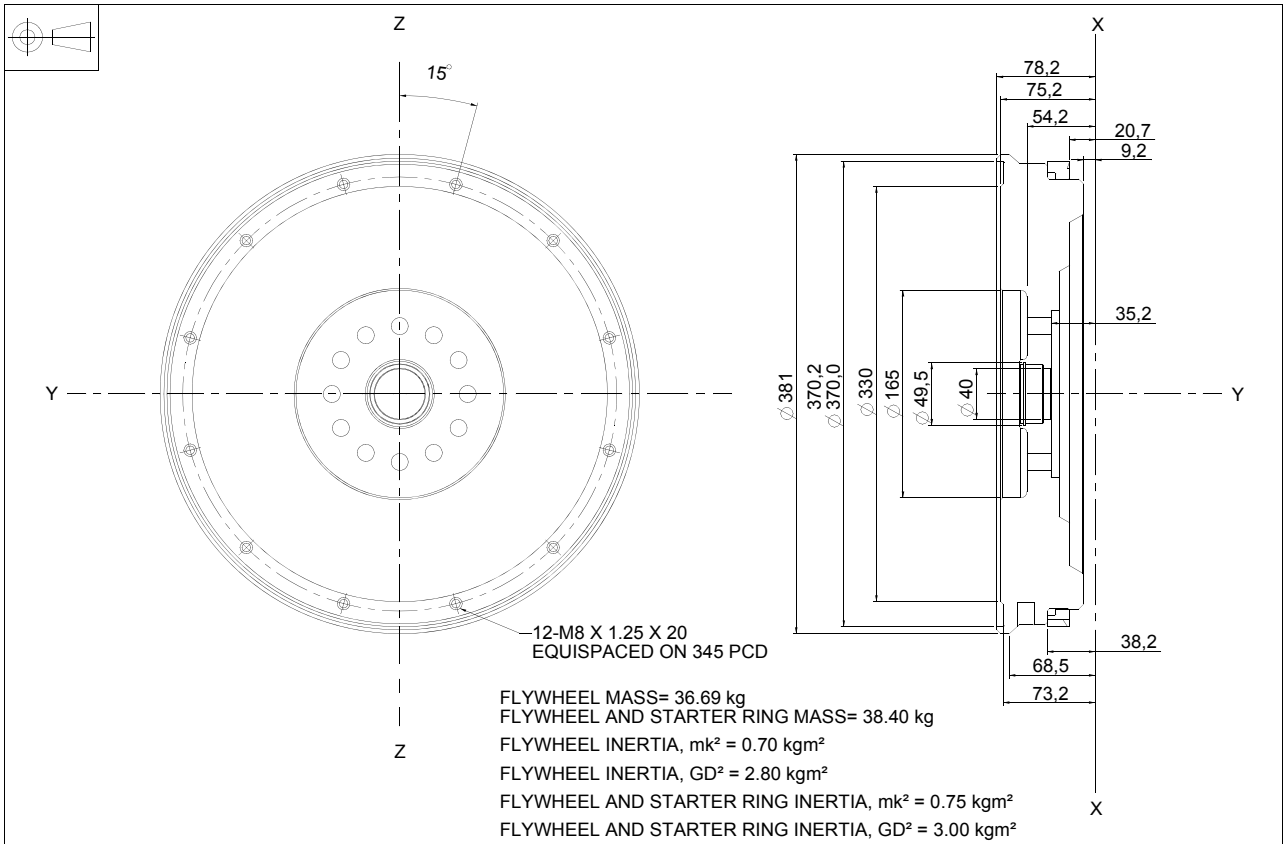


D0066 - For customer transmission



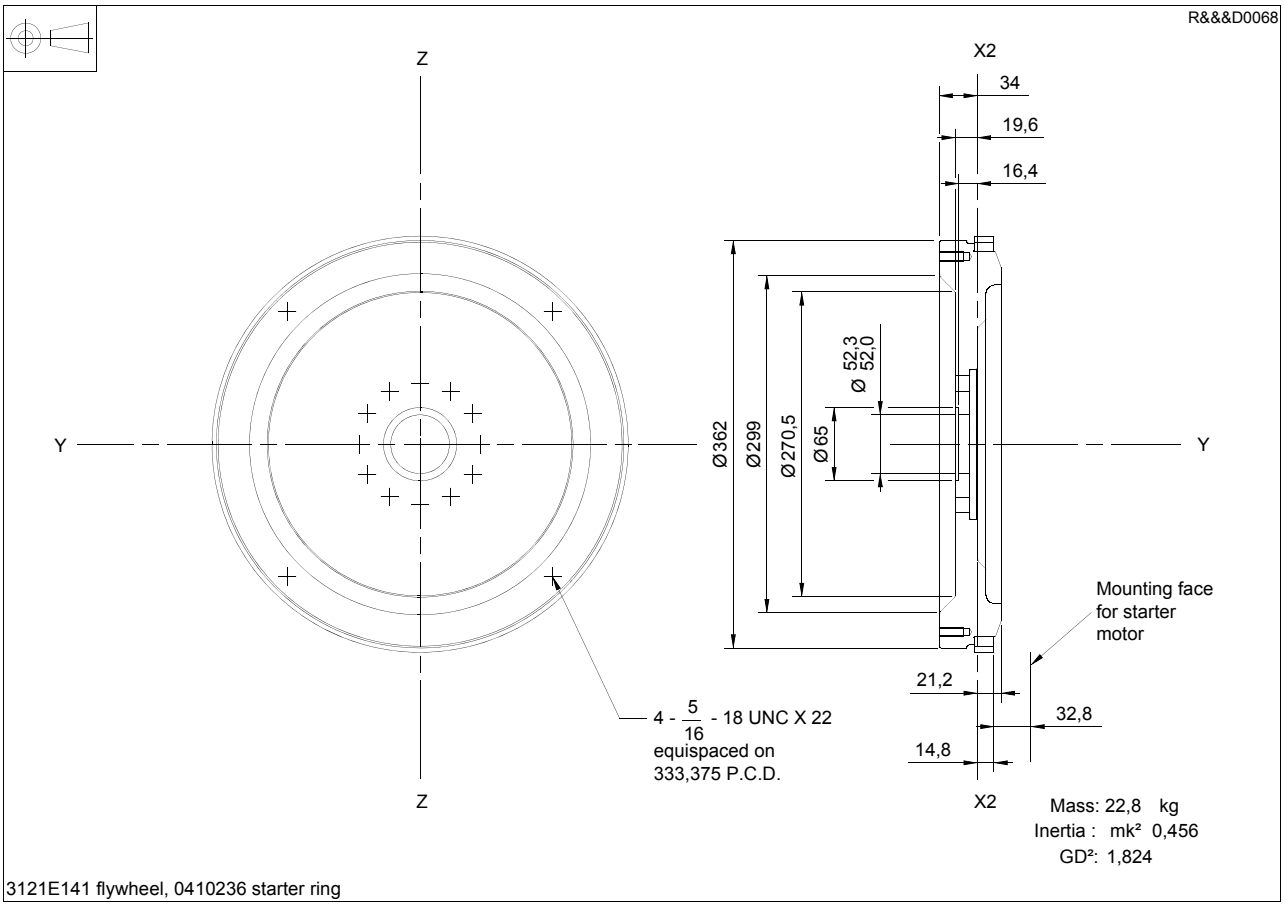
3121K133 flywheel 0410236 starter ring

D0067 - For customer transmission



3122C161 FLYWHEEL 0410236 STARTER RING 115 TOOTH FLYWHEEL ASSEMBLY 4111D306

D0068 - For customer transmission

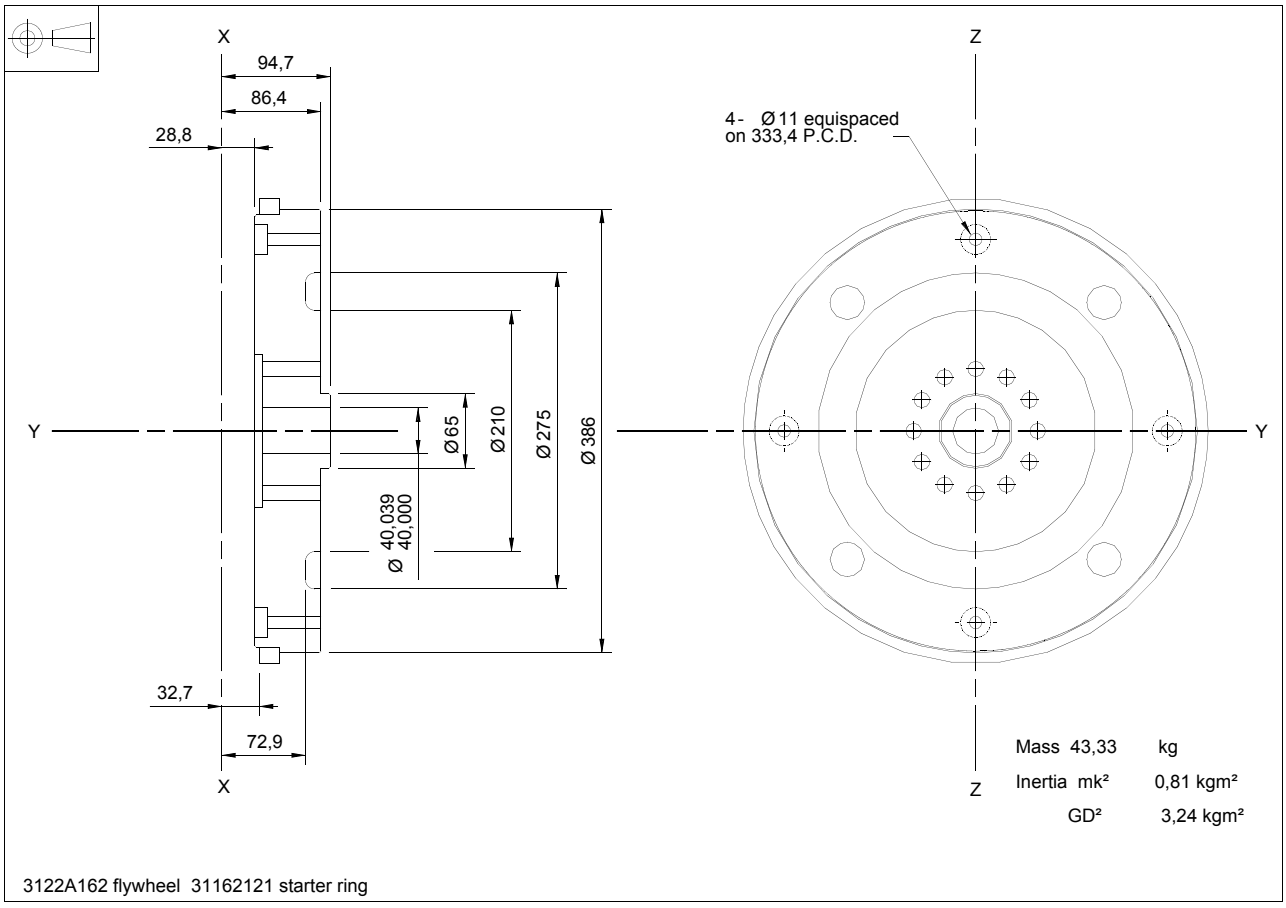


3121E141 flywheel, 0410236 starter ring

D0069 - For customer transmission

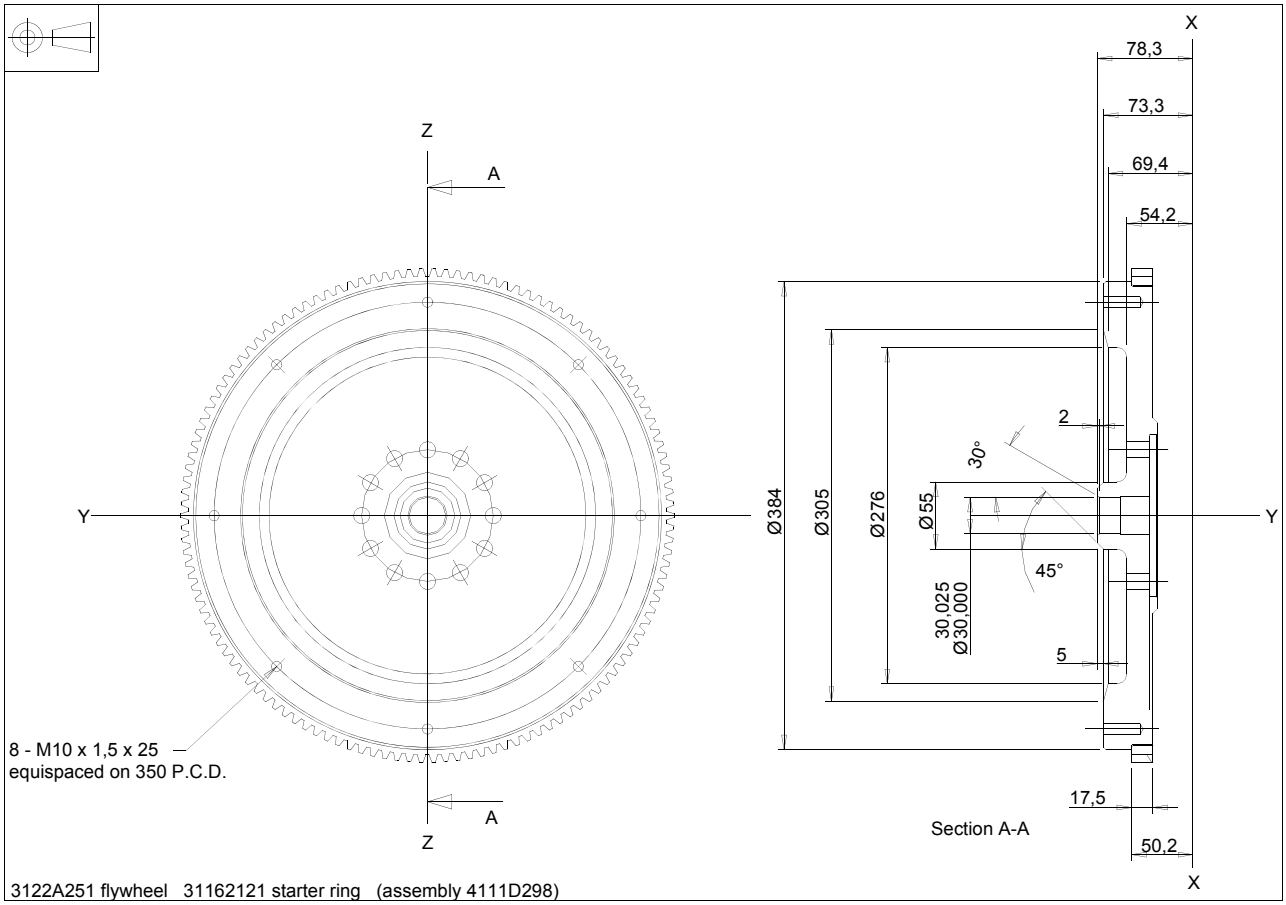
Drawing not available at time of print

D0070 - For ZF115 transmission



3122A162 flywheel 31162121 starter ring

D0092 - For ZFWG9 transmission



3122A251 flywheel 31162121 starter ring (assembly 4111D298)

Starter motors

Description		Option
Not required		E0000
12V 5 kW RHS suitable for dry back end only (for SAE 3 housing) (1)		E0191
24V 4.5 kW RHS, suitable for dry back end only (1)		E0201
12V 3.2 kW LHS, suitable for dry back end only (2) (3) (4)	*replacement for option code E0101*	E0301
12V 3.2 kW RHS, suitable for dry back end only (1)	*replacement for option code E0111*	E0311

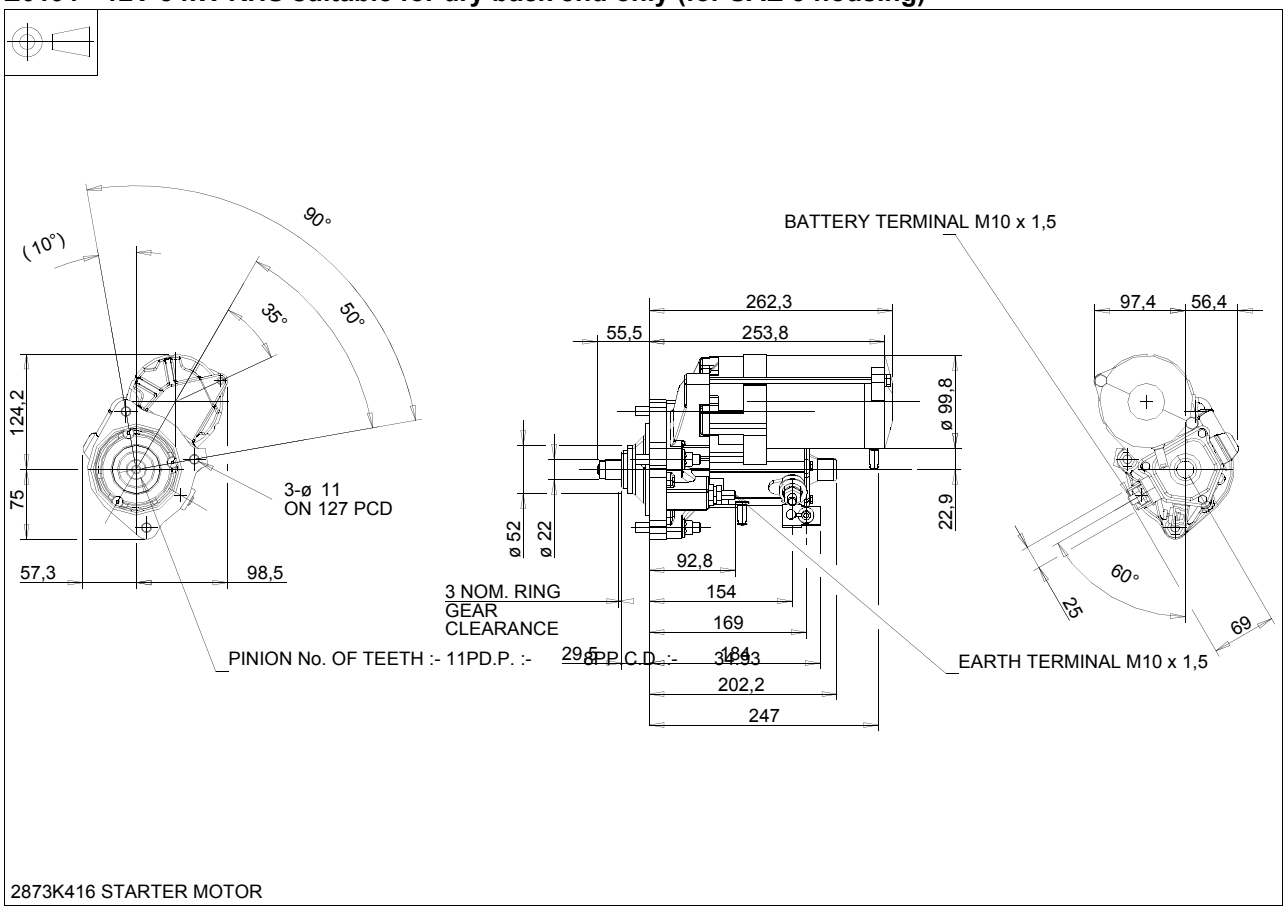
1. Only compatible with non-stressed RHS flywheel housing options.
2. For use with flywheel housing C0010/C0033/C0021/C0026 only.
3. Incompatible with Q**38.
4. Incompatible with Q4042/Q4055/Q4059 when J0060/J0061 selected.

Starter motor branding

Description	Option
Not applicable (1)	EL000
Standard	EL001

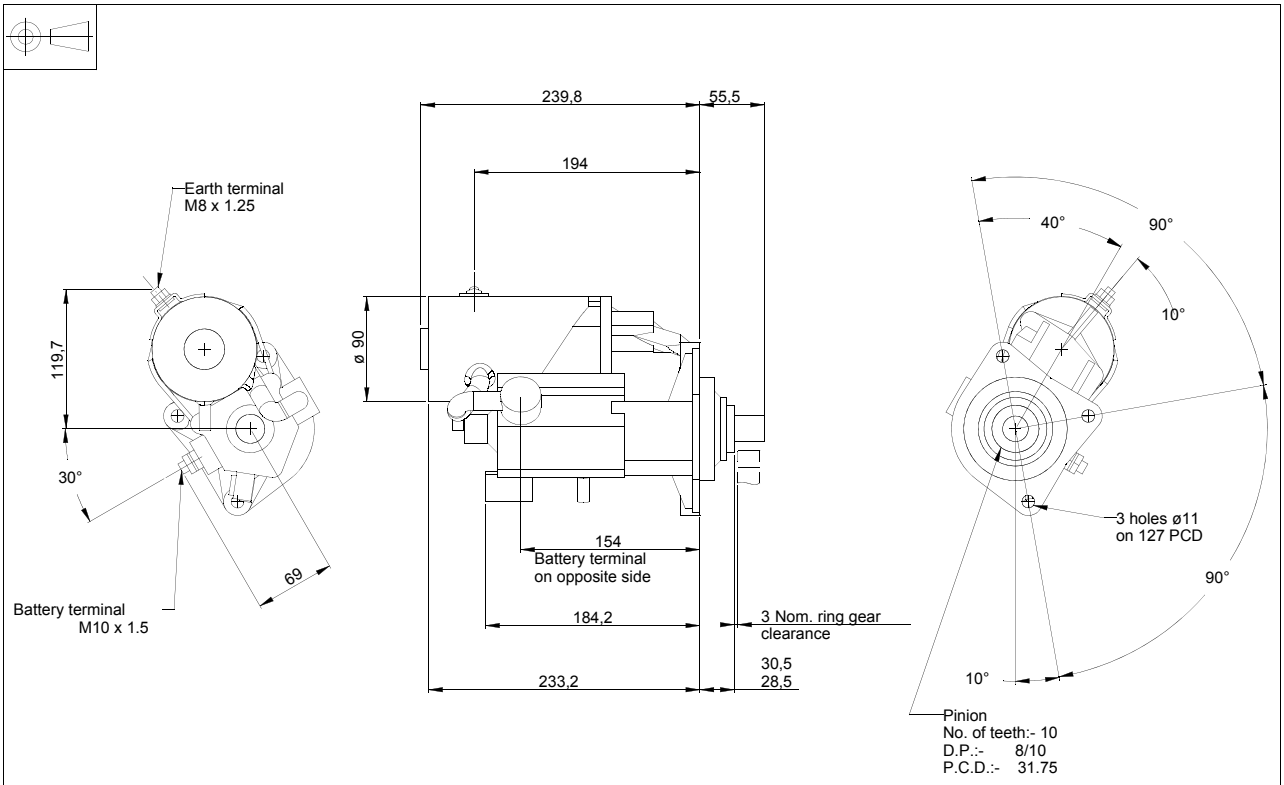
1. Compatible with E0000 only.

E0191 - 12V 5 kW RHS suitable for dry back end only (for SAE 3 housing)



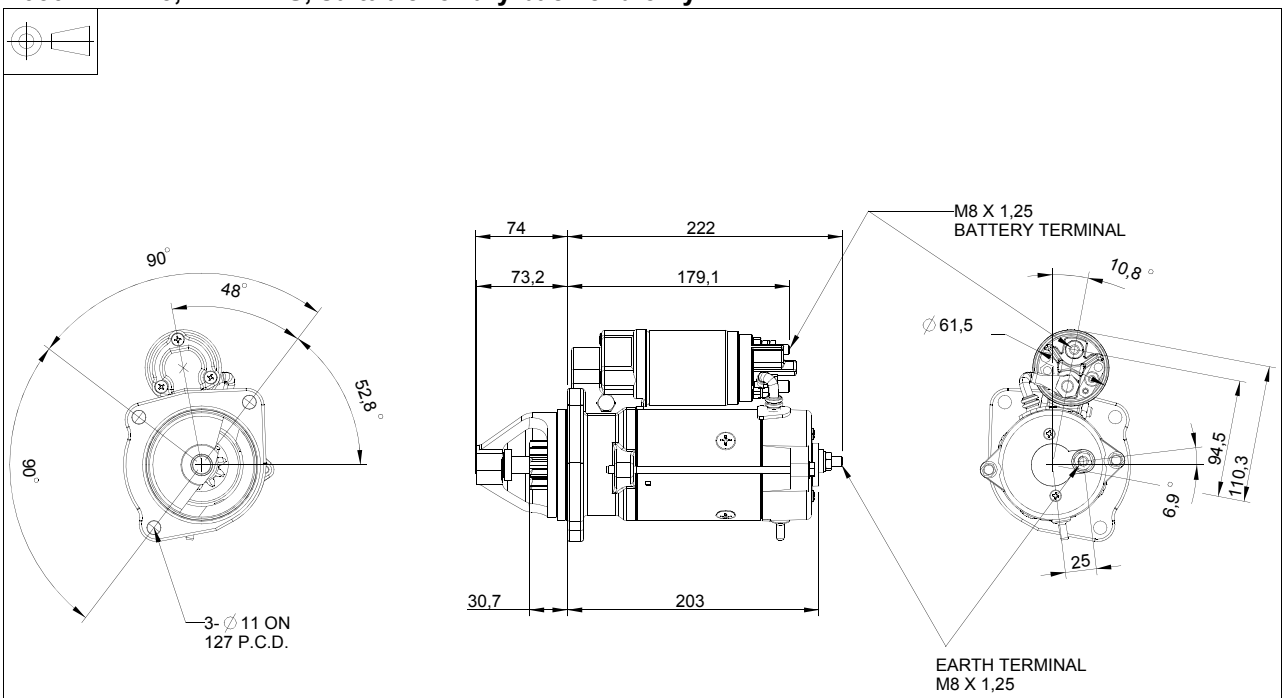
2873K416 STARTER MOTOR

E0201 - 24V 4,5 kW RHS



2873K406 starter motor

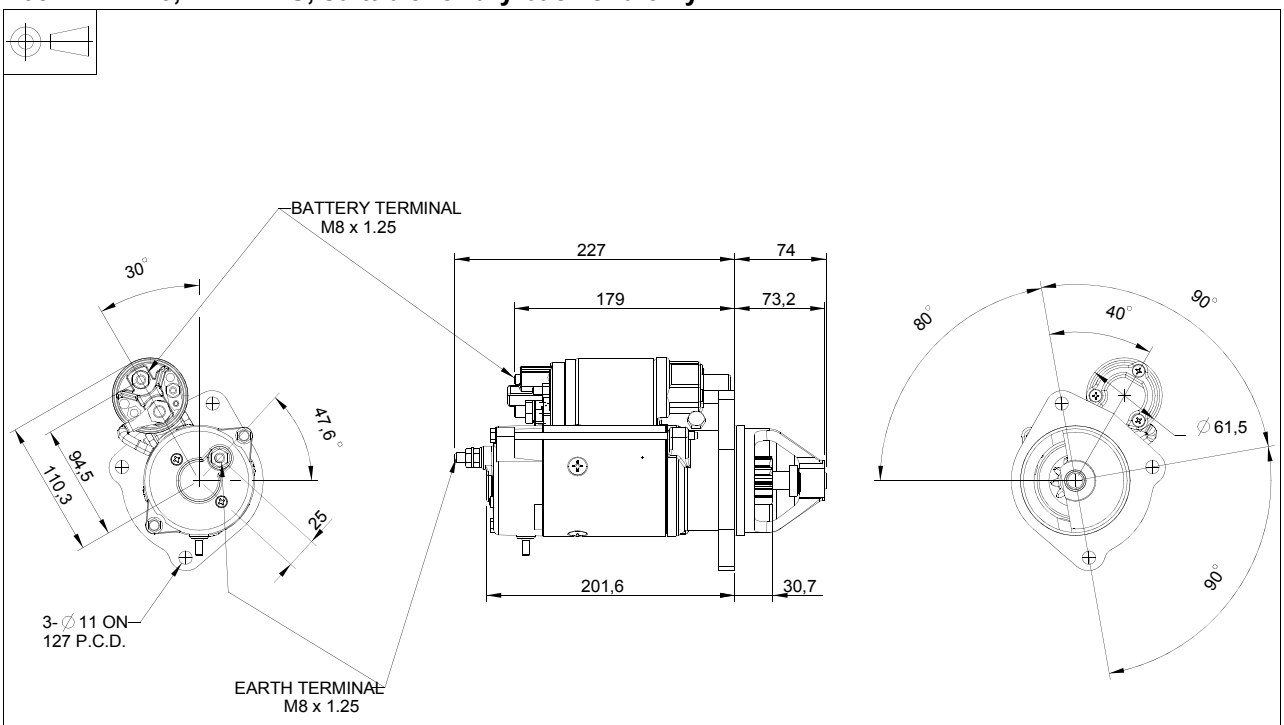
E0301 - 12V 3,2 kW LHS, suitable for dry back end only



PINION
No. OF TEETH 10
MODULE 3.175
PRESSURE ANGLE 20°
P.C.DIAMETER 31.75

2873K624 starter motor

E0311 - 12V 3,2 kW RHS, suitable for dry back end only



Pinion
No. of teeth 10
module 3.175
Pressure angle 20°
P.C.Diameter 31.75

2873K621 starter motor

Fan drives

Fan drive standard vee

Drive ratio	Description	Option
n/a	Fan drive not required *only selectable with M0000/P0000/N0000*	F0000
1 : 1	Fan centre 262 mm (10.31 in) pulley Dia. 200 mm (1)	F0011
	Fan centre 285 mm (11.22 in) pulley Dia. 200 mm (1)	F0012
	Fan centre 356 mm (14.02 in) pulley Dia. 200 mm (1)	F0013
1.25 : 1	Fan centre 262 mm (10.31 in) pulley Dia. 160 mm (1) (2)	F0021
	Fan centre 285 mm (11.22 in) pulley Dia. 160 mm (1) (2)	F0022
	Fan centre 356 mm (14.02 in) pulley Dia. 160 mm (1) (2)	F0023
	Fan centre 440 mm (17.32 in) pulley Dia. 160 mm (1) (2)	F0025
0.85 : 1	Fan centre 262 mm (10.31 in) pulley Dia. 200 mm (3)	F0031
	Fan centre 285 mm (11.22 in) pulley Dia. 200 mm (3)	F0032
	Fan centre 356 mm (14.02 in) pulley Dia. 200 mm (3)	F0033
	Fan centre 440 mm (17.32 in) pulley Dia. 200 mm (3)	F0035
1.06 : 1	Fan centre 262 mm (10.31 in) pulley Dia. 160 mm (3)	F0041
	Fan centre 285 mm (11.22 in) pulley Dia. 160 mm (3)	F0042
	Fan centre 356 mm (14.02 in) pulley Dia. 160 mm (3)	F0043
1.43 :1	Fan centre 262 mm (10.31 in) pulley Dia. 140 mm (1) (2)	F0061
	Fan centre 285 mm (11.22 in) pulley Dia. 140 mm (1) (2)	F0062
	Fan centre 356 mm (14.02 in) pulley Dia. 140 mm (1) (2)	F0063
	Fan centre 395 mm (15.55 in) pulley Dia. 140 mm (1) (2)	F0064
n/a	Fan centre 262 mm (10.31 in) *no pulley or belts*	F0501
	Fan centre 285 mm (11.22 in) *no pulley or belts*	F0502
	Fan centre 356 mm (14.02 in) *no pulley or belts*	F0503
	Fan centre 395 mm (15.55 in) *no pulley or belts*	F0504
	Fan centre 310 mm (12.20 in) (3) *no pulley or belts*	F0507

1. Select crankshaft pulley K0001 or K0004.
2. Compatible with composite fans only.
3. Select crankshaft pulley K0006 or K0007.

Note: All fan pulleys have twin grooves.

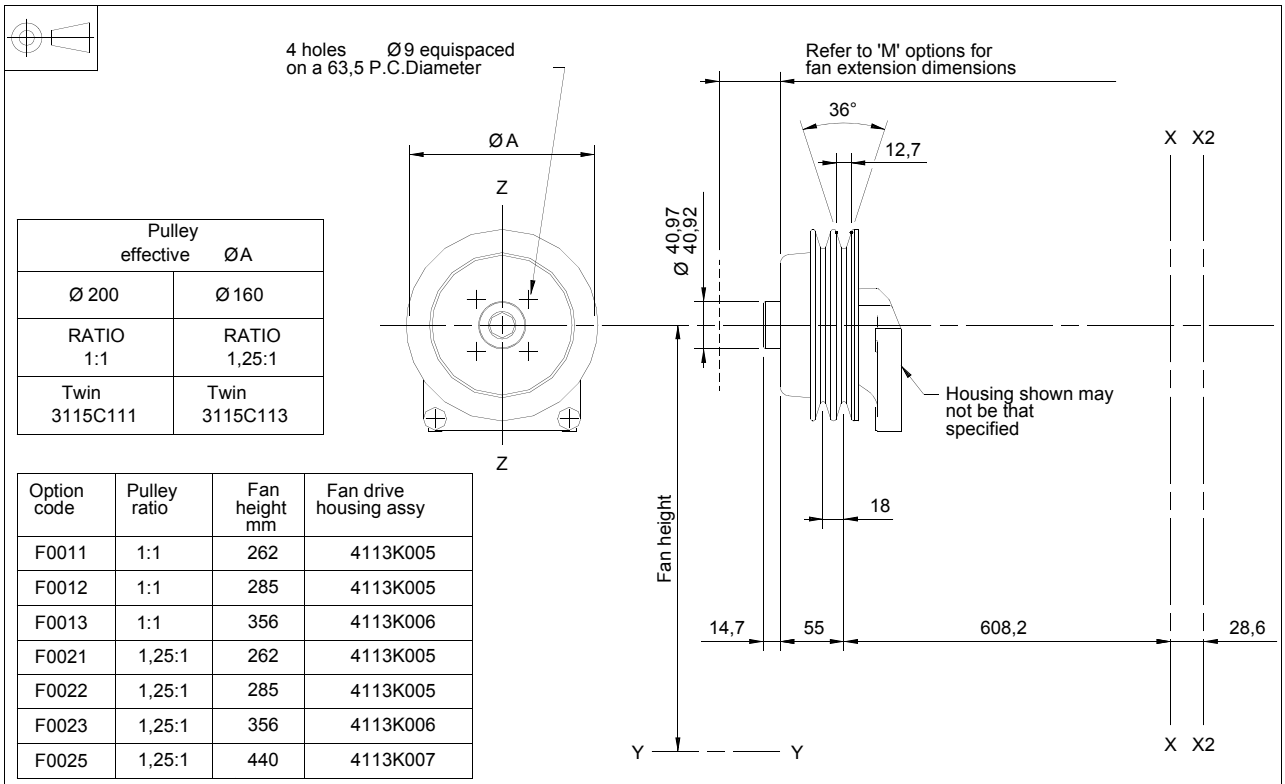
Caution: *When engines are supplied with one fan belt the unused fan pulley* ***must not*** *be used to drive auxiliary equipment.*

Fan drive multi vee

Drive ratio	Description	Option
n/a	Fan drive not required *only selectable with M0000/P0000/N0000*	F0000
0.9 : 1	Fan centre 262 mm (10.31 in) pulley Dia. 167 mm (1)	F4421
	Fan centre 285 mm (11.22 in) pulley Dia. 167 mm (2)	F4422
1 : 1	Fan centre 262 mm (10.31 in) pulley Dia. 150 mm (2)	F4461
	Fan centre 285 mm (11.22 in) pulley Dia. 150 mm (2)	F4462
1.2 : 1	Fan centre 262 mm (10.31 in) pulley Dia. 167 mm (2)	F4441
	Fan centre 285 mm (11.22 in) pulley Dia. 167 mm (2)	F4442
1.33 : 1	Fan centre 262 mm (10.31 in) pulley Dia. 150 mm (2) (3)	F4451
	Fan centre 285 mm (11.22 in) pulley Dia. 150 mm (2) (3)	F4452
n/a	Fan centre 262 mm (10.31 in) (3) *no pulley or belts*	F0501
	Fan centre 285 mm (11.22 in) (3) *no pulley or belts*	F0502
	Fan centre 310 mm (12.20 in) (3) *no pulley or belts*	F0507

1. Select 150 mm crankshaft pulley K0010/K0011.
2. Compatible with composite fans only.
3. Incompatible with K0000, only selectable with M0000 and P0000.

F0011 to F0013 and F0021 to F0025

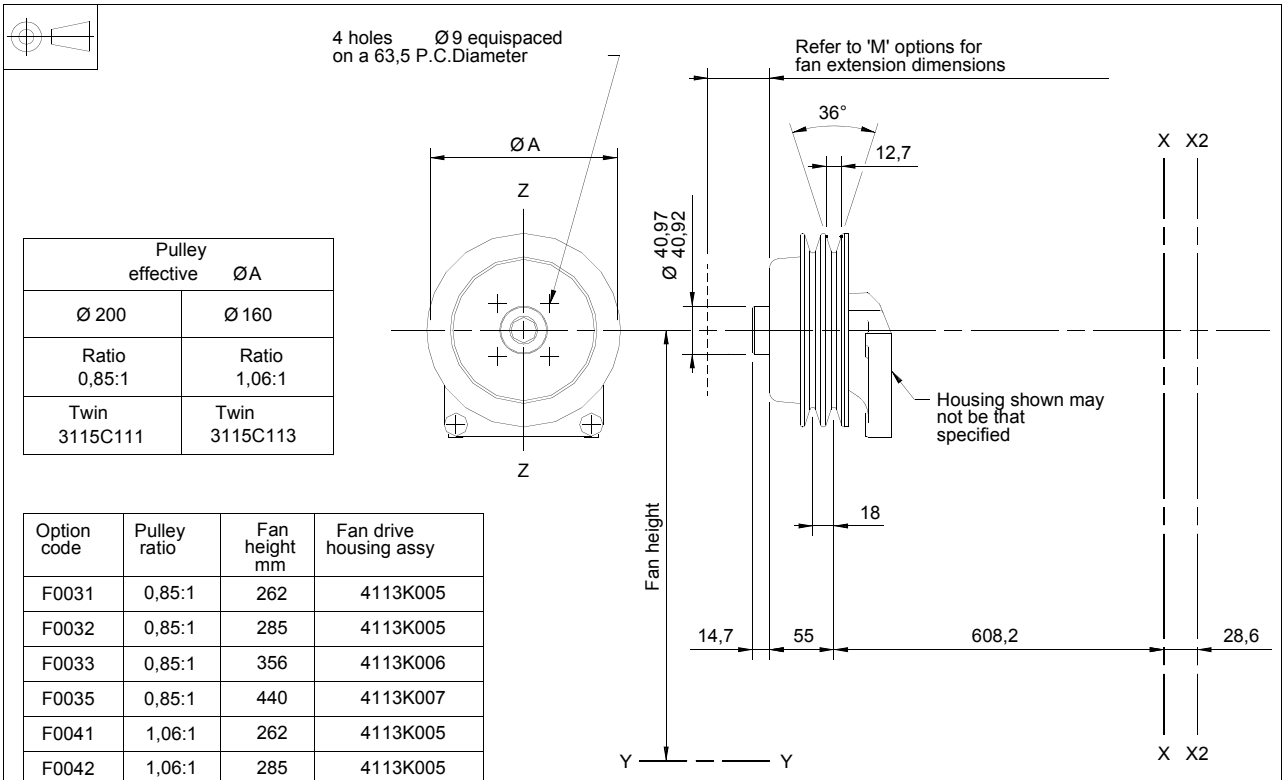


Pulley effective ØA	
Ø 200	Ø 160
RATIO 1:1	RATIO 1,25:1
Twin 3115C111	Twin 3115C113

Option code	Pulley ratio	Fan height mm	Fan drive housing assy
F0011	1:1	262	4113K005
F0012	1:1	285	4113K005
F0013	1:1	356	4113K006
F0021	1,25:1	262	4113K005
F0022	1,25:1	285	4113K005
F0023	1,25:1	356	4113K006
F0025	1,25:1	440	4113K007

Fan drive assemblies; for part numbers refer to the table shown

F0031 to F0035 and F0041 to F0042

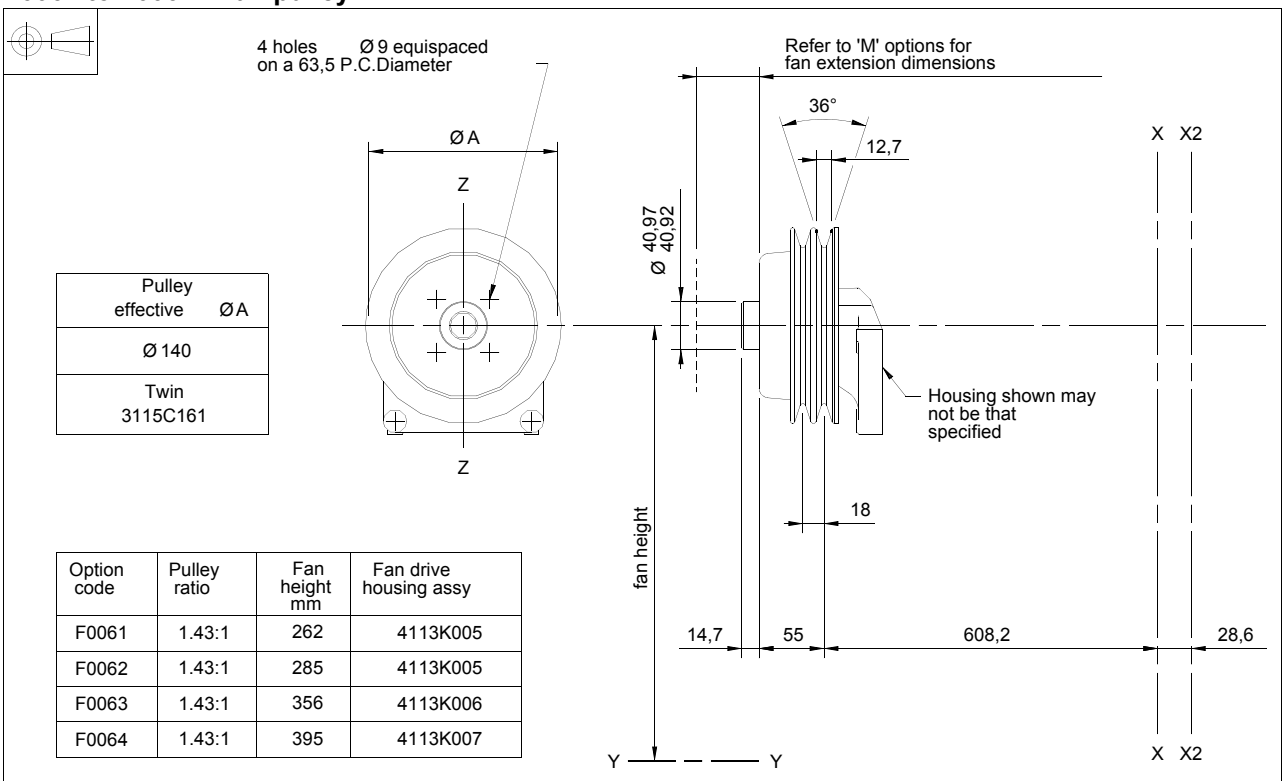


Pulley effective ØA	
Ø 200	Ø 160
Ratio 0,85:1	Ratio 1,06:1
Twin 3115C111	Twin 3115C113

Option code	Pulley ratio	Fan height mm	Fan drive housing assy
F0031	0,85:1	262	4113K005
F0032	0,85:1	285	4113K005
F0033	0,85:1	356	4113K006
F0035	0,85:1	440	4113K007
F0041	1,06:1	262	4113K005
F0042	1,06:1	285	4113K005

Fan drive assemblies ; for part numbers refer to table shown

F0061 to F0064 - Fan pulley

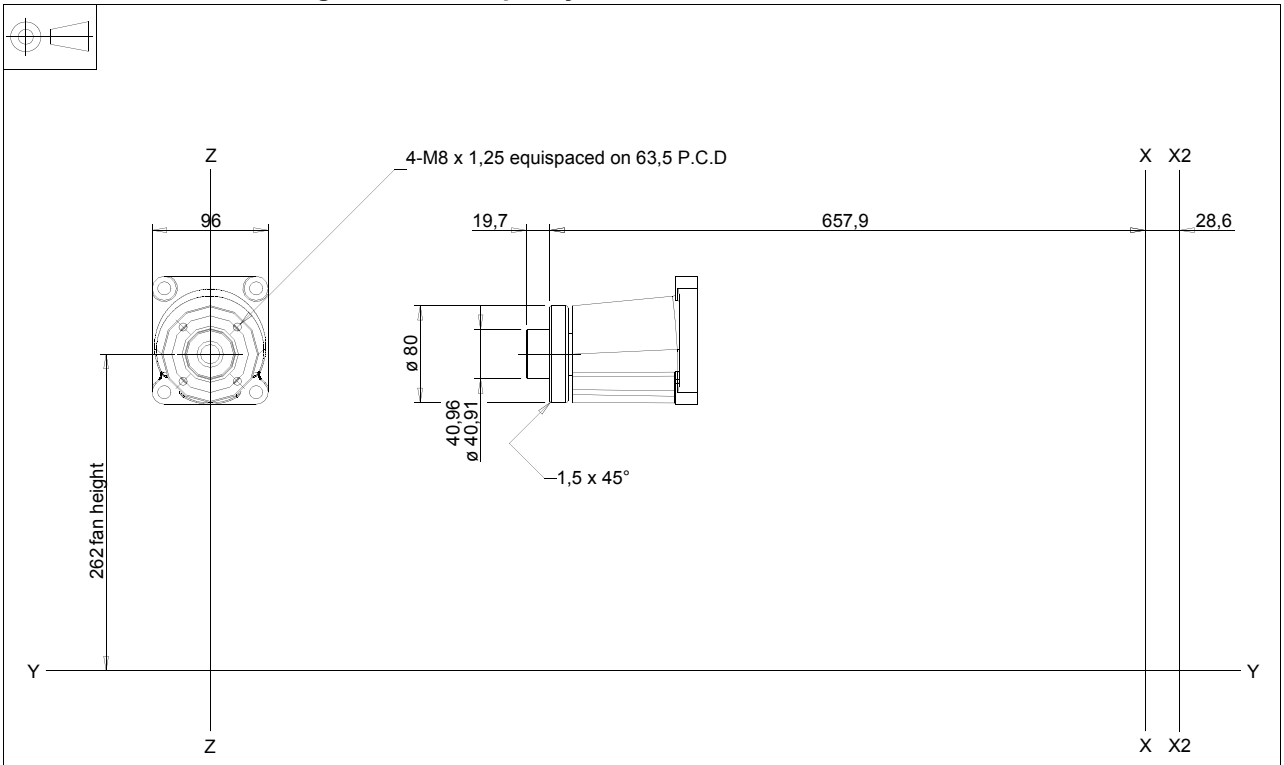


Pulley effective ØA
Ø 140
Twin 3115C161

Option code	Pulley ratio	Fan height mm	Fan drive housing assy
F0061	1.43:1	262	4113K005
F0062	1.43:1	285	4113K005
F0063	1.43:1	356	4113K006
F0064	1.43:1	395	4113K007

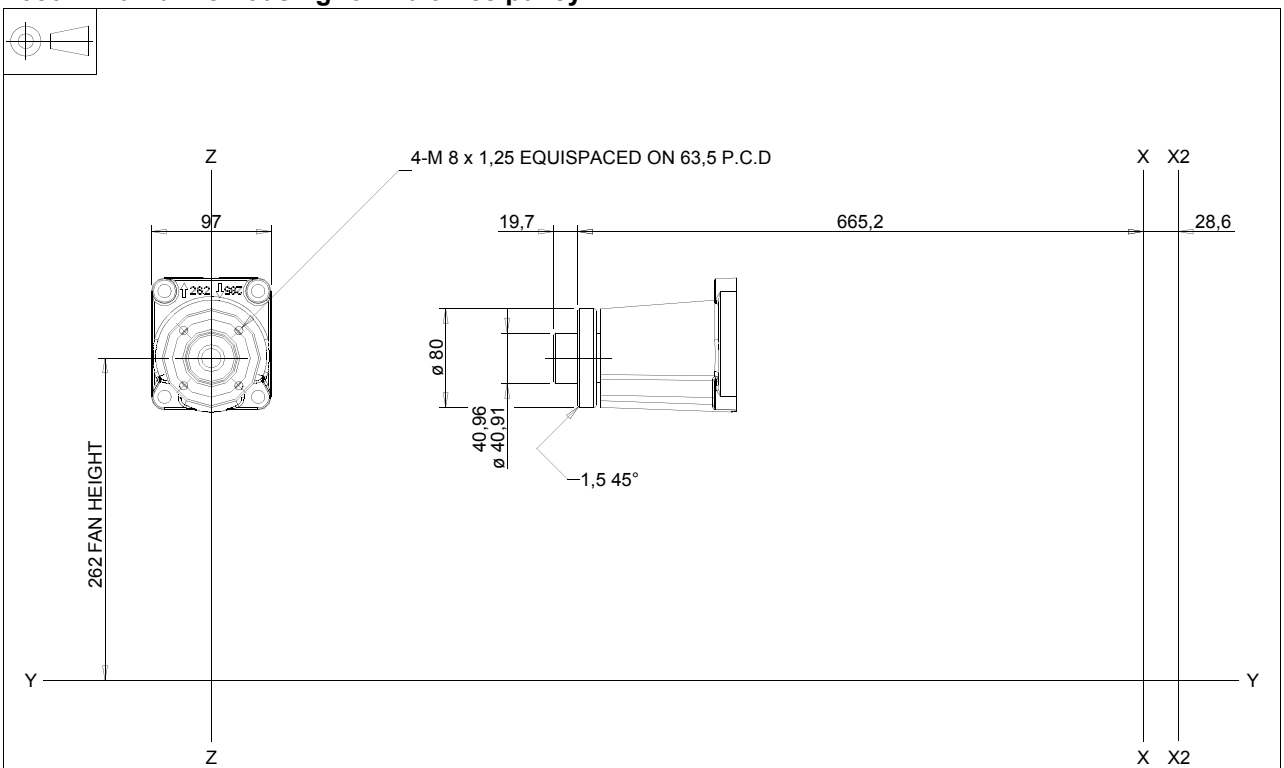
Fan drive assemblies; for part numbers refer to the table shown

F0501 - Fan drive housing for standard pulley



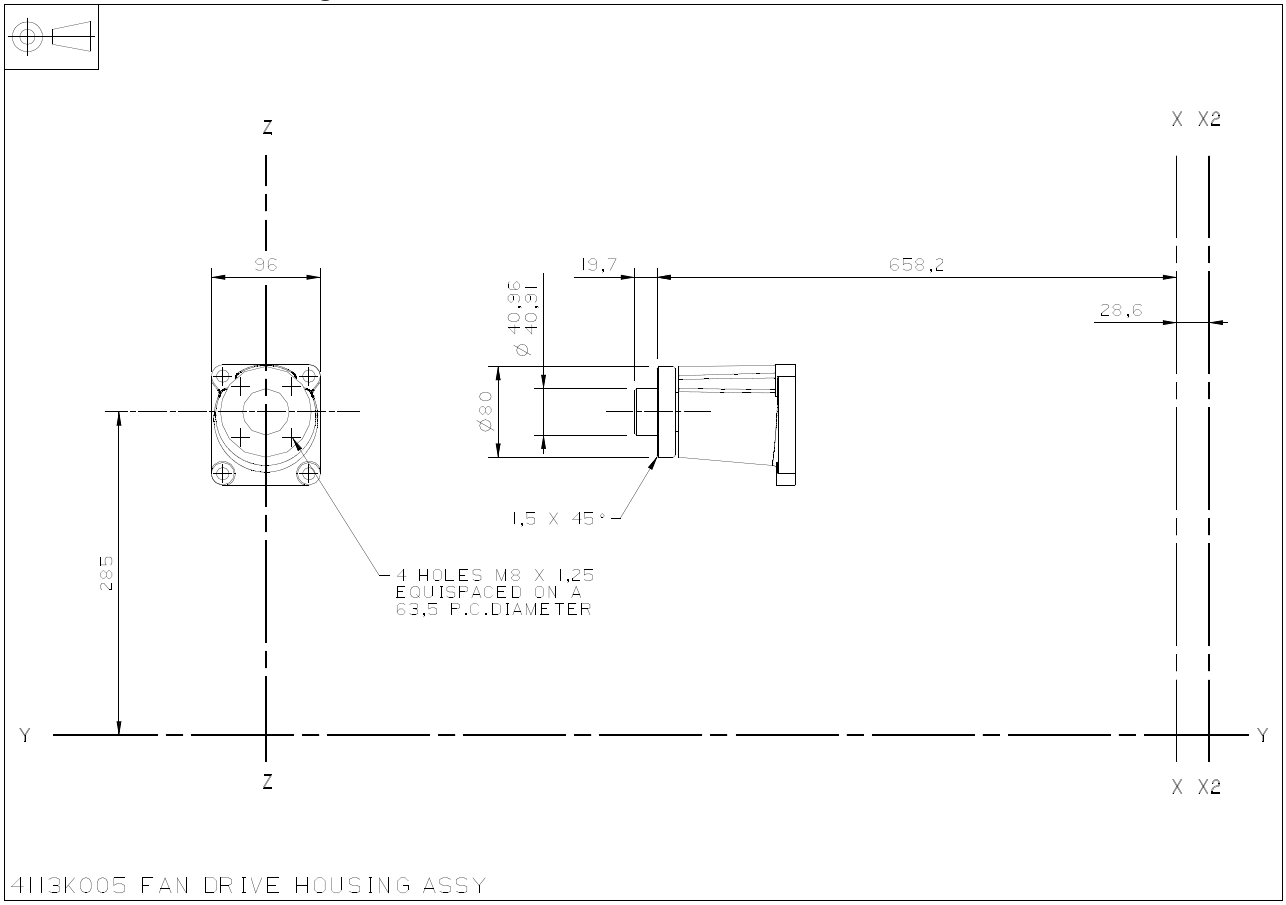
4113K005-FAN DRIVE HOUSING ASSEMBLY-TO SUIT OPTIONS K0001/K0004/K0006/K0007

F0501 - Fan drive housing for multi vee pulley

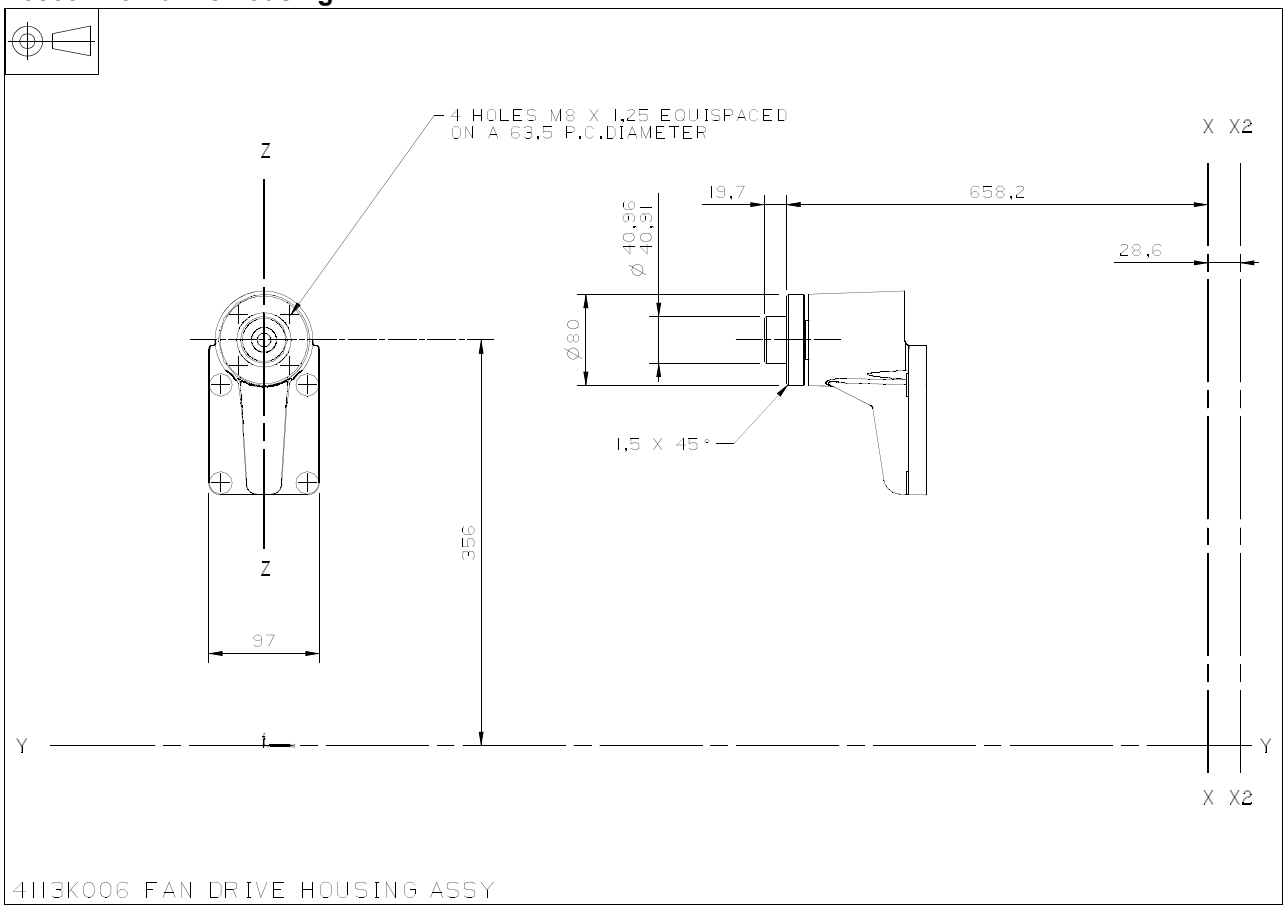


4133K001-fan drive housing assembly-to suit options K0010/K0011/K0020/K0021

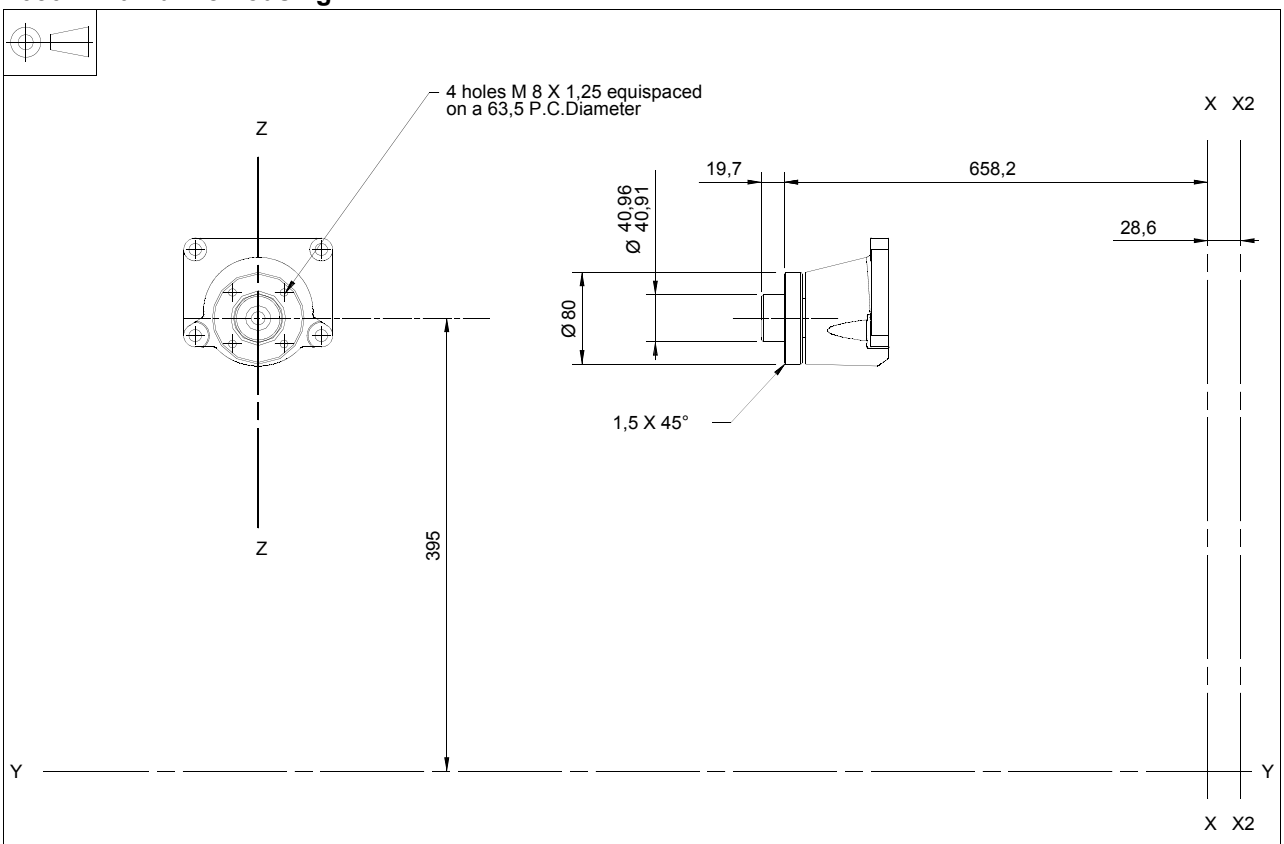
F0502 - Fan drive housing



F0503 - Fan drive housing

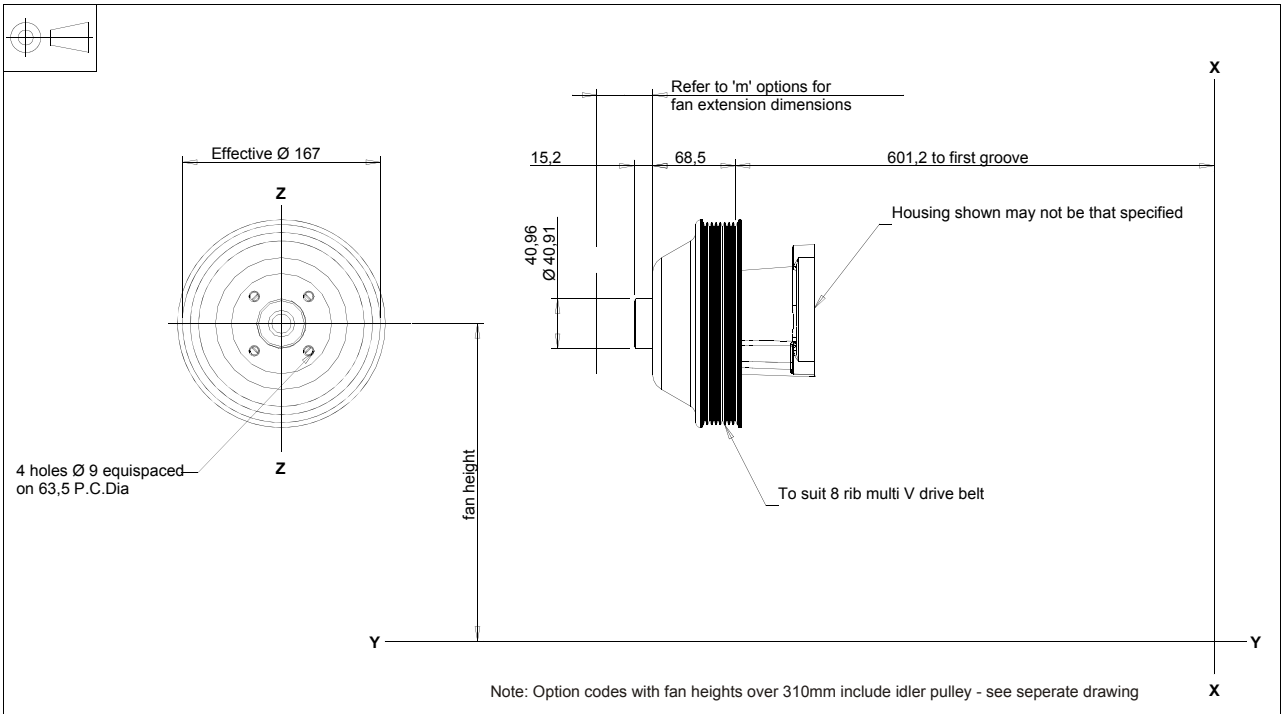


F0504 - Fan drive housing



4113K007 fan drive housing assy

F4422/F4441/F4442 - Fan centre 285 mm

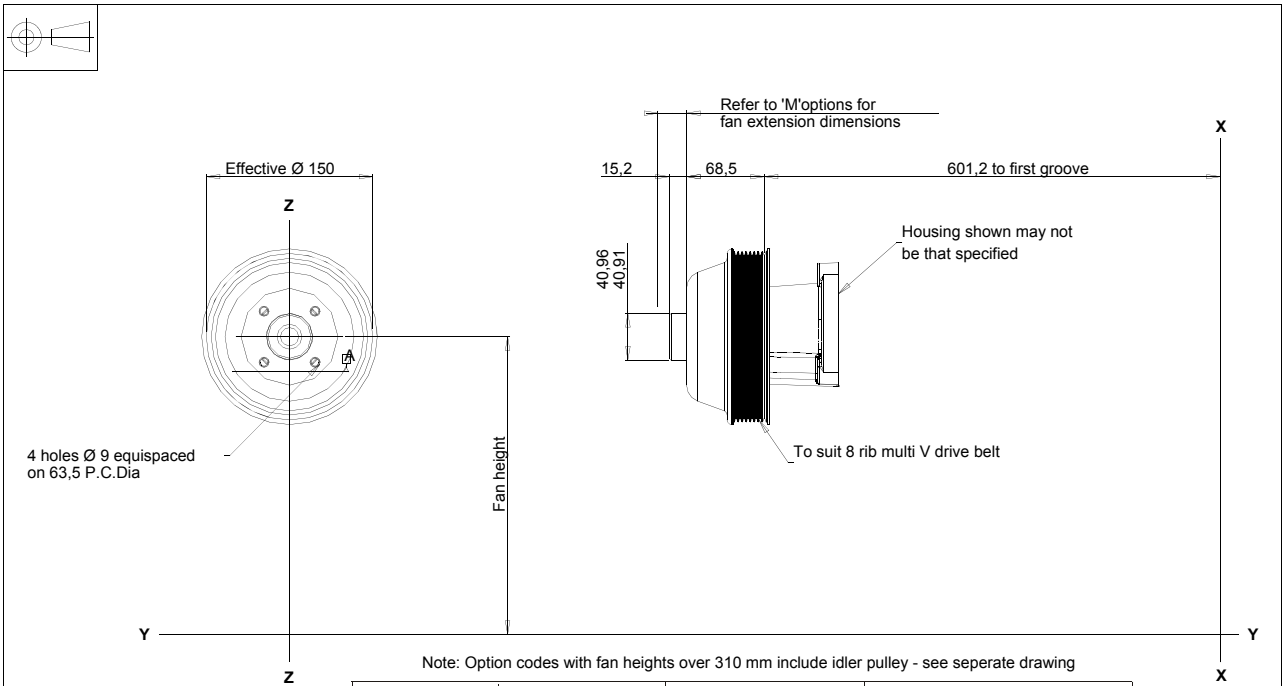


Note: Option codes with fan heights over 310mm include idler pulley - see seperate drawing

Option Code	Pulley Ratio	Fan Height mm	Fan Drive Housing Assy
F4422	0,9 : 1	285	4113K0011
F4441	1,2 : 1	262	4113K0011
F4443		285	4113K0011

3115Y011 pulley

F4451/F4452/F4461/F4462



Note: Option codes with fan heights over 310 mm include idler pulley - see seperate drawing

Option Code	Pulley Ratio	Fan Height mm	Fan Drive Housing Assy
F4451	0,33 : 1	262	4113K011
F4452		285	
F4461	1 : 1	262	4113K011
F4462		285	

3115Y021 Pulley

Lubricating oil sumps and dipsticks

Non-stressed cylinder block sumps

Description		Option
Steel, flat bottom sump, LHS dipstick only (1) (2) (3) (4) (5)		G01**
Steel, flat bottom sump, RHS dipstick only (3) (6)		G02**
Cast iron, flat bottom sump (1) (4) (6)	*balancer R0001 can be selected*	G03**
Aluminium, front well sump (1)		G04**
Aluminium, shallow rear well sump (1) (2) (3) (4) (5) (6) (7) (8) (9)		G06**
Aluminium, deep well sump (1) (4)		G10**

1. Available with G***1.
2. Available with G***2.
3. Available with G***0.
4. Available with G***5.
5. Available with G**11.
6. Available with G***3.
7. Available with G***4.
8. Available with G***9.
9. Available with G***7.

Stressed cylinder block sumps

Description		Option
Cast iron, deep flat bottom sump (1) (2) (3) (4)	*balancer R0001 can be selected*	G20**
Cast iron, shallow tunnel sump (1) (5)	*balancer R0001 must be selected*	G21**

1. Available with G***1.
2. Available with G***3.
3. Available with G***4.
4. Available with G***6.
5. Available with balancer R0001 only

Dipsticks

Description	Option
No dipstick	G**00
Dipstick short, LHS	G**01
Dipstick long, LHS	G**02
Dipstick short, RHS	G**03
Dipstick medium, LHS	G**04
Dipstick medium, LHS, rearward facing	G**05
Dipstick special, RHS	G**06
Dipstick medium, RHS	G**07
Dipstick Long, forward facing, LHS	G**08

Example: Steel, flat bottom sump with short dipstick LHS = G0101.

Oil capacities and gradability

Gradient of operation and oil capacities

The table below shows the oil capacity of each sump and the angle at continuous operation permitted in all directions. Gradient figures are measured from the horizontal position.

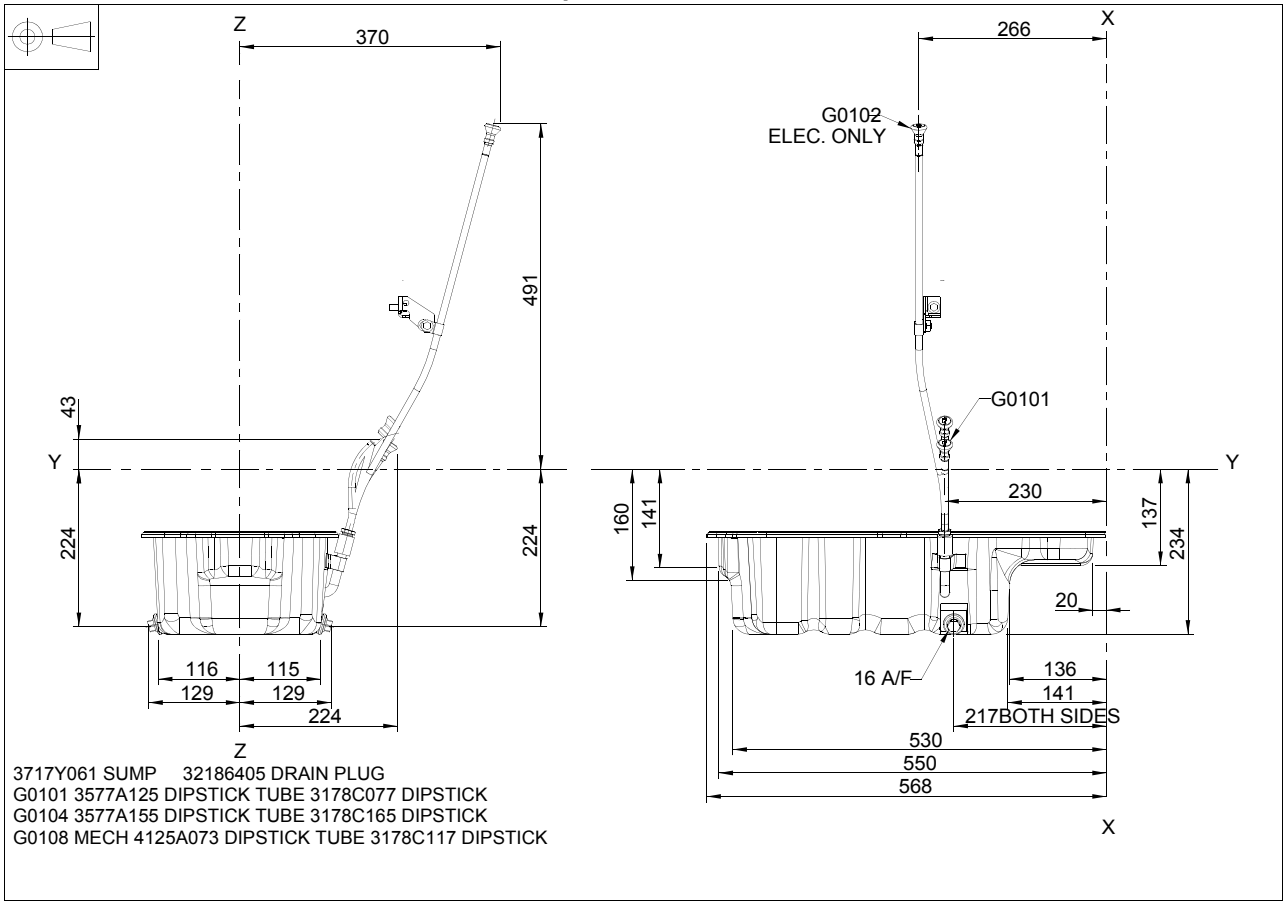
Note: Oil change period of low capacity sumps under review.

Option code	Gradient limitation (1)	Sump capacities Max/min		
		Litres	UK pints	US quarts
G010*/G020*	24°	6,9/5,6	12.1/9.9	7.3/5.9
G030*	30°	7,0/5,5	12.3/9.6	7.4/5.8
G030* (2)	25°	6,4/4,1	11.3/7.2	6.7/4.3
G040*	30°	8,1/6,6	14.3/11.6	8.6/7.0
G060*/G080*	30°	8,0/6,4	14.1/11.3	8.4/6.7
G100*	25°	13.5/6.1	23.6/10.8	14.3/6.4
G200*	35°	9,4/7,6	16.5/13.3	9.9/8.0
G210* (2)	25°	7,0/5,9	12.3/10.4	7.4/6.2

1. Based on minimum oil level.
2. When balancer fitted.

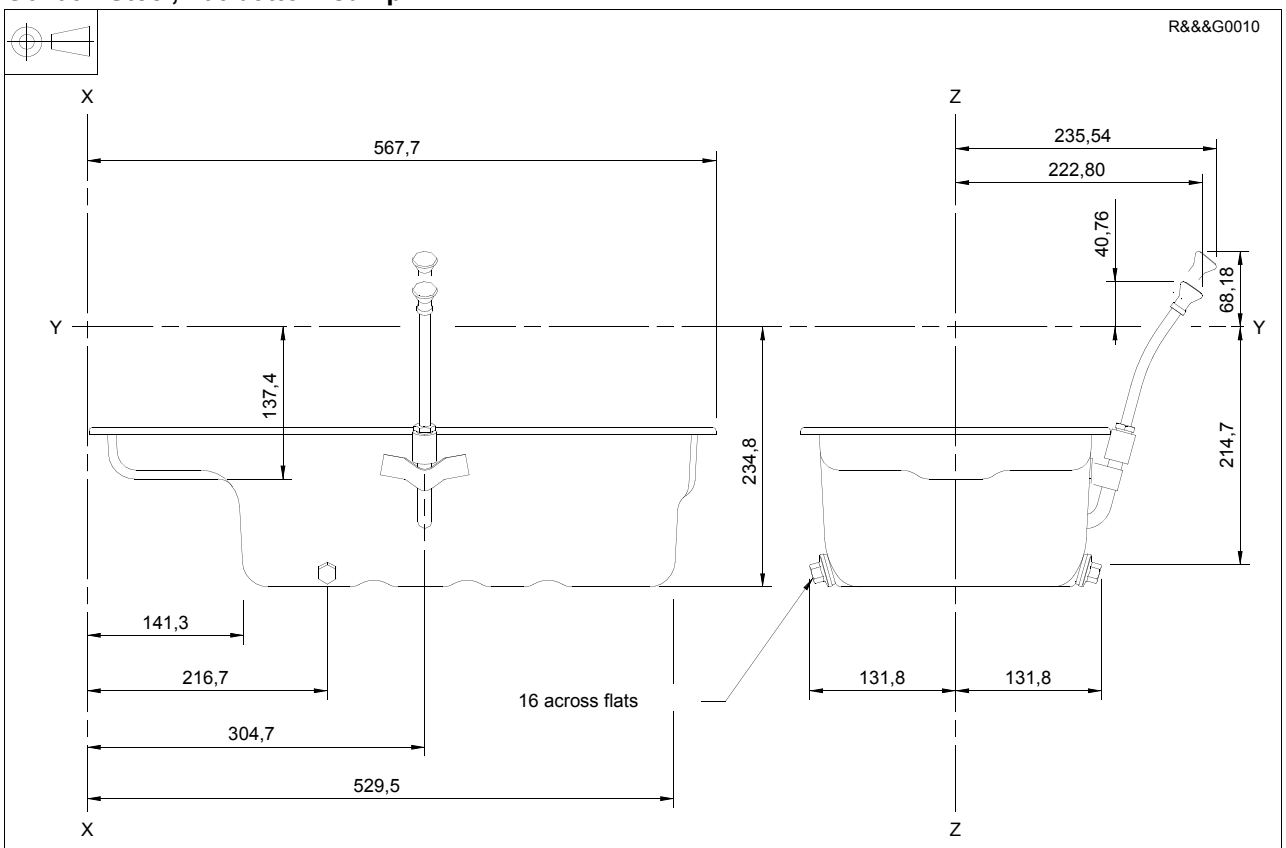
Note: For the total oil capacity of the engine, add 1,5 litres, (2.6 UK pints), 1.6 US quarts to the figures in the above table.

G0100/G0101/G0104 - Steel, flat bottom sump



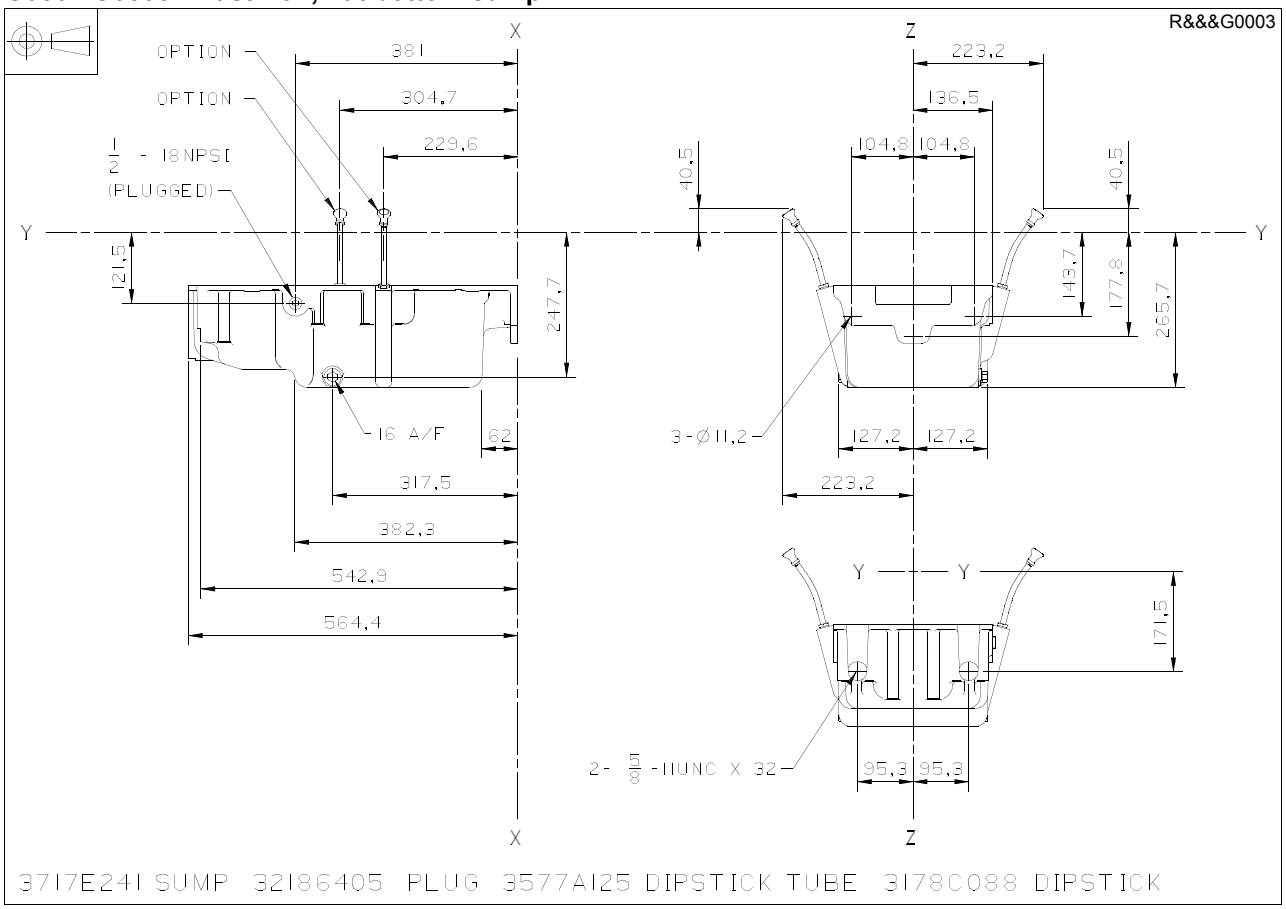
3717Y061 SUMP 32186405 DRAIN PLUG
G0101 3577A125 DIPSTICK TUBE 3178C077 DIPSTICK
G0104 3577A155 DIPSTICK TUBE 3178C165 DIPSTICK
G0108 MECH 4125A073 DIPSTICK TUBE 3178C117 DIPSTICK

G0203 - Steel, flat bottom sump

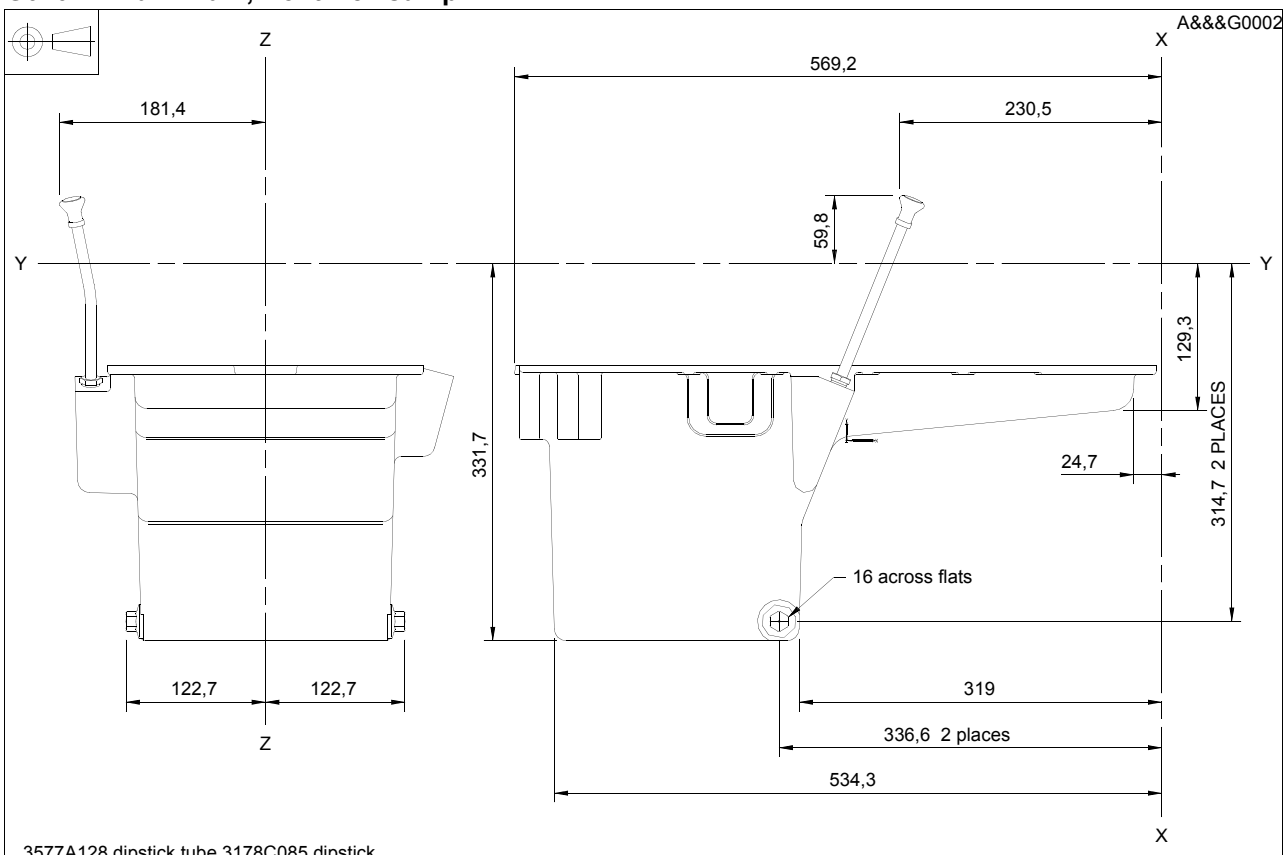


3577A128 dipstick tube, 3178C088 dipstick, used with J0016 J0019.
3717Y062 sump, 3577A125 dipstick tube, 3178C077 dipstick, 32186405 drain plug.

G0301/G0303 - Cast iron, flat bottom sump

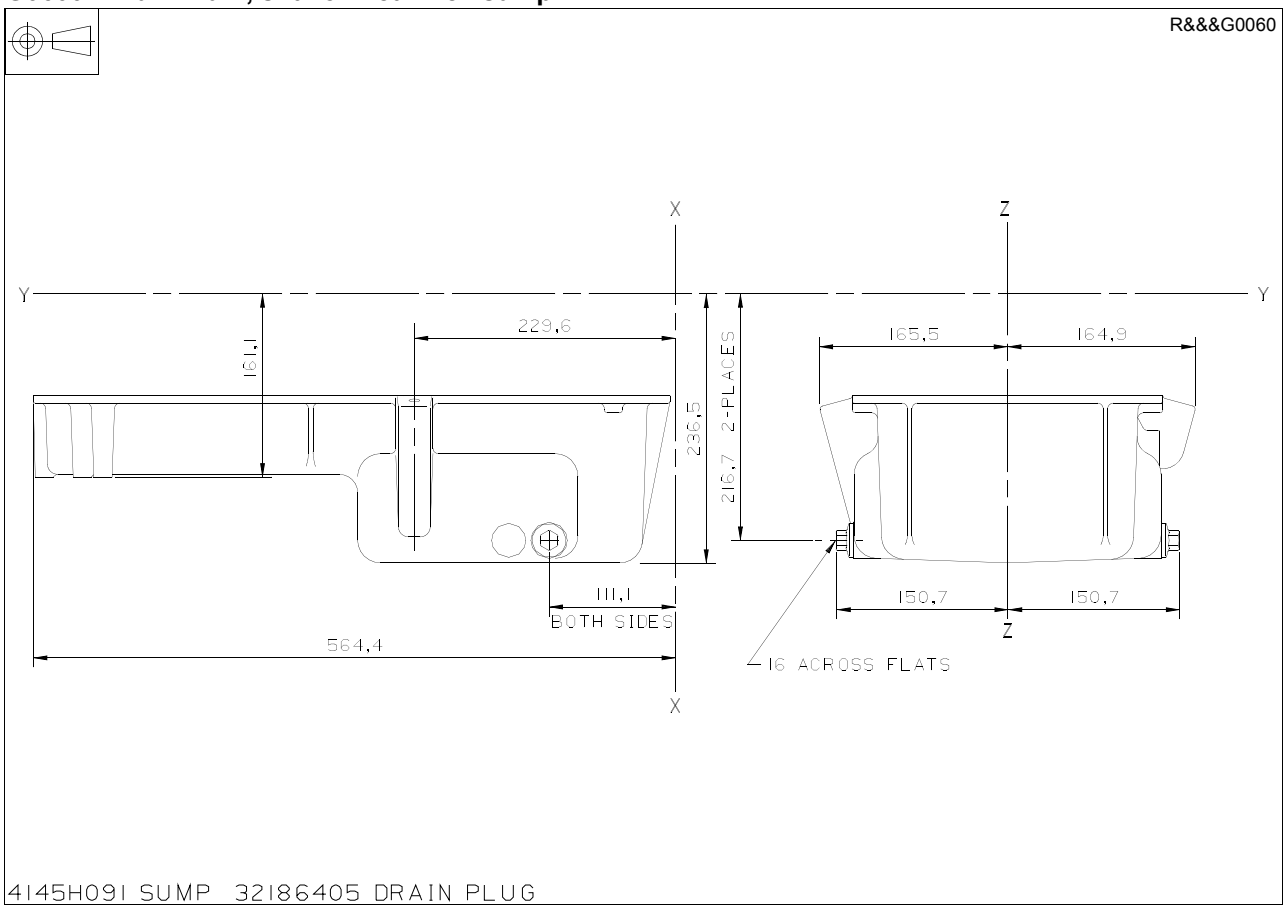


G0401 - Aluminium, front well sump



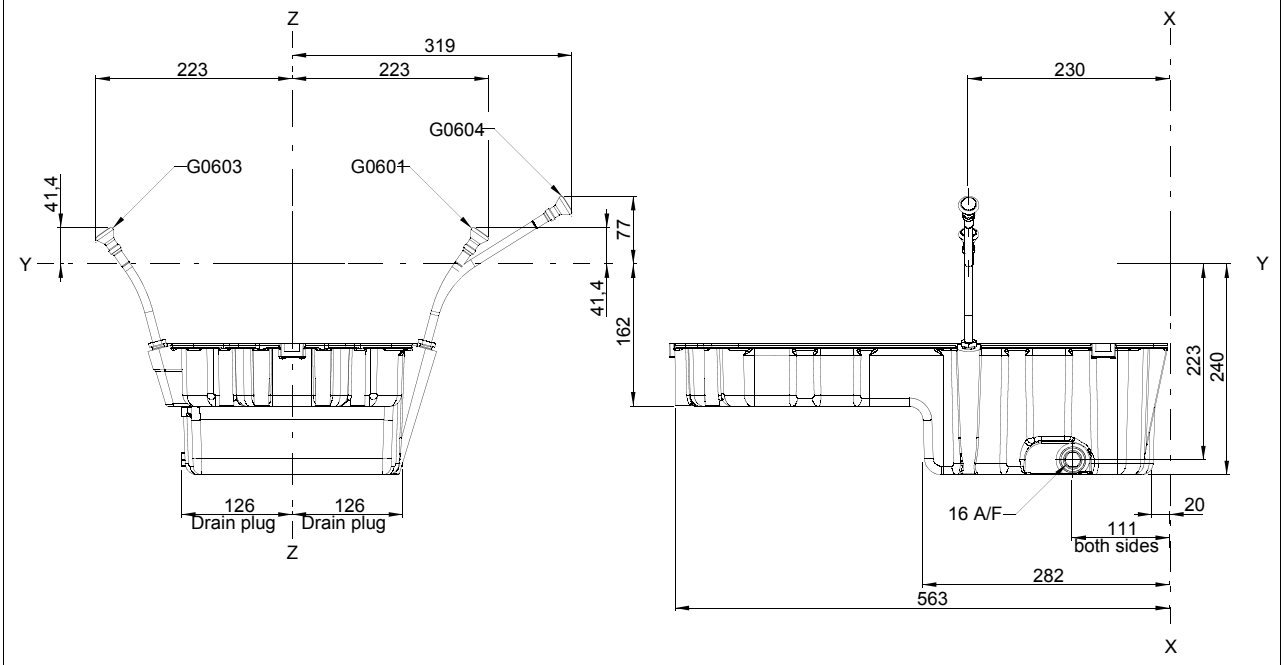
3577A128 dipstick tube 3178C085 dipstick
3717E124 sump 32186405 drain plug

G0600 - Aluminium, shallow rear well sump



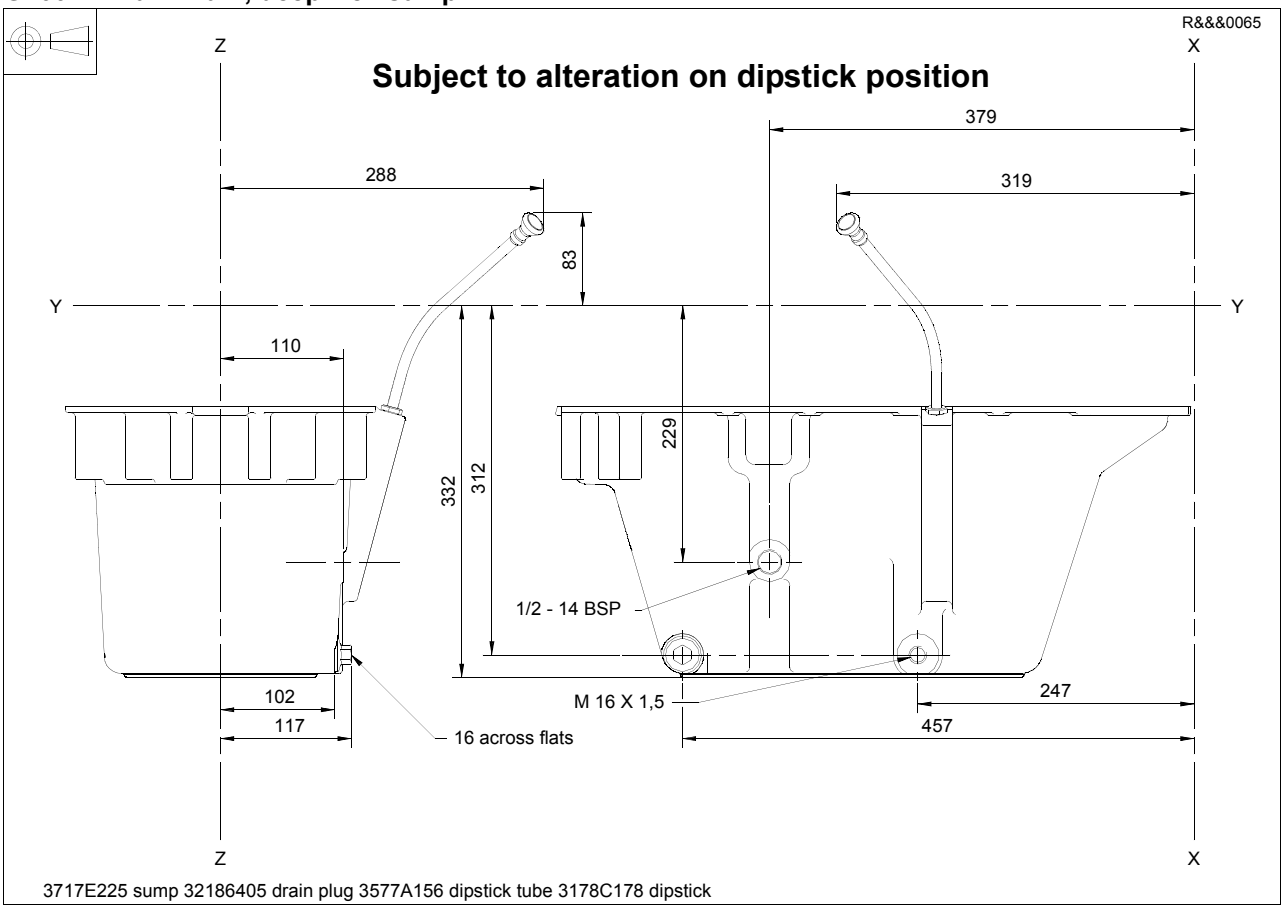
4145H091 SUMP 32186405 DRAIN PLUG

G0600/G0601/G0603/G0604 - Aluminium, shallow rear well sump



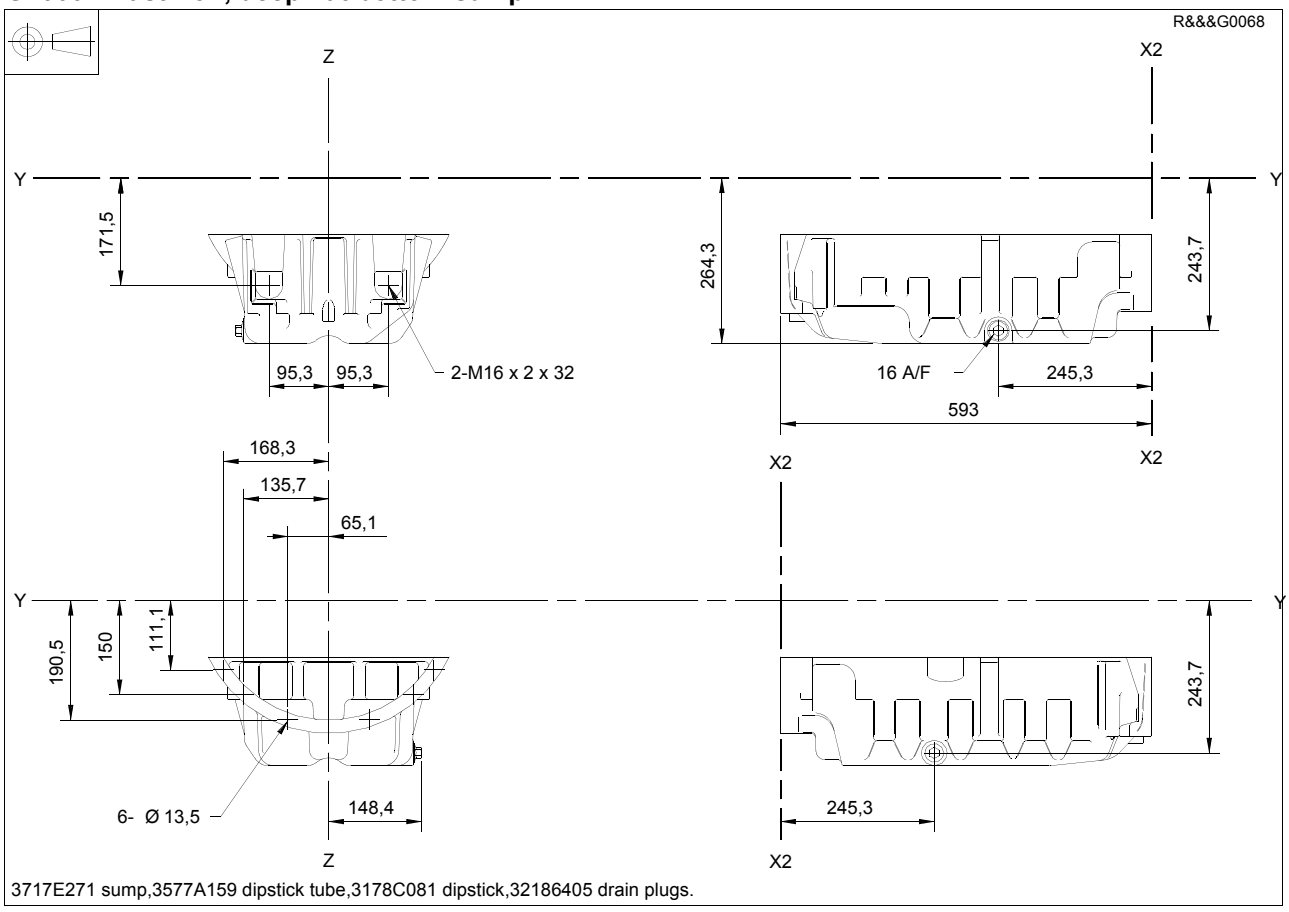
4145H131 sump 32186405 drain plug
G0601 3577A125 dipstick tube 3178C069 dipstick
G0603 3577A125 dipstick tube 3178C069 dipstick
G0604 3577A156 dipstick tube 3178C185 dipstick

G1001 - Aluminium, deep well sump



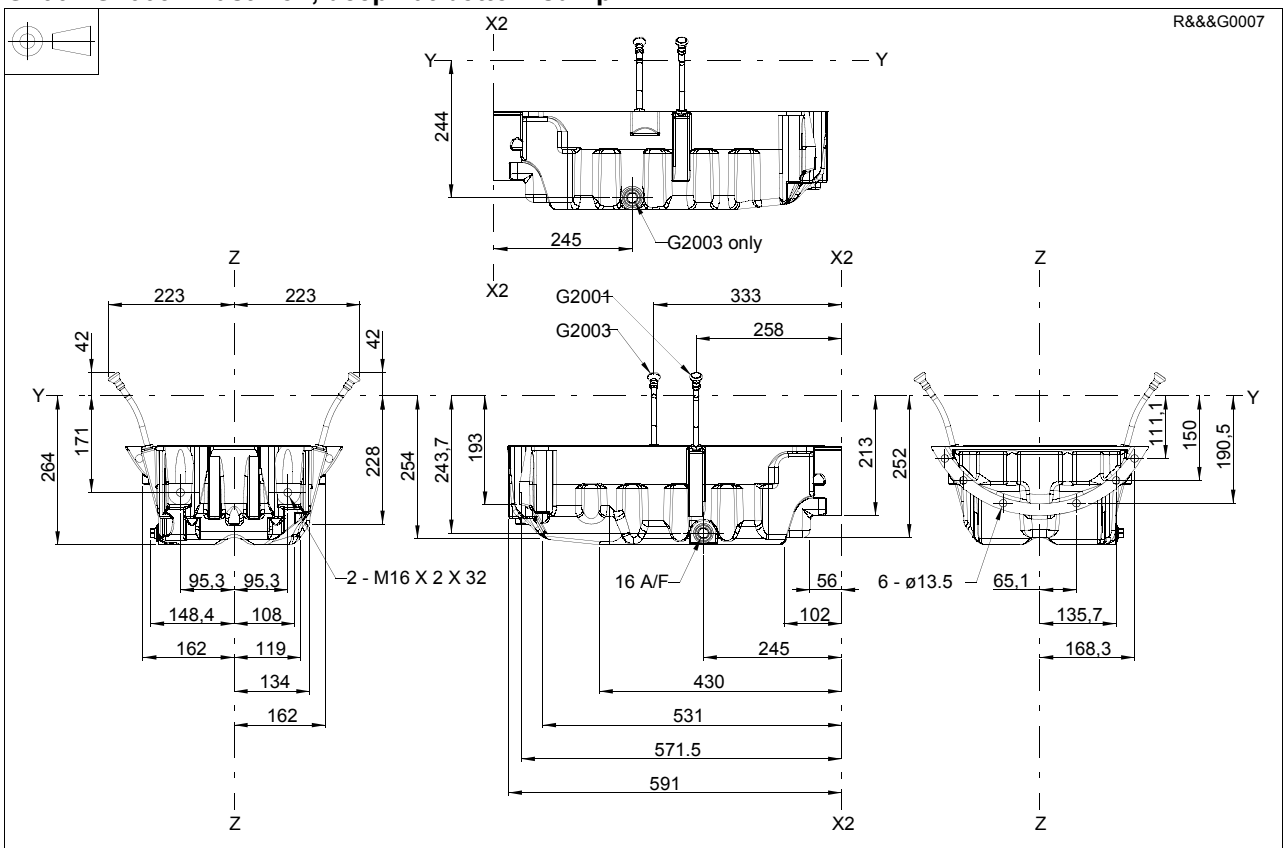
3717E225 sump 32186405 drain plug 3577A156 dipstick tube 3178C178 dipstick

G2000 - Cast iron, deep flat bottom sump



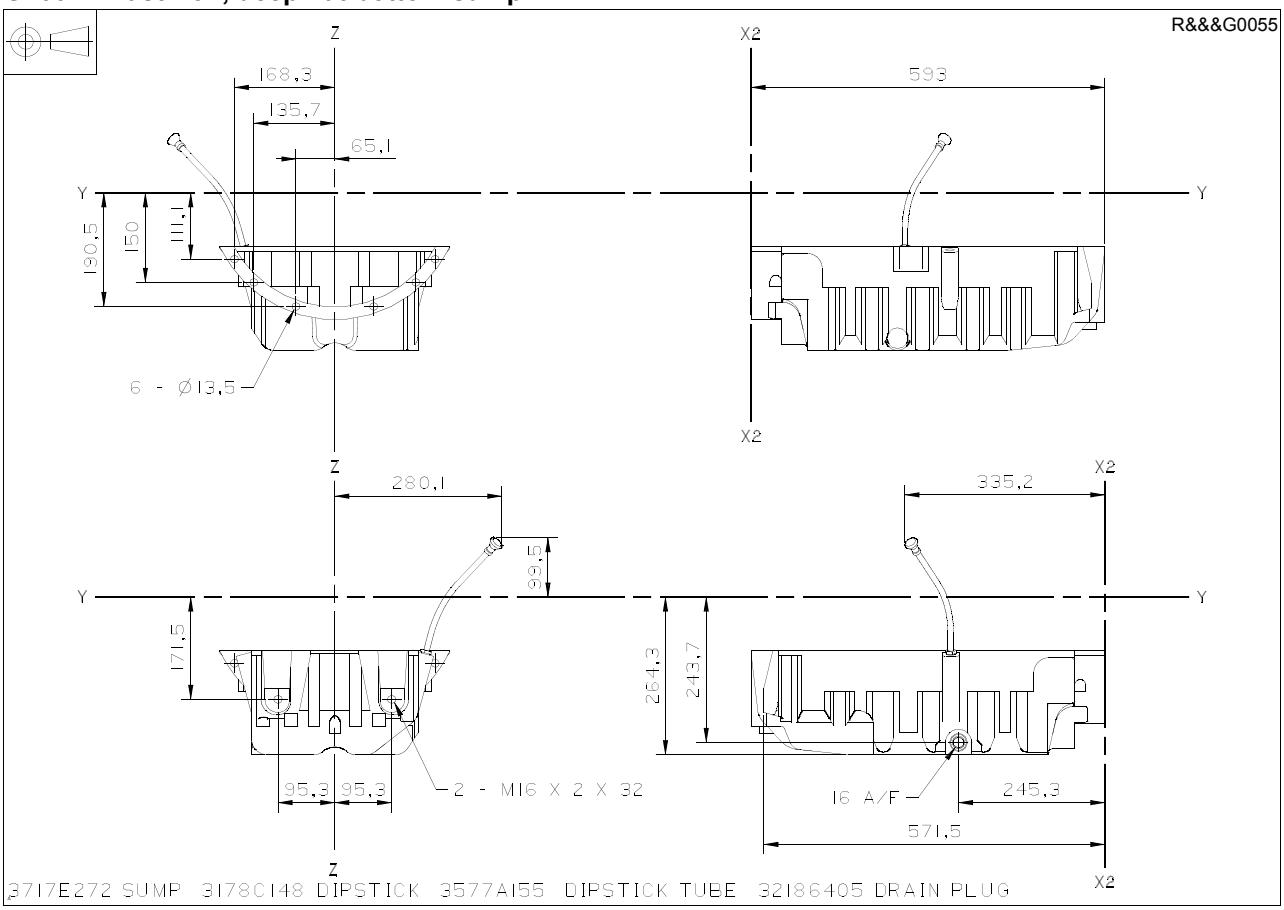
3717E271 sump,3577A159 dipstick tube,3178C081 dipstick,32186405 drain plugs.

G2001/G2003 - Cast iron, deep flat bottom sump

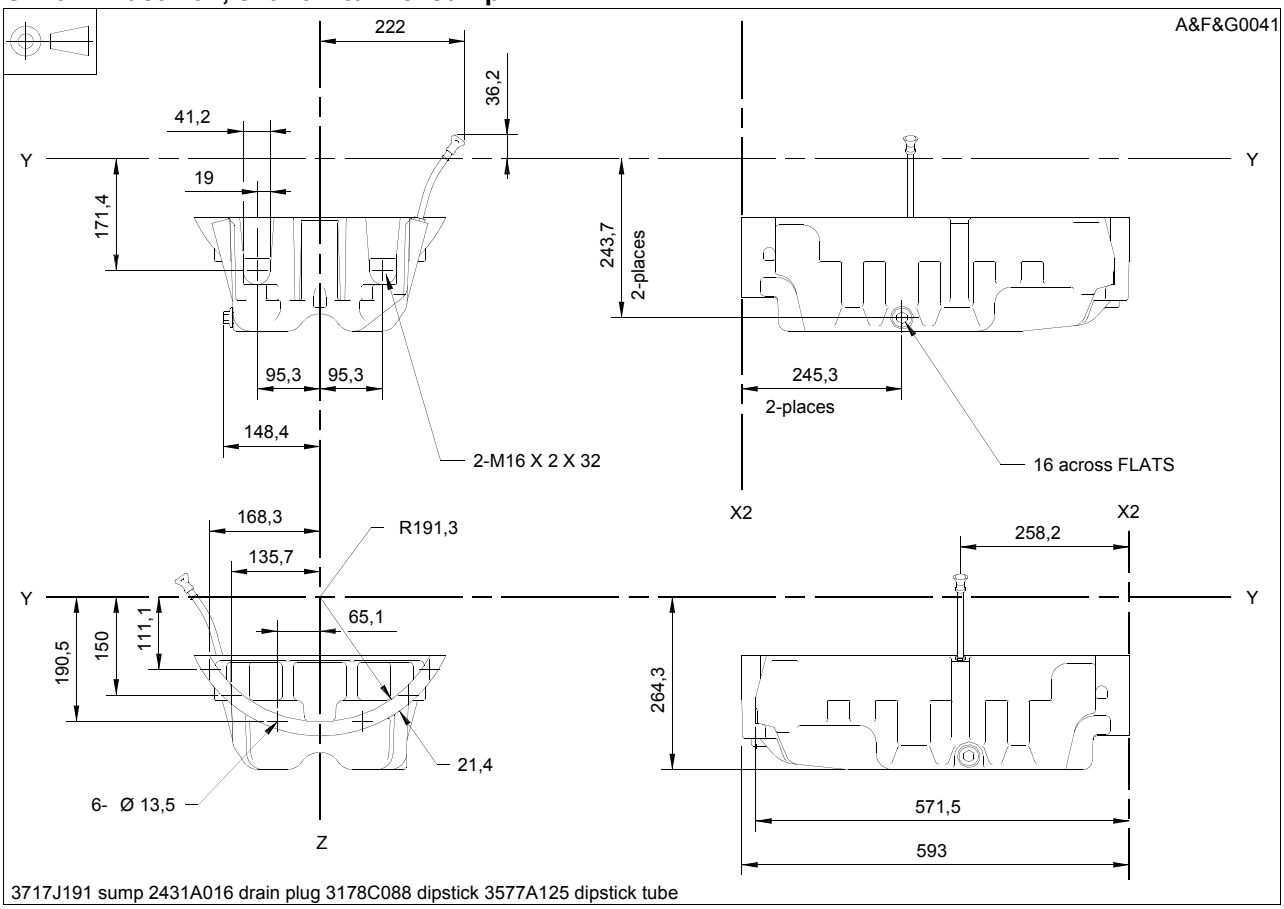


G2001 3717E272 sump
G2003 3717E271 sump 32186405 drain plug 3577A125 dipstick tube 3178C081 dipstick

G2004 - Cast iron, deep flat bottom sump



G2101 - Cast iron, shallow tunnel sump



Lubricating oil filler and breather

Top cover, breathers and lubricating oil fillers

Description	Option
Closed breather [1] *mandatory for all naturally aspirated engines*	H01**
Open breather, short hose	H02**
Filtered open breather [2]	H03**
Open breather, long hose [3]	H12**
Top cover, no filler [4] *must select block or timing case filler*	H**00
Top cover, filler middle [5]	H**10
Top cover, filler rear [5]	H**20

1. Not available for turbo and air to air charge cooled models.
2. Incompatible with G0401/G2002, Q1023/Q1024/Q1025/Q1026/Q4042, .
3. Available as H1210 and H1220 only.
4. Not available with HD000/Q4042.
5. Not compatible with S0251/S1253.

Example: Open breather with rear top cover filler = H1220

Breather branding

Description	Option
Not required [1]	HL000
Standard [2]	HL001

1. Compatible with H02**, H12** only.
2. Compatible with H03** only.

Breather system options

Engine type	Legislation	Standard option	Optional
NA	EU	Closed (without canister) (H01**)	
	EPA	Product not available	
Turbo	EU	Open (H02**)	Filtered open (H03**)
	EPA	Open (H02**)	Filtered open (H03**)
Turbo / air charge cooled	EU	Open (H02**)	Filtered open (H03**)
		Open (H02**)	
	EPA	Open (H02**)	Filtered open (H03**)

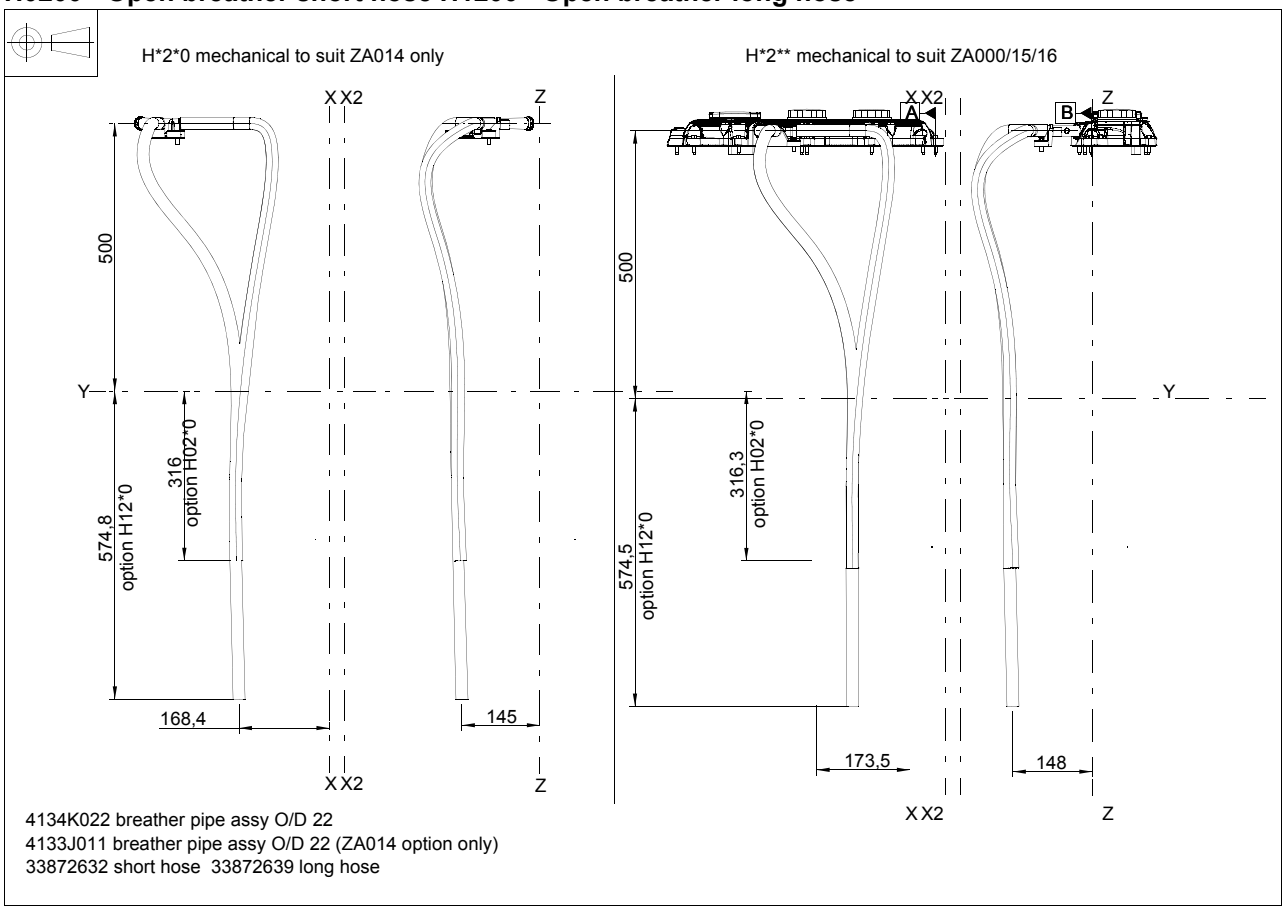
Warning! *EU and EPA legislation no longer allows direct piping of crankcase gases to the induction system.*

Timing case lubricating oil fillers

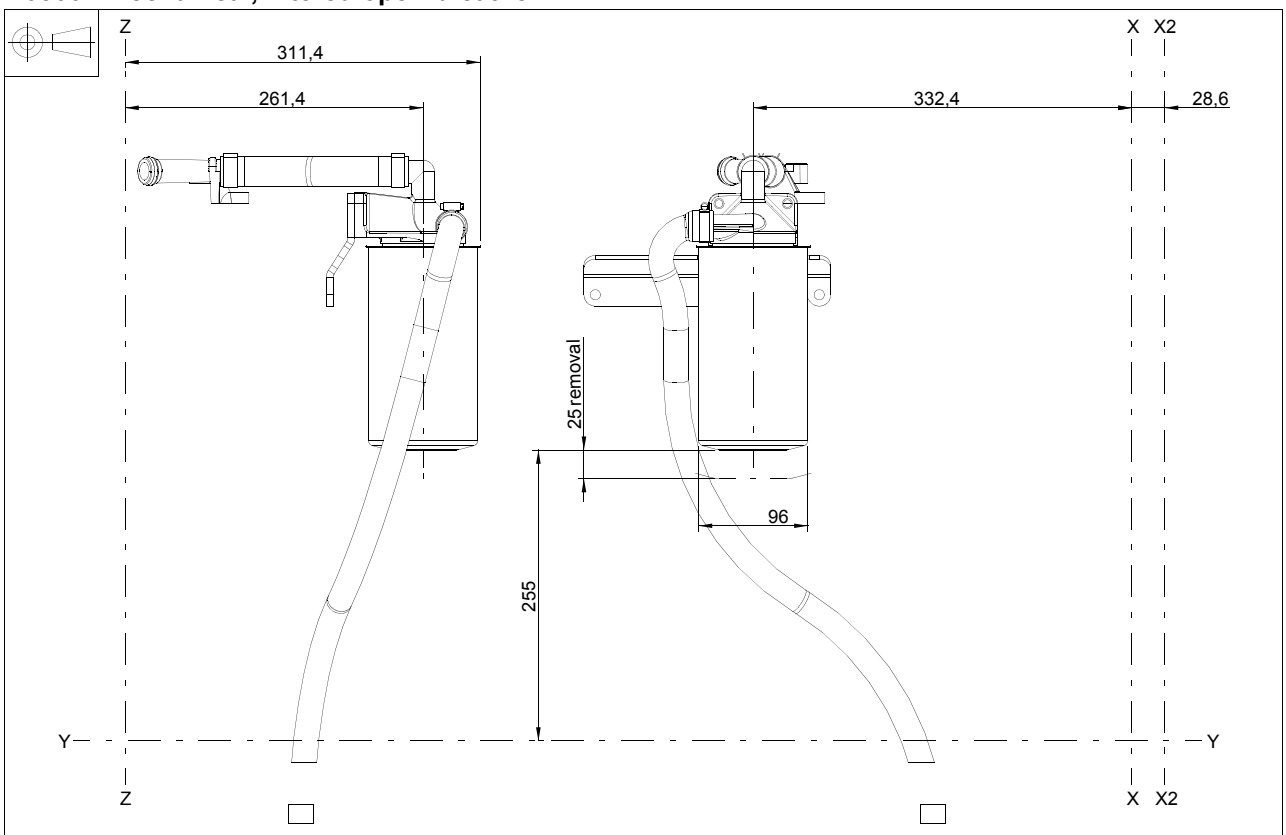
Description	Option
Timing case filler, not required	HD000
Timing case filler, LHS mid position (1)	HD001
Timing case filler, on LHS lower position (2)	HD004
Timing case filler, on LHS upper position	HD005
Timing case filler, LHS mid position for customer supplied filler	HD006
Remote timing case filler LHS lower position (1)	HD007
Remote timing case filler adaptor, LHS mid position (1)	HD011
LHS mid-positionfiller (3)	HD100

1. Incompatible with Q1023/Q1024/Q1025/Q1026/Q4042.
2. For use with Q1100/Q3000/Q3030 only.
3. For use with RHS PTO timing cases. Q3000/3030.

H0200 - Open breather short hose H1200 - Open breather long hose

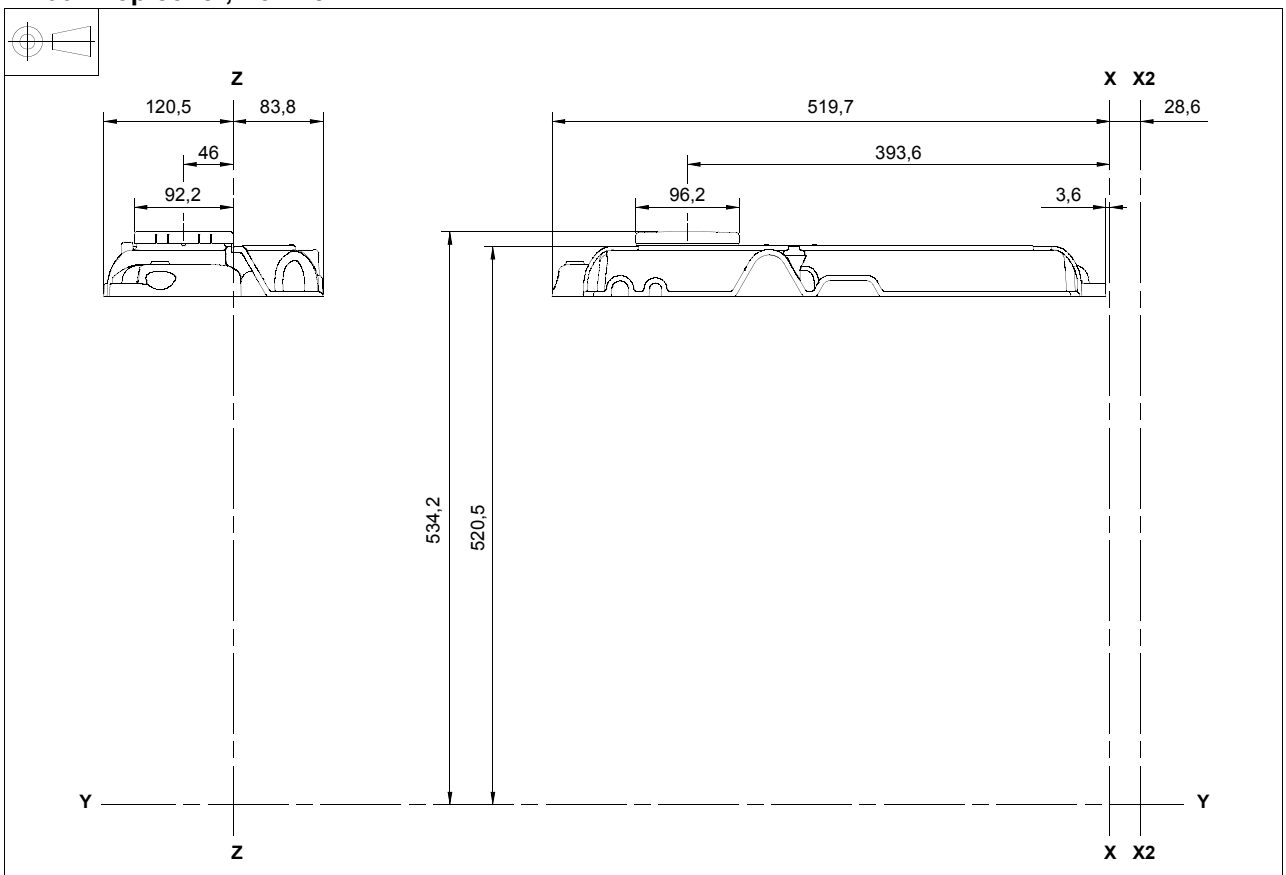


H0300 - Mechanical, filtered open breather



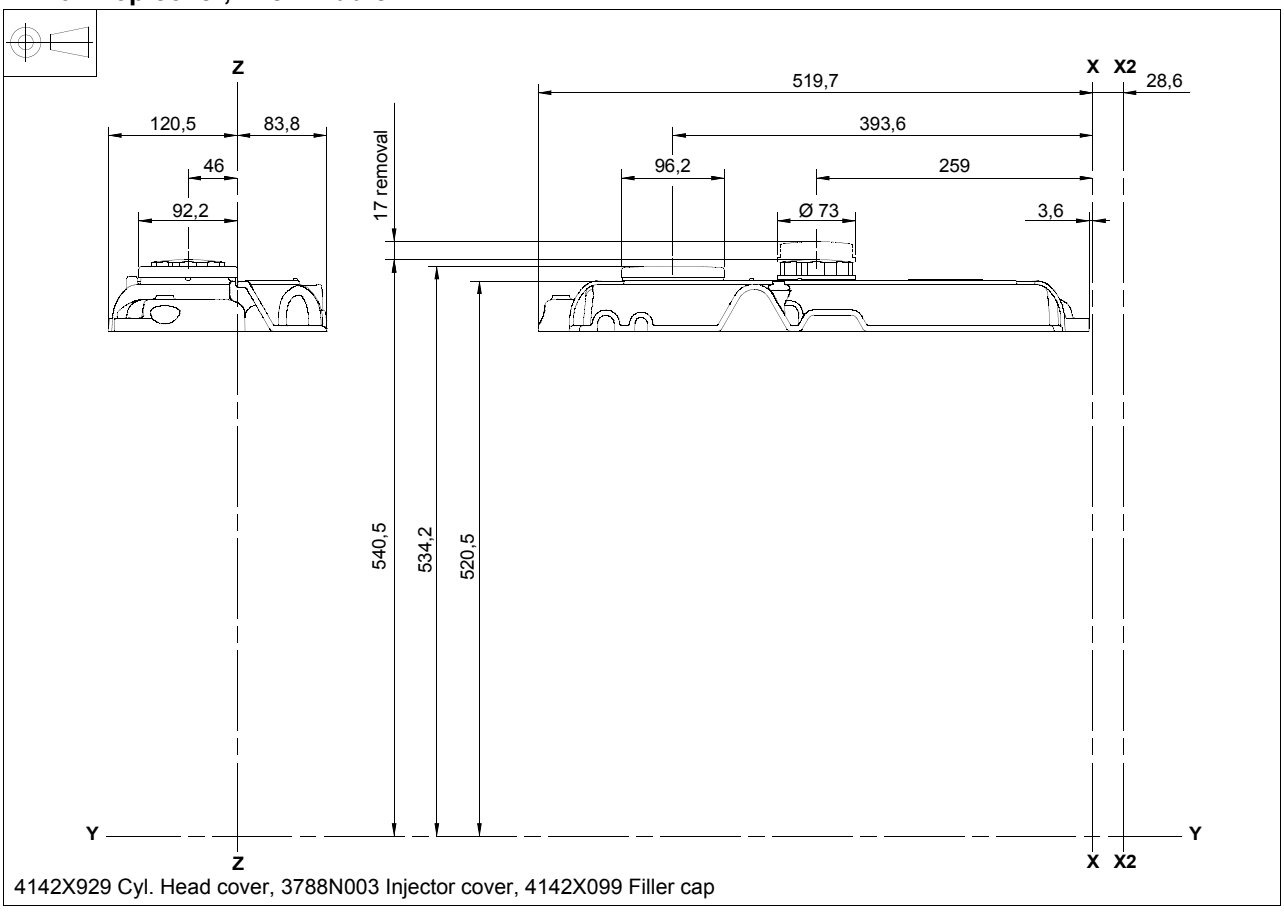
4134E071 filter head assembly 2654A104 filter 4133J011 breather transfer pipe
3653A042 bracket

H00 - Top cover, no filler**



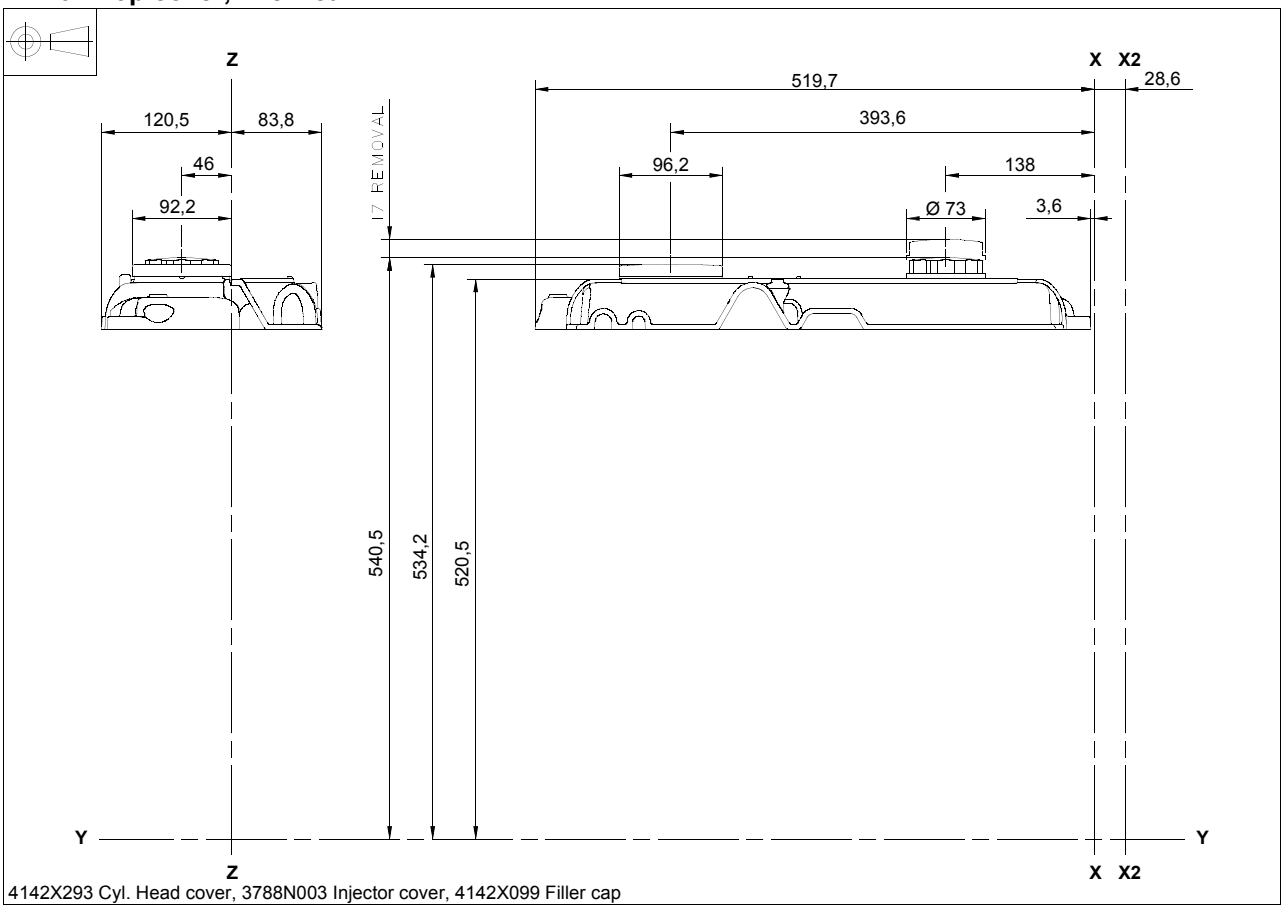
4142X291 Cyl. Head cover, 3788N003 Injector cover

H10 - Top cover, filler middle**



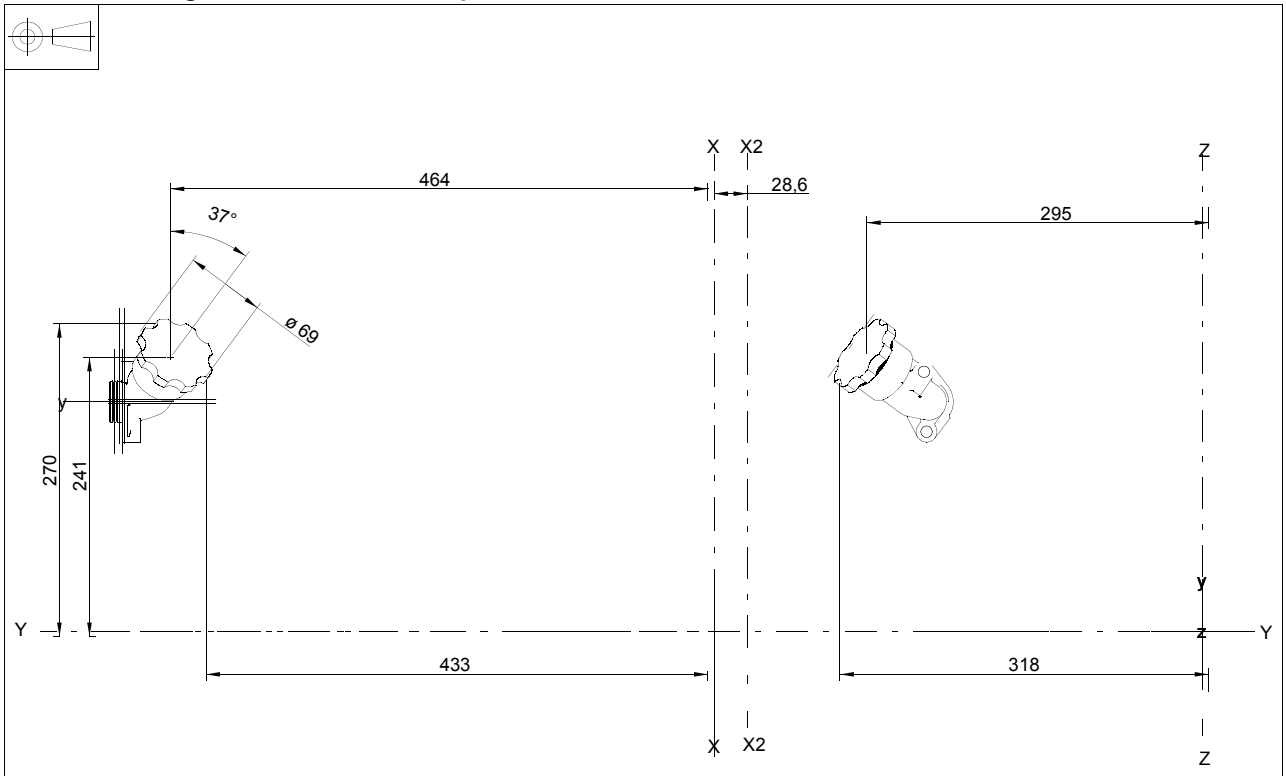
4142X929 Cyl. Head cover, 3788N003 Injector cover, 4142X099 Filler cap

H20 - Top cover, filler rear**



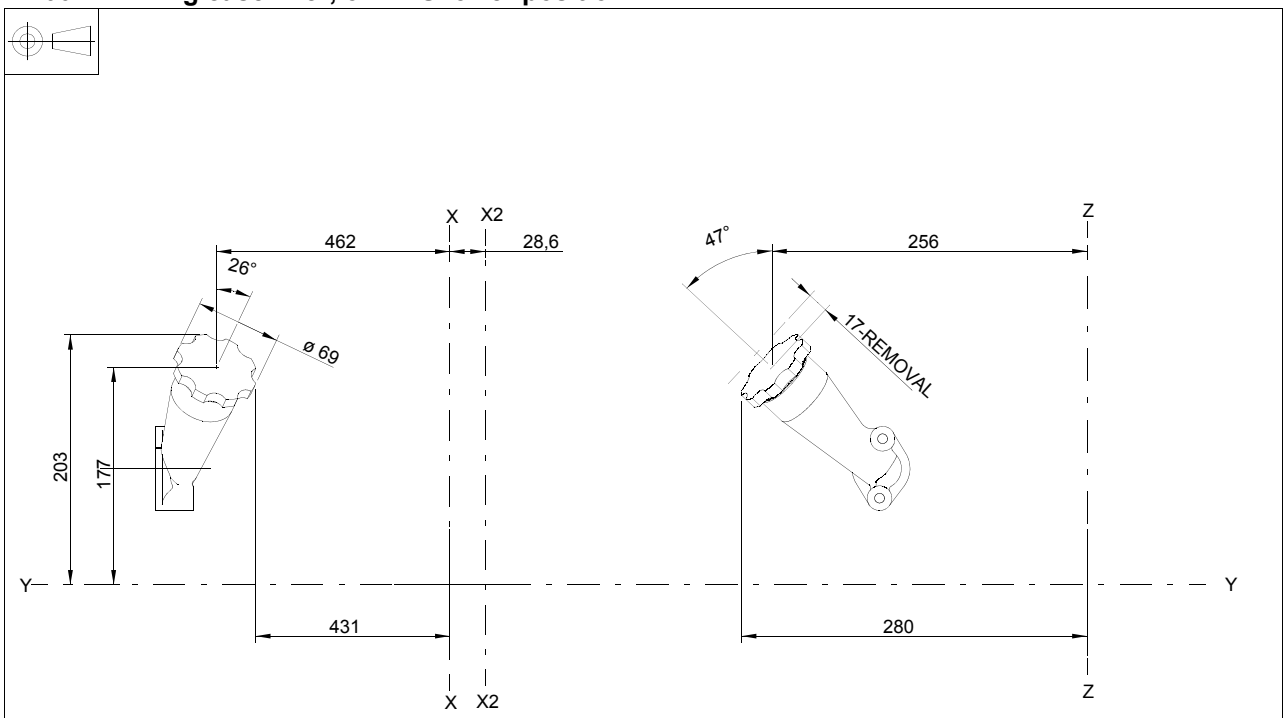
4142X293 Cyl. Head cover, 3788N003 Injector cover, 4142X099 Filler cap

HD001 - Timing case filler, LHS mid position



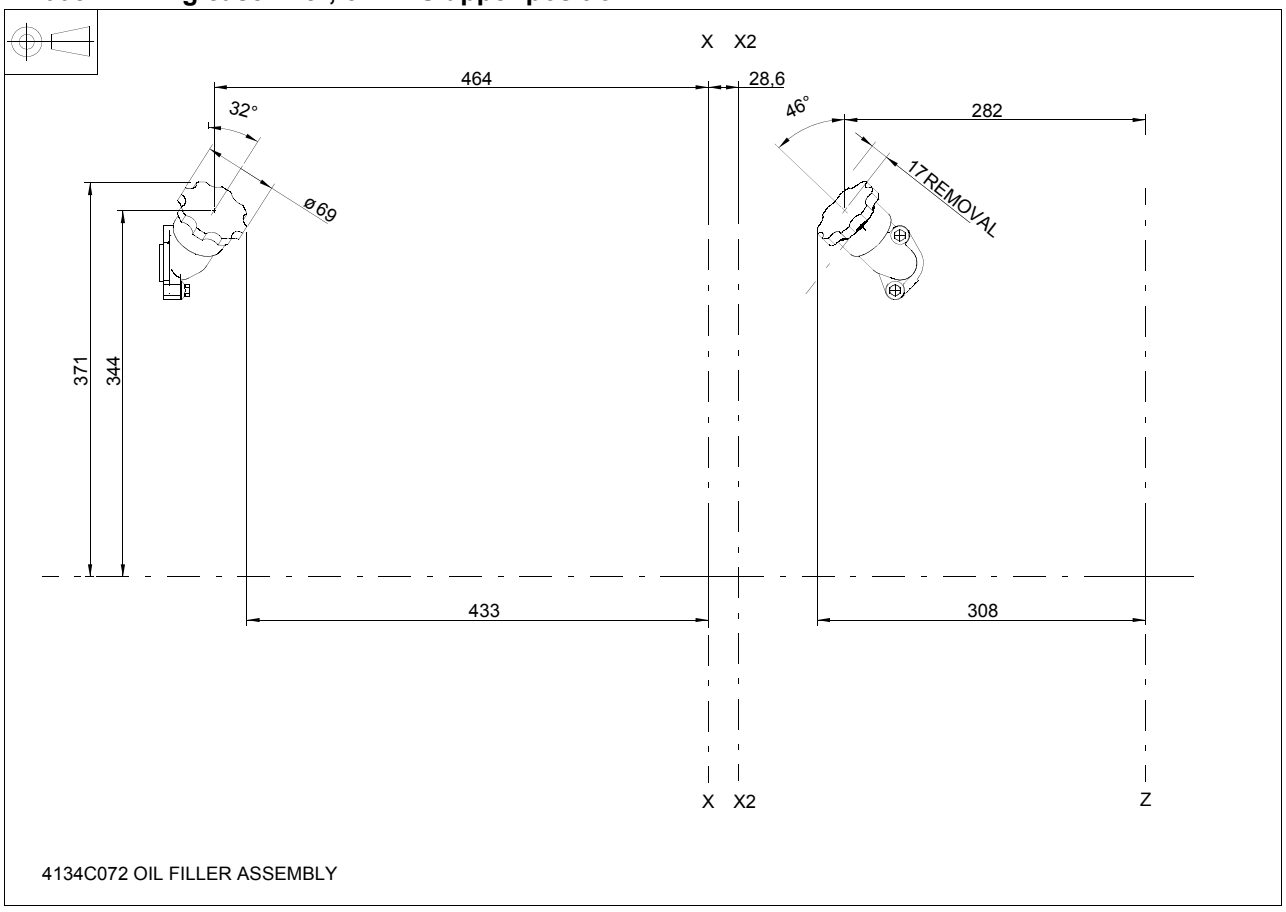
4134C072 OIL FILLER ASSEMBLY

HD004 - Timing case filler, on LHS lower position



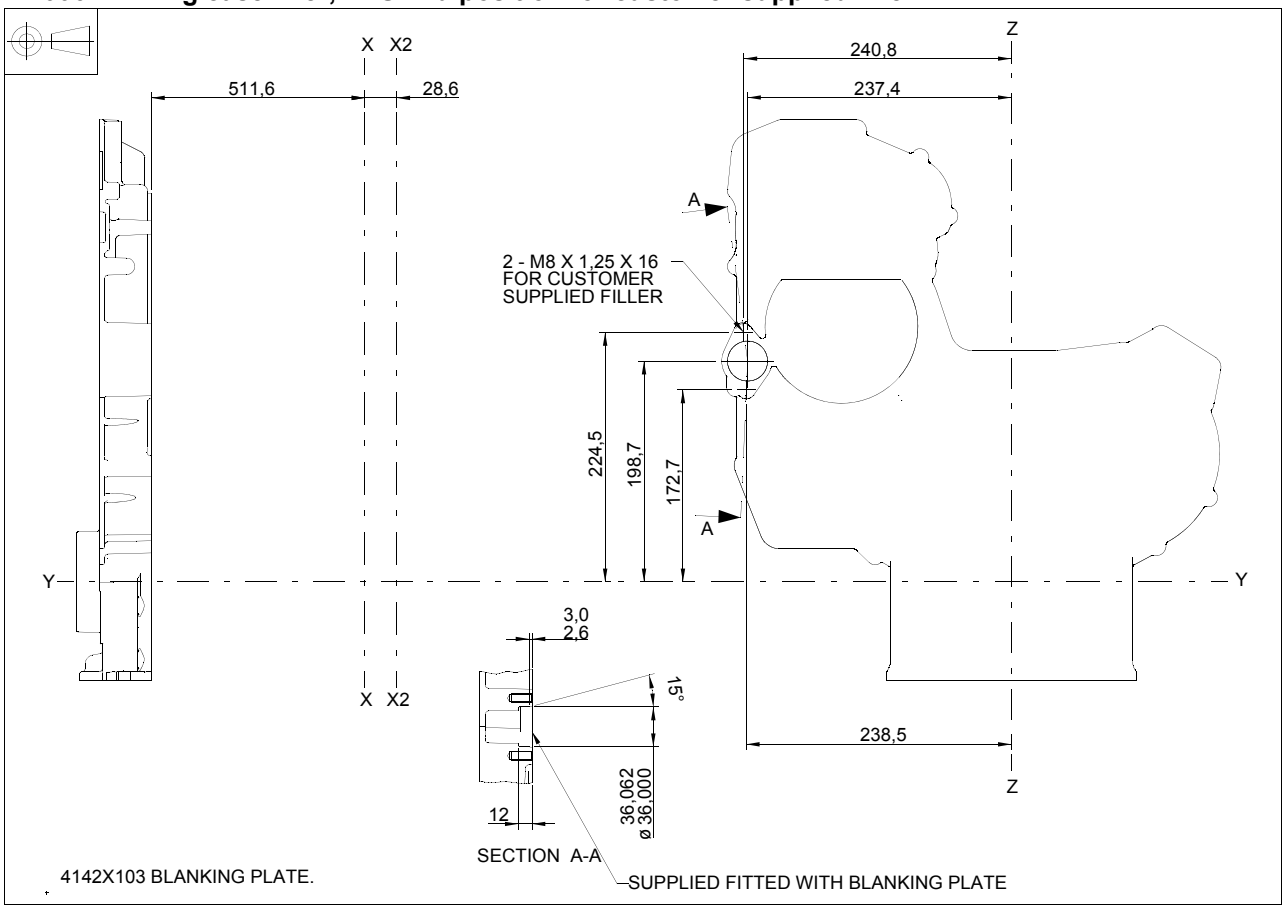
4134C073 OIL FILLER ASSEMBLY

HD005 - Timing case filler, on LHS upper position

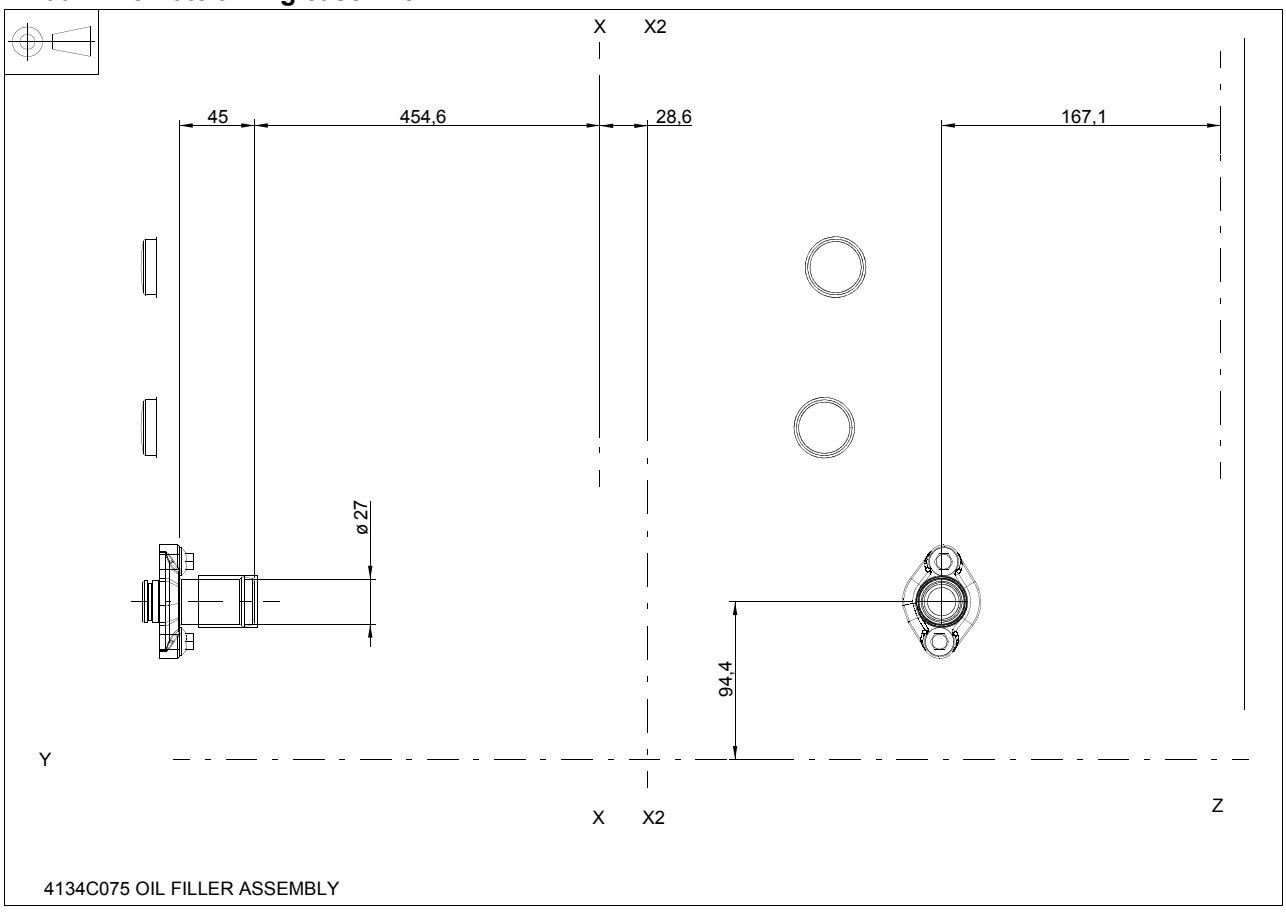


4134C072 OIL FILLER ASSEMBLY

HD006 - Timing case filler, LHS mid position for customer supplied filler

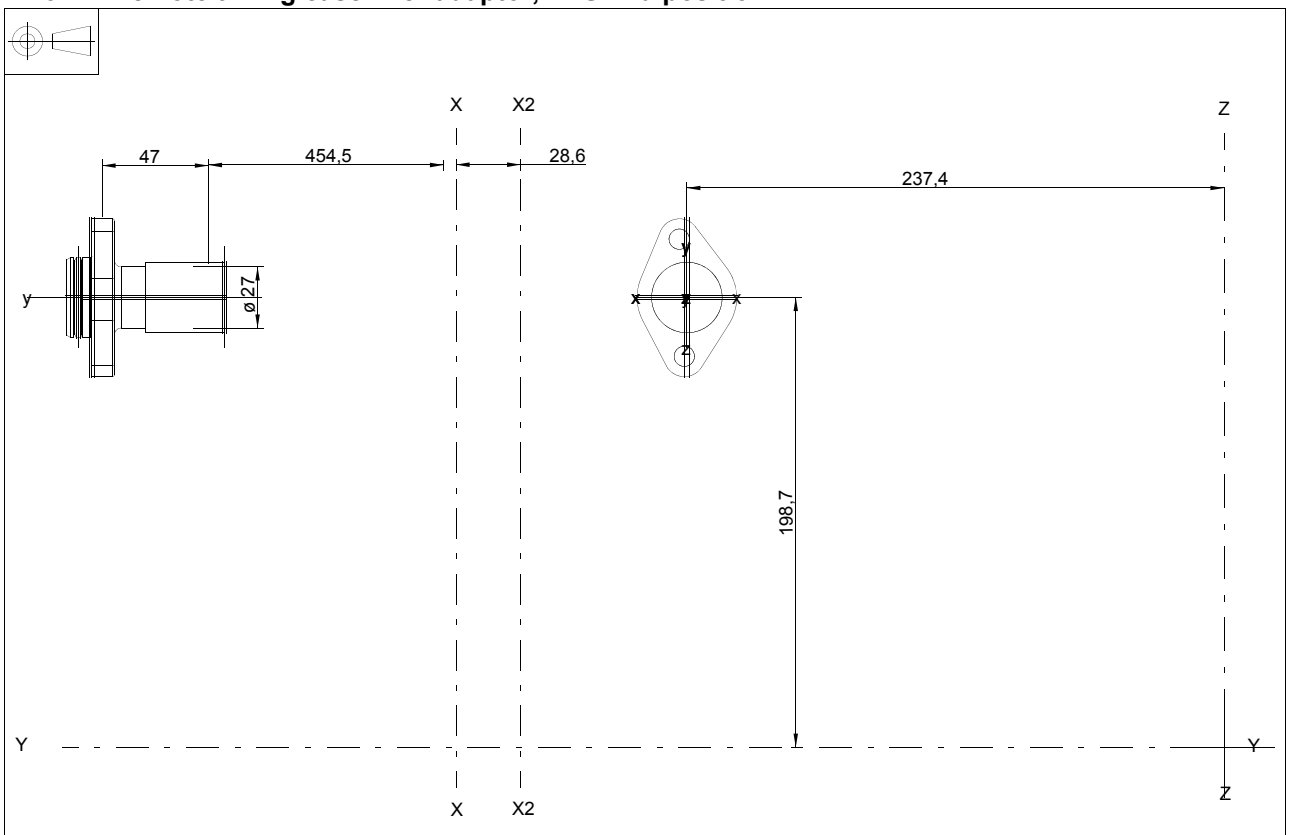


HD007 - Remote timing case filler



4134C075 OIL FILLER ASSEMBLY

HD011 - Remote timing case filler adaptor, LHS mid position



4134C071 OIL FILLER ASSEMBLY

Lubricating oil filters and coolers

Spin on oil filters

Description	Option
Vertically down filter, LHS, without oil cooler (1) (2)	J0011
Horizontal filter, LHS, without oil cooler (1) (2) (3)	J0021
Vertically down filter head, RHS no filter (customer to supply), without oil cooler (1) (2) (4) (5)	J0030
Vertically down filter, RHS without oil cooler (1) (2) (4) (5)	J0031
Vertically down filter head, LHS no filter (customer to supply), with oil cooler	J0050
Vertically down filter, LHS, with oil cooler	J0051
Horizontal filter, LHS, no filter (customer to supply) with oil cooler (3)	J0060
Horizontal filter, LHS, with oil cooler (3)	J0061
Vertically down filter head, RHS no filter (customer to supply), with oil cooler (4) (5)	J0070
Vertically down filter head, RHS with oil cooler (4) (5)	J0071
Adaptor for remote oil filter (customer to supply) with oil cooler (6)	J0130

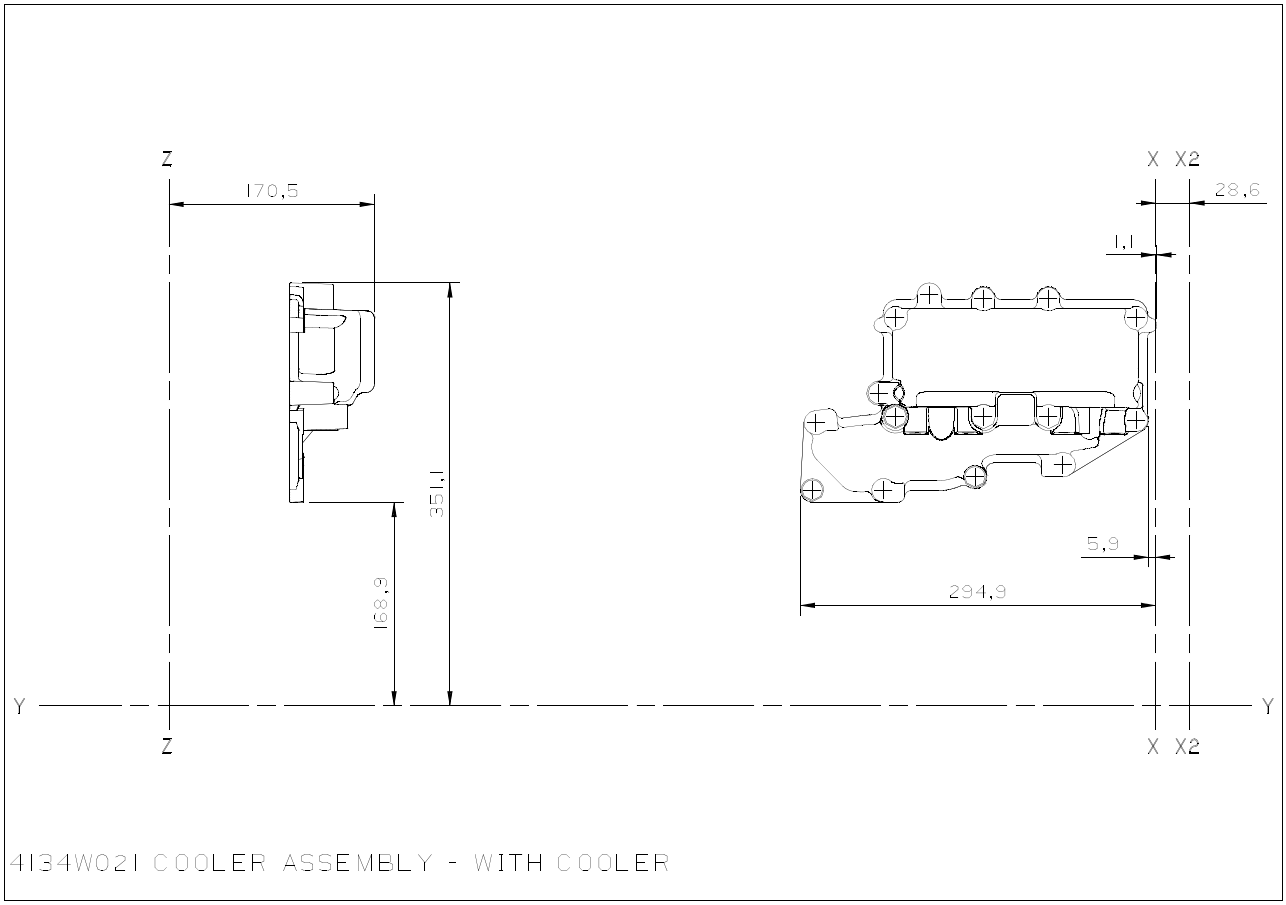
1. Naturally aspirated engines only.
2. Incompatible with balanced engines, if a balancer is specified a cooler must be selected.
3. Incompatible with Q1023/Q1024/Q1025/Q1026/Q1038/Q2038.
4. Oil filters fitted on the right hand side are not compatible when balancer selected.
5. Incompatible with G0203/G0303/G0603.
6. Perkins Application and Engineering approval required prior to selection.

Lubricating oil filter branding

Description	Option
Not applicable (1)	JD000
Standard	JD001

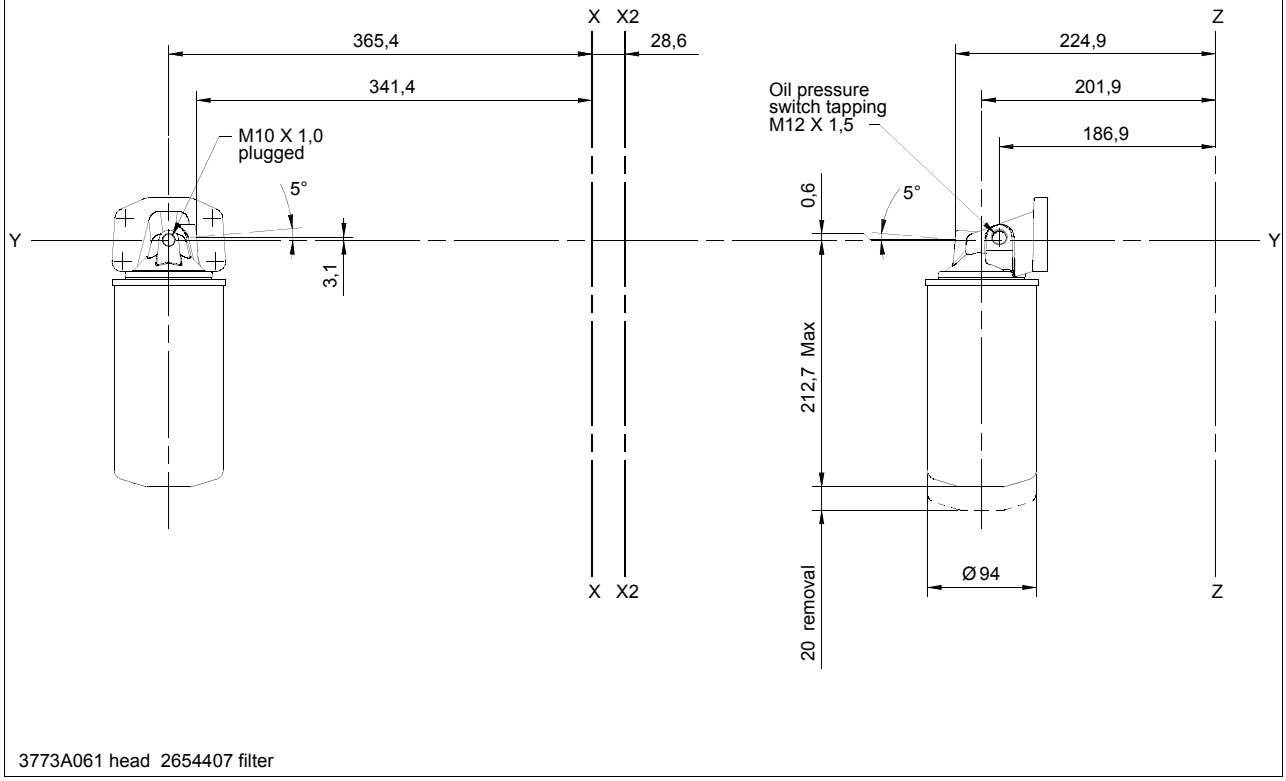
1. Compatible with J0030/J0050/J0070/J0130 only.

Oil cooler



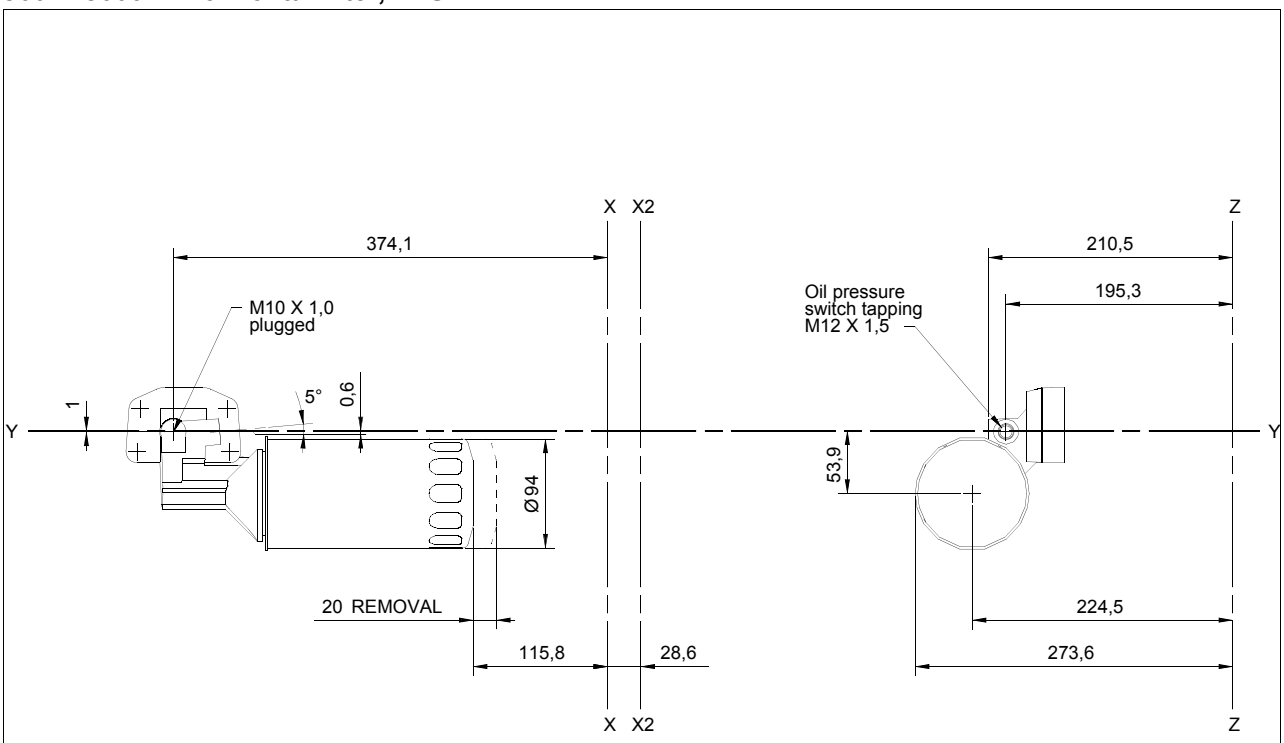
4I34W021 COOLER ASSEMBLY - WITH COOLER

J0011/J0051 - Vertically down, LHS



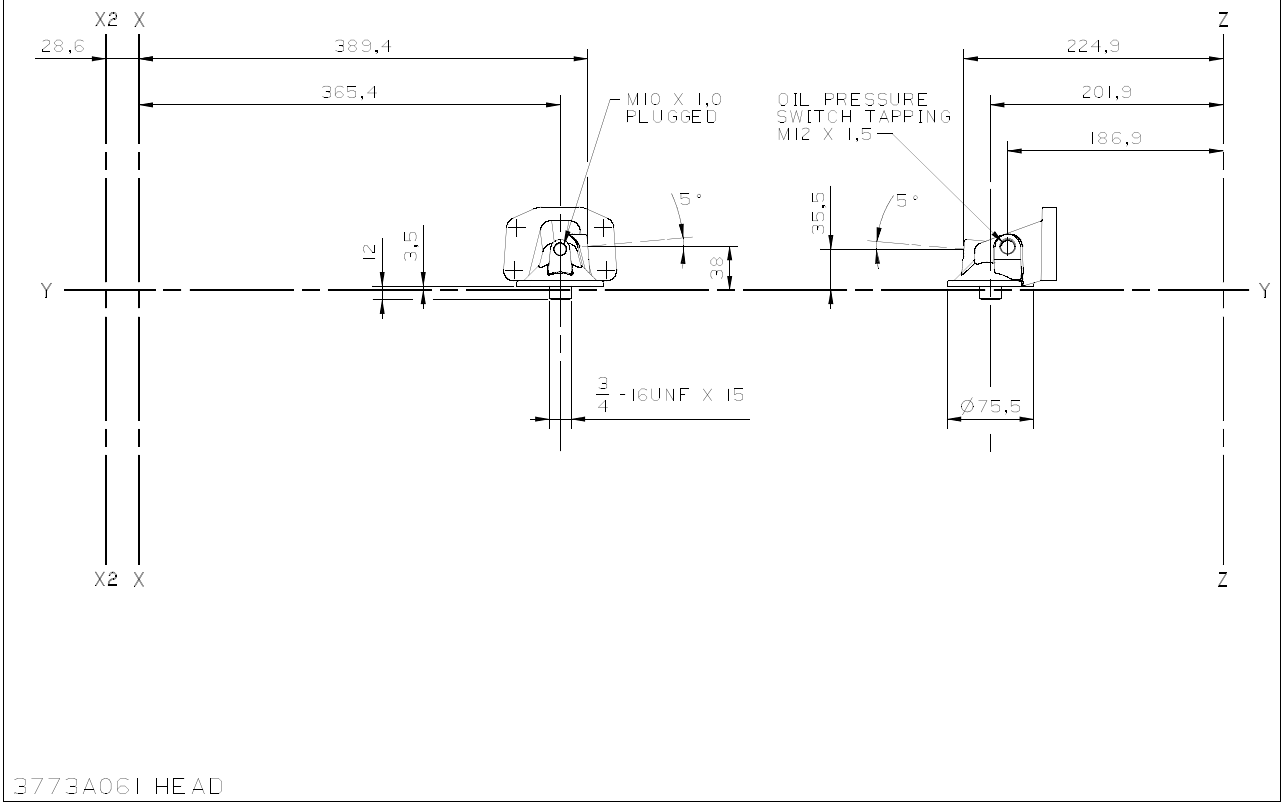
3773A061 head 2654407 filter

J0021/J0061 - Horizontal filter, LHS



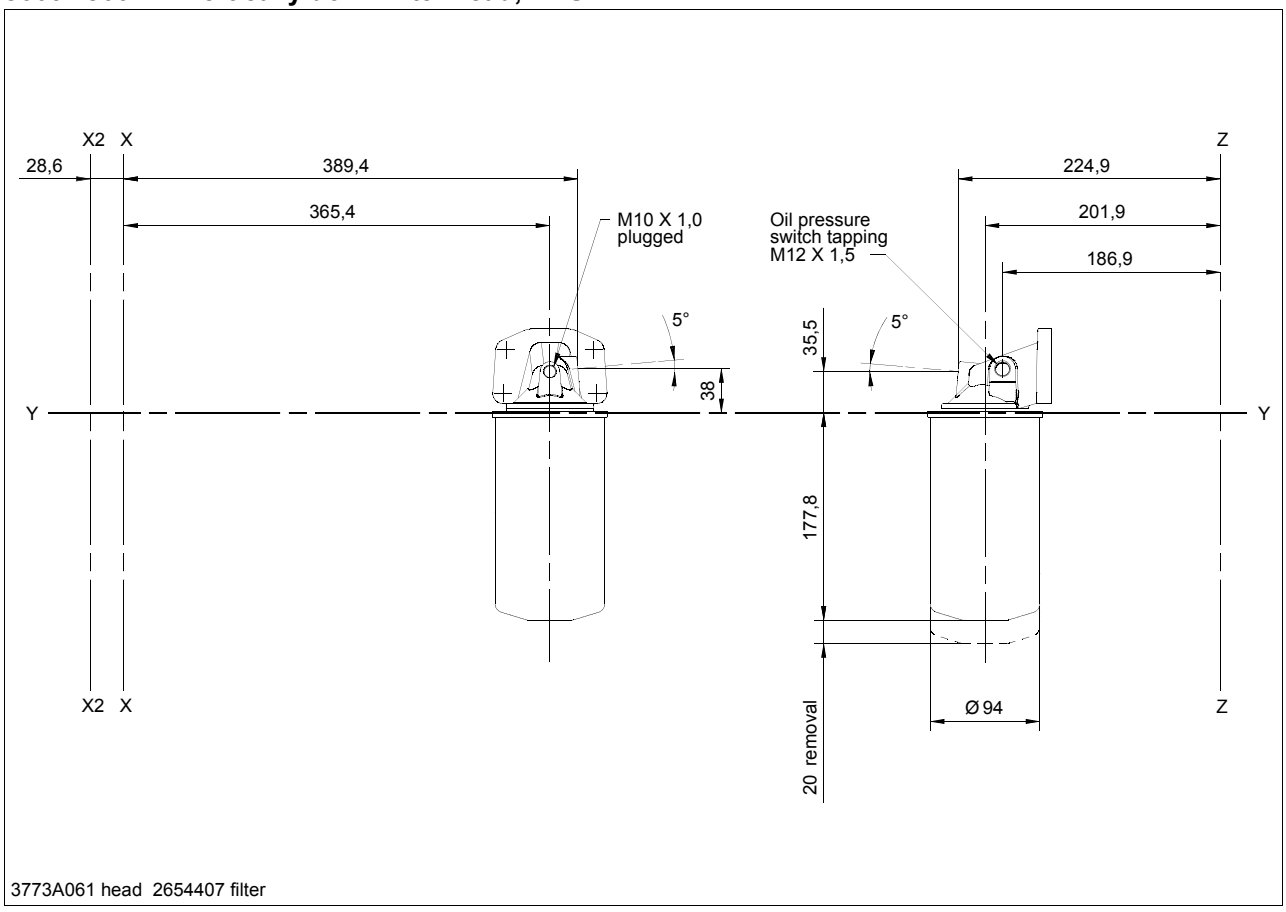
3773A081 adaptor 3773A071 head 2654407 filter

J0030 - Vertically down filter head, RHS no filter (customer supply), without oil cooler



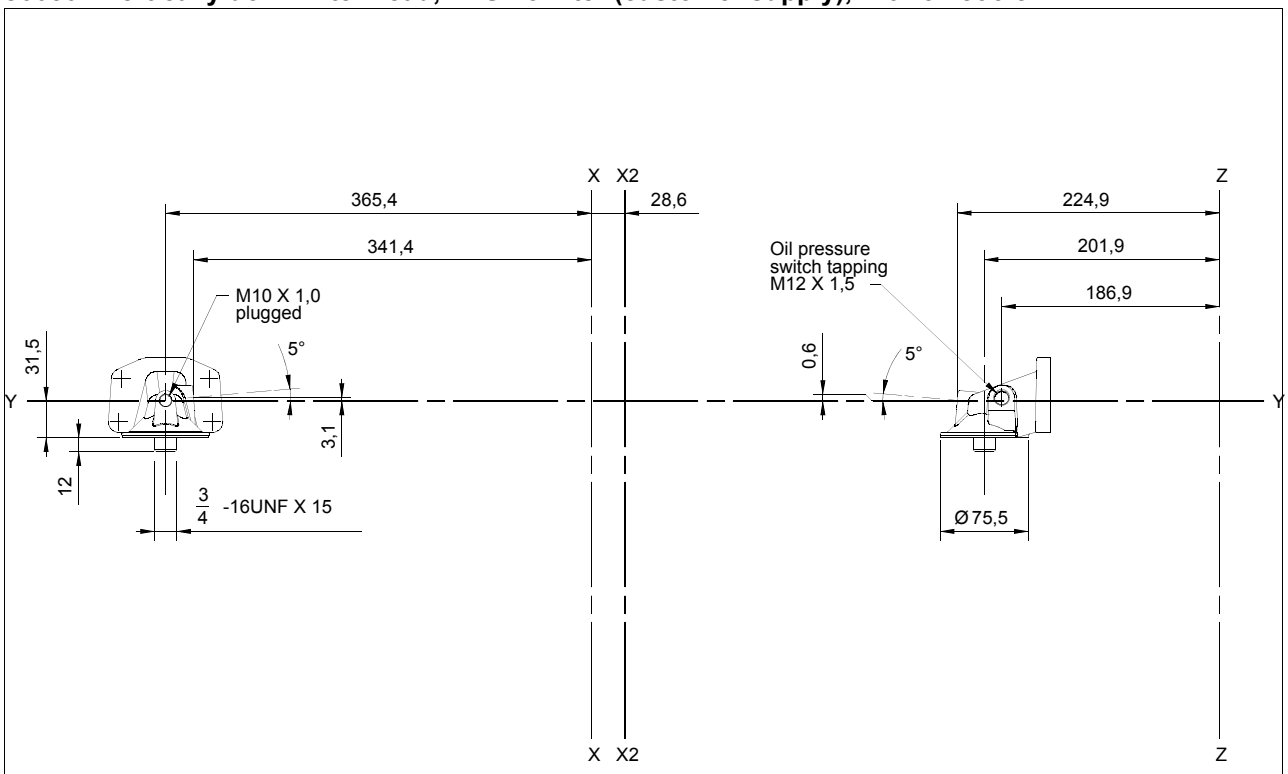
3773A061 HEAD

J0031/J0071 - Vertically down filter head, RHS



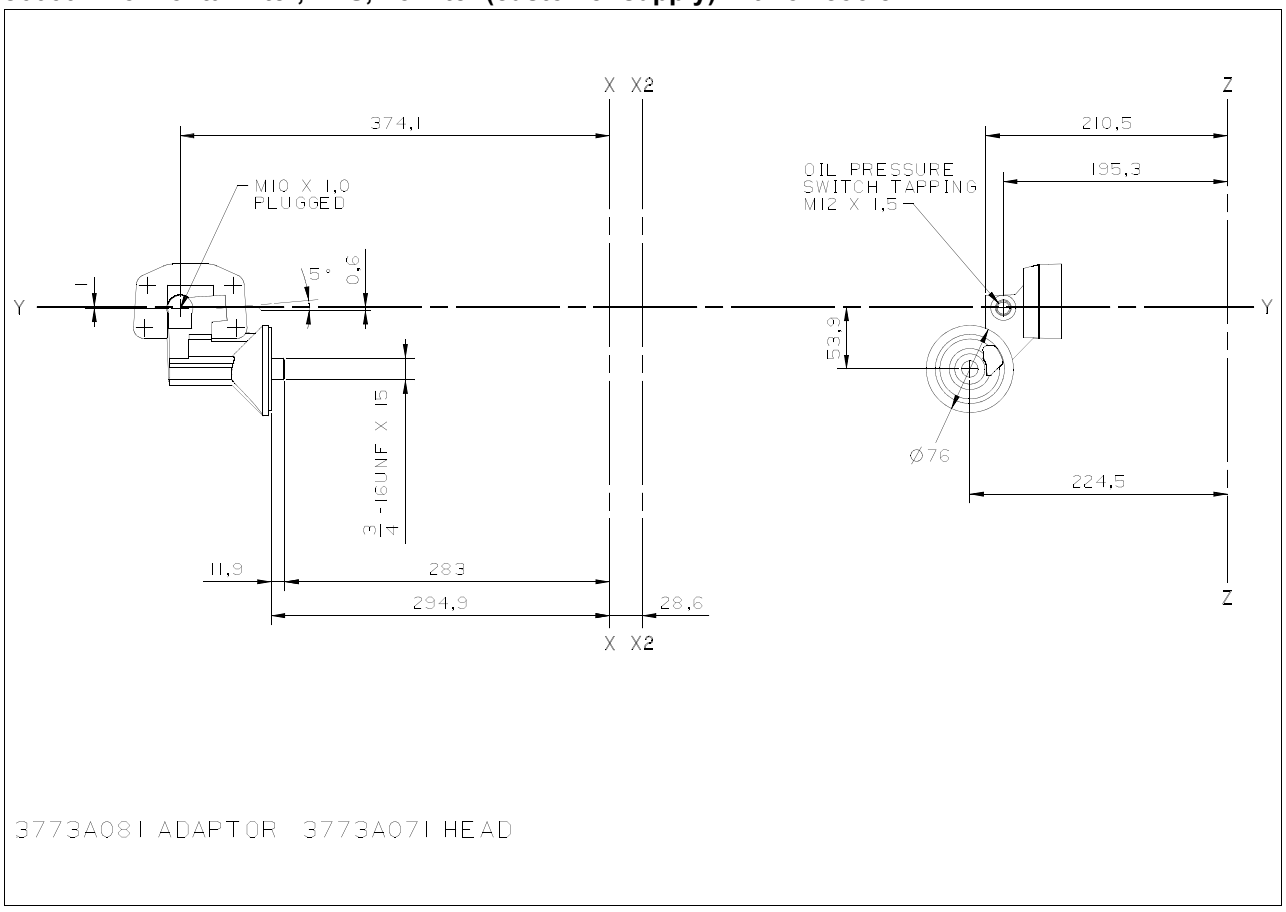
3773A061 head 2654407 filter

J0050 - Vertically down filter head, LHS no filter (customer supply), with oil cooler

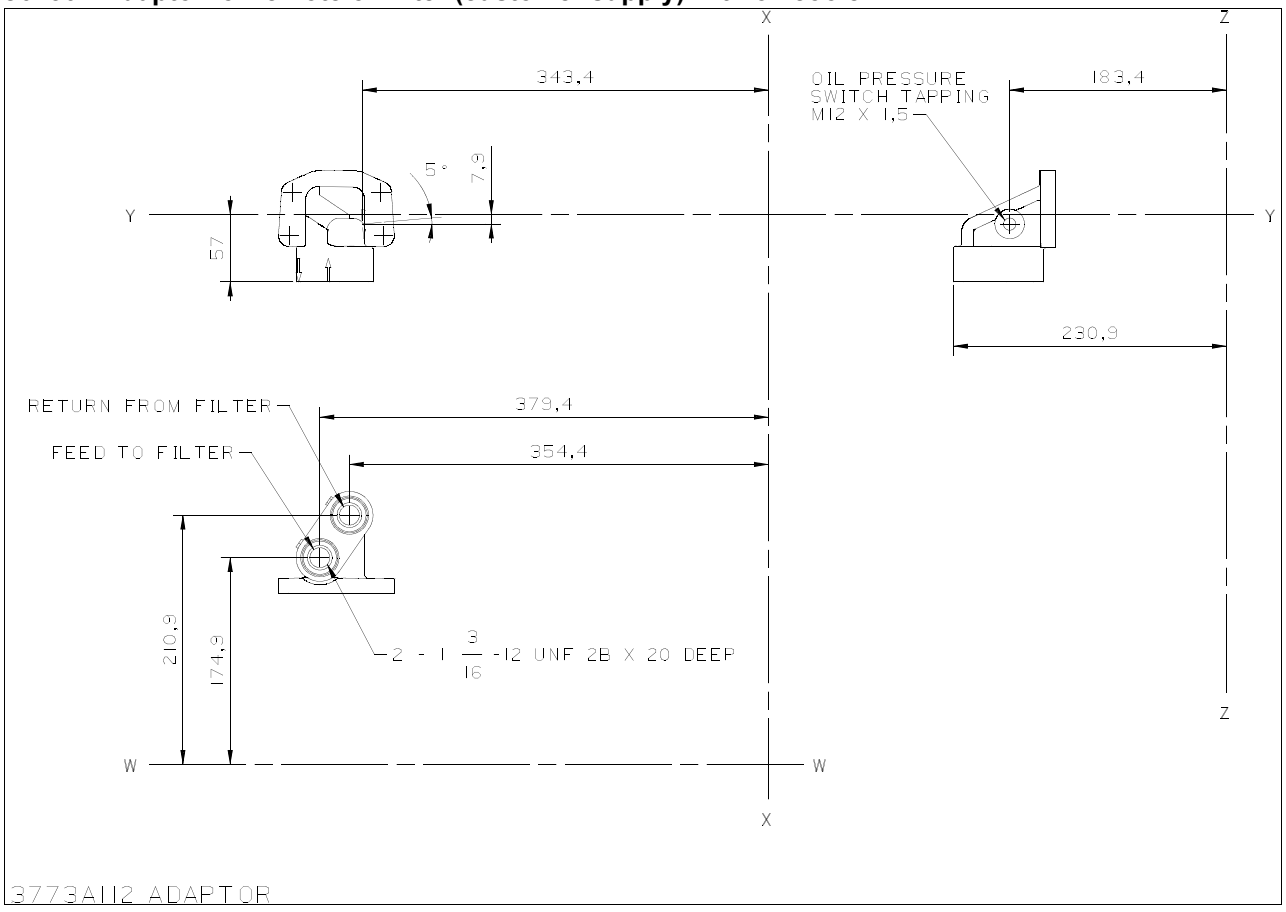


3773A061 head

J0060 - Horizontal filter, LHS, no filter (customer supply) with oil cooler



J0130 - Adaptor for remote oil filter (customer supply) with oil cooler



Crankshaft pulleys

Fan drive standard vee

Description	Option
Crankshaft stub seal, when no crankshaft pulley fitted (1)	K0000
Cast iron, single groove, 200 mm diameter 12,7 mm belt	K0001
Cast iron, twin groove, 200 mm diameter 12,7 mm belt	K0004
Cast iron, twin groove, 170 mm diameter 12,7 mm belt	K0006
Cast iron, single groove, 170 mm diameter 12,7 mm belt	K0007

1. Compatible with F0000/M0000/N0000/P0000 only.

Example: Primary drive 150 mm, secondary single groove 200 mm = K0011

Fan drive multi vee

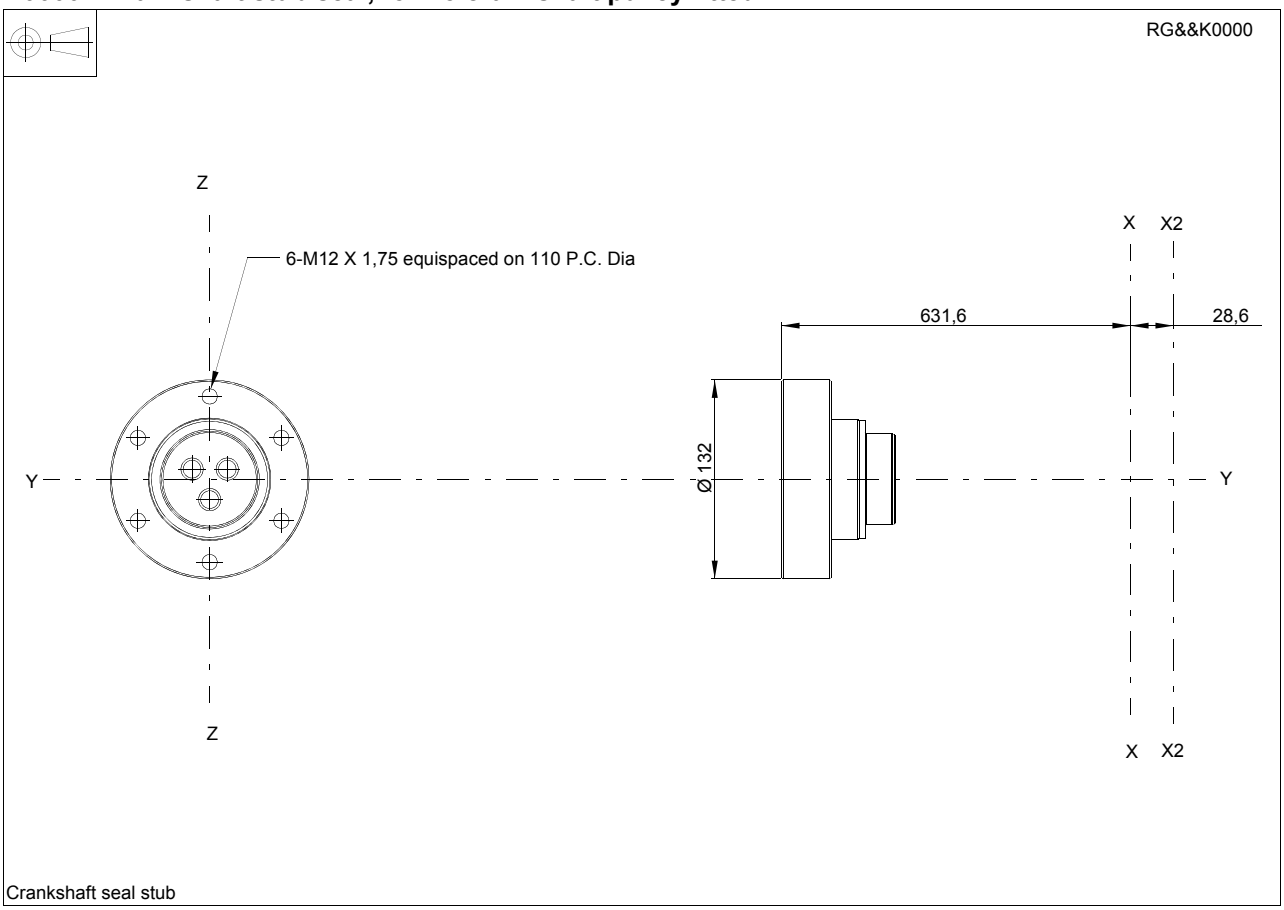
Description	Option
Crankshaft stub seal, when no crankshaft pulley fitted (1)	K000*
Primary drive, steel, 150 mm diameter	K001*
Primary drive, steel, 200 mm diameter	K002*
No secondary pulley required	K***0
Secondary PTO, single groove, vee belt drive pulley 200 mm diameter	K***1

1. Compatible with F0000/M0000/N0000/P0000 only.

Example:

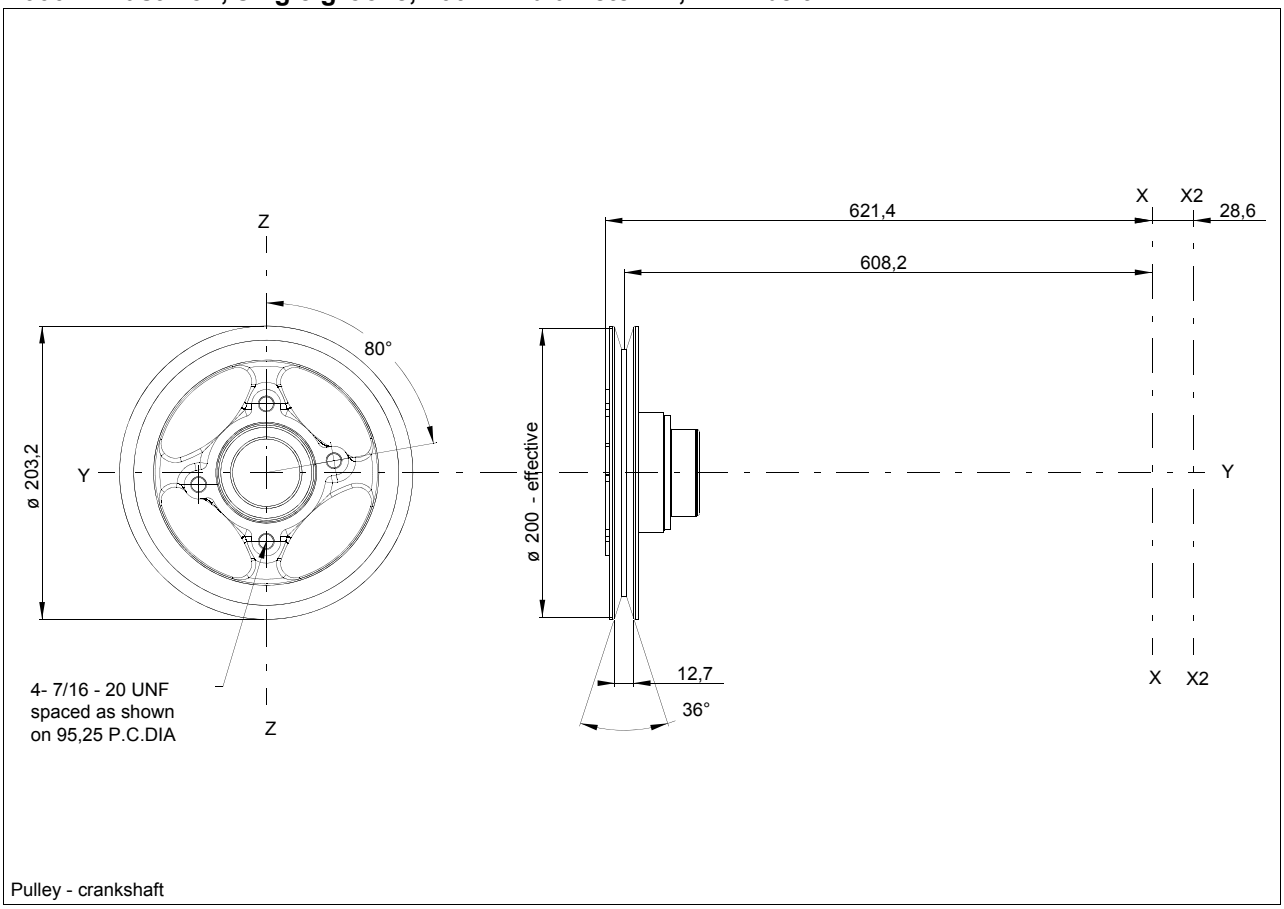
Note: See fan drive options for compatible crankshaft pulley options.

K0000 - Crankshaft stub seal, for no crankshaft pulley fitted



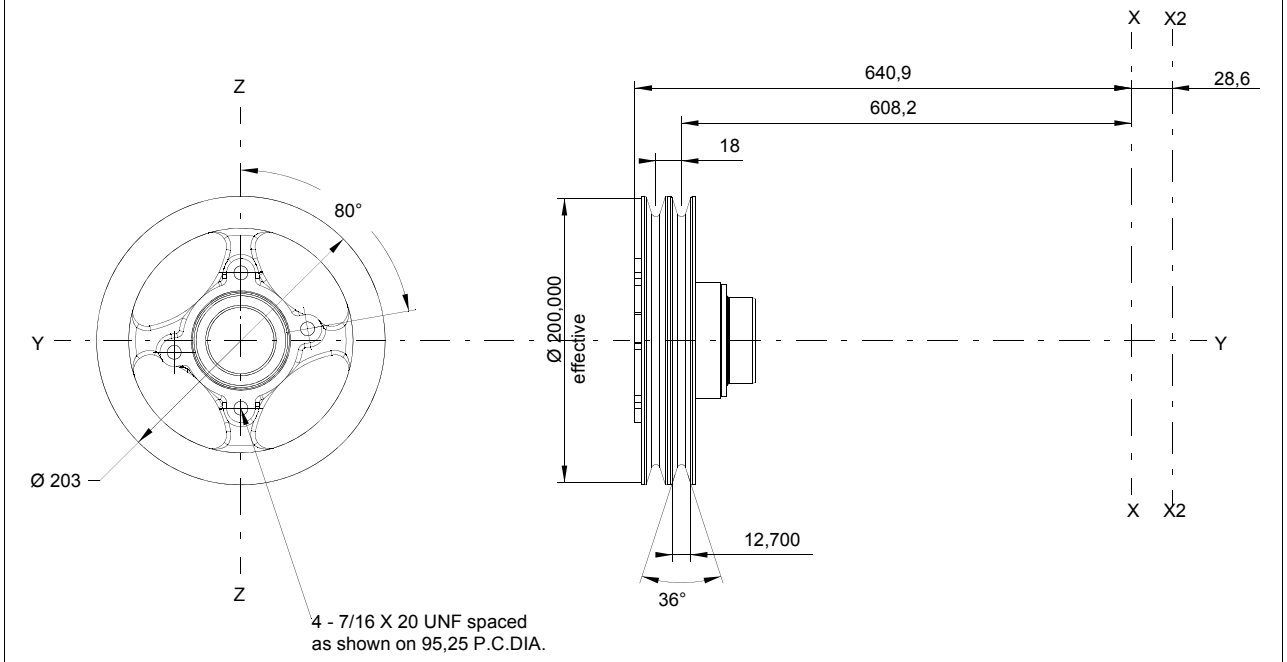
Crankshaft seal stub

K0001 - Cast iron, single groove, 200 mm diameter 12,7 mm belt



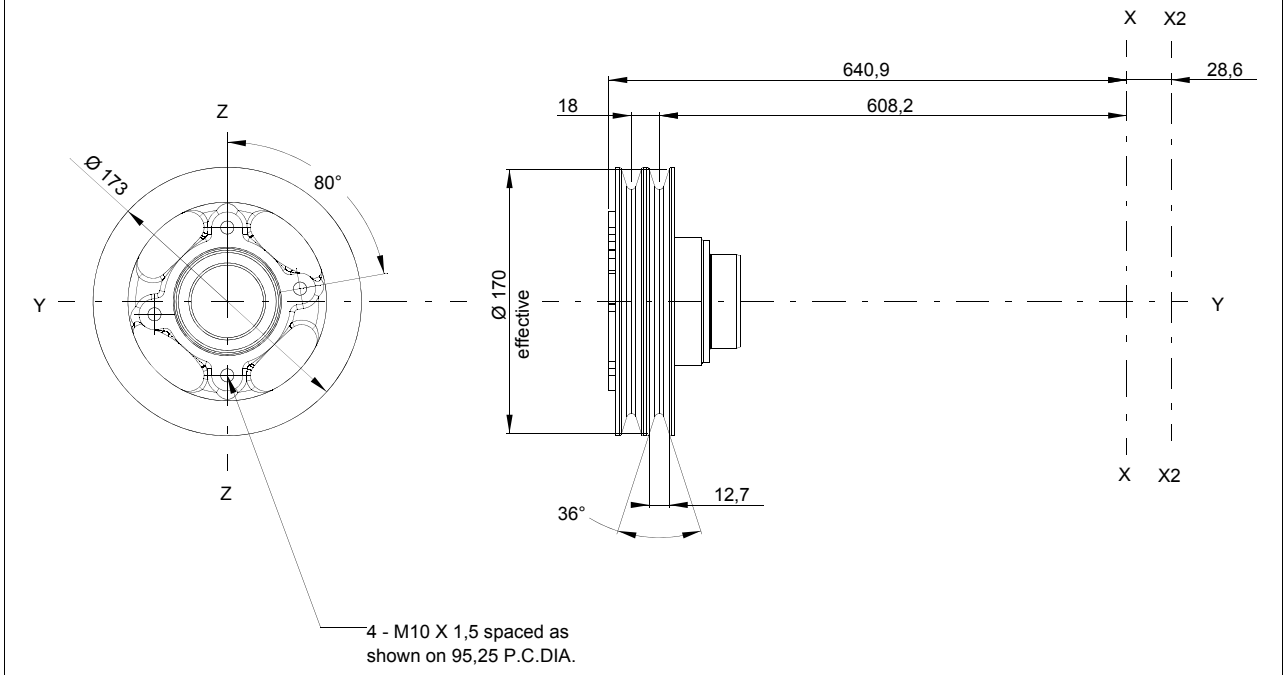
Pulley - crankshaft

K0004 - Cast iron, twin groove, 200 mm diameter 12,7 mm belt



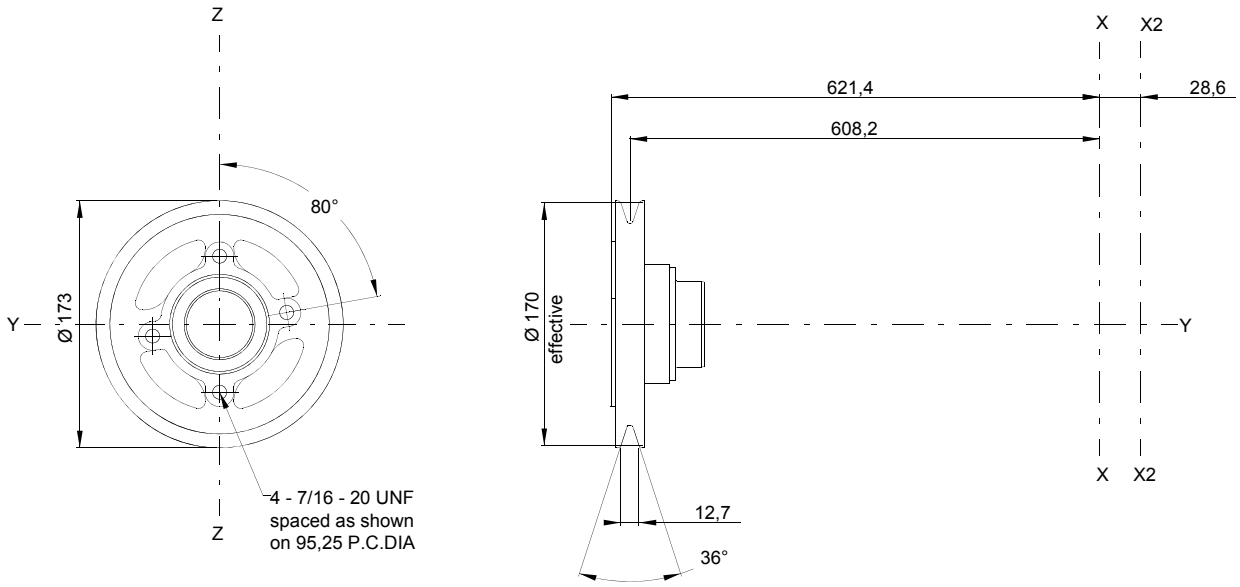
Crankshaft pulley

K0006 - Cast iron, twin groove, 170 mm diameter 12,7 mm belt



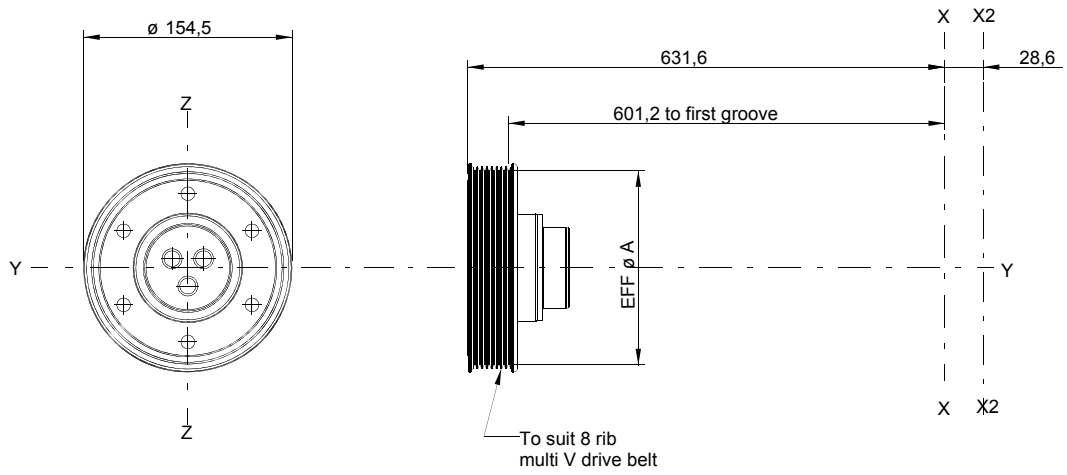
Crankshaft pulley

K0007 - Cast iron, single groove, 170 mm diameter 12,7 mm belt



Crankshaft pulley

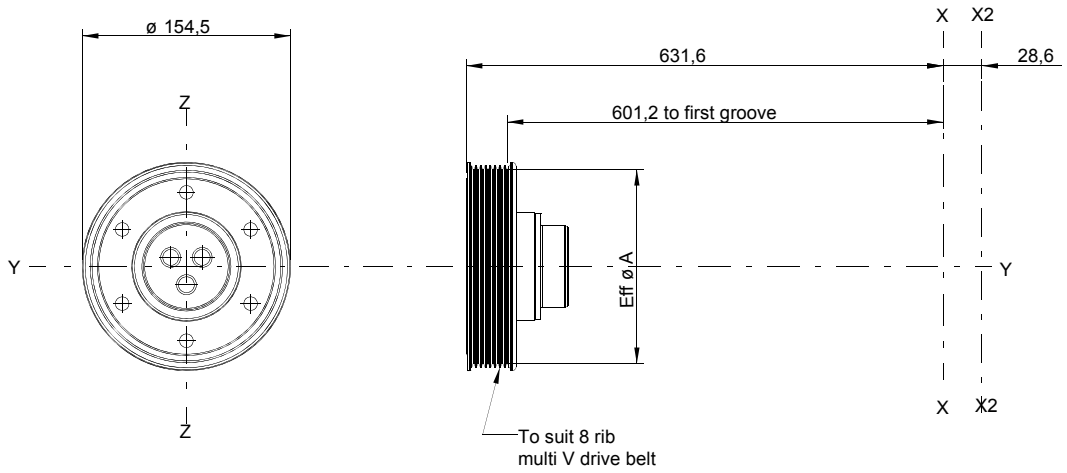
K0010/K0020 - Primary drive, steel, 150 mm - 200 mm diameter



Option code	Pulley part No.	Effective Dia. A
K0010	3115X041	150
K0020	3115X031	200

3741A051 adaptor

K0010/K0020 - Primary drive, steel, 150 mm - 200 mm diameter



Option code	Pulley part No.	Effective Dia. A
K0010	3115X041	150
K0020	3115X031	200

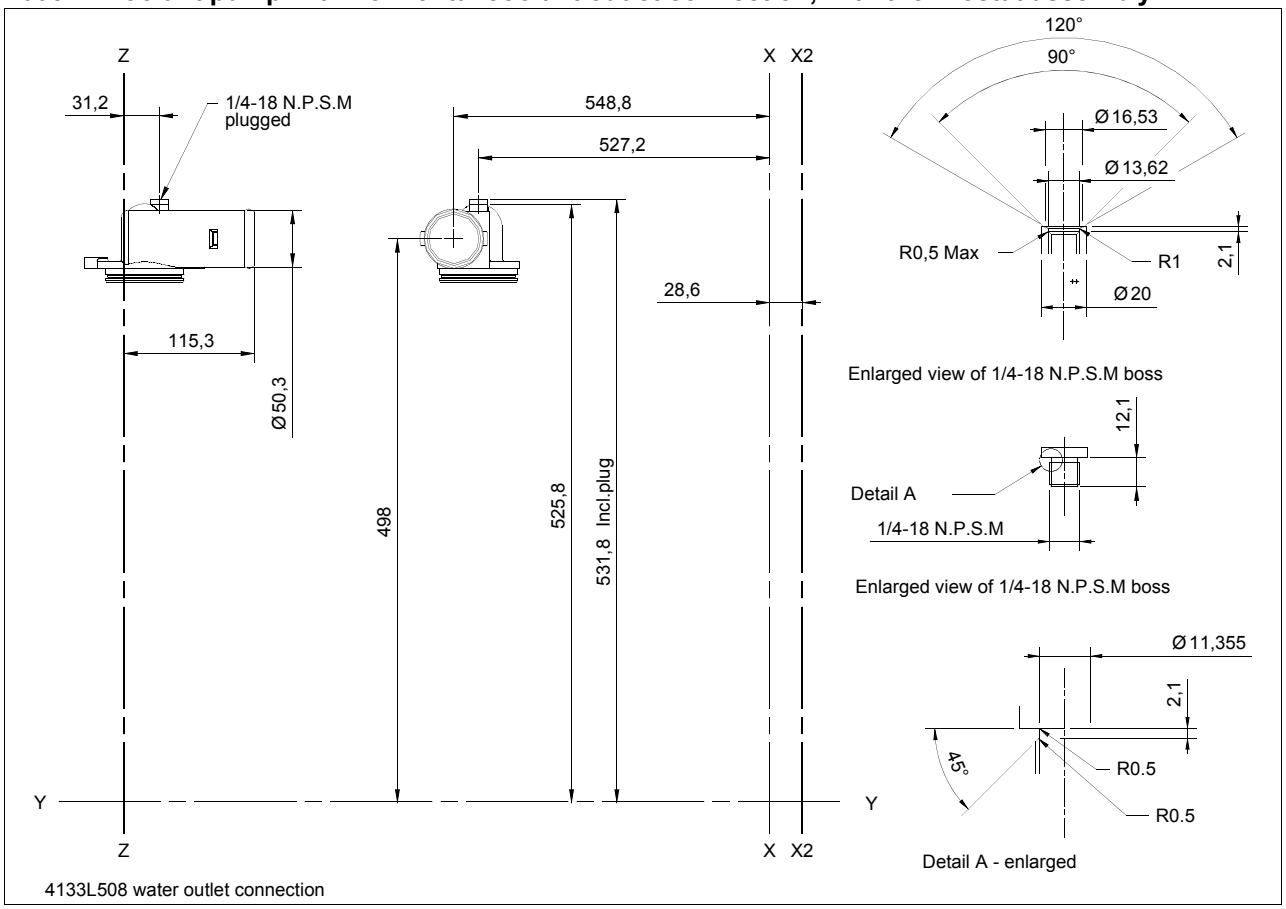
3741A051 adaptor

Coolant pump and outlet connection

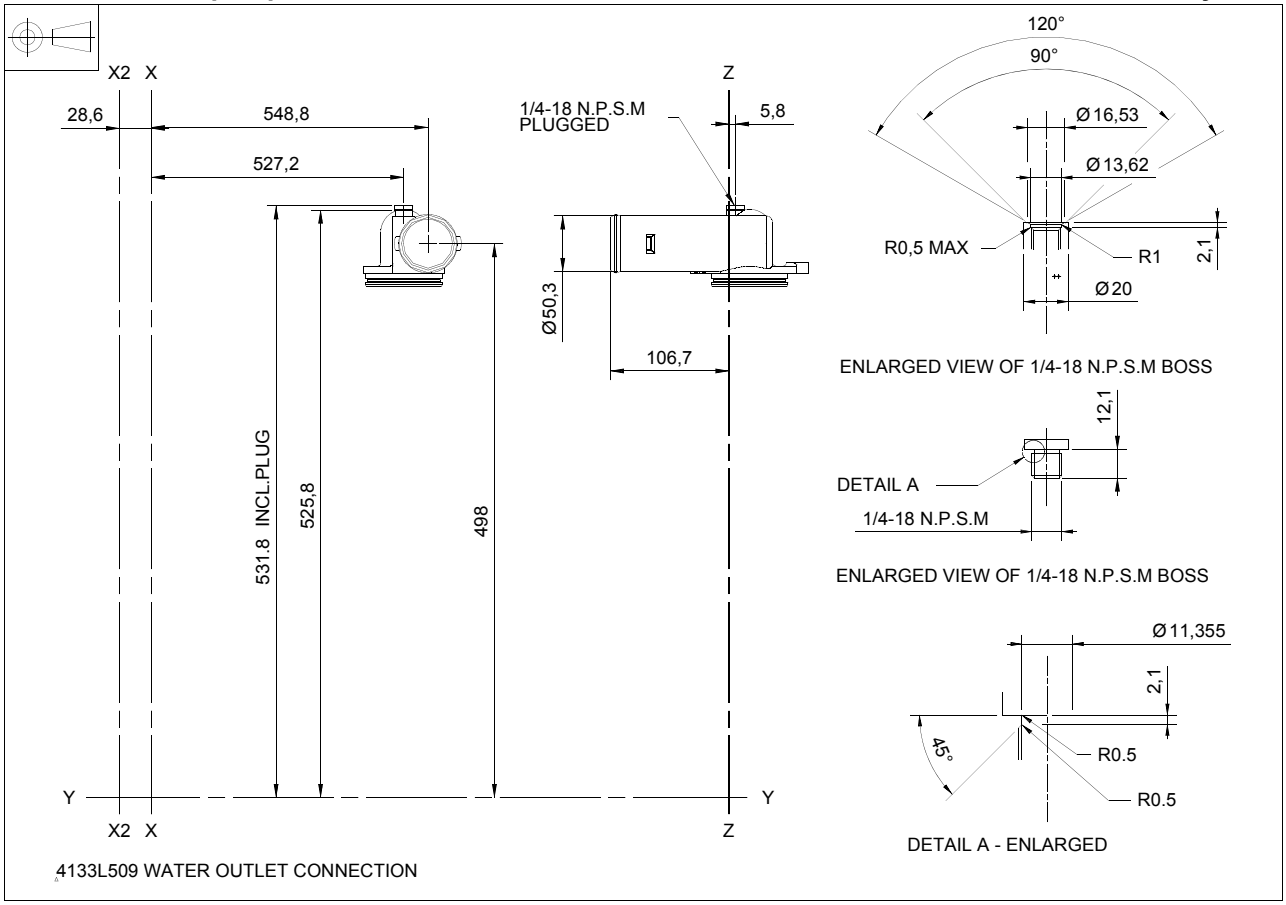
Description	Option
Coolant pump with horizontal coolant outlet connection, LHS with thermostat assembly	L0052
Coolant pump with horizontal coolant outlet connection, RHS with thermostat assembly	L0053
Coolant pump with vertical coolant outlet connection with thermostat assembly (1)	L0056

1. Only option compatible with radiator options.

L0052 - Coolant pump with horizontal coolant outlet connection, with thermostat assembly

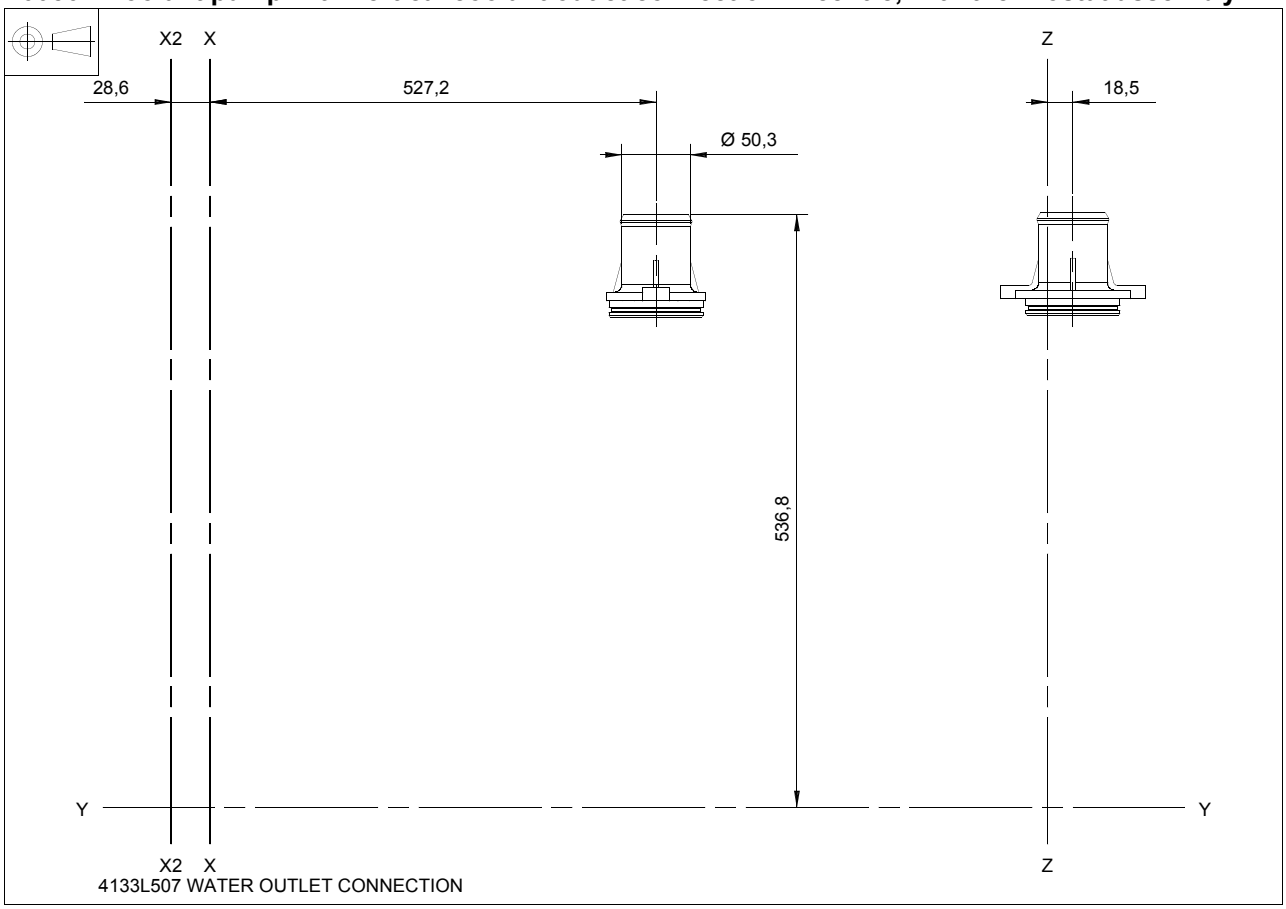


L0053 - Coolant pump with horizontal coolant outlet connection RHS, with thermostat assembly



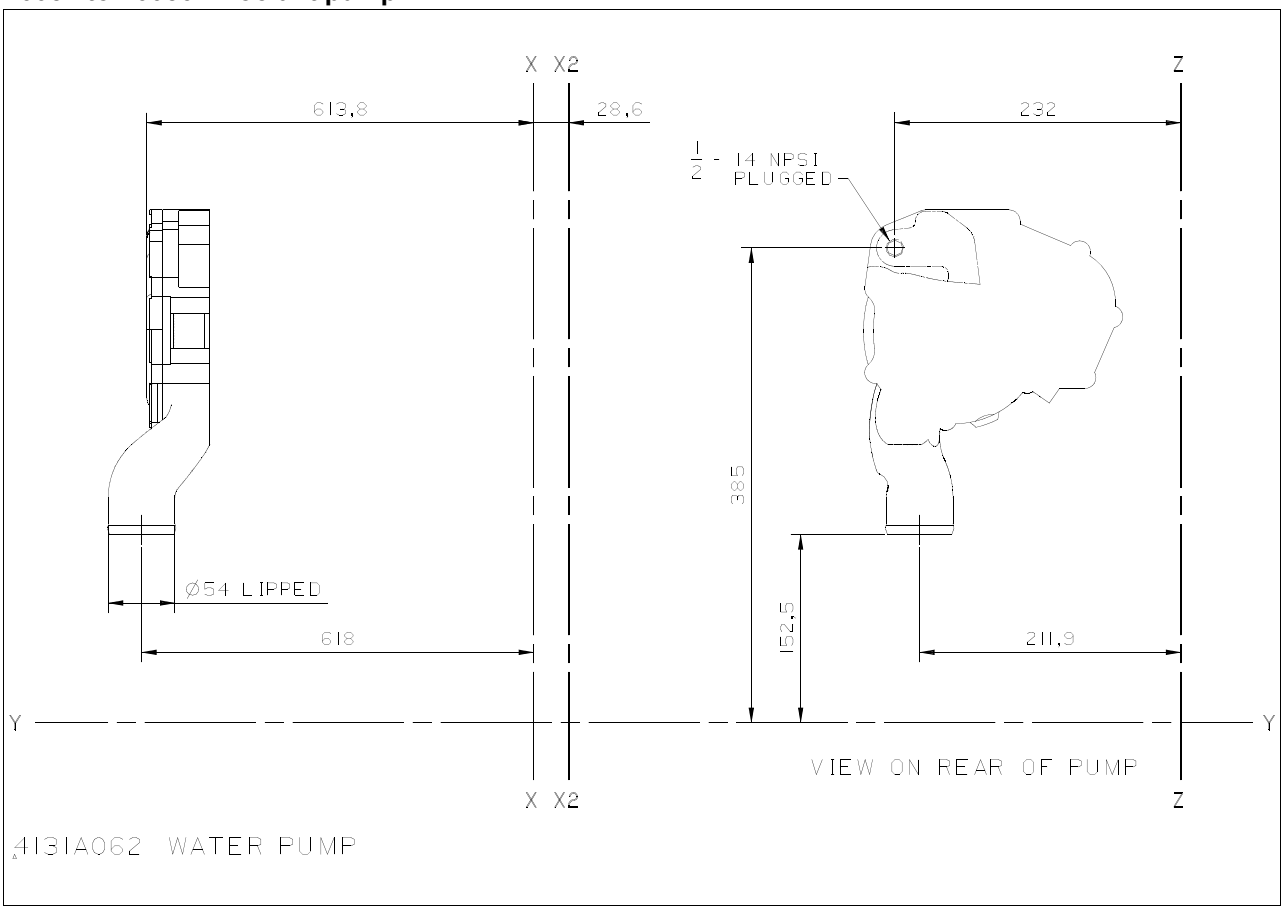
4133L509 WATER OUTLET CONNECTION

L0056 - Coolant pump with vertical coolant outlet connection in centre, with thermostat assembly



4133L507 WATER OUTLET CONNECTION

L0052 to L0056 - Coolant pump

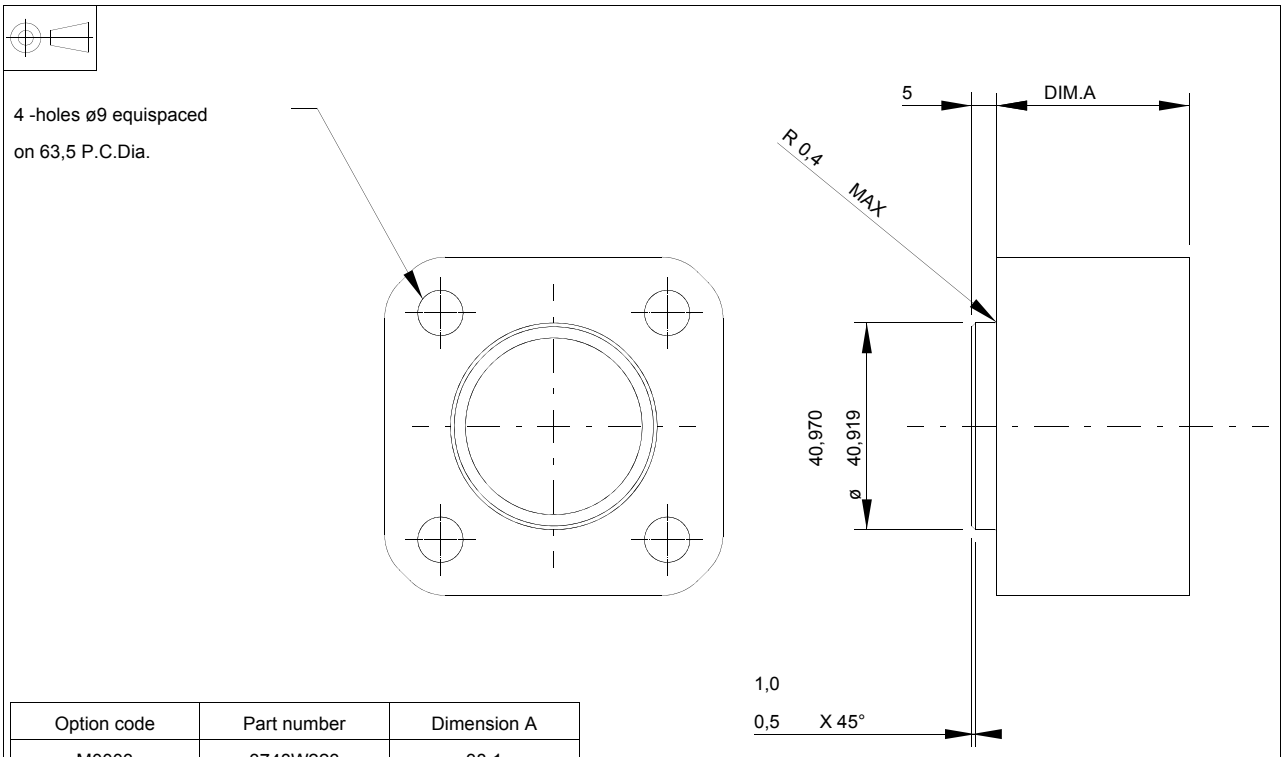


Fans and extensions

Description	Option
Fan and extension not required (1)	M0000
38 mm (1.5 in), fan extension (1)	M0003
51 mm (2.0 in), fan extension (1)	M0004
63 mm (2.5 in), fan extension (1)	M0005
76 mm (3.0 in), fan extension (1)	M0006
Fan and extension not required, fitted with transit hardware only	M0090
457.2 mm (18 in) Pusher, 6 blade, with 38 mm (1.5 in), fan extension (2)	M2203
457.2 mm (18 in) Pusher, 6 blade, with 51 mm (2.0 in), fan extension (2)	M2204
457.2 mm (18 in) Pusher, 6 blade, with 63 mm (2.5 in), fan extension (2)	M2205
457.2 mm (18 in) Pusher, 6 blade, with 76 mm (3.0 in), fan extension (2)	M2206
457.2 mm (18 in) Puller, 7 blade, with 63 mm (2.5 in), fan extension (3)	M2315
457.2 mm (18 in) Puller, 10 blade, with 38 mm (1.5 in), fan extension (3) (4)	M2323
457.2 mm (18 in) Puller, 10 blade, with 51 mm (2.0 in), fan extension (3)	M2324
457.2 mm (18 in) Puller, 10 blade, with 63 mm (2.5 in), fan extension (3)	M2325
457.2 mm (18 in) Puller, 10 blade, with 76 mm (3.0 in), fan extension (3)	M2326
457.2 mm (18 in) Pusher, 7 blade, with 63 mm (2.5 in), fan extension (3)	M2415
457.2 mm (18 in) Pusher, 7 blade, with 76 mm (3.0 in), fan extension (3) (4)	M2416
508 mm (20 in) Puller, 7 blade, with 38 mm (1.5 in), fan extension (3) (4)	M3313
508 mm (20 in) Puller, 7 blade, with 51 mm (2.0 in), fan extension (3)	M3314
508 mm (20 in) Puller, 7 blade, with 63 mm (2.5 in), fan extension (3)	M3315
508 mm (20 in) Puller, 7 blade, with 76 mm (3.0 in), fan extension (3)	M3316
508 mm (20 in) Puller, 10 blade, with 38 mm (1.5 in), fan extension (3) (4)	M3323
508 mm (20 in) Puller, 10 blade, with 51 mm (2.0 in), fan extension (3)	M3324
508 mm (20 in) Puller, 10 blade, with 63 mm (2.5 in), fan extension (3)	M3325
508 mm (20 in) Puller, 10 blade, with 76 mm (3.0 in), fan extension (3)	M3326
508 mm (20 in) Pusher, 7 blade, with 63 mm (2.5 in), fan extension (3) (4)	M3415
508 mm (20 in) Pusher, 7 blade, with 76 mm (3.0 in), fan extension (3)	M3416
559 mm (22 in) Puller, 10 blade, with 76 mm (3.0 in), fan extension (3)	M4326
559 mm (22 in) Pusher, 7 blade, with 63 mm (2.5 in), fan extension (3) (4)	M4415

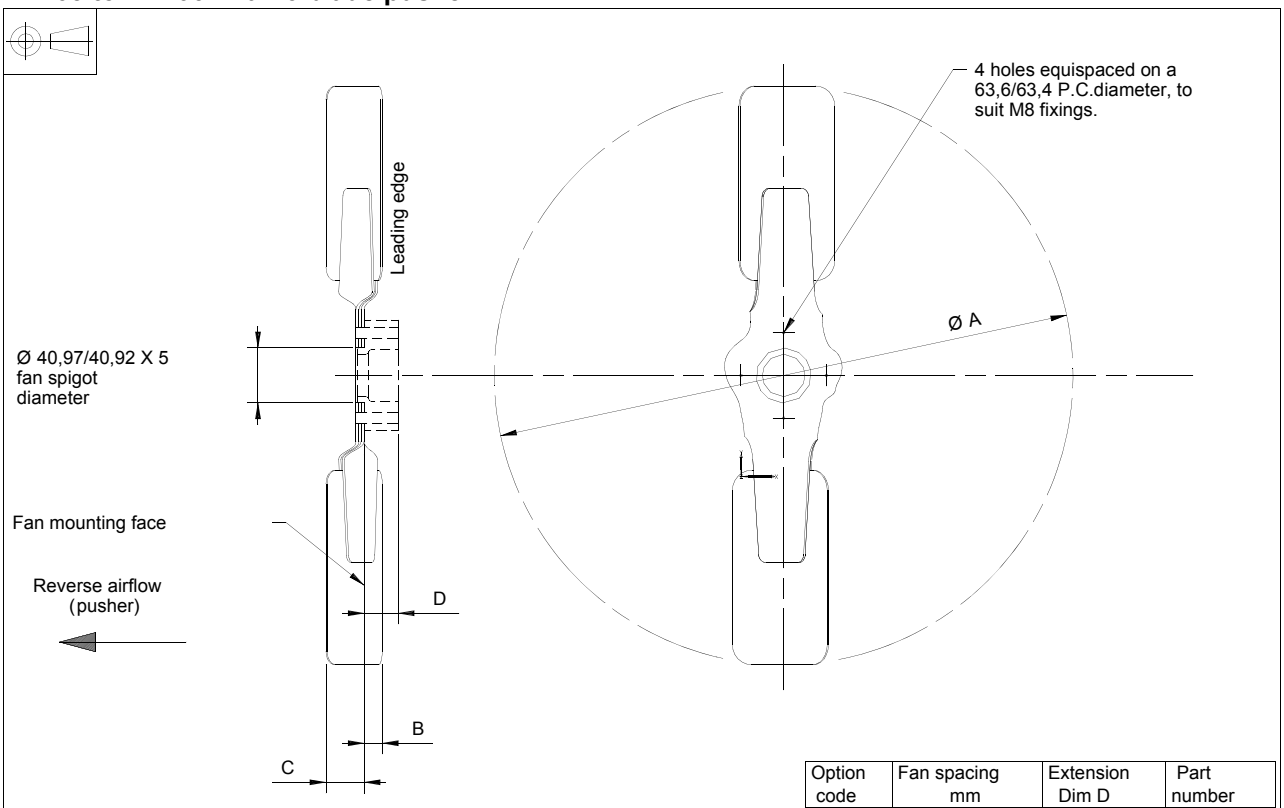
1. Customer supplied fan and extensions must be approved by Perkins Applications.
2. Metal fans.
These fans are limited to engines with rated speeds up to and including 2200 rev/min. When a balancer is selected rated speeds can be increased to 2400 rev/min.
3. Composite fans.
4. Not available with P0001/P0003.

M0003/M0004/M0005/M0006 - Fan extension



Option code	Part number	Dimension A
M0003	3748W223	38,1
M0004	3748W232	50,8
M0005	3748W242	63
M0006	3748W243	76

M2203 to M2206 - Fan 6 blade pusher

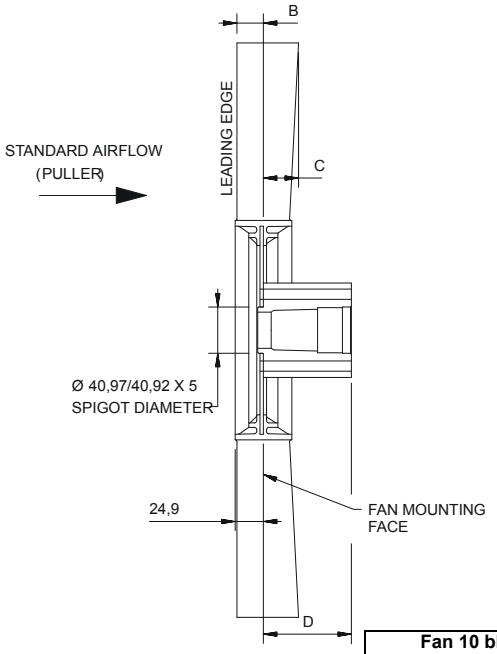


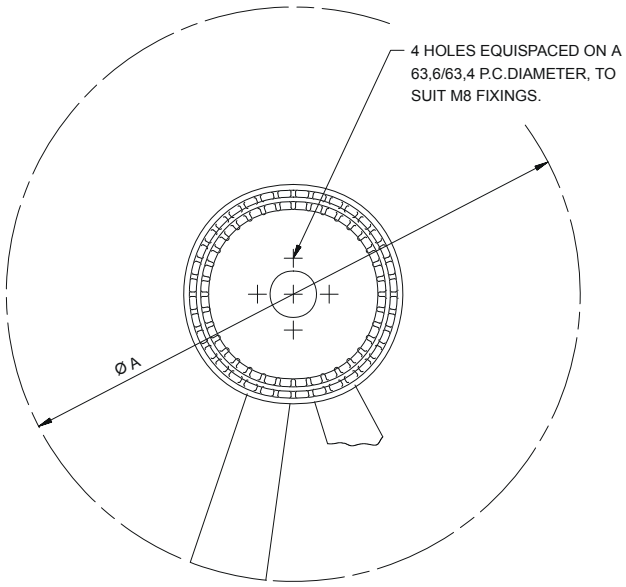
Fan 6 blade-reverse airflow (pusher)					
Code	D A	Part NO.	Material	B	C
M2203-6	457,2	2485C822	Aluminium	15,6	39.55

Option code	Fan spacing mm	Extension Dim D	Part number
M***3	ZERO	38	3748W223
M***4	12	51	3748W232
M***5	25	63	3748W242
M***6	38	76	3748W243

M2323 to M2326, M3323 to M3326 and M4326 - 10 blade (puller)

Note: Minimum of 25 mm clearance in front and behind of dimensions **B** and **C** must be maintained.



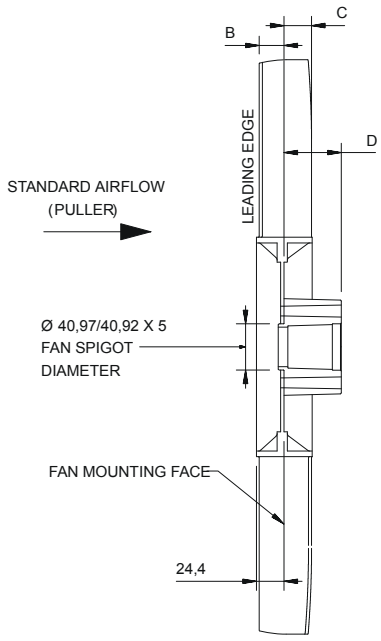


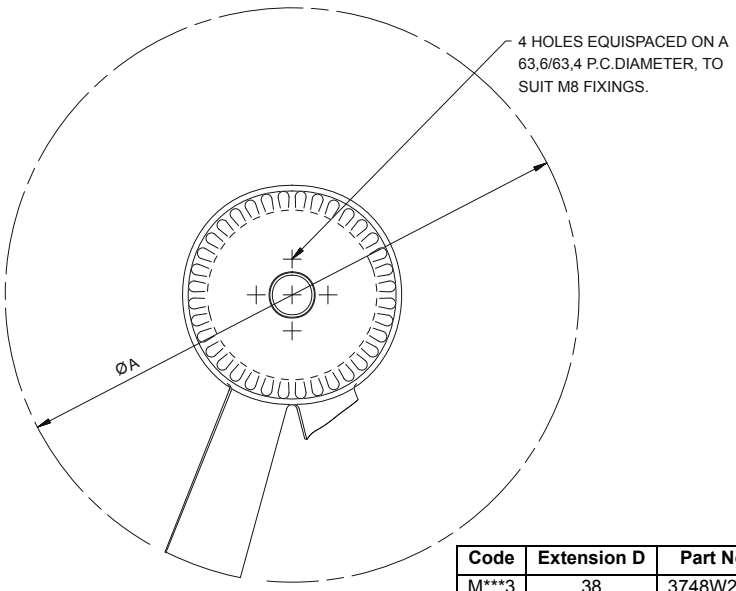
Fan 10 blade-standard airflow (puller)						Code	Extension D	Part No
Code	A	Part No.	Material	B	C			
M2323/6	457,0	2485C522	Plastic	27,94	25,1	M***3	38	3748W223
M3323/6	508,0	2485C518	Plastic	29,21	25,1	M***4	51	3748W232
M4326	559,0	2485C521	Plastic	30,48	25,1	M***5	63	3748W242
						M***6	76	3748W243

A1113

M3313 to M3316, 7 blade (puller)

Note: Minimum of 25 mm clearance in front and behind of dimensions **B** and **C** must be maintained.

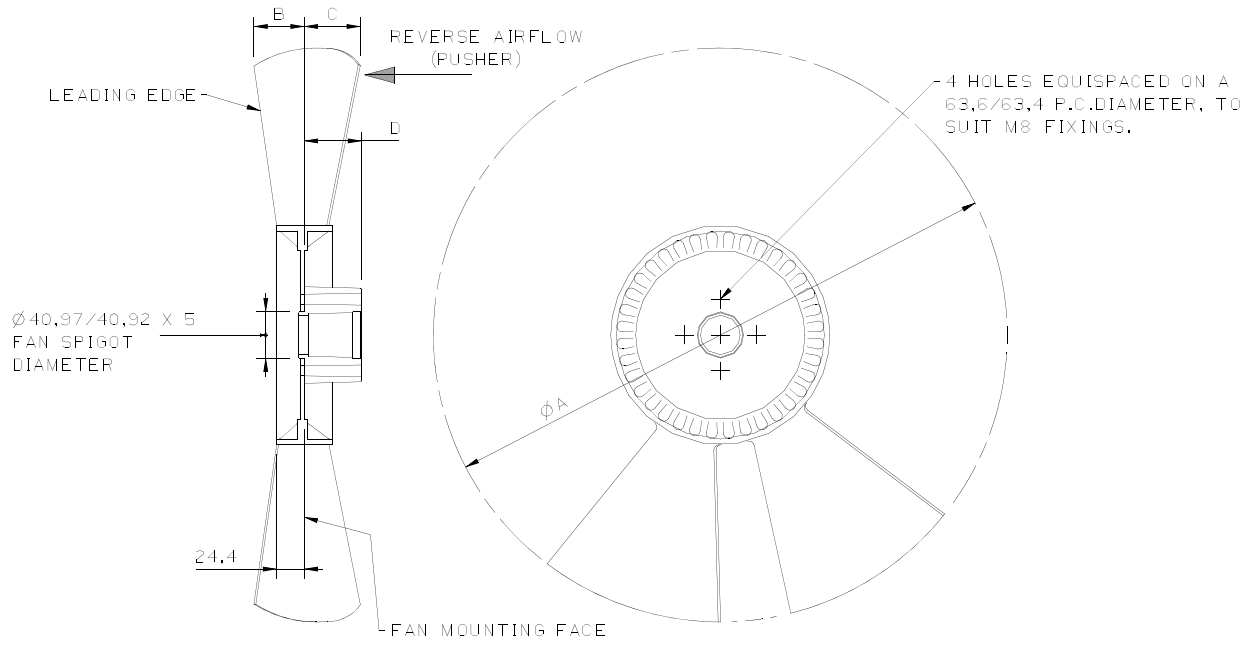




Fan 7 blade-standard airflow (puller)						Code	Extension D	Part No
Code	A	Part No.	Material	B	C			
M3313/6	508	2485C517	Plastic	24,4	24,9	M***3	38	3748W223
						M***4	51	3748W232
						M***5	63	3748W242
						M***6	76	3748W243

A1114

M3415 and M3416 - Fan 7 blade (pusher)



NOTE
MINIMUM OF 25 CLEARANCE
OF DIMENSIONS B AND C MUST BE MAINTAINED

FAN 7 BLADE-REVERSE AIRFLOW (PUSHER)					
CODE	ØA MM	PART NO.	MATERIAL	B	C
M3415-6	508	2485C514	PLASTIC	44,5	49,8

OPTION CODE	FAN SPACING MM	EXTENSION DIM D	PART NUMBER
M+++5	25	63	3748W242
M+++6	38	76	3748W243

Alternators

Standard vee belt drive

Description	Option
Not required	N0000
12V, 65A, lug mounted alternator	N0101
12V, 75A, lug mounted alternator	N0111
12V, 85A, lug mounted alternator	N0121
12V, 100A, lug mounted alternator	N0131
12V, 120A, lug mounted alternator (1)	N0171
24V, 75A, lug mounted alternator	N0301
24V, 55A, lug mounted alternator	N0321

1. Incompatible with ZM121/ZM122/ZM130/ZM131.

Multi vee belt drive

Description	Option
Alternator, bracket and tensioner not required	N0000
Tensioner supplied using transit fixings only	N0050
12V, 65A, lug mounted alternator	N0101
12V, 75A, lug mounted alternator	N0111
12V, 85A, lug mounted alternator	N0121
12V, 100A, lug mounted alternator	N0131
12V, 120A, lug mounted alternator (1)	N0171
24V, 75A, lug mounted alternator	N0301
24V, 55A, lug mounted alternator	N0321

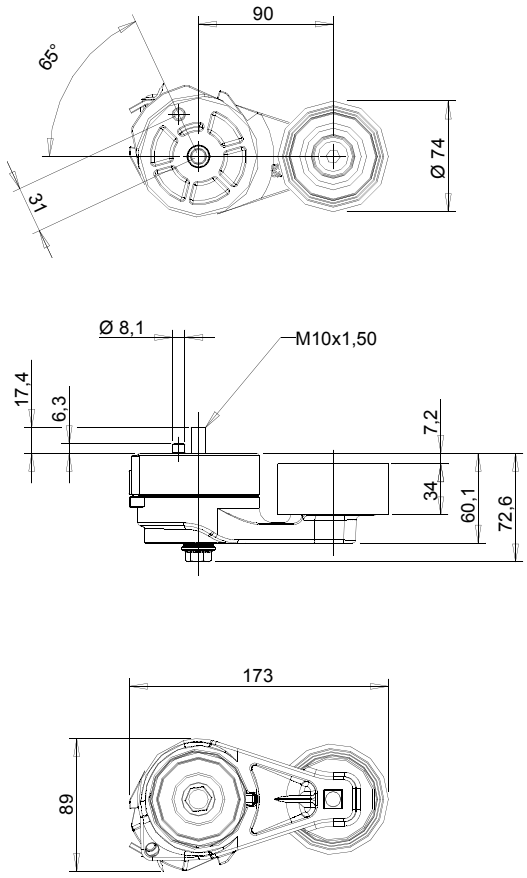
1. Incompatible with ZM121/ZM122/ZM130/ZM131.

Alternator branding

Description	Option
Not applicable (1)	NL000
Standard	NL001

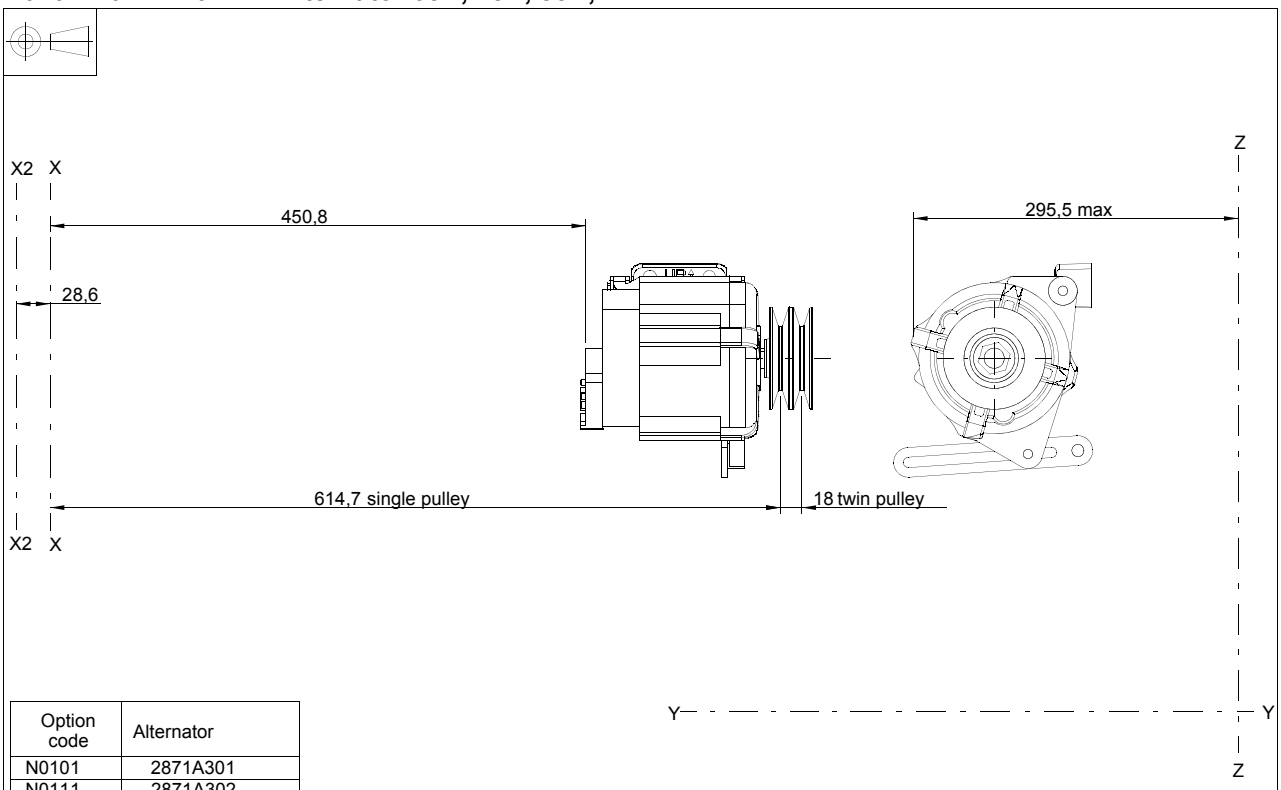
1. Compatible with N0000 only.

N0050 - Automatic belt tensioner



2637A001 belt tensioner assembly

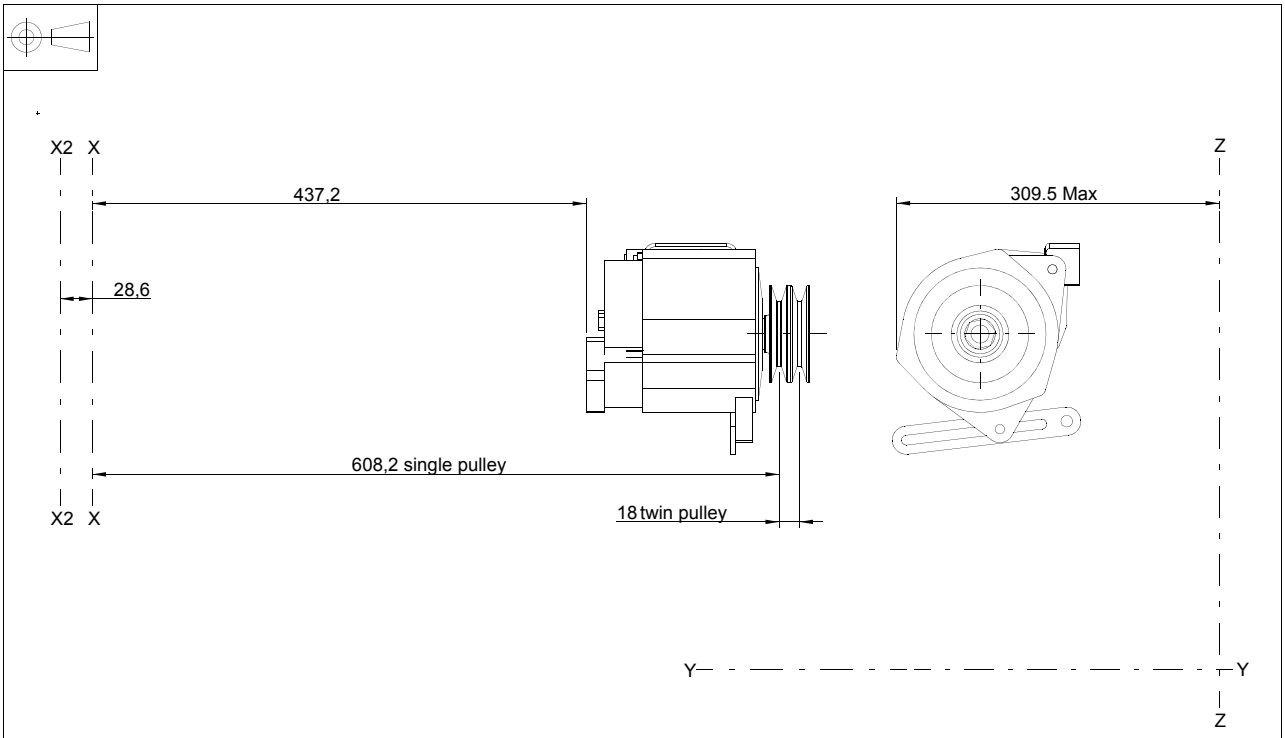
N0101/N0111/N0121 - Alternator 65A, 75A, 85A, 12v



Option code	Alternator
N0101	2871A301
N0111	2871A302
N0121	2871A303

3824A071 bracket 36155429 link

N0131/N0171/N0301/N0321 - Alternator, 100A, 120A, 12v and 55A, 75A 24v



0ption	Alternator	Voltage	Current
N0131	2871A304	12V	100A
N0321	2781A701	24V	55A

3824A071 bracket 36155429 link

Multi Vee belt drive

Artwork required

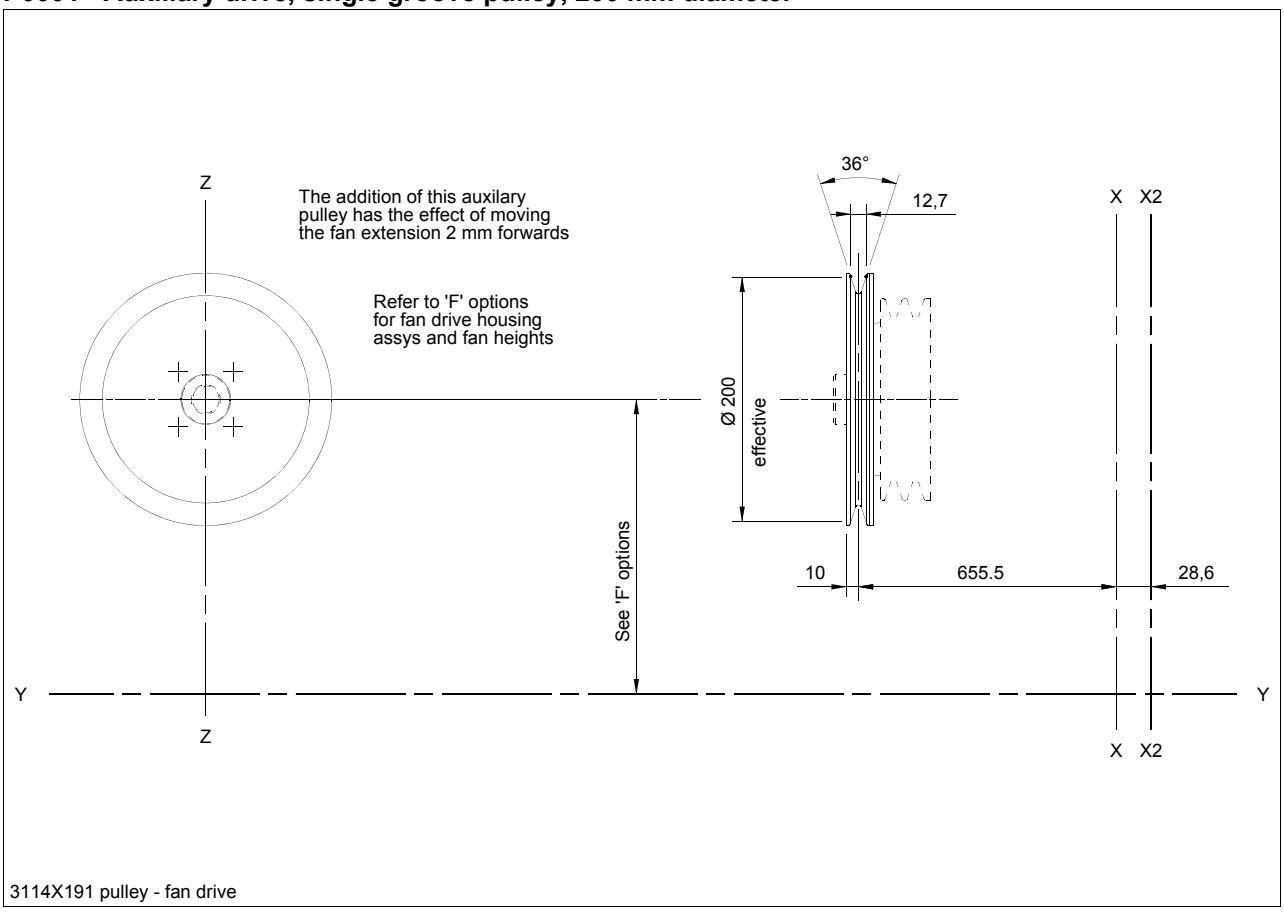
Belt driven auxiliaries

Standard vee belt drive

Description [1]	Option
Not required	P0000
Auxiliary drive, single groove pulley, 200 mm diameter [2]	P0001
Auxiliary drive, single groove pulley, 140 mm diameter [3]	P0003

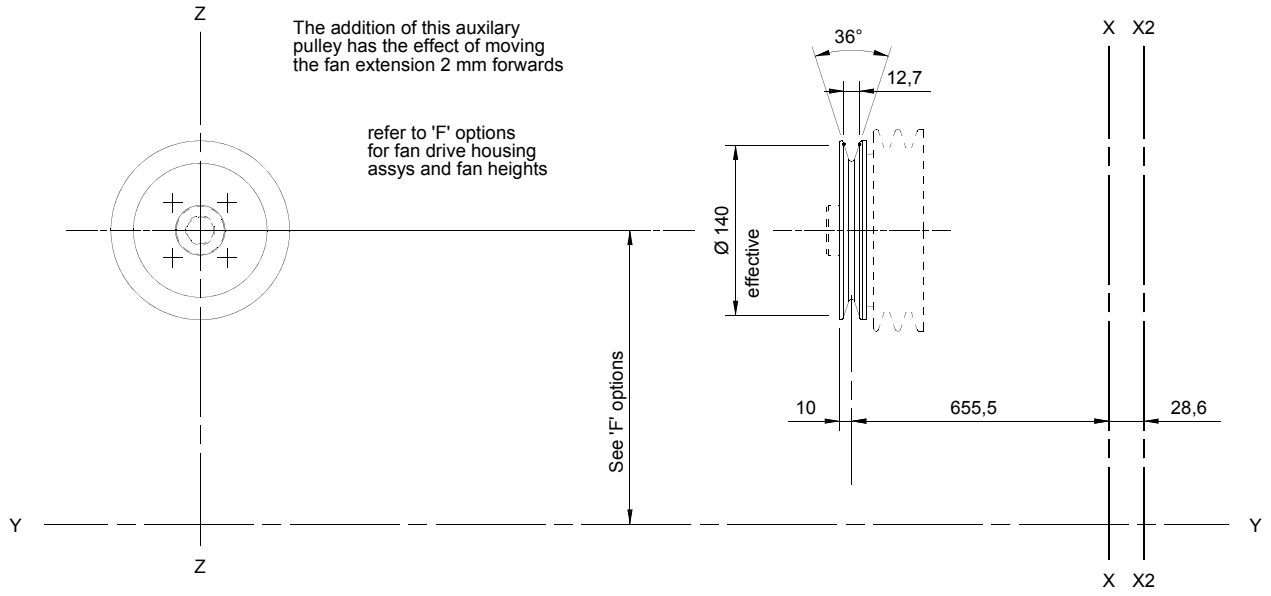
1. Standard vee belts supplied with all options except when F0501/F0502/F0503/F0504 or K0000 or when F0000 with N0000 selected.
2. Incompatible with ZM101/ZM102/ZM103/ZM110.
3. Engine supplied with twin belts, compatible with F0062/F0063/F0061/F0064 only, for use with fan pulley 140 mm only.

P0001 - Auxiliary drive, single groove pulley, 200 mm diameter



3114X191 pulley - fan drive

P0003 - Auxiliary drive, single groove pulley, 140 mm diameter



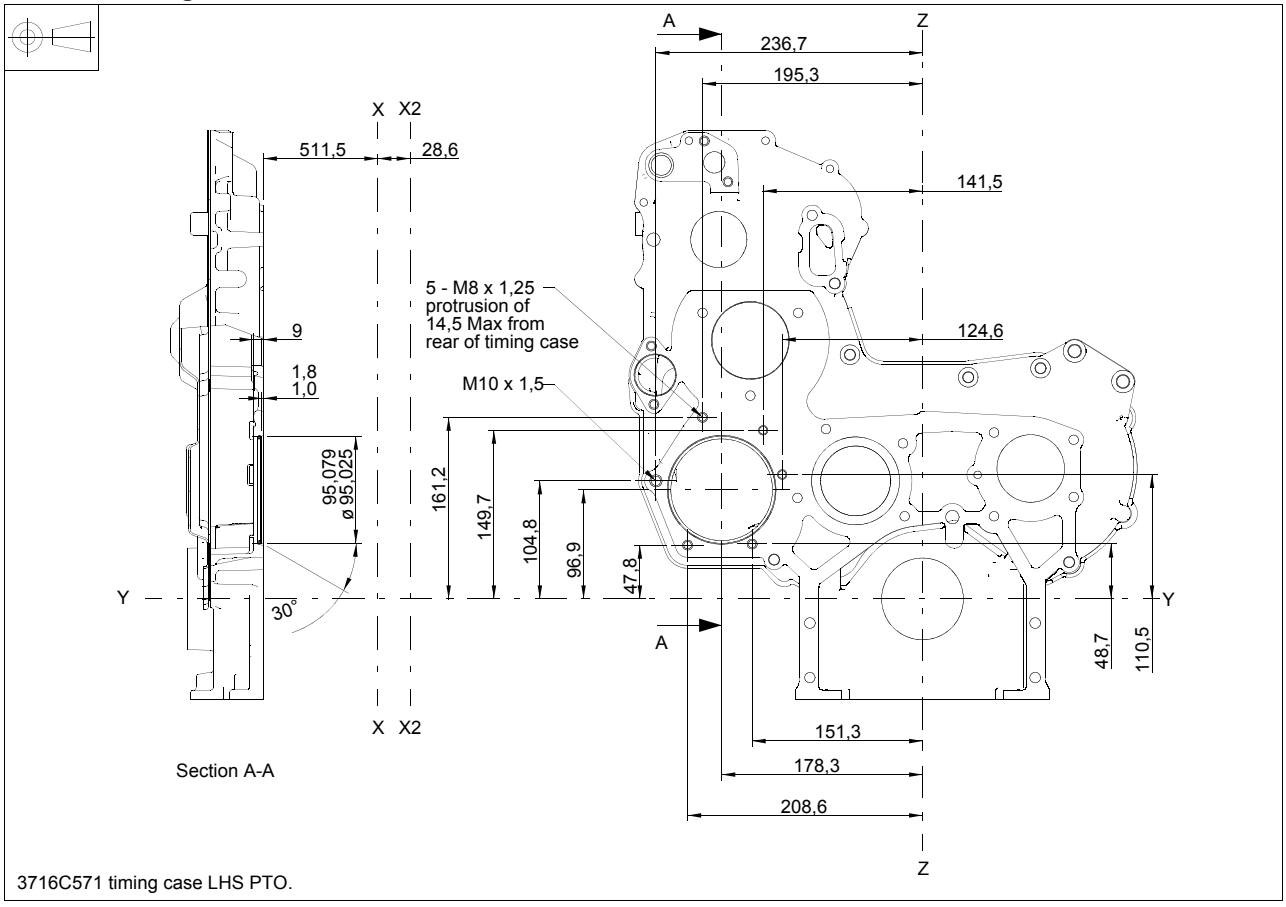
3114X192 pulley - fan drive

Timing case and gear driven auxiliaries

Description	Option
Timing case, single LHS PTO (142 Nm Max.)	
No auxiliaries (1)	Q1000
Exhauster	Q1001
Hydraulic pump drive adaptor, 2 bolt fixing, SAE flange, 13 tooth spline, LHS	Q1005
Hydraulic pump drive adaptor, 4 bolt fixing	Q1009
Hydraulic pump drive adaptor, 2 bolt fixing, SAE flange, 11 tooth spline, LHS	Q1015
Hydraulic pump drive adaptor, 2 bolt fixing, SAE flange, 9 tooth spline, LHS	Q1016
Timing case, single LHS PTO (210 Nm Max.)	
No auxiliaries (1)	Q1030
Hydraulic pump drive adaptor, 2 bolt fixing, SAE flange, 13 tooth spline, LHS	Q1035
Hydraulic pump drive adaptor, 2 bolt fixing, SAE flange, 11 tooth spline, LHS	Q1036
Hydraulic pump drive adaptor, 2 bolt fixing, SAE flange, 9 tooth spline, LHS	Q1037
Adaptor and extension for SAE B drive (2)	Q1038
Timing case, single LHS PTO (80 Nm Max.)	
Z drive adaptor with SAE B flange for customer fit compressor or auxiliaries (2) (3)	Q1020
Z drive adaptor and compressor, 225 cc with SAE flange, head unload (3) (4)	Q1023
Z drive adaptor and compressor, 225 cc with DIN flange, head unload (3) (4)	Q1024
Z drive adaptor and compressor, 225 cc with DIN flange, line unload (3) (4)	Q1025
Z drive adaptor and compressor, 225 cc with SAE flange, line unload (3) (4)	Q1026
Timing case, no PTO capability	
No PTO capability (5)	Q1100
Timing case, twin PTO (210 Nm Max.)	
No auxiliaries (1)	Q2030
Hydraulic pump drive adaptor, 2 bolt fixing, SAE flange, 13 tooth spline, LHS (1)	Q2035
Hydraulic pump drive adaptor, 2 bolt fixing, SAE flange, 11 tooth spline, LHS (1)	Q2036
Hydraulic pump drive adaptor, 2 bolt fixing, SAE flange, 9 tooth spline, LHS (1)	Q2037
Adaptor and extension for SAE B drive (2)	Q2038
Timing case, single RHS PTO	
Aluminium timing case, single RHS PTO, no auxiliaries fitted. (Medium duty 38 Nm PTO max)	Q3000
No auxiliaries fitted (76 Nm Max. PTO)	Q3030
Timing case, single PTO	
Heavy duty to suit compressor 630cc,SAE flange, head unload (4) (6)	Q4042
Timing case, single LHS PTO (280 Nm Max.)	
Heavy duty to suit SAE B drive flange, 13 tooth spline, no auxiliaries	Q4055
Heavy duty to suit SAE B drive flange, 15 tooth spline, no auxiliaries	Q4059

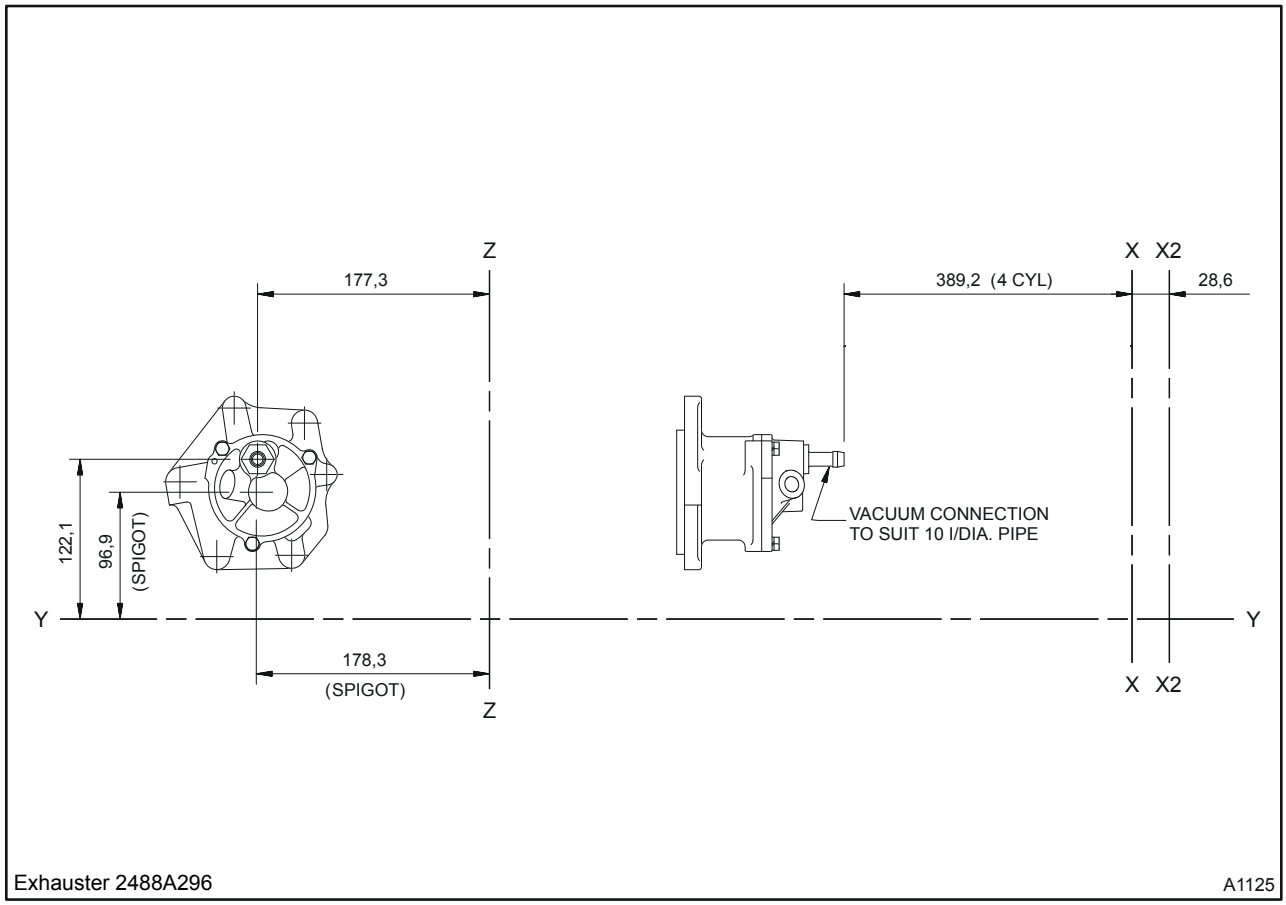
1. Incompatible with HD004/HD005/HD007/HD0100, ZM110/ZM131.
2. Incompatible with LHS dipstick options ZJ006/ZJ008.
3. Design includes a ‘Z’ drive adaptor driven from the standard duty LHS PTO timing case.
4. Only compatible with ZZ014.
5. Incompatible withHD005/HD100
6. Incompatible with RHS dipstick options and timing case fillers.

Q1000 - Timing case LHS PTO, no auxiliaries fitted



3716C571 timing case LHS PTO.

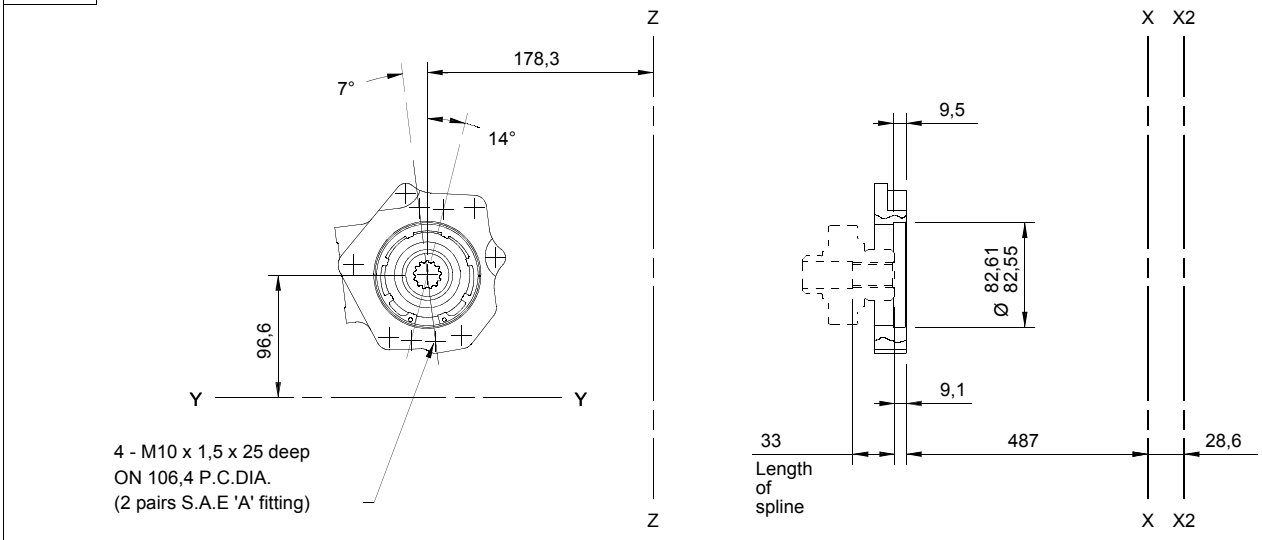
Q1001 - Exhauster



Exhauster 2488A296 A1125

Q1005, Q1035 and Q2035 - Hydraulic pump drive adaptor, 2 bolt fixing, SAE flange, 13 tooth spline, LHS

R&&&&Q1005

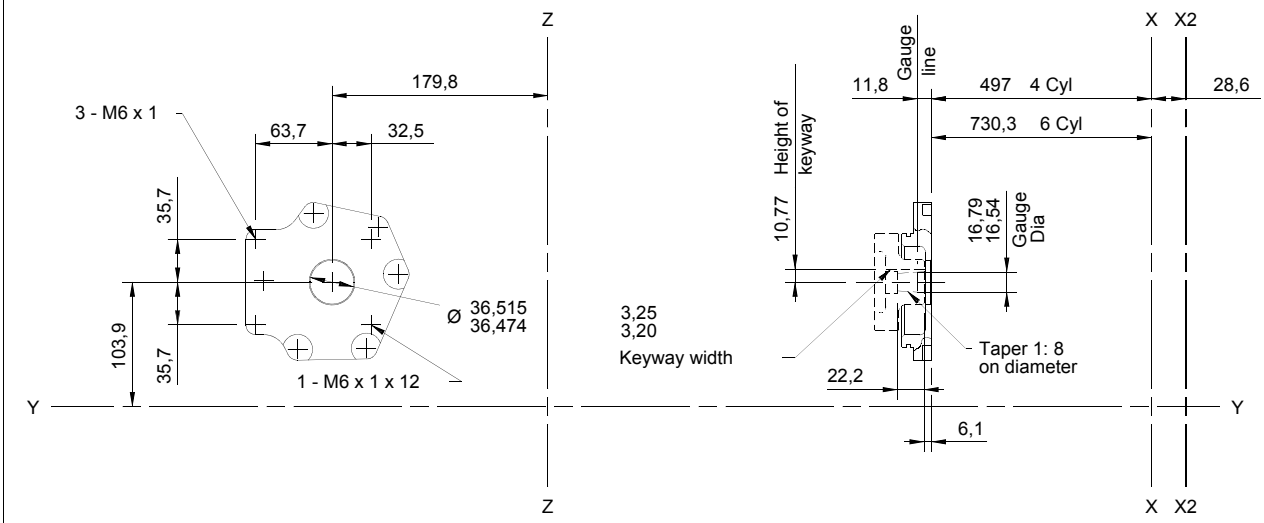


Gear spline data		
Flat root side fit details to ANSI B92.1 Class 6		
Number of teeth - 13	Major Dia. -	22,504
Pitch - 16/32		22,225
Pressure angle - 30°	Pitch Dia. - 20,637	

4113H092 adaptor - hydraulic pump drive L.H.S P.T.O

Q1009 - Hydraulic pump drive adaptor, 4 bolt fixing, LHS PTO

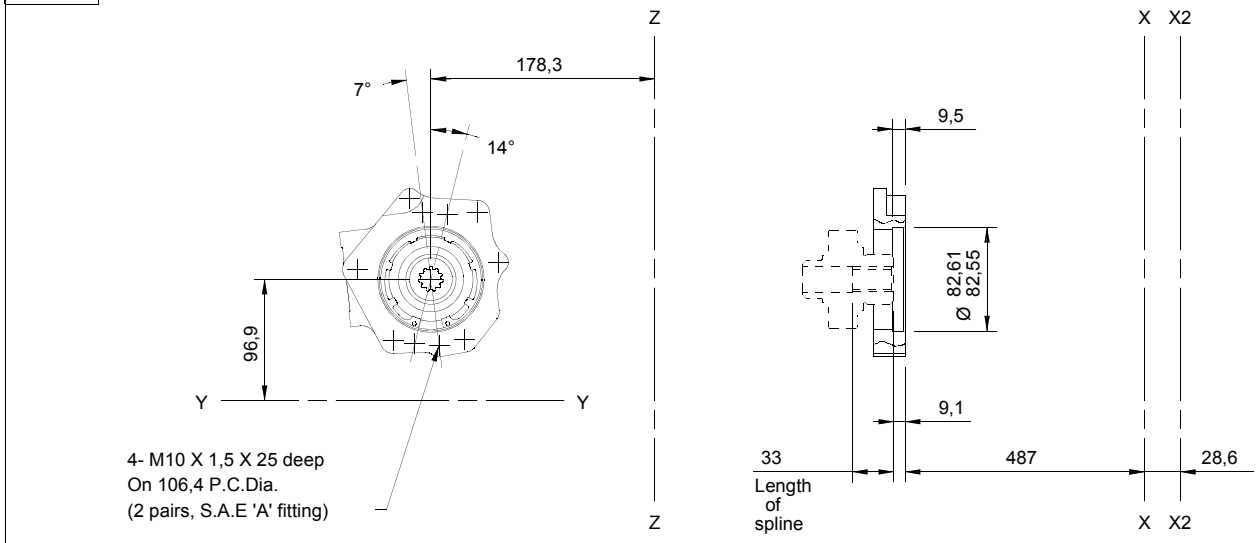
R&&&&Q1009



375IK082 adaptor - hydraulic pump drive - LHS PTO

Q1015, Q1036 and Q2036 - Hydraulic pump drive adaptor, 2 bolt fixing, SAE flange, 11 tooth spline, LHS

R&&&&1015

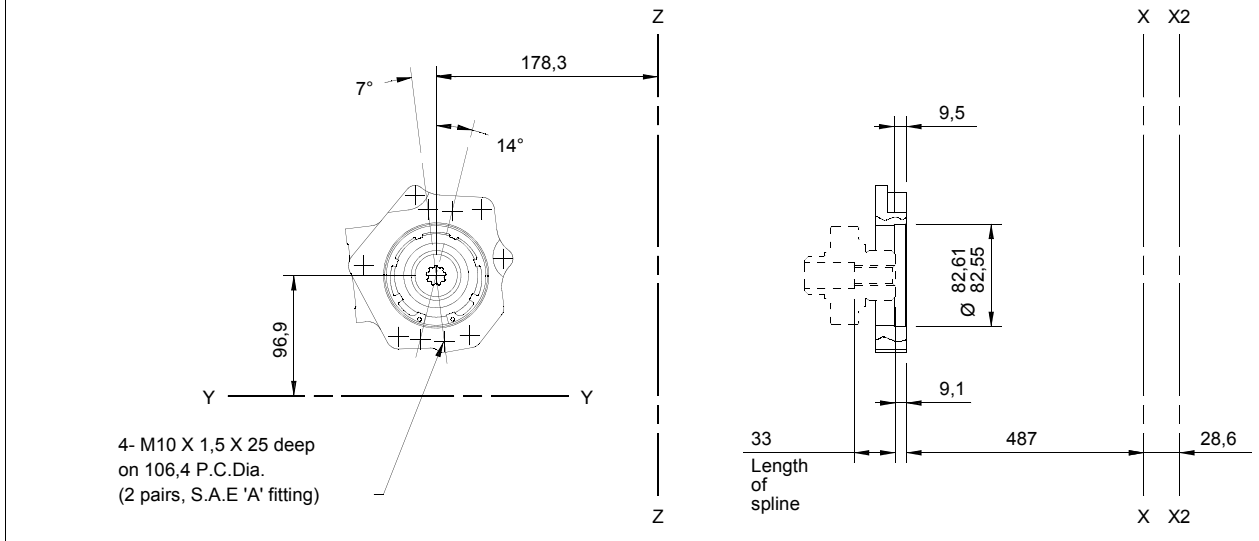


Gear spline data	
Flat root side fit details to ANSI B92.1 Class 6	
Number of teeth - 11	Major Dia. - 19,71
Pitch - 16/32	
Pressure angle - 30°	Pitch Dia. - 17,463

4113H093 adaptor - hydraulic pump drive L.H.S. P.T.O.

Q1016, Q1037 and Q2037 - Hydraulic pump drive adaptor, 2 bolt fixing, SAE flange, 9 tooth spline, LHS

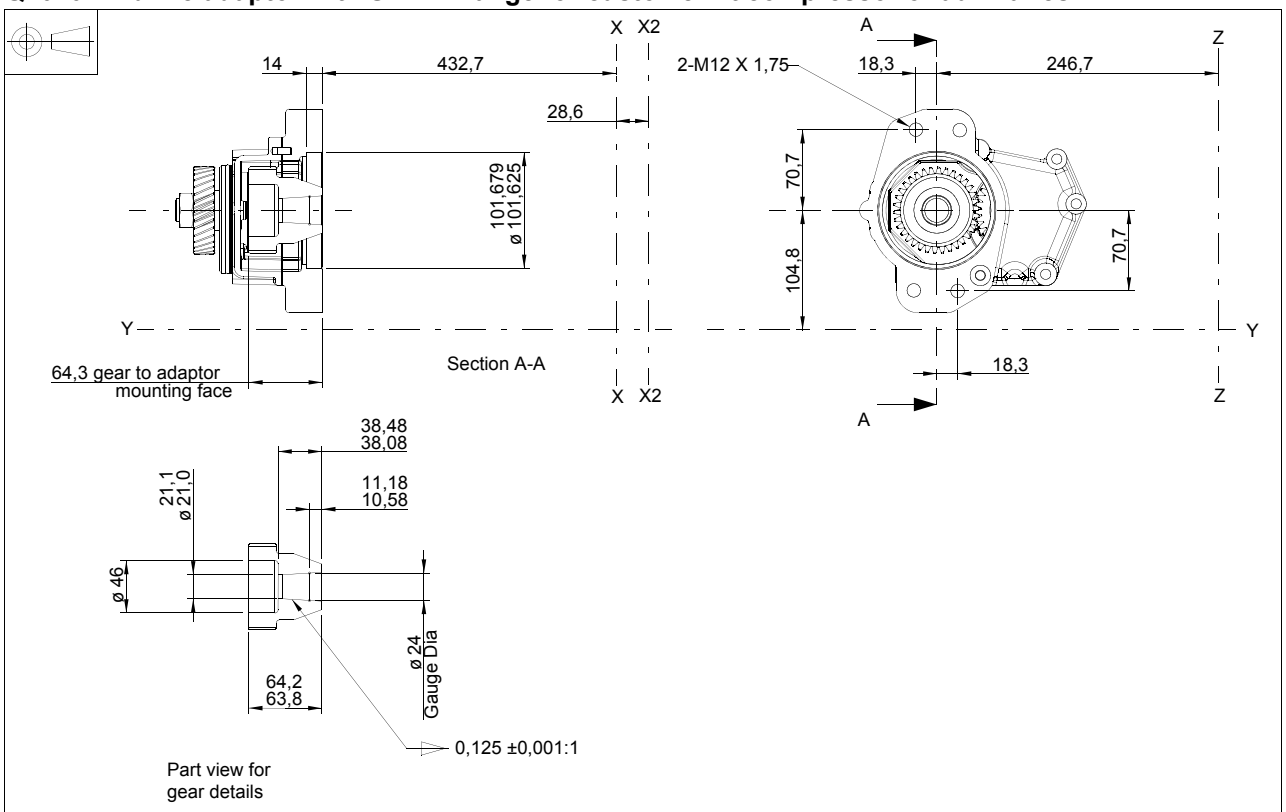
R&&&&Q1016



Gear spline data		
Flat root side fit details to ANSI B92.1 Class 6		
Number of teeth - 9	Major Dia. -	16,154
Pitch - 16/32		15,875
Pressure angle - 30°	Pitch Dia. - 14,288	

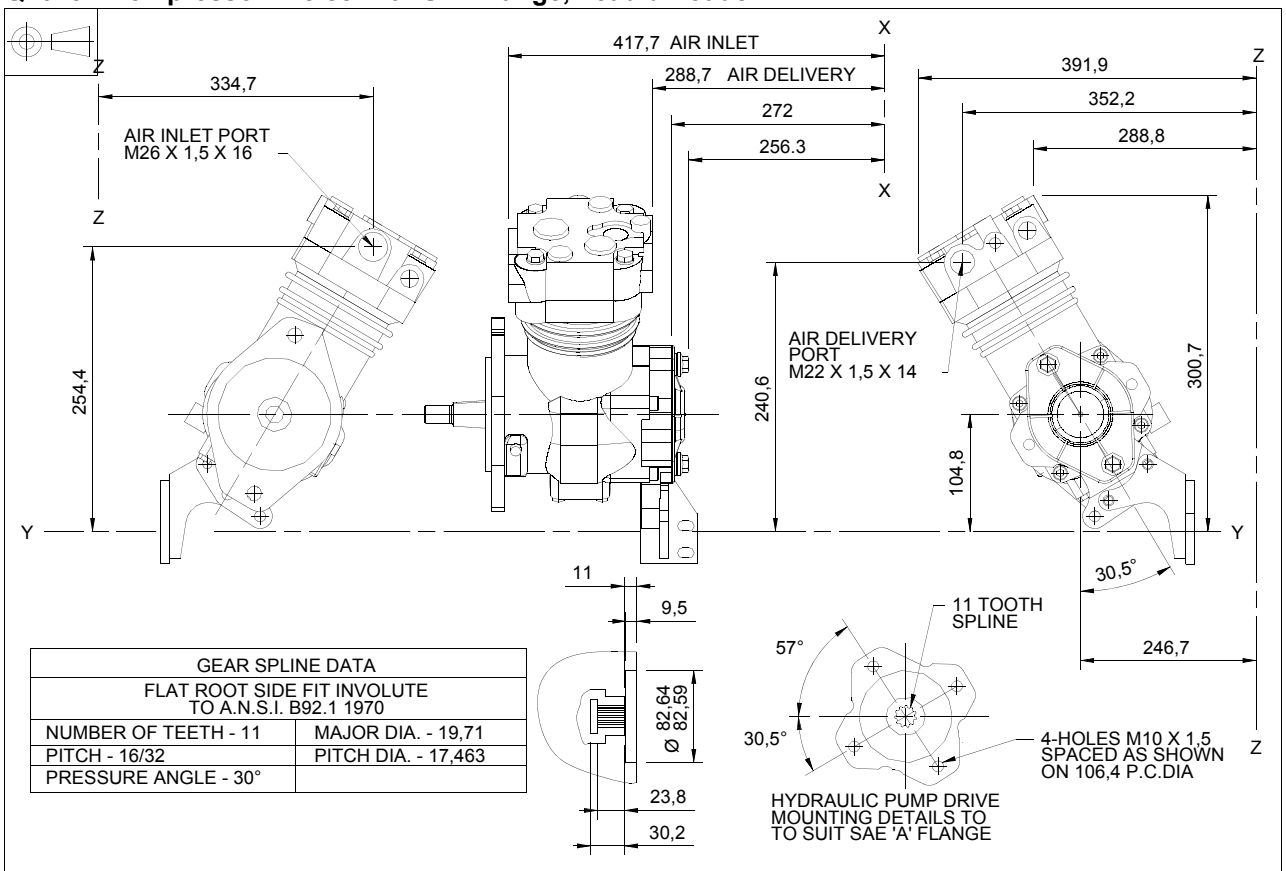
4113H094 adaptor - hydraulic pump drive L.H.S. P.T.O

Q1020 - Z drive adaptor with SAE B flange for customer fit compressor or auxiliaries



2488A299 adaptor assembly

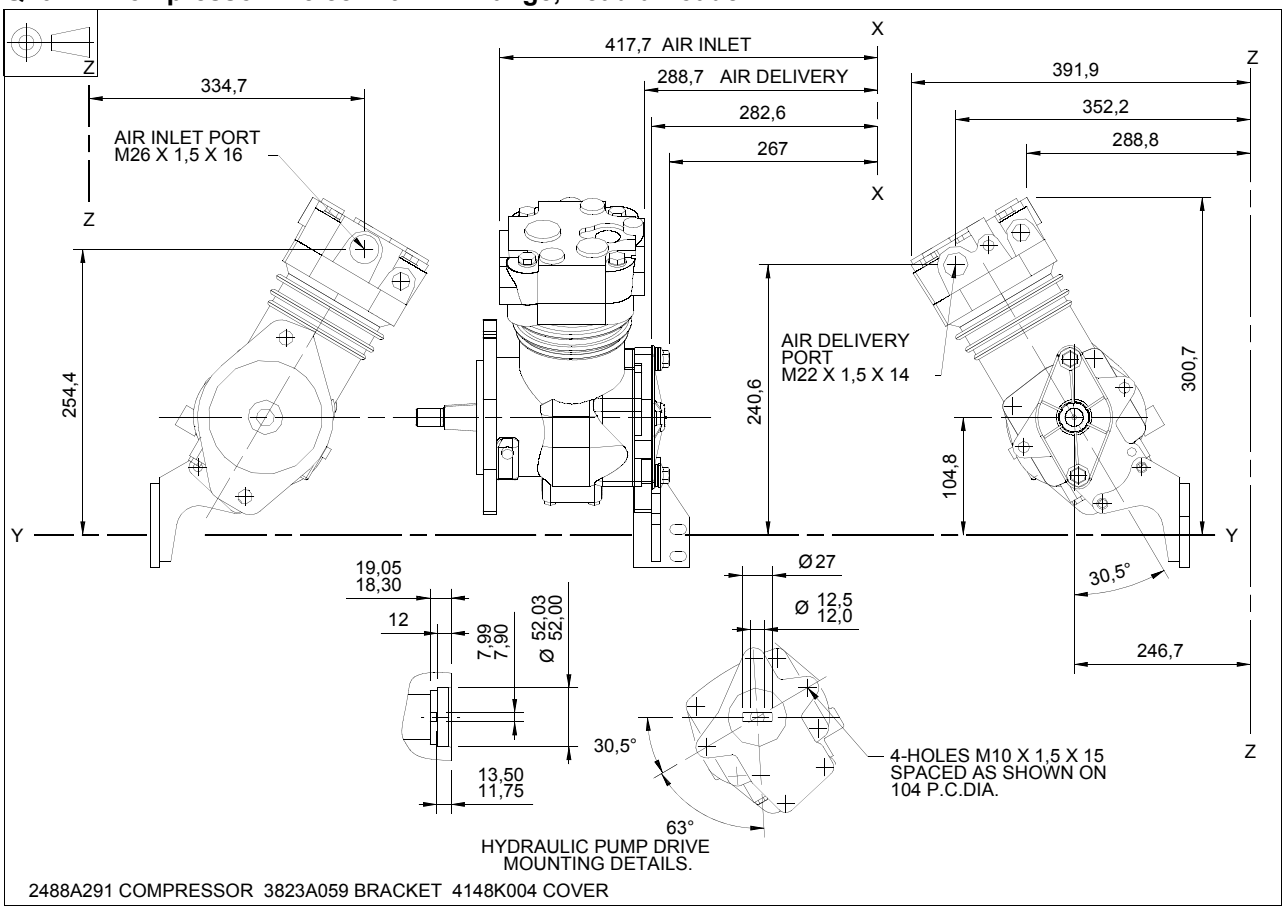
Q1023 - Compressor 225 cc with SAE flange, head unloader



GEAR SPLINE DATA	
FLAT ROOT SIDE FIT INVOLUTE TO A.N.S.I. B92.1 1970	
NUMBER OF TEETH - 11	MAJOR DIA. - 19,71
PITCH - 16/32	PITCH DIA. - 17,463
PRESSURE ANGLE - 30°	

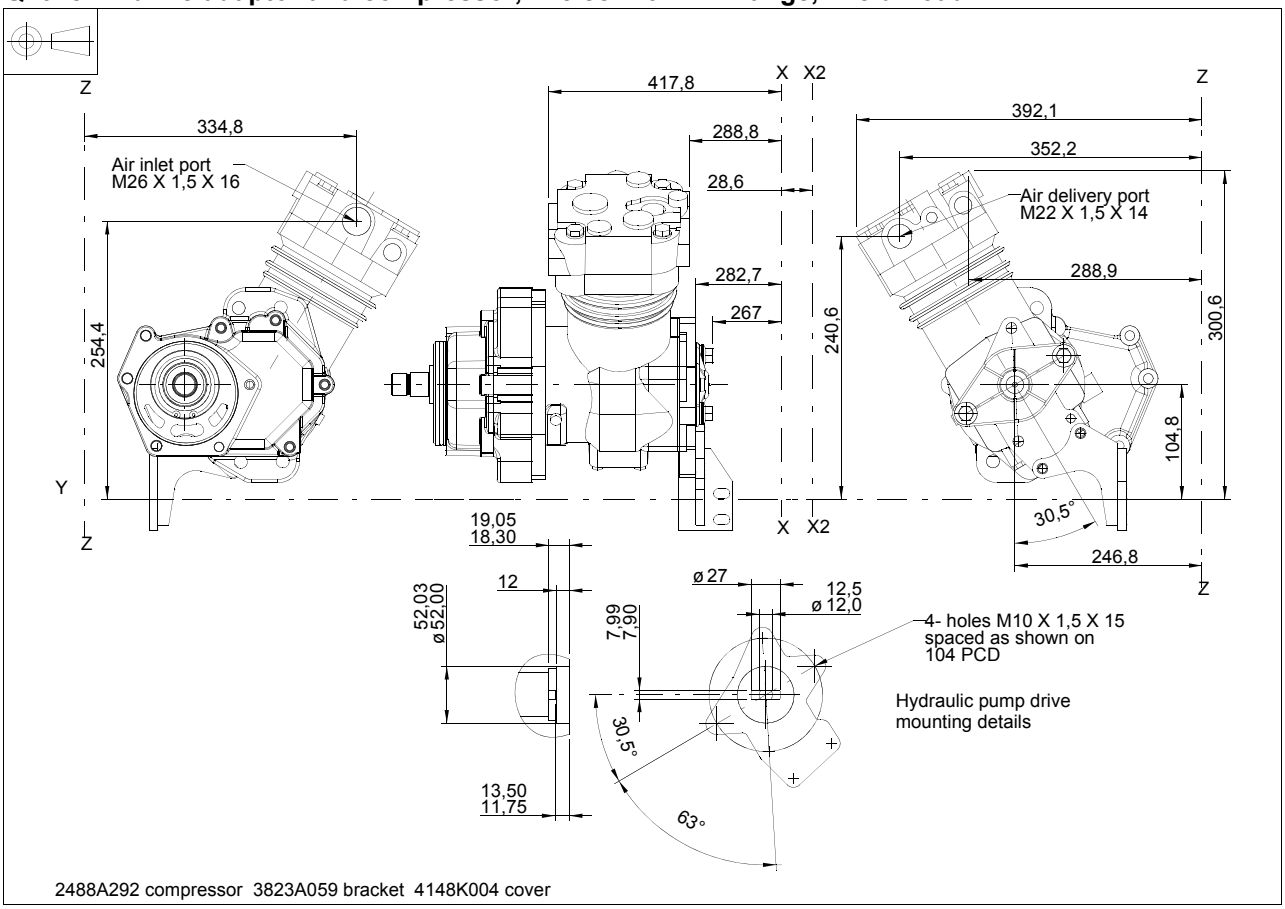
2488A293 COMPRESSOR 3823A059 BRACKET 4148K001 COVER

Q1024 - Compressor 225 cc with DIN flange, head unloader



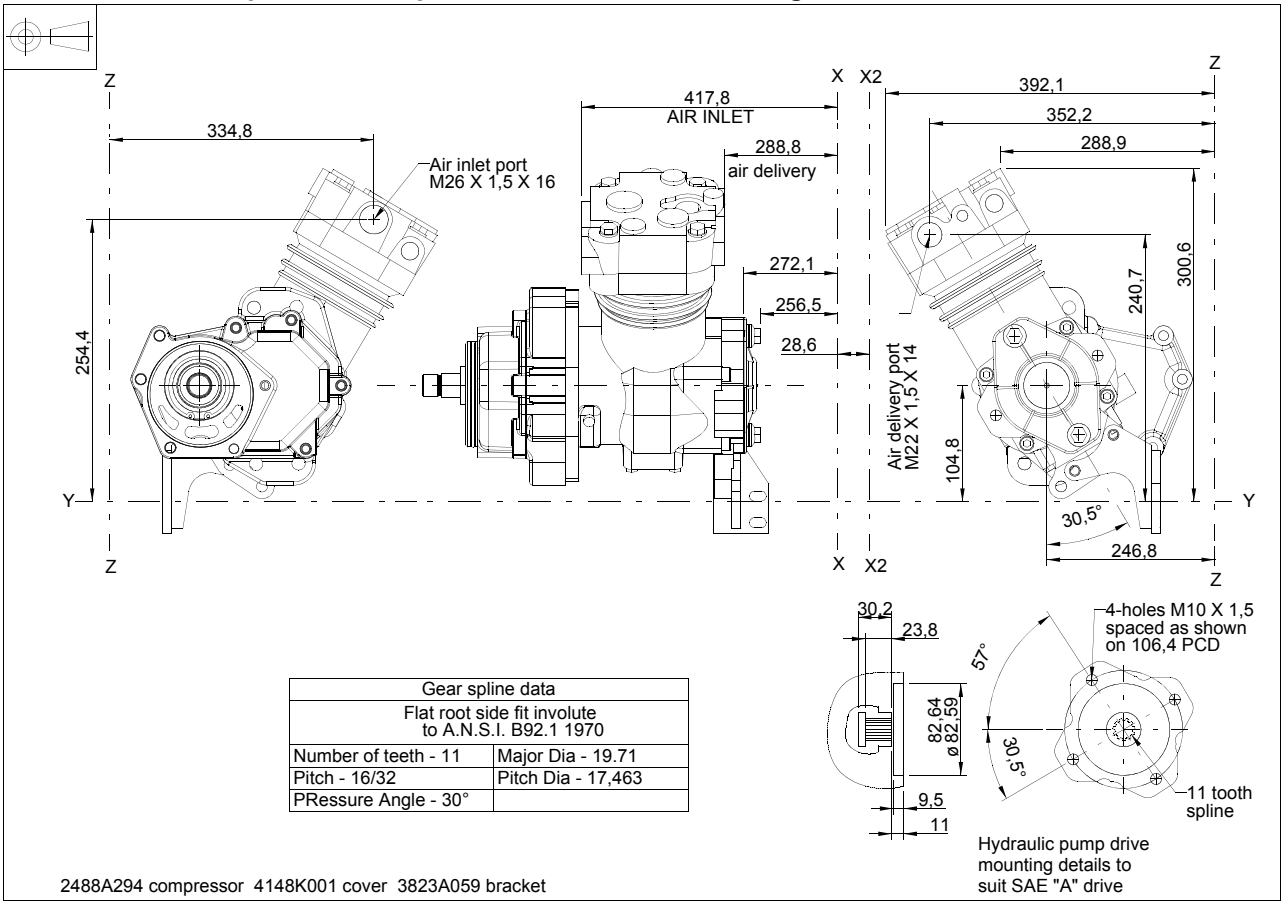
2488A291 COMPRESSOR 3823A059 BRACKET 4148K004 COVER

Q1025 - Z drive adaptor and compressor, 225 cc with DIN flange, line unload



2488A292 compressor 3823A059 bracket 4148K004 cover

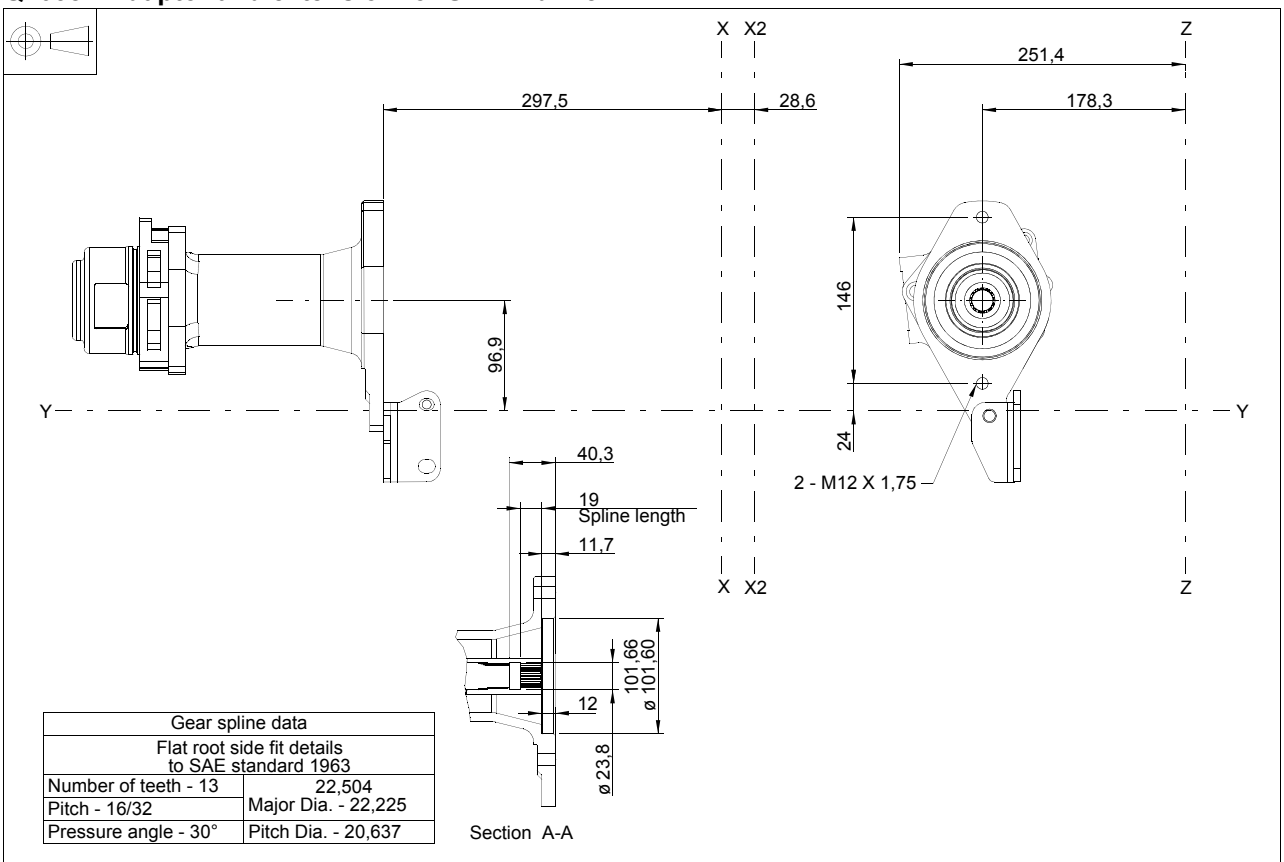
Q1026 - Z drive adaptor and compressor, 225 cc with SAE flange, line unload



Gear spline data	
Flat root side fit involute to A.N.S.I. B92.1 1970	
Number of teeth - 11	Major Dia - 19.71
Pitch - 16/32	Pitch Dia - 17,463
PRessure Angle - 30°	

2488A294 compressor 4148K001 cover 3823A059 bracket

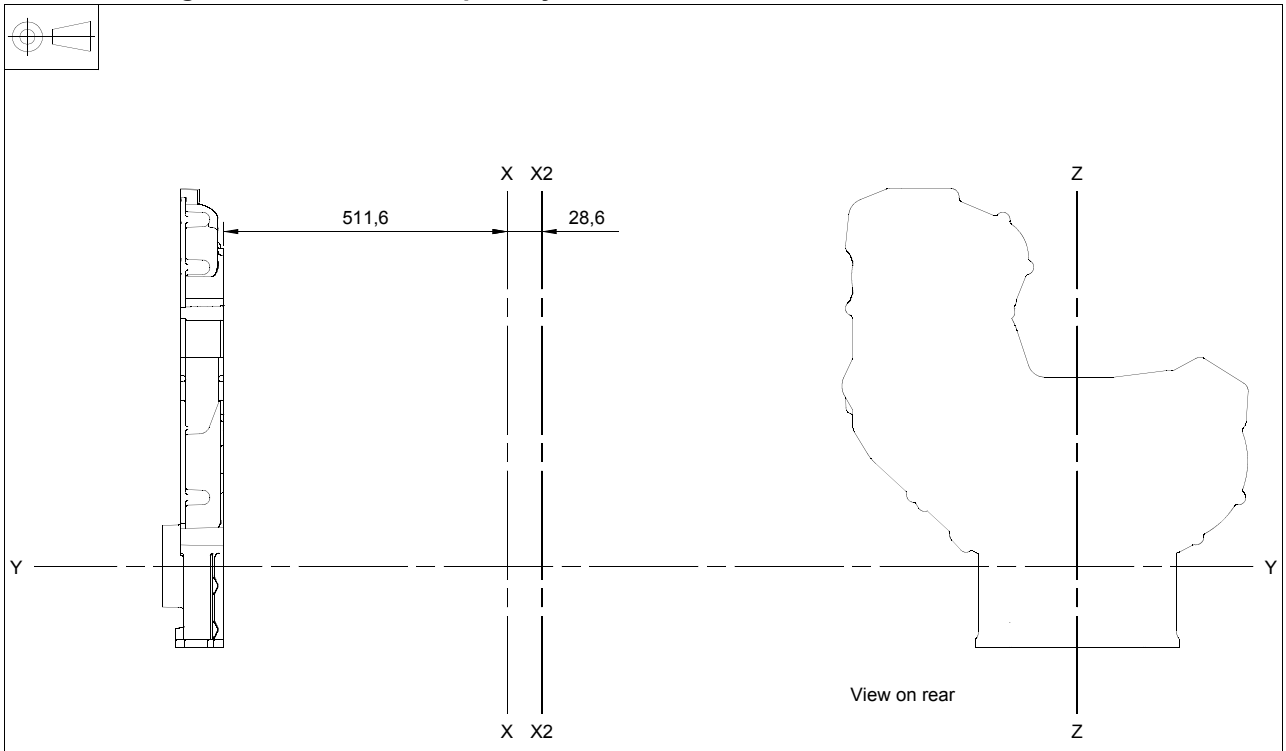
Q1038 - Adaptor and extension for SAE B drive



Gear spline data	
Flat root side fit details to SAE standard 1963	
Number of teeth - 13	22,504 Major Dia. - 22,225
Pitch - 16/32	
Pressure angle - 30°	Pitch Dia. - 20,637

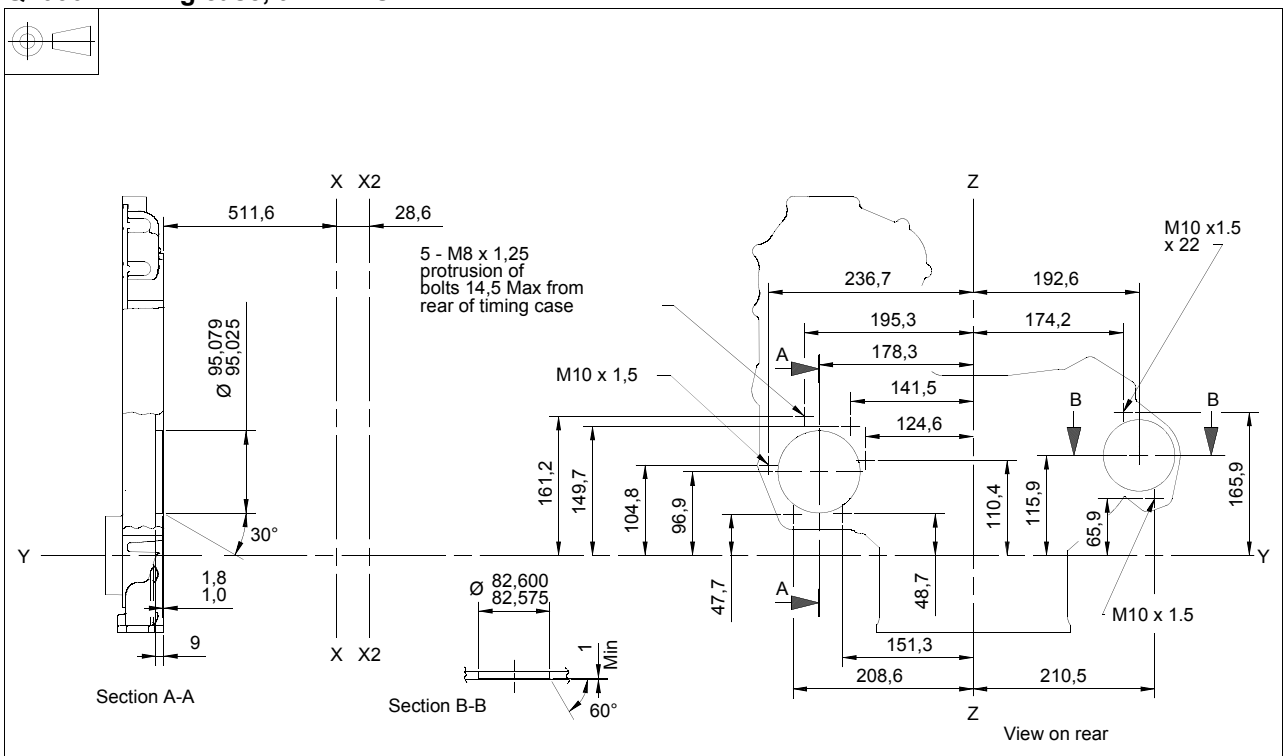
4113H092 adaptor 3751K112 housing 3821A026 bracket

Q1100 - Timing case with no PTO capability



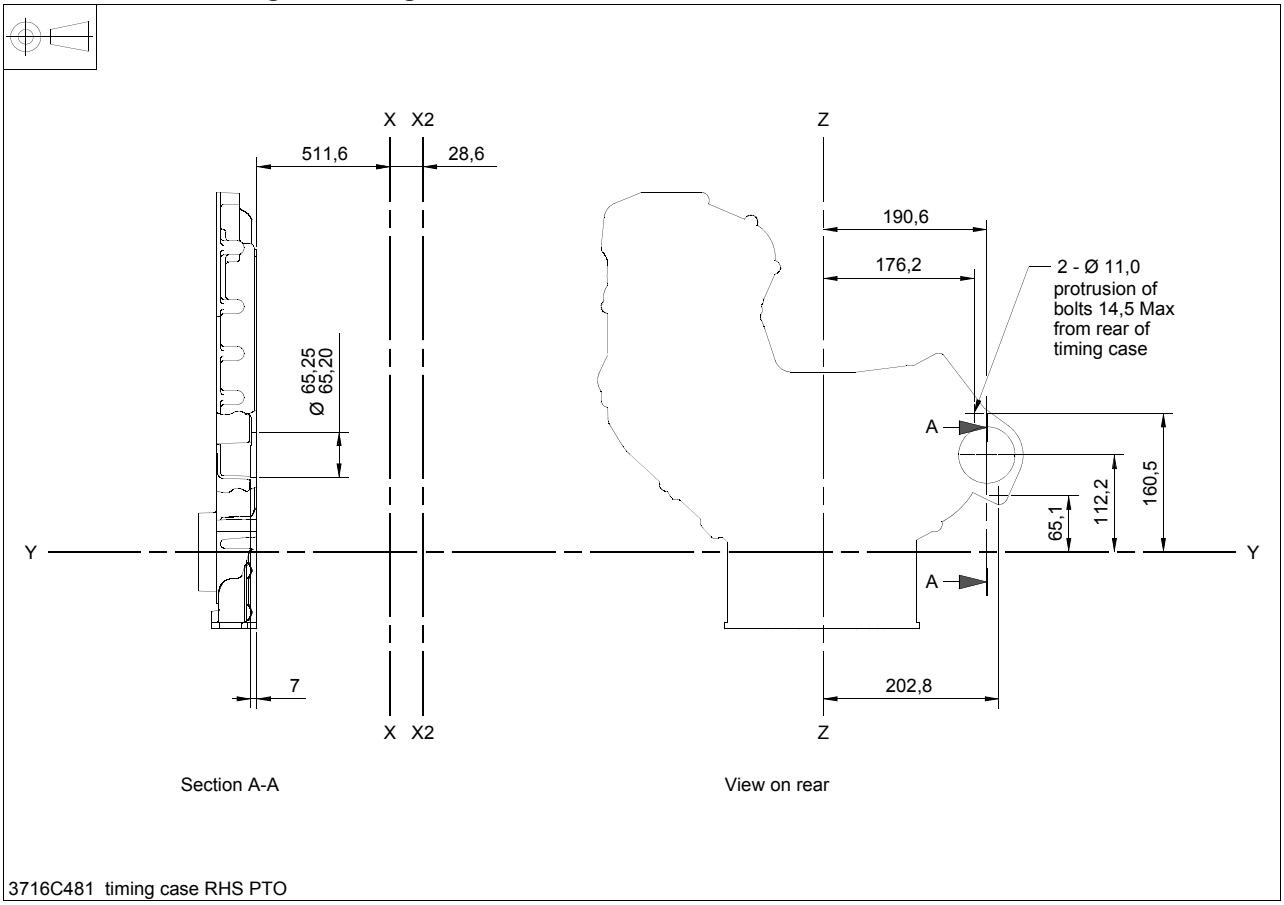
3716C462 timing case no PTO

Q2030 - Timing case, twin PTO



3716C491 timing case twin PTO.

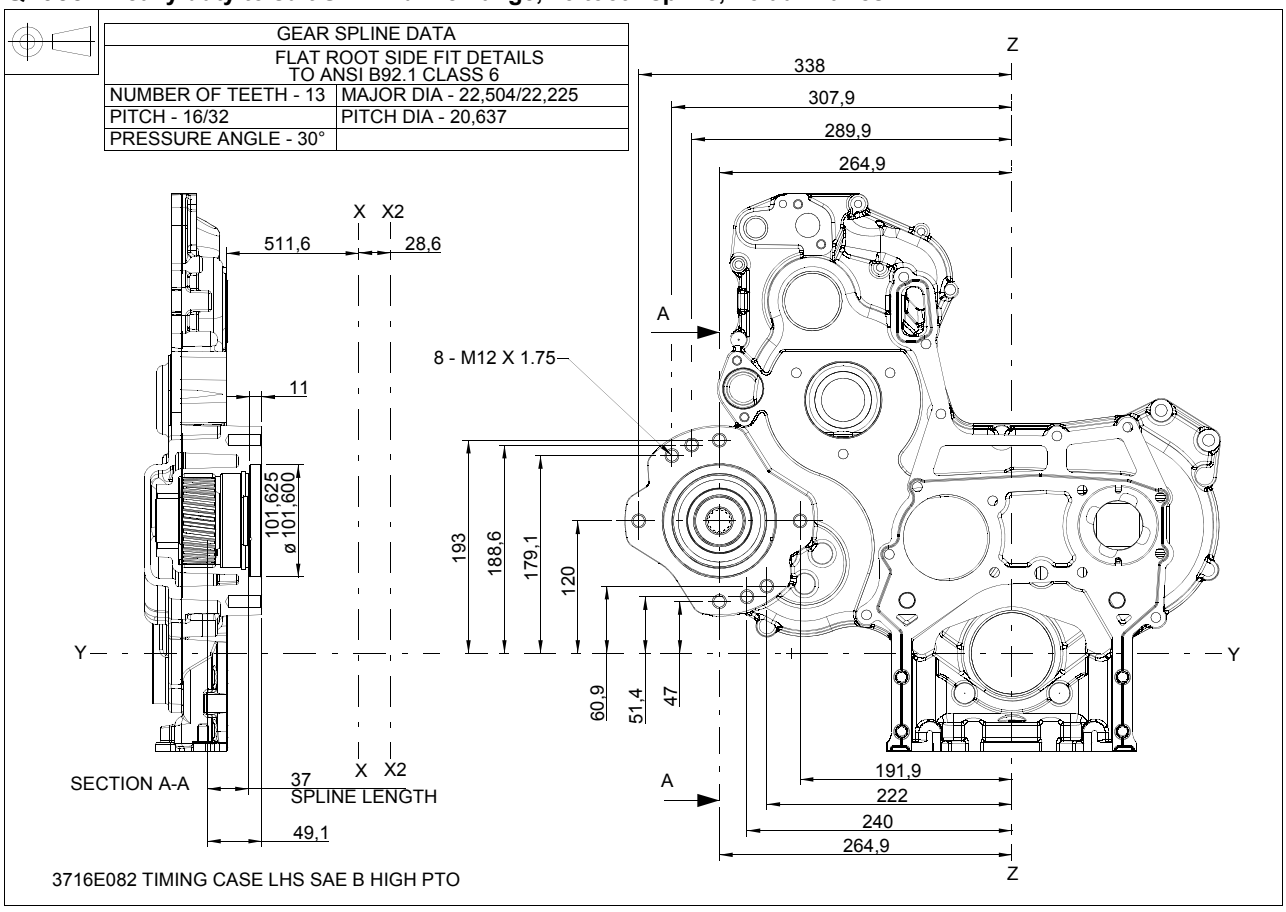
Q3000/Q3030 - Timing case, single RHS PTO, no auxiliaries fitted



3716C481 timing case RHS PTO

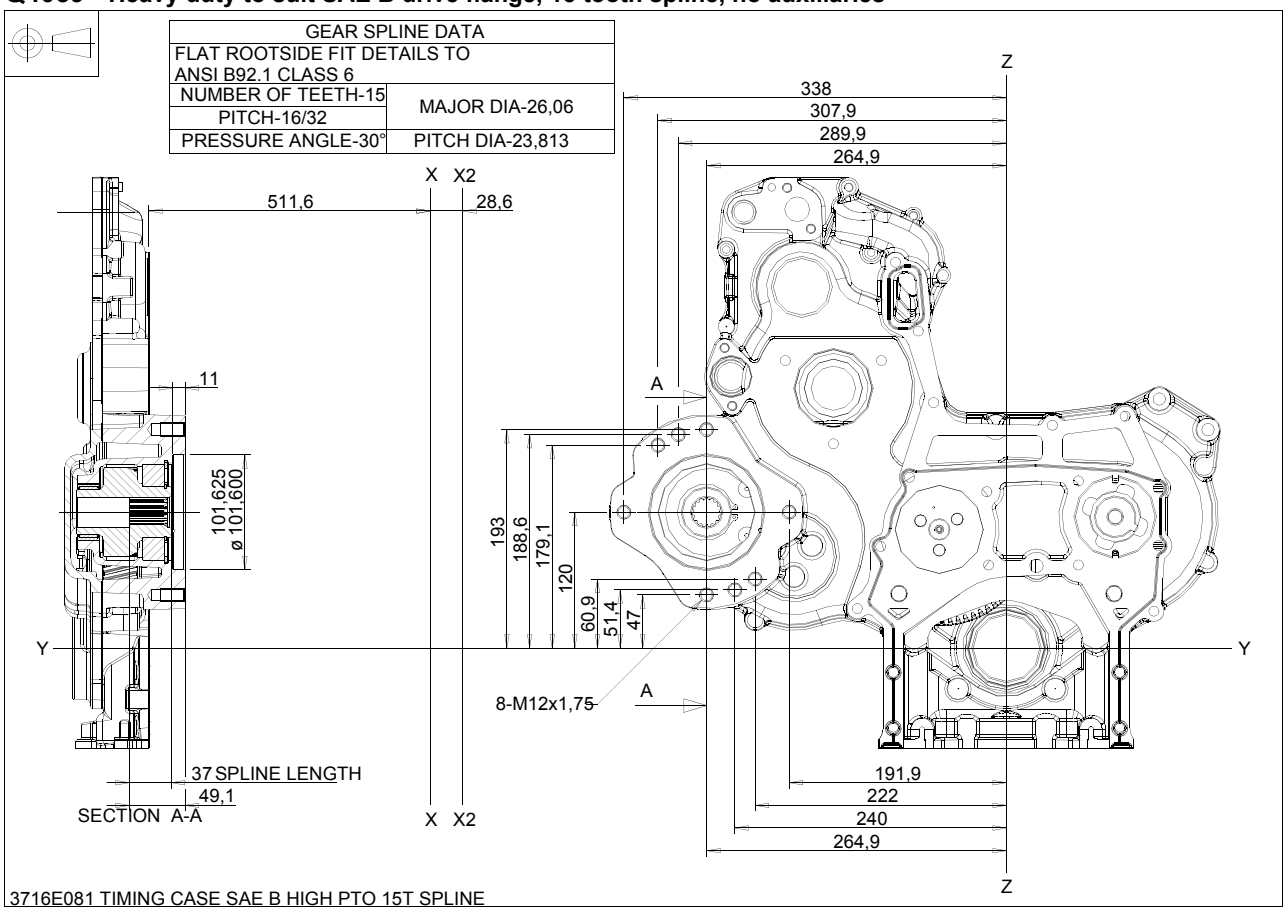
Q4042 - Heavy duty to suit compressor 630 cc, SAE flange, head unload

Q4055 - Heavy duty to suit SAE B drive flange, 13 tooth spline, no auxiliaries



3716E082 TIMING CASE LHS SAE B HIGH PTO

Q4059 - Heavy duty to suit SAE B drive flange, 15 tooth spline, no auxiliaries



3716E081 TIMING CASE SAE B HIGH PTO 15T SPLINE

Balancer

Description	Option
Not required	R0000
Balancer fitted (1)	R0001

(1). Compatible with balanced ratings only, see A options.
Not compatible with oil filter options J0031/J0071/J0011/J0021/J0030/J0070.
See “Lubricating oil sumps and dipsticks” on page 68. for compatible sumps.

Manifolds, elbows and air filters for turbocharged engines

Description [1] [2]	Option
Not required	S0000
Side mounted turbo, RHS, exhaust forward, no exhaust elbow, cross over pipe to rear, end [3]	S0100
Side mounted turbo, RHS, exhaust forward, no exhaust elbow, cross over pipe to rear, top [3]	S0101
Side mounted turbo, RHS, exhaust elbow forward up, cross over pipe to rear, end [3] [4]	S0110
Side mounted turbo, RHS, exhaust elbow forward up, cross over pipe to rear, top [3] [4]	S0111
Side mounted turbo, RHS, exhaust elbow forward up, cross over pipe to rear, top with air filter [3] [4] [5]	S0114
Side mounted turbo, RHS, exhaust elbow forward up, cross over pipe to rear, top with heavy duty air filter with ejector supplied	S0115
Side mounted turbo, RHS, exhaust elbow forward down, cross over pipe to rear, end [3] [5]	S0120
Side mounted turbo, RHS, exhaust elbow forward down, cross over pipe to rear, top [3] [4] [5] [6]	S0121
Side mounted turbo, RHS, exhaust rearward, no exhaust elbow, cross over pipe to rear, end [3]	S0150
Side mounted turbo, RHS, exhaust rearward, no exhaust elbow, cross over pipe to rear, top [3] [5]	S0151
Top mounted turbo, exhaust outlet rearward, no exhaust elbow, cross over pipe to rear, top [3]	S0251
Side mounted turbo, RHS, exhaust forward, no exhaust elbow, compressor outlet up, for air to air cooling [7]	S1101
Side mounted turbo, RHS, exhaust elbow forward up, compressor outlet up, for air to air cooling [4] [7]	S1111
Side mounted turbo, RHS, exhaust elbow forward up, compressor outlet down, for air to air cooling [7]	S1112
Side mounted turbo, RHS, exhaust elbow forward up, compressor outlet down, for air to air cooling, with air filter [4] [5] [7]	S1114
Side mounted turbo, RHS, exhaust elbow forward up, compressor outlet down, for air to air cooling, with heavy duty air filter with ejector supplied	S1115
Side mounted turbo, RHS, exhaust elbow forward down, compressor outlet up, for air to air cooling [4] [5] [7]	S1121
Side mounted turbo, RHS, exhaust rearward, no exhaust elbow, compressor outlet up, for air to air cooling [7]	S1151
Side mounted turbo, RHS, exhaust rearward, no exhaust elbow, compressor outlet down, for air to air cooling [4] [7]	S1152
Side mounted turbo, RHS, exhaust elbow rearward up, compressor outlet up, for air to air cooling [7]	S1181
Side mounted turbo, RHS, exhaust elbow rearward up, compressor outlet down, for air to air cooling [4] [7]	S1182
Top mounted turbo, exhaust rearward, no exhaust elbow, compressor outlet across, for air/air cooling [7]	S1253

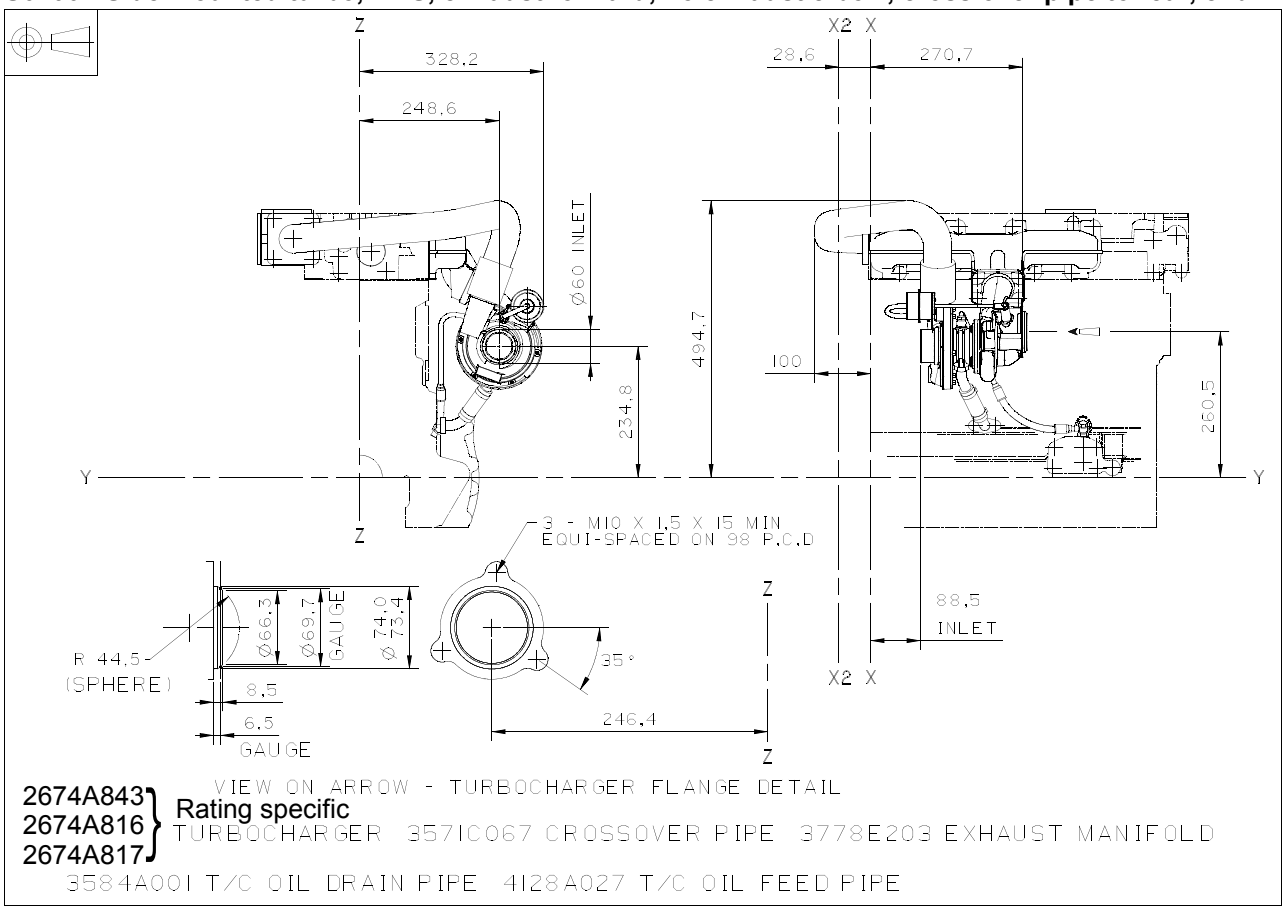
(1). No additional loading should be applied directly from the turbine housing.
(2). All exhaust outlet systems must be supported by a bracket which is independent to the turbocharger using a floating coupling.
(3). Incompatible with ZM121/ZM122/ZM130/ZM131.
(4). Incompatible with G0607.
(5). Incompatible with X0002.
(6). Incompatible with G***3.
(7). Only compatible with ZM000/ZM121/ZM122/ZM130/ZM131.

Exhaust hardware

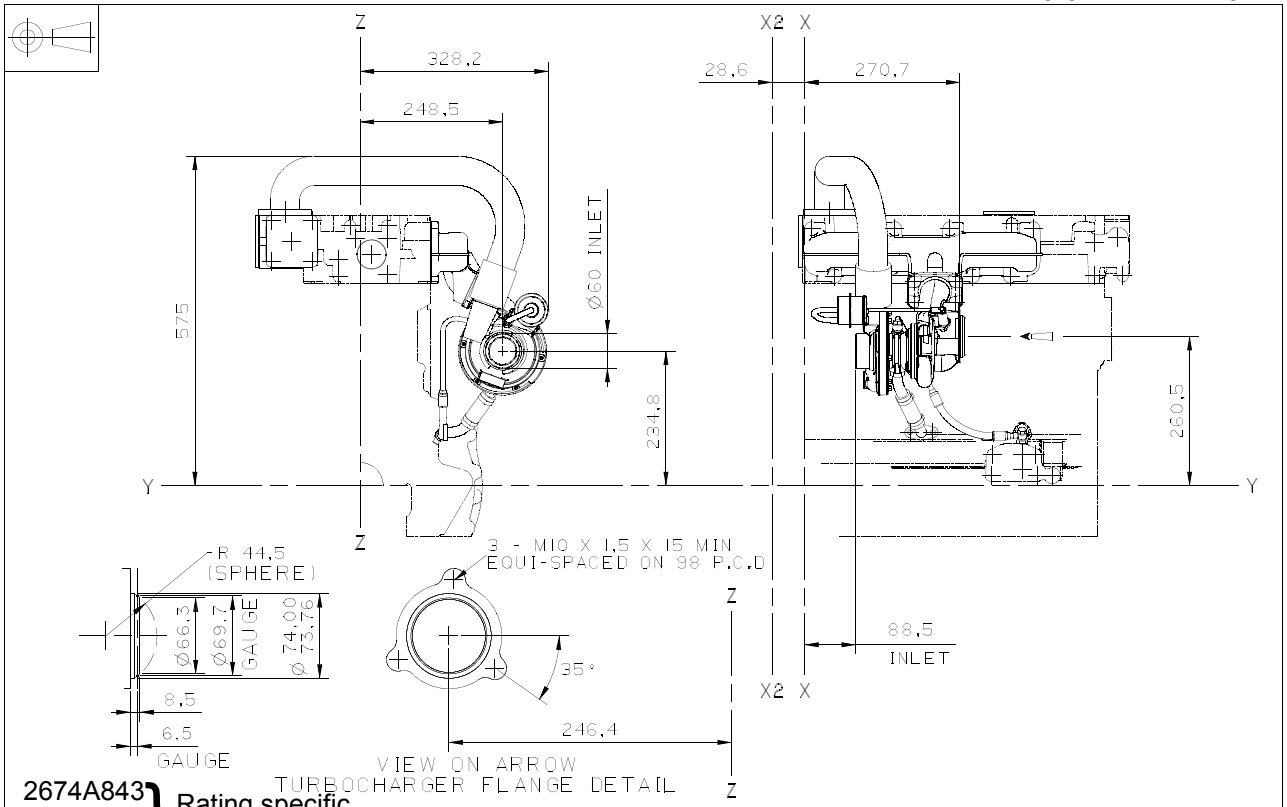
Description	Option
Not required	SD000
Studs and nuts only (1)	SD002
Studs, nuts, flange and gasket (1)	SD003
Studs, nuts only (2)	SD004

(1). Only available with turbo charged options supplied and fitted with an exhaust elbow.
(2). Only available with turbo charged options that are ***not*** supplied and fitted with an exhaust elbow.

S0100 - Side mounted turbo, RHS, exhaust forward, no exhaust elbow, cross over pipe to rear, end



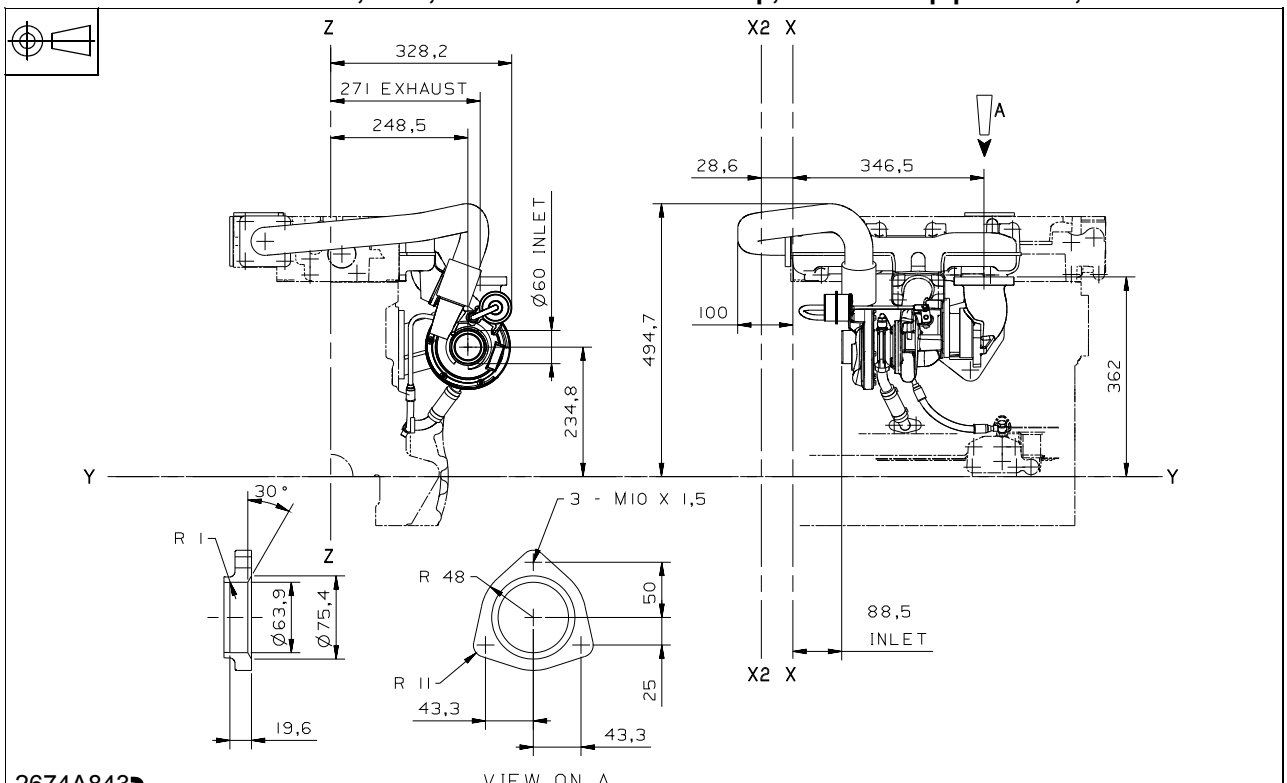
S0101 - Side mounted turbo, RHS, exhaust forward, no exhaust elbow, cross over pipe to rear, top



2674A843
2674A816
2674A817
} Rating specific

TURBOCHARGER 3778E203 EXH MANIFOLD 4128A027 T/C OIL FEED PIPE 3584A001 T/C OIL DRAIN PIPE, 3571C068 CROSSOVER PIPE, 3611M006 BLANKING PLATE.

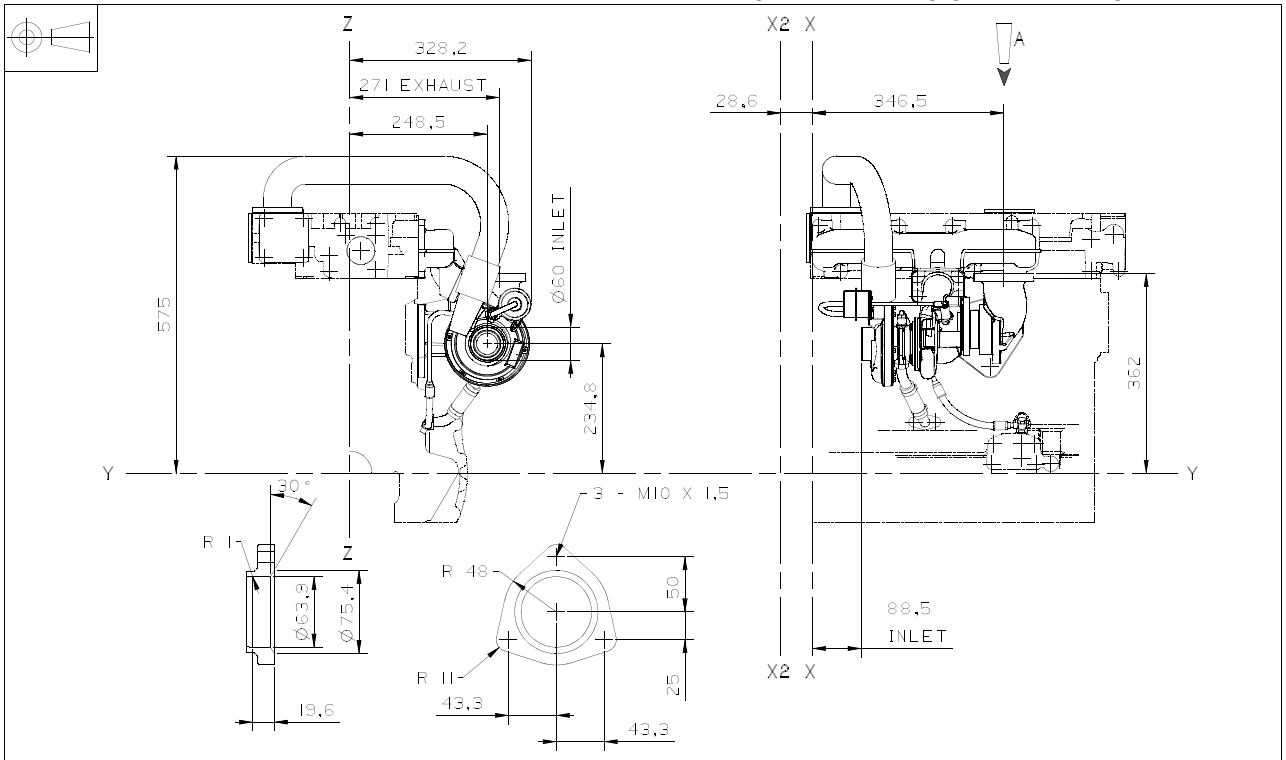
S0110 - Side mounted turbo, RHS, exhaust elbow forward up, cross over pipe to rear, end



2674A843
2674A816
2674A817
} Rating specific

TURBOCHARGER 3778E203 EXH MANIFOLD 3766A131 EXH ELBOW T/C OIL FEED PIPE 4128A027 T/C OIL DRAIN PIPE 3584A001 CROSSOVER PIPE 3571C067 EXH ELBOW ADAPTOR 3347A091 BRACKET 3823A051 BLANKING PLATE 3611M006

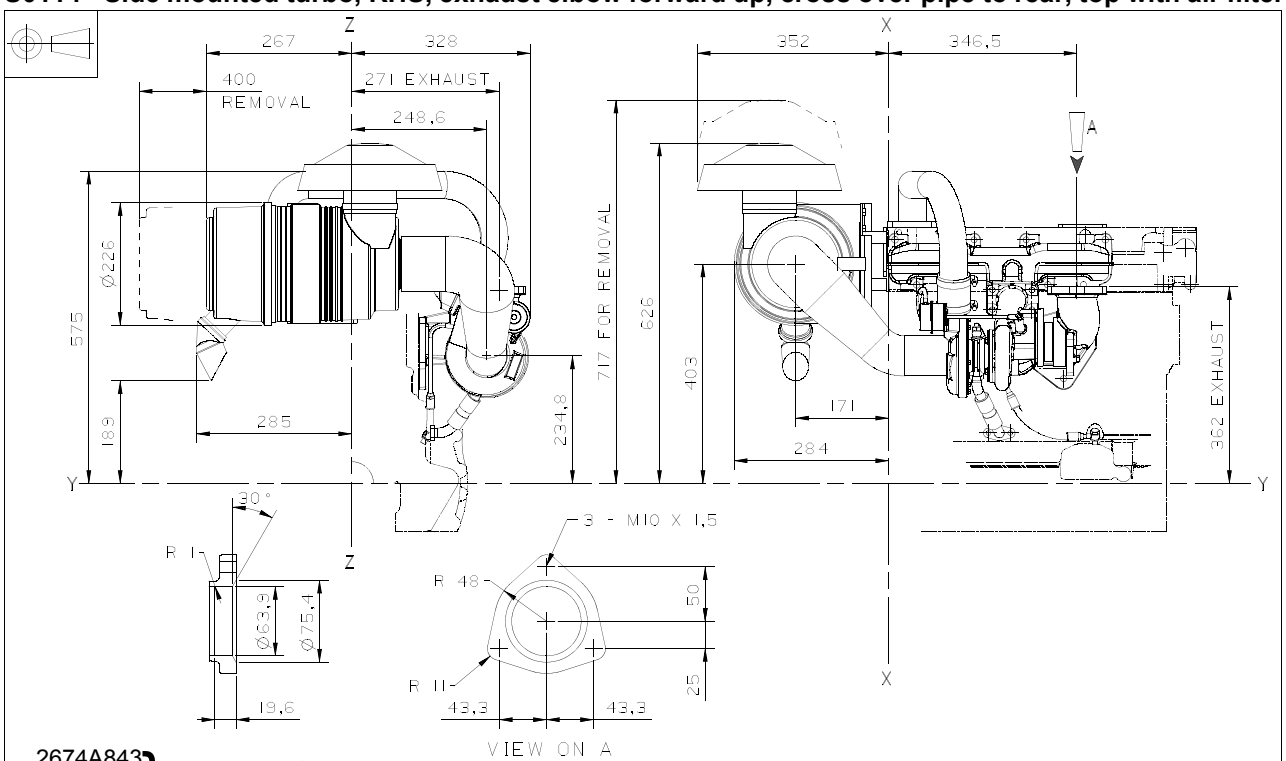
S0111 - Side mounted turbo, RHS, exhaust elbow forward up, cross over pipe to rear, top



2674A843
2674A816
2674A817
} Rating specific

TURBOCHARGER 3778E203 EXH MANIFOLD 3766A131 EXH ELBOW
4128A027 T/C OIL FEED PIPE 3584A001 T/C OIL DRAIN PIPE 357IC068 CROSSOVER PIPE
3347A091 EXH ELBOW ADAPTOR 3823A051 BRACKET 361IM006 BLANKING PLATE

S0114 - Side mounted turbo, RHS, exhaust elbow forward up, cross over pipe to rear, top with air filter



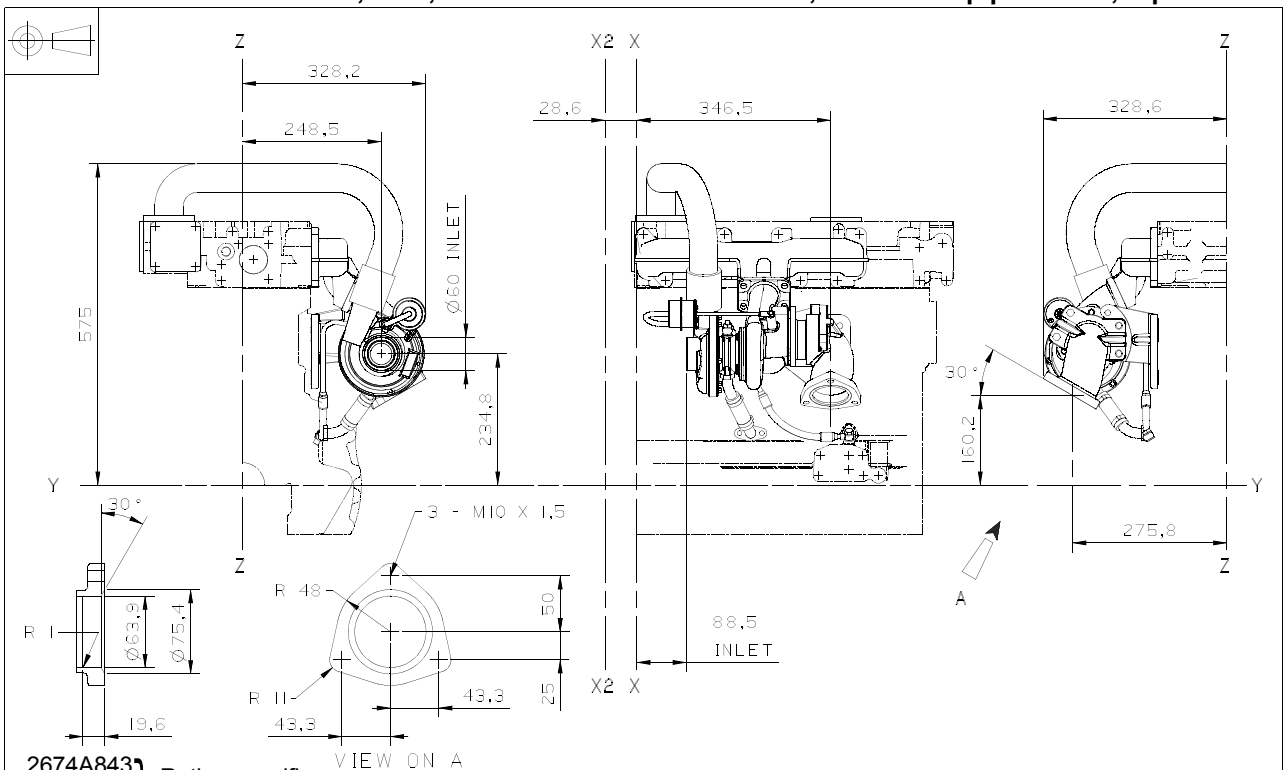
2674A843
2674A816
2674A817
} Rating specific

TURBOCHARGER 357IC068 CROSSOVER PIPE 3778E203 EXHAUST MANIFOLD
3823A051 BRACKET 3766A131 ELBOW 3347A091 ADAPTOR
3584A001 TURBO DRAIN PIPE 4128A027 TURBO FEED PIPE
2652C207 AIR FILTER 3644A023 BRACKET 3783R013 HOSE

S0120 - Side mounted turbo, RHS, exhaust elbow forward down, cross over pipe to rear, end

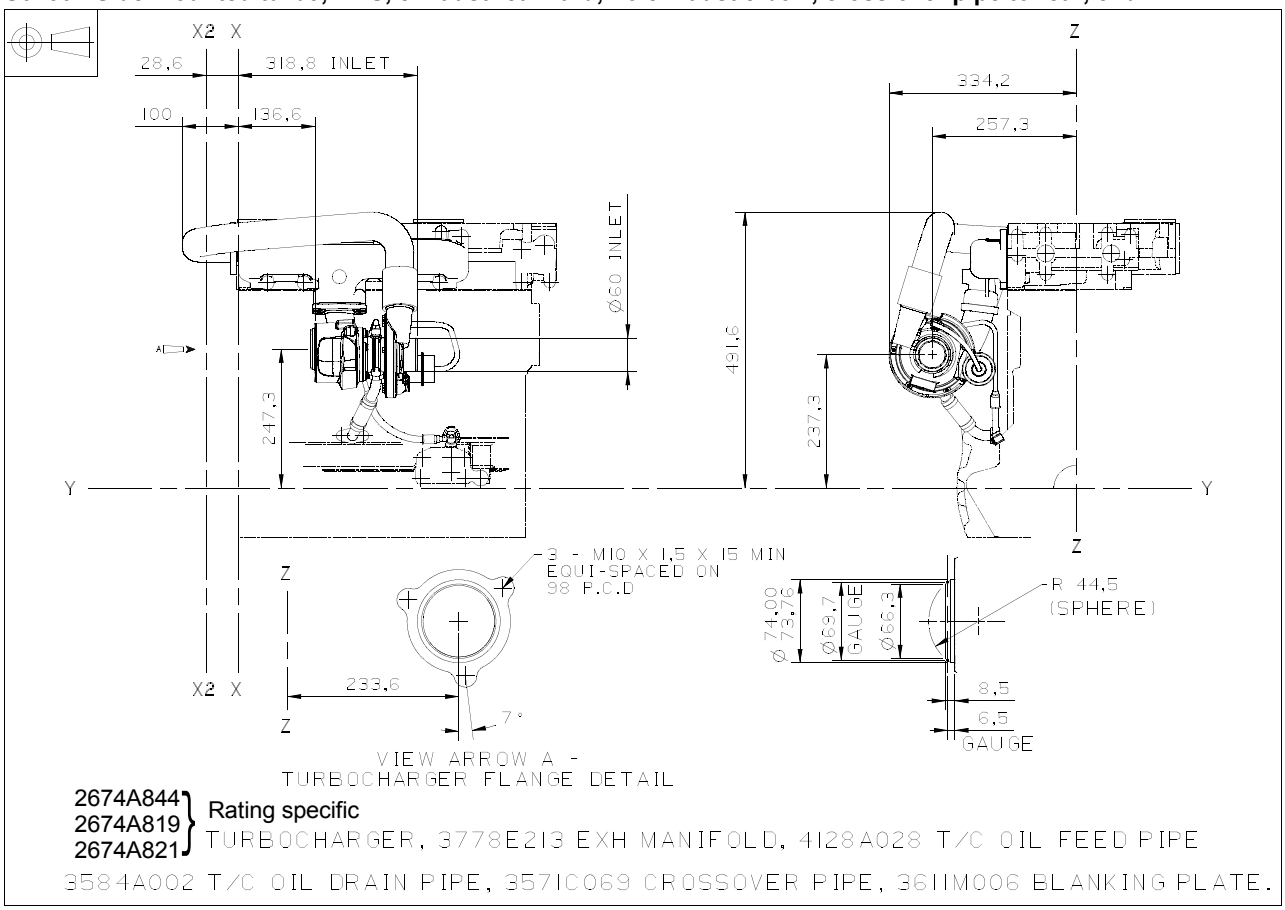
2674A843
2674A816
2674A817
} Rating specific turbocharger

S0121 - Side mounted turbo, RHS, exhaust elbow forward down, cross over pipe to rear, top



2674A843
2674A816
2674A817
} Rating specific TURBOCHARGER 3778E203 EXH MANIFOLD 3766A131 EXHAUST ELBOW
4128A027 T/C OIL FEED PIPE 3584A001 T/C OIL DRAIN PIPE 3571C068 CROSSOVER PIPE
3347A091 EXH ELBOW ADAPTOR 3823A051 BRACKET 3611M006 BLANKING PLATE

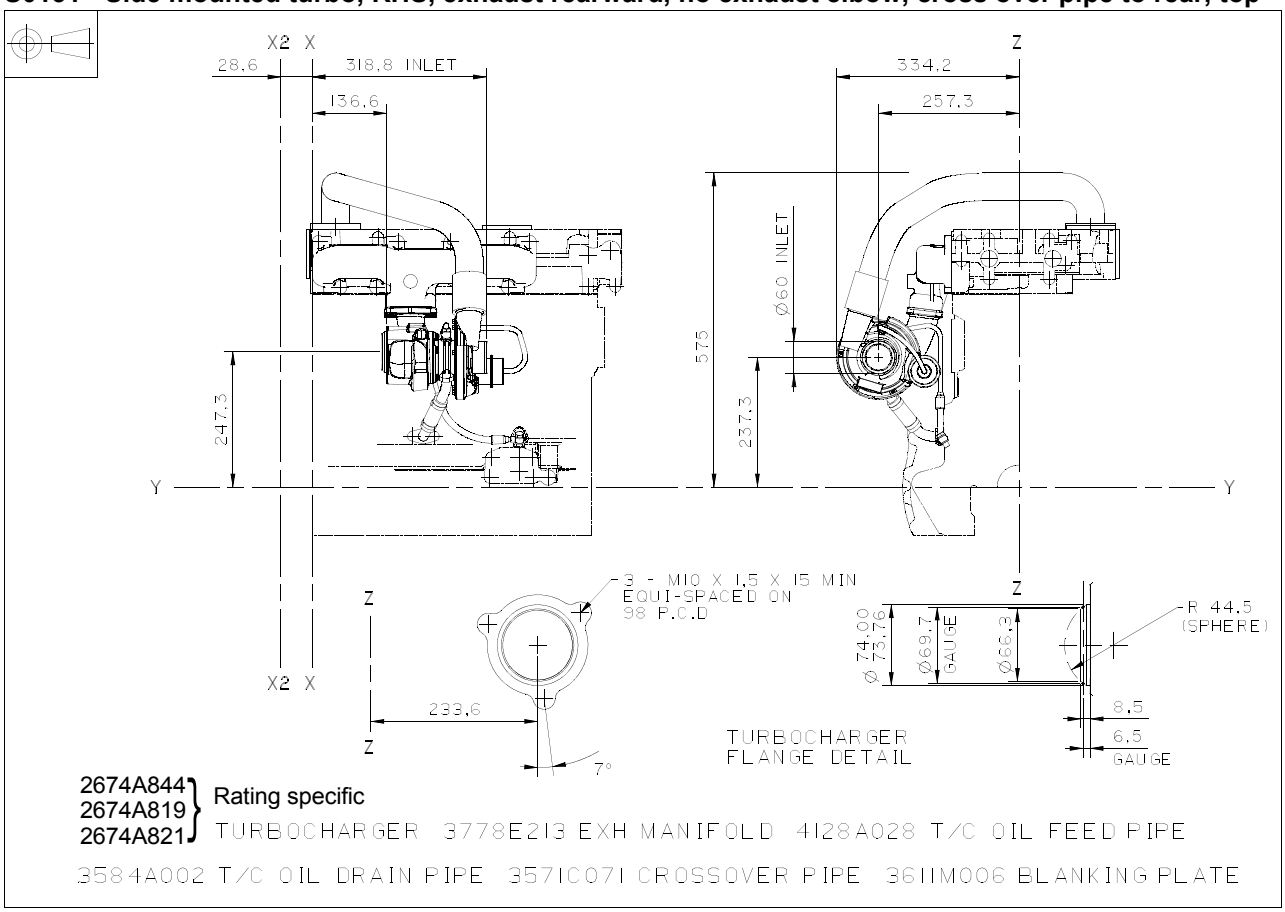
S0150 - Side mounted turbo, RHS, exhaust rearward, no exhaust elbow, cross over pipe to rear, end



2674A844
2674A819
2674A821
} Rating specific

TURBOCHARGER, 3778E213 EXH MANIFOLD, 4128A028 T/C OIL FEED PIPE
3584A002 T/C OIL DRAIN PIPE, 357IC069 CROSSOVER PIPE, 361IM006 BLANKING PLATE.

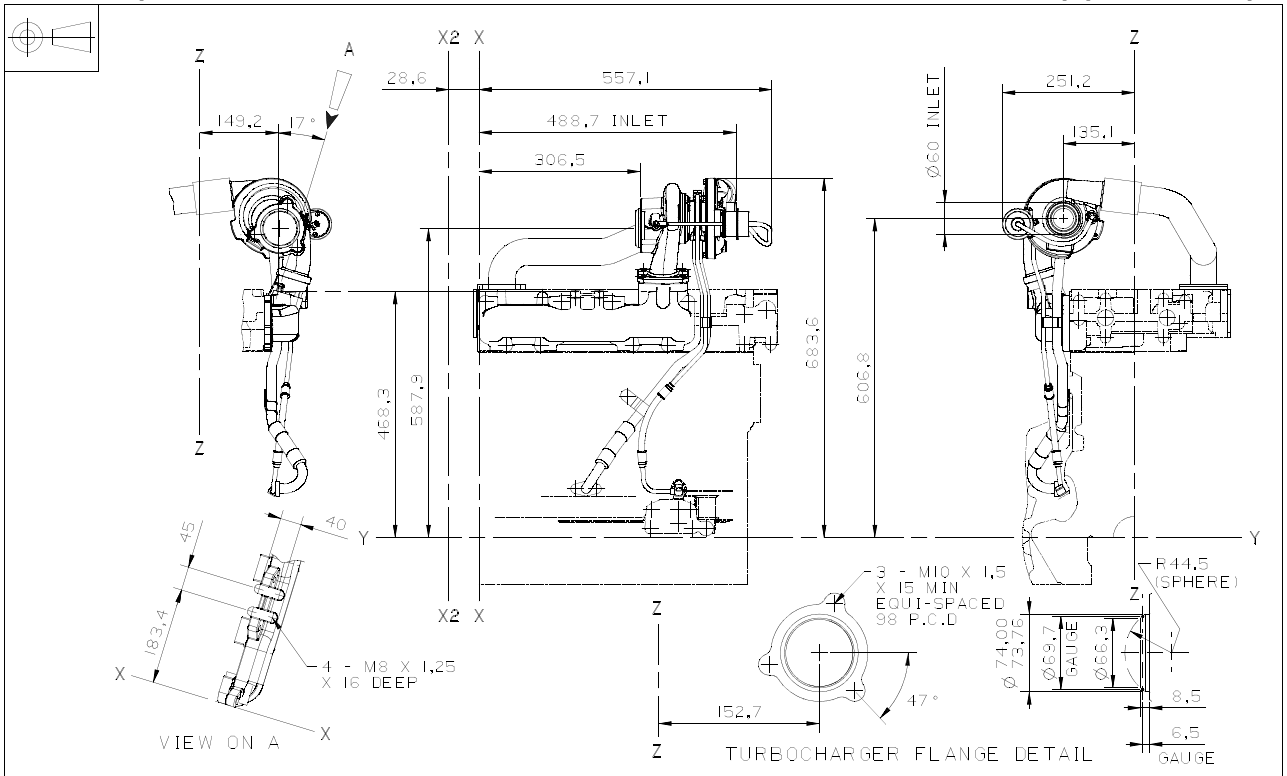
S0151 - Side mounted turbo, RHS, exhaust rearward, no exhaust elbow, cross over pipe to rear, top



2674A844
2674A819
2674A821
} Rating specific

TURBOCHARGER 3778E213 EXH MANIFOLD 4128A028 T/C OIL FEED PIPE
3584A002 T/C OIL DRAIN PIPE 357IC071 CROSSOVER PIPE 361IM006 BLANKING PLATE

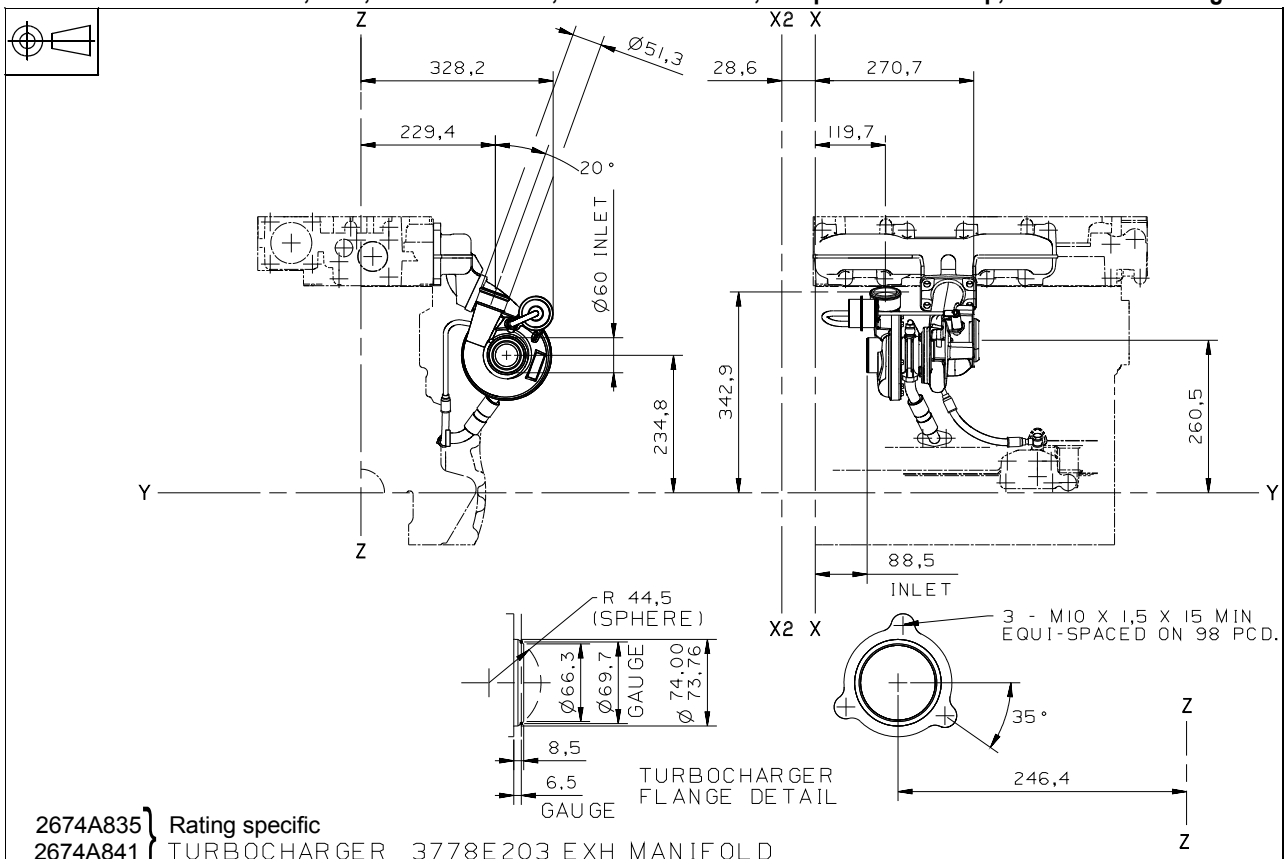
S0251 - Top mounted turbo, exhaust outlet rearward, no exhaust elbow, cross over pipe to rear, top



2674A845
2674A826
2674A827
} Rating specific
TURBOCHARGER, 3778E223 EXH MANIFOLD, 4128A029 T/C OIL FEED PIPE

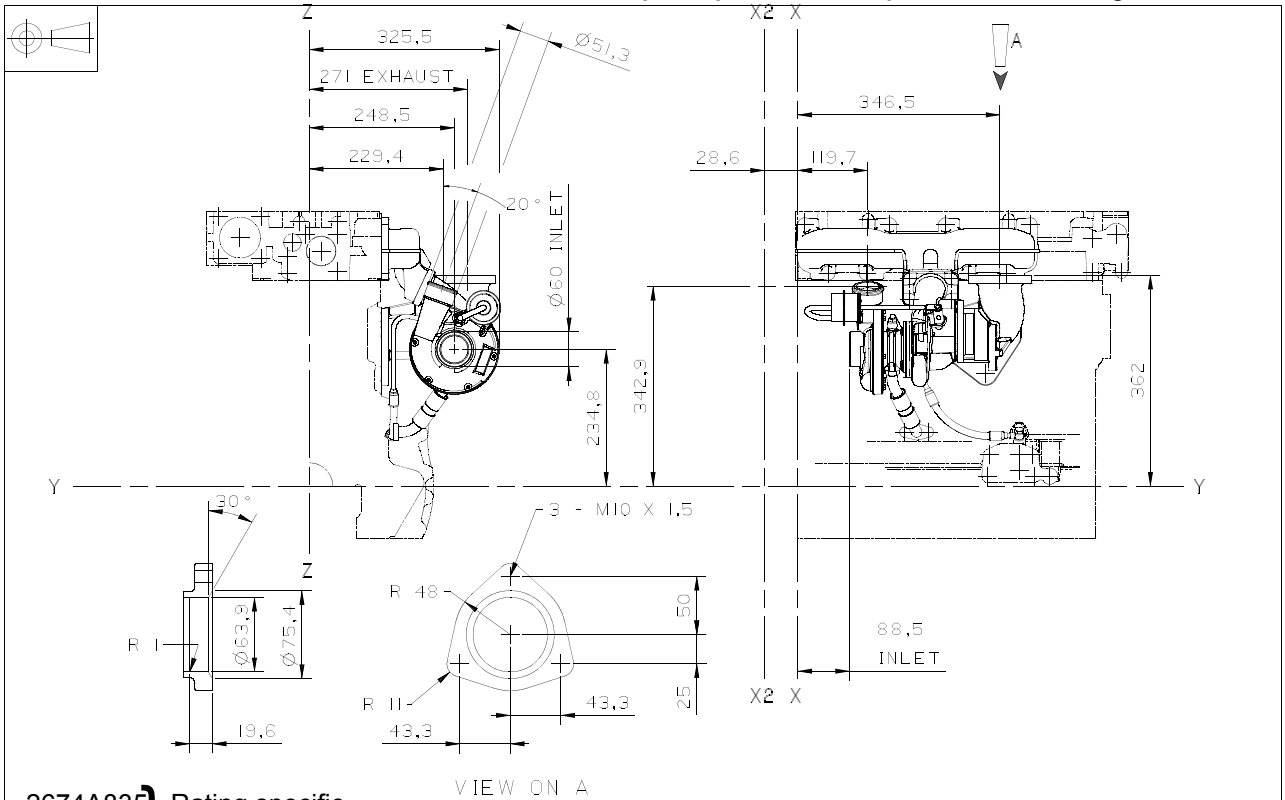
3584A003 T/C OIL DRAIN PIPE, 3571C072 CROSSOVER PIPE, 3611M006 BLANKING PLATE.

S1101 - Side mounted turbo, RHS, exhaust forward, no exhaust elbow, compressor outlet up, for air to air cooling



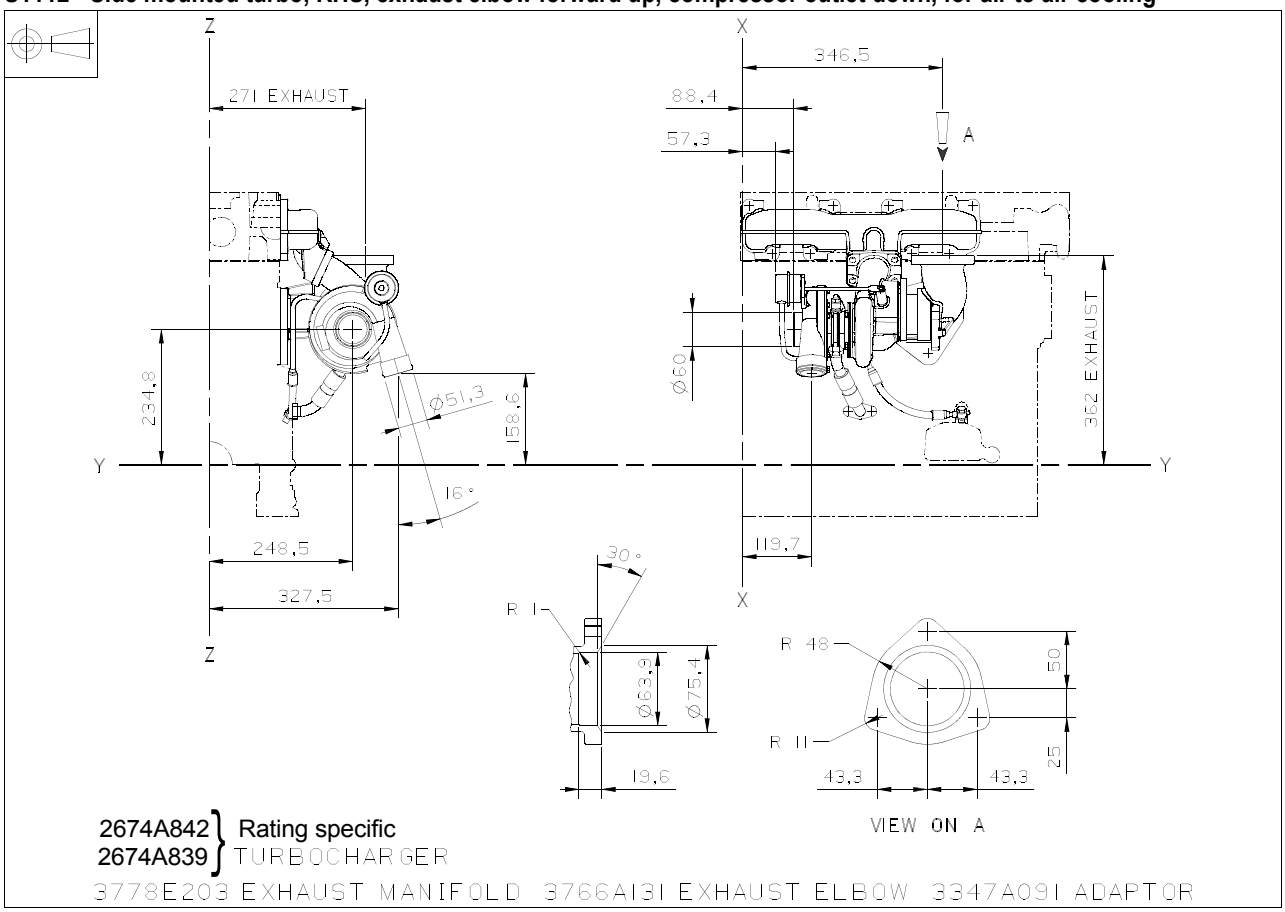
2674A835
2674A841
} Rating specific
TURBOCHARGER 3778E203 EXH MANIFOLD
4128A027 T/C OIL FEED PIPE 3584A001 T/C OIL DRAIN PIPE

S1111 - Side mounted turbo, RHS, exhaust elbow forward up, compressor outlet up, for air to air cooling



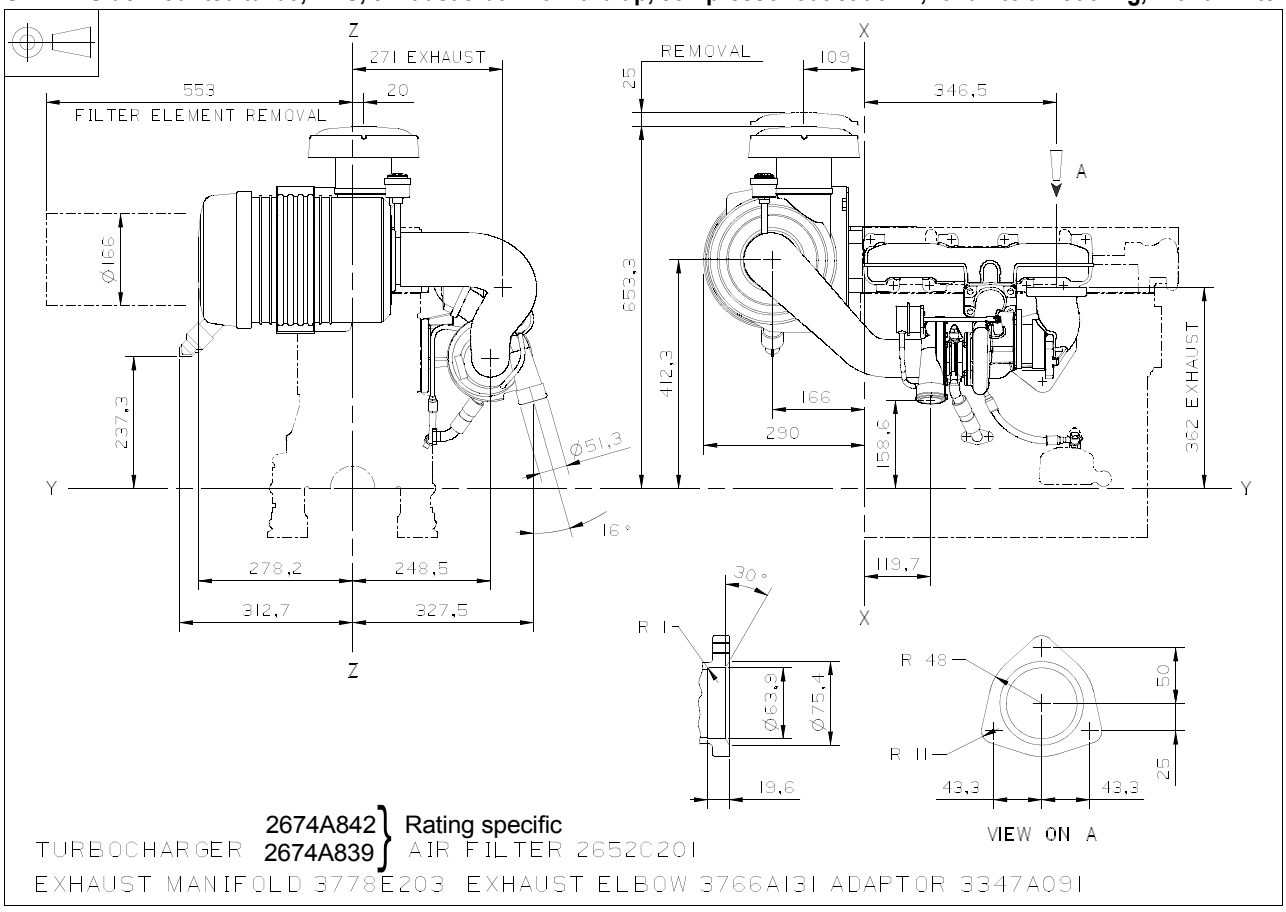
2674A835 } Rating specific
2674A841 } TURBOCHARGER 3778E203 EXH MANIFOLD 4128A027 T/C OIL FEED PIPE, 3584A001 T/C OIL DRAIN PIPE 3347A091 OUTLET ADAPTOR 3766A131 EXH OUTLET ELB 3823A051 EXH ELBOW BRACKET

S1112 - Side mounted turbo, RHS, exhaust elbow forward up, compressor outlet down, for air to air cooling

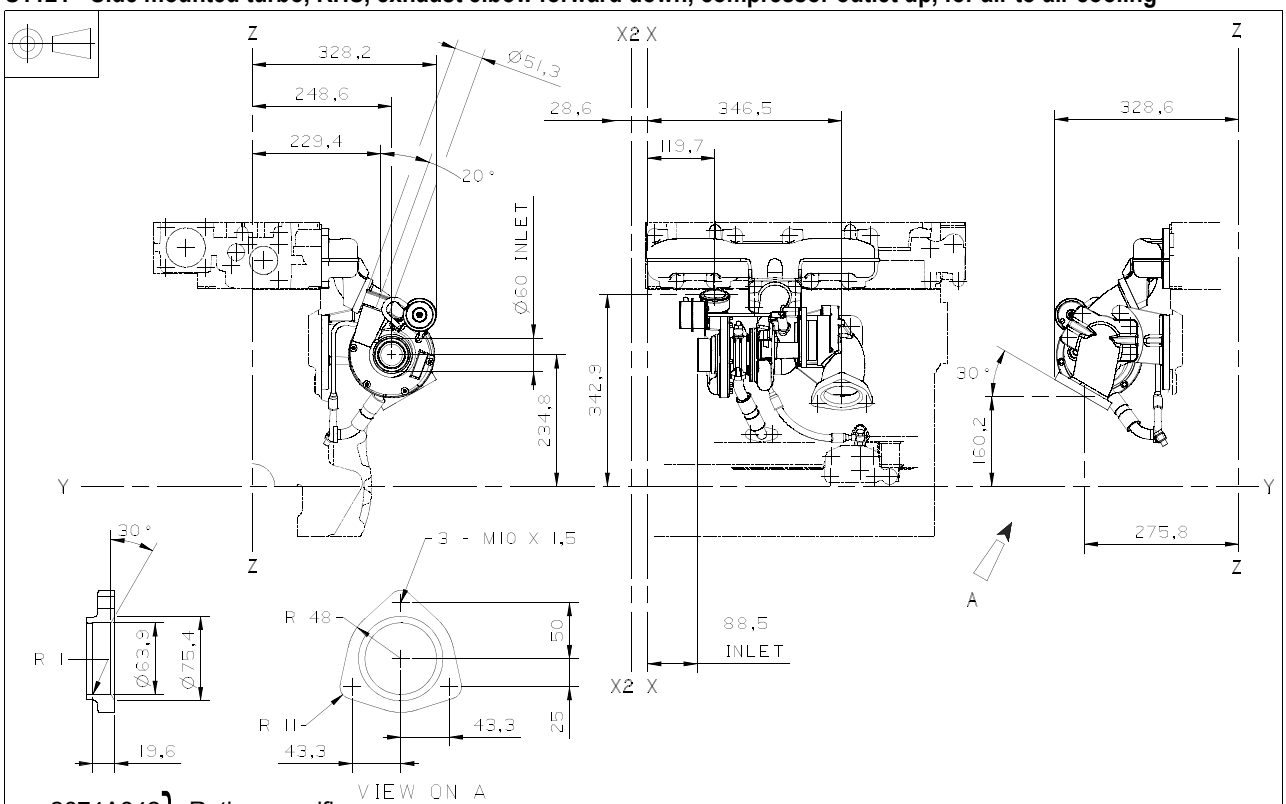


2674A842 } Rating specific
2674A839 } TURBOCHARGER
3778E203 EXHAUST MANIFOLD 3766A131 EXHAUST ELBOW 3347A091 ADAPTOR

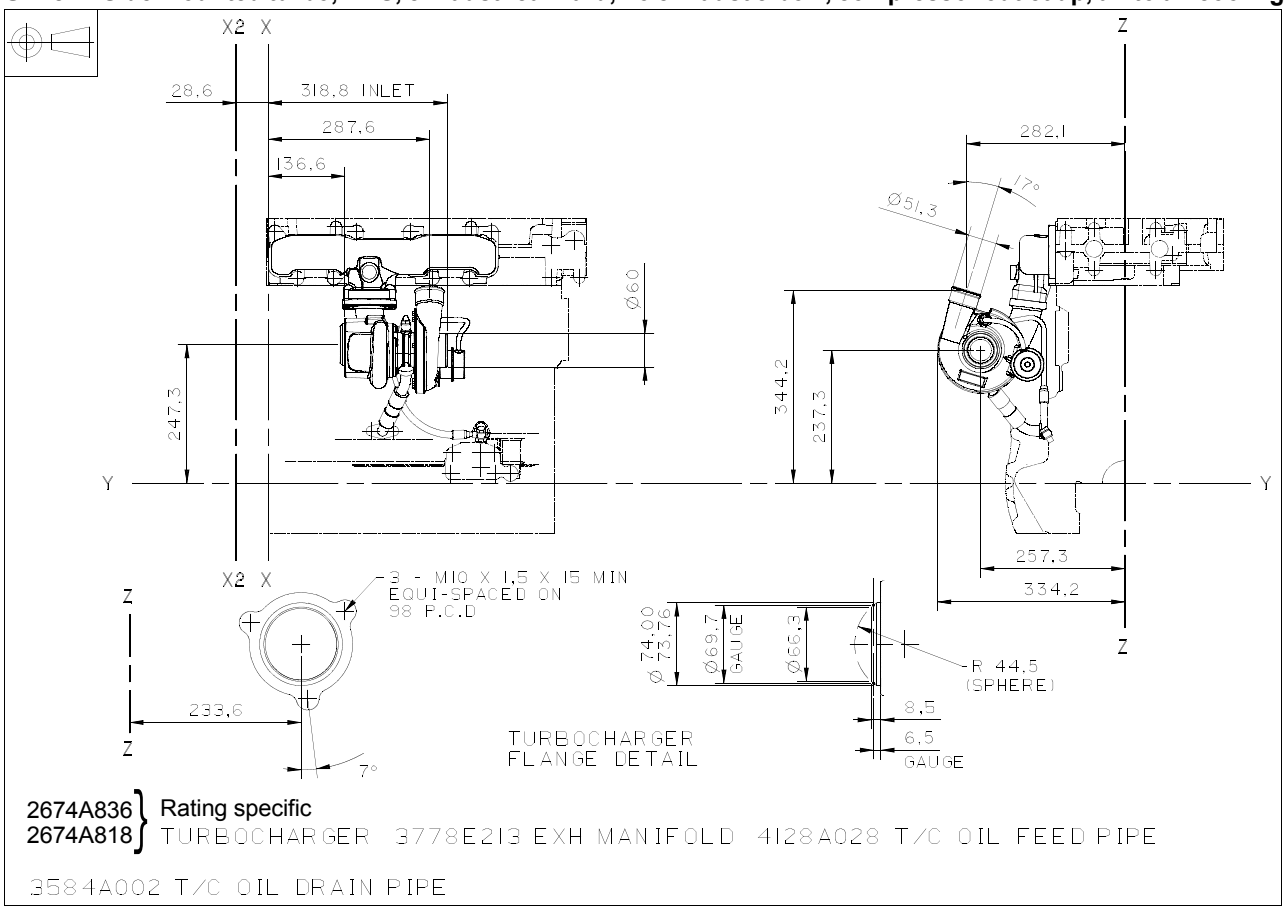
S1114 - Side mounted turbo, RHS, exhaust elbow forward up, compressor outlet down, for air to air cooling, with air filter



S1121 - Side mounted turbo, RHS, exhaust elbow forward down, compressor outlet up, for air to air cooling



S1151 - Side mounted turbo, RHS, exhaust rearward, no exhaust elbow, compressor outlet up, air to air cooling

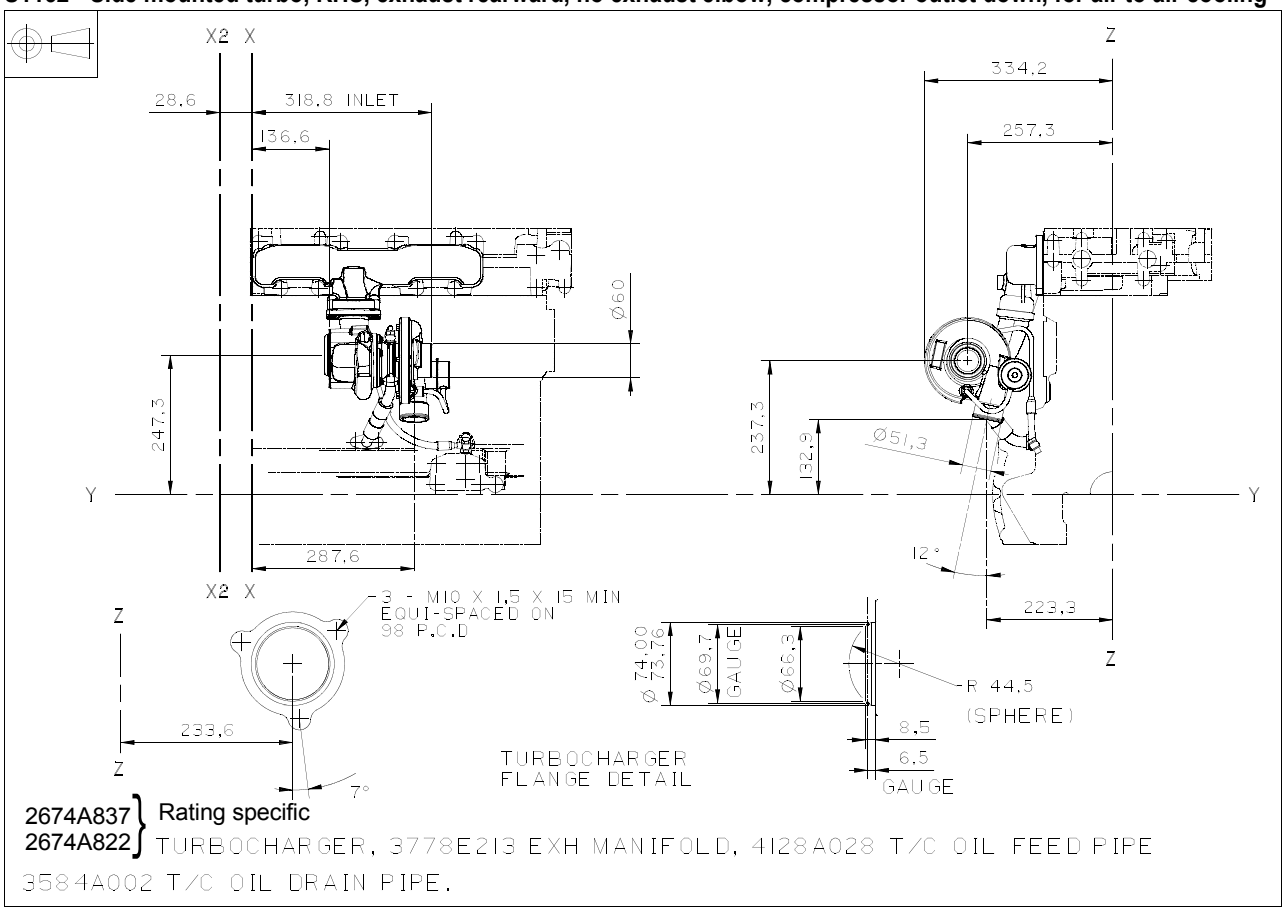


2674A836
2674A818
} Rating specific

TURBOCHARGER 3778E213 EXH MANIFOLD 4128A028 T/C OIL FEED PIPE

3584A002 T/C OIL DRAIN PIPE

S1152 - Side mounted turbo, RHS, exhaust rearward, no exhaust elbow, compressor outlet down, for air to air cooling

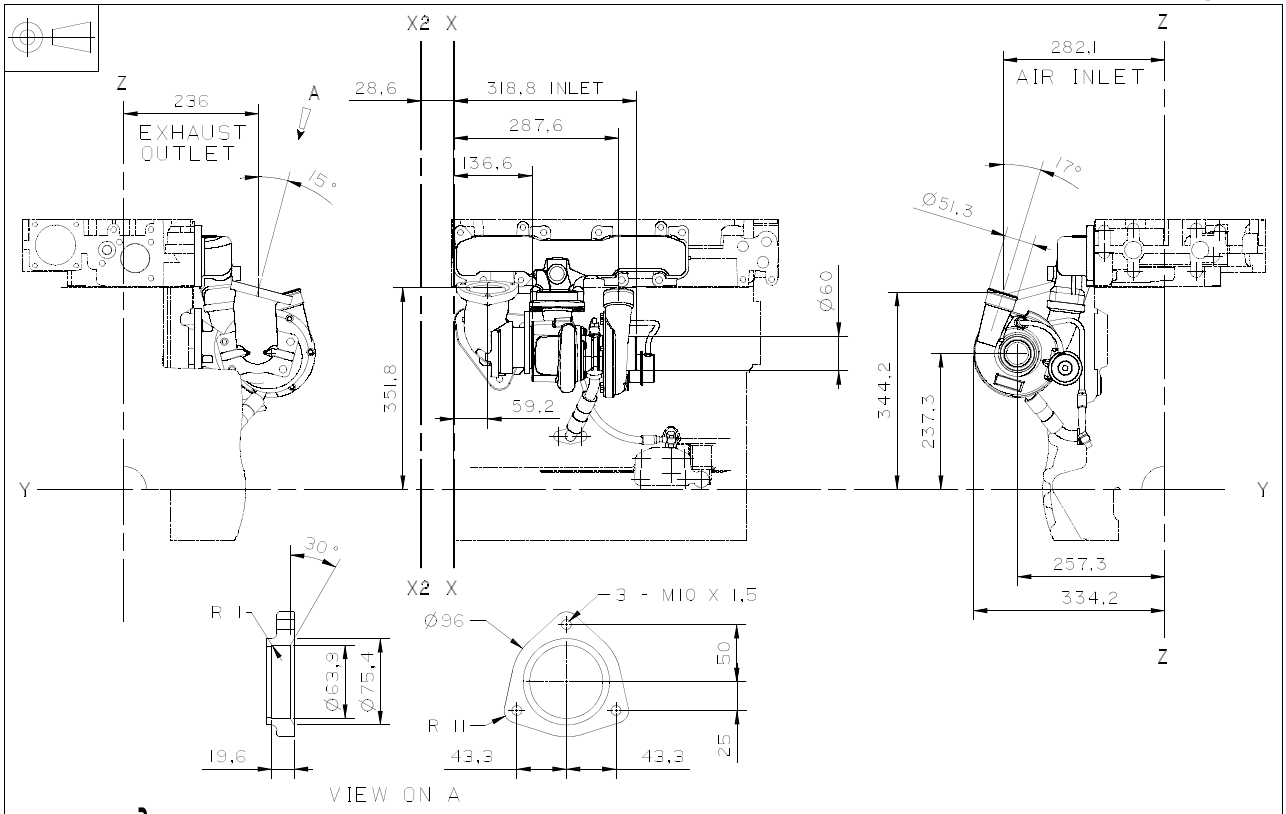


2674A837
2674A822
} Rating specific

TURBOCHARGER, 3778E213 EXH MANIFOLD, 4128A028 T/C OIL FEED PIPE

3584A002 T/C OIL DRAIN PIPE.

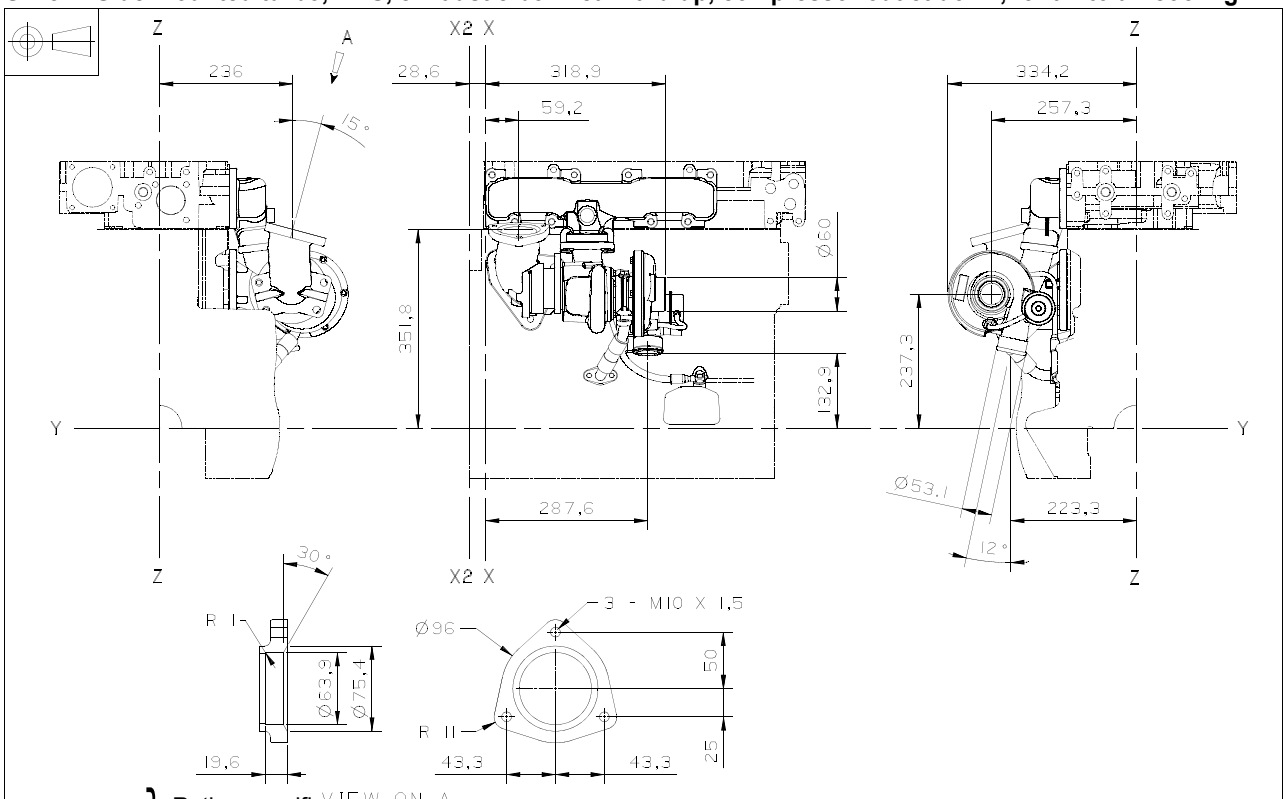
S1181 - Side mounted turbo, RHS, exhaust elbow rearward up, compressor outlet up, for air to air cooling



2674A836
2674A818
} Rating specific

TURBOCHARGER 3778E213 EXH MANIFOLD 4128A028 T/C OIL FEED PIPE 3584A002 T/C OIL DRAIN PIPE 3766A131 EXH ELBOW 3347A091 ELBOW ADAPTOR

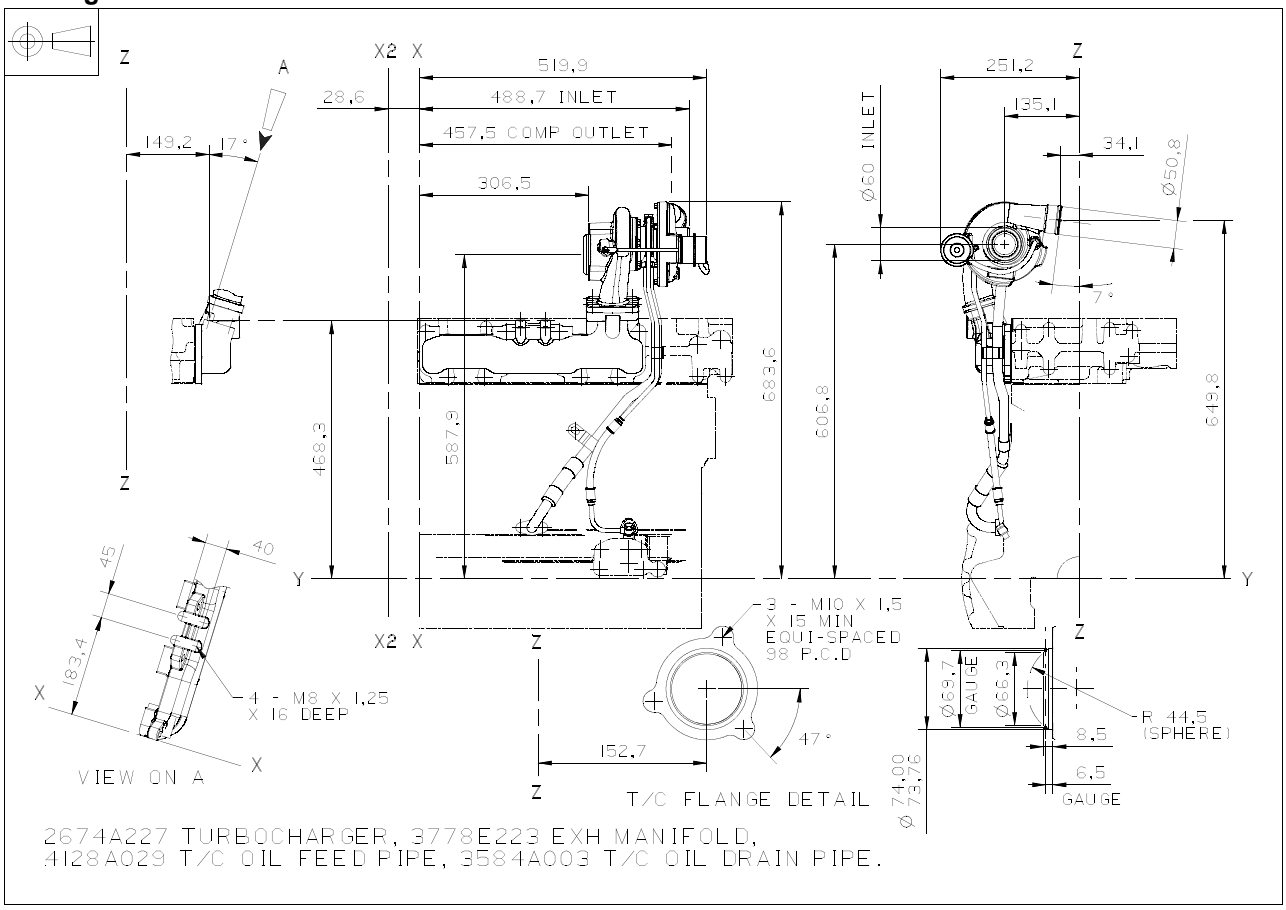
S1182 - Side mounted turbo, RHS, exhaust elbow rearward up, compressor outlet down, for air to air cooling



2674A836
2674A818
} Rating specific

TURBOCHARGER 3778E213 EXHAUST MANIFOLD 4128A028 T/C OIL FEED PIPE 3584A002 T/C OIL DRAIN PIPE 3347A091 EXHAUST ADAPTOR 3824A081 BRACKET 3766A131 ELBOW

S1253 -Top mounted turbo, exhaust rearward, no exhaust elbow, compressor outlet across, for air/air cooling



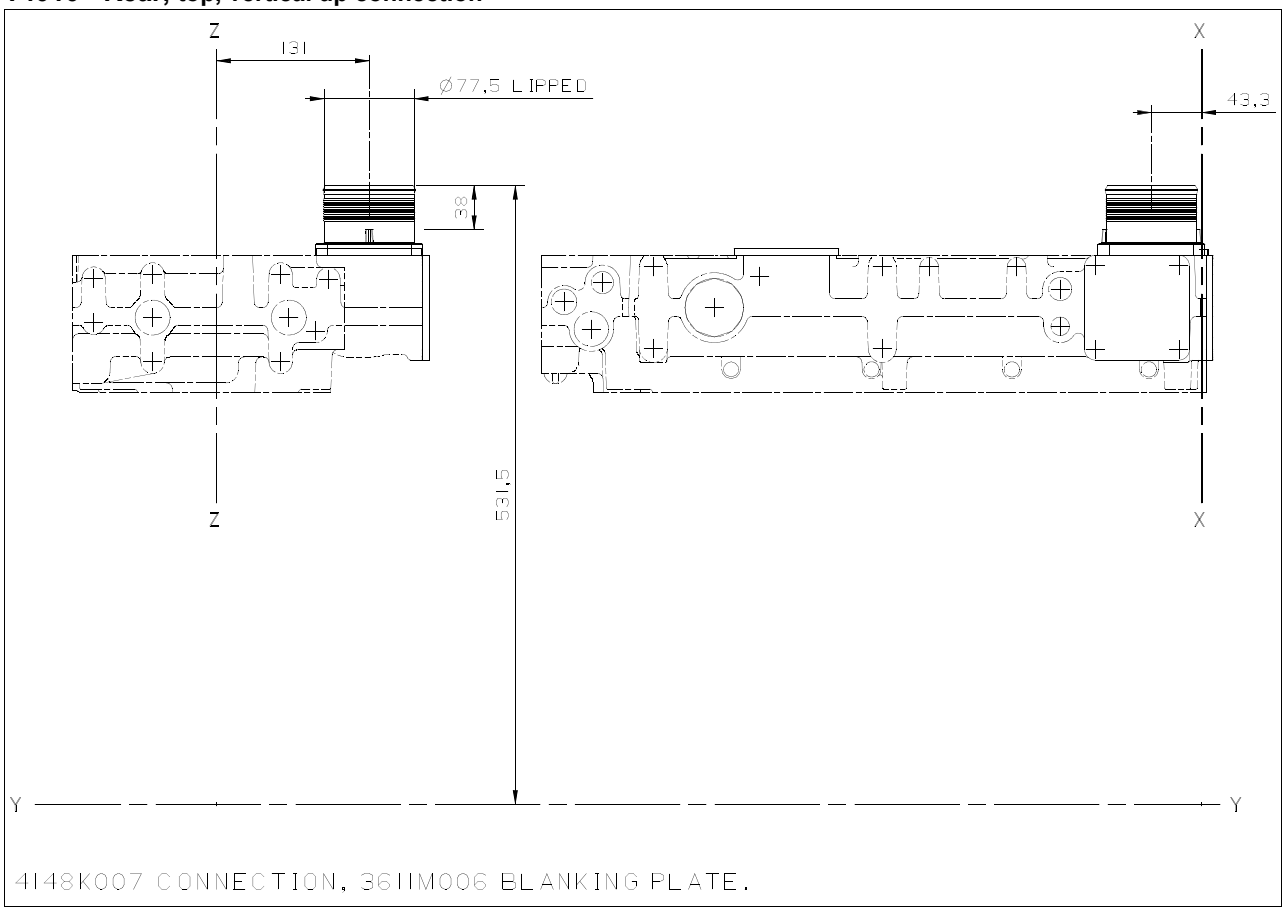
Intake manifold, intake connections

Description	Option
Not required	T0000
Rear, top, no inlet with blanking plug for transit only	T4001
Rear, top, vertically up facing connection	T4010
Rear, top, vertically up facing connection with air filter	T4012
Rear, top, forward facing 90° connection	T4050
Rear top, 90° forward facing connection - 60.0 mm dia	T4060
Rear, top, side facing, LHS 90° connection (1)	T4080
Rear, horizontal straight connection (2)	T6010
Rear with sideways, inward facing, 90° connection (2)	T6070

(1). Incompatible with V2201
(2). Incompatible with S3114.

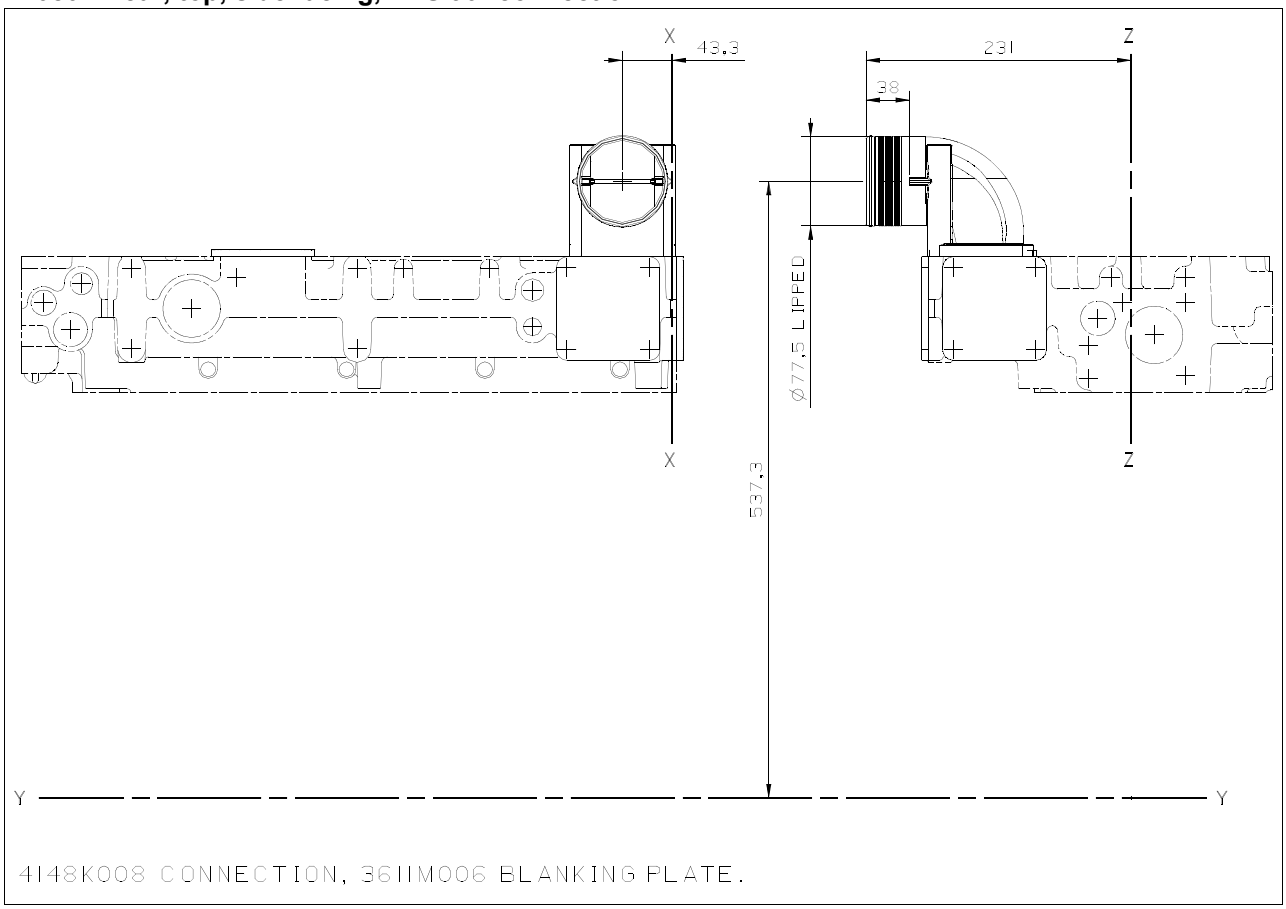
Note: An intake manifold connection selection is required for all air to air aftercooled engines.

T4010 - Rear, top, vertical up connection

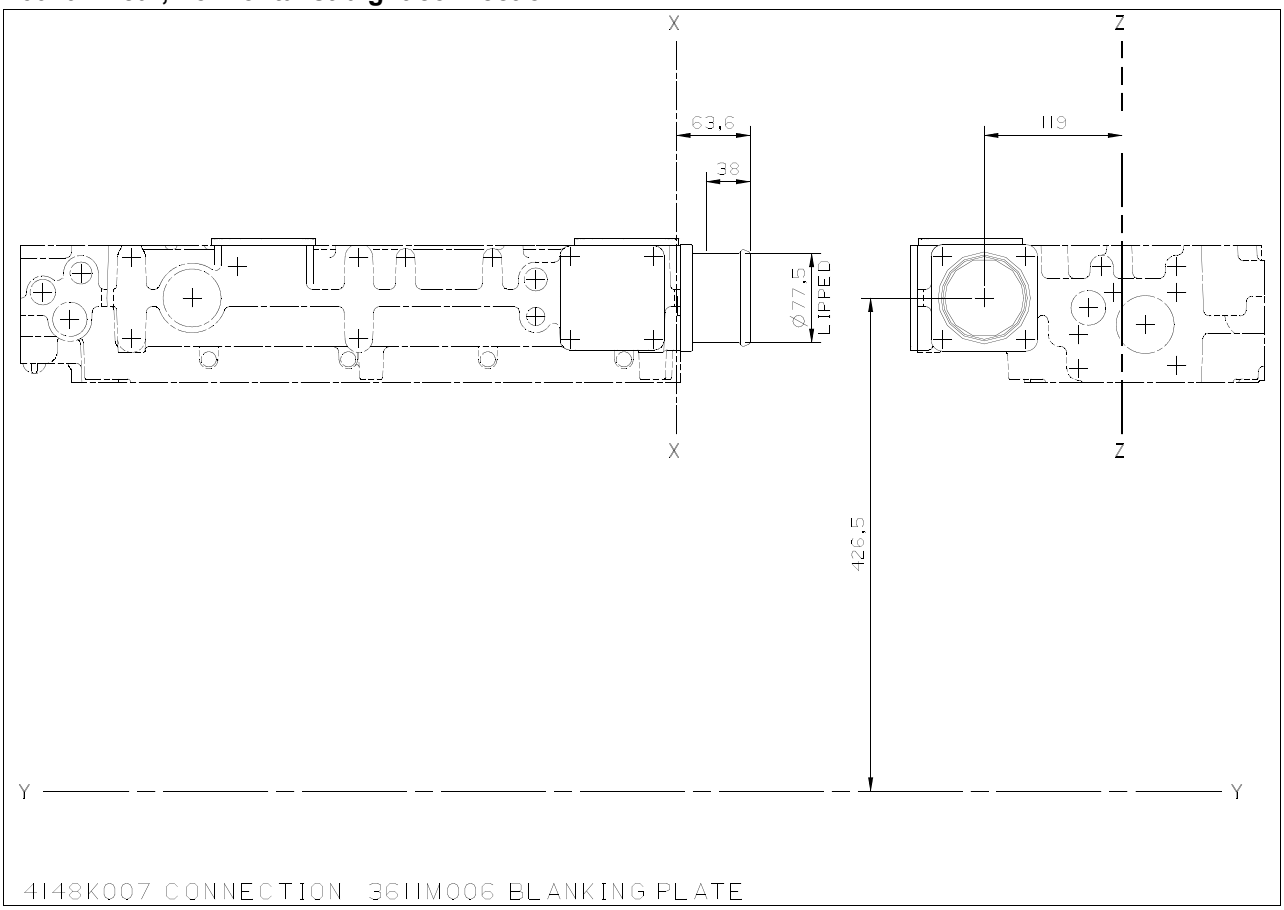


T4050 - Rear, top, forward facing 90° connection

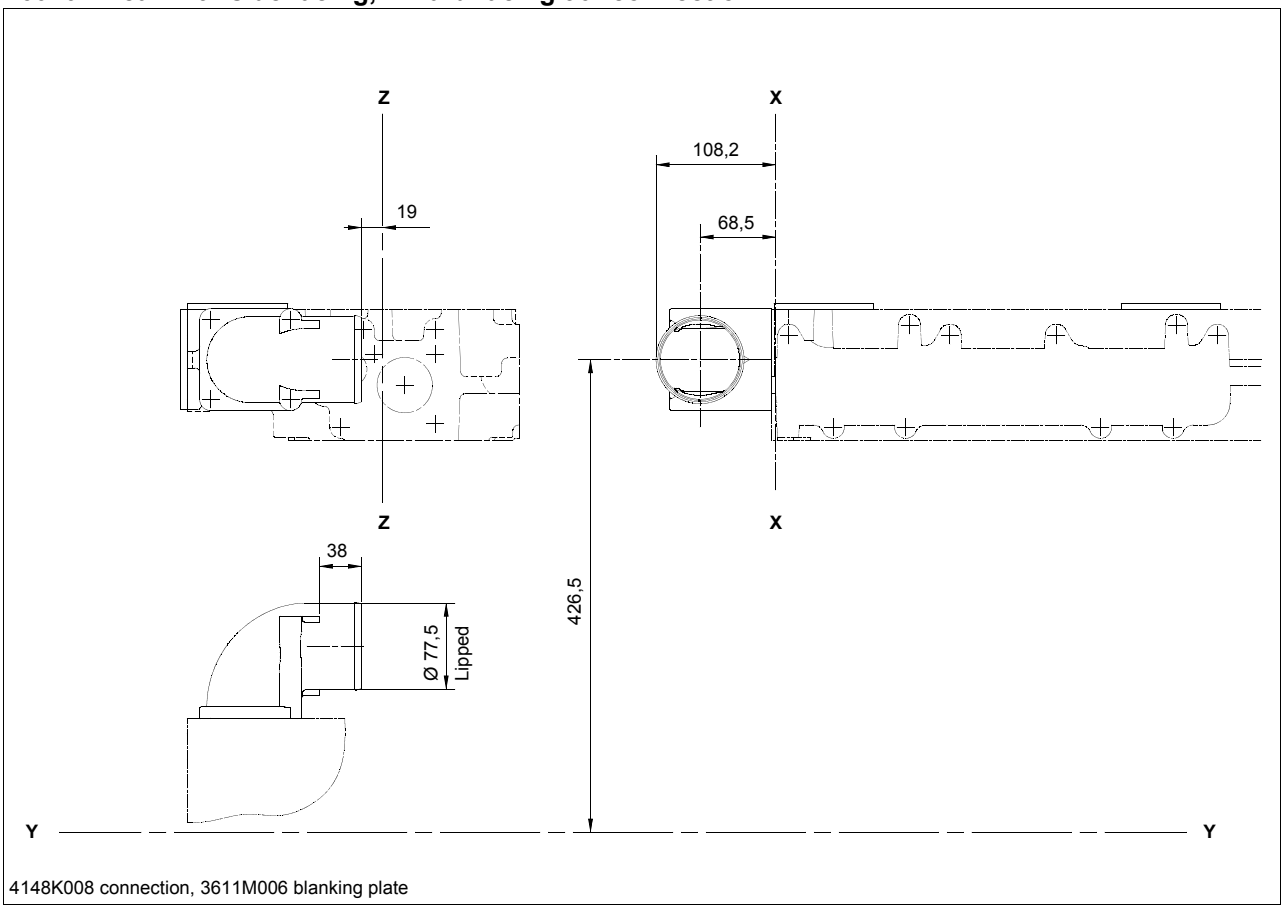
T4080 - Rear, top, side facing, LHS 90° connection



T6010 - Rear, horizontal straight connection



T6070 - Rear with side facing, inward facing 90° connection



Exhaust outlet and elbow

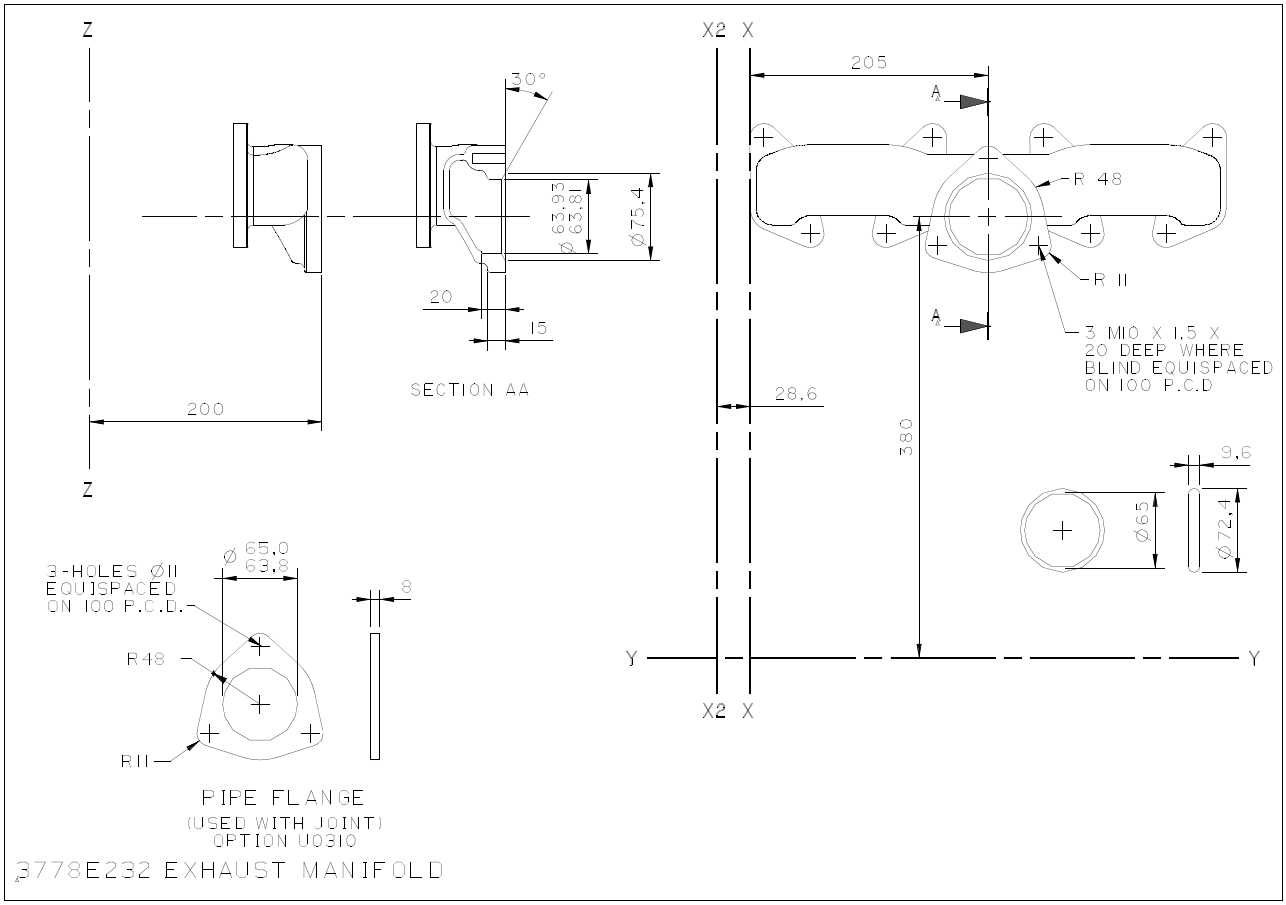
Description	Option
Not required (1)	U0000
Centre side	U0300
Centre side, with vertical elbow	U0301
Centre side, with 120° elbow	U0303
Centre side, with 180° elbow	U0304
Centre down	U0400
Centre top (2)	U0500

(1). Turbocharged engines only.
(2). Incompatible with H**10/H**20.

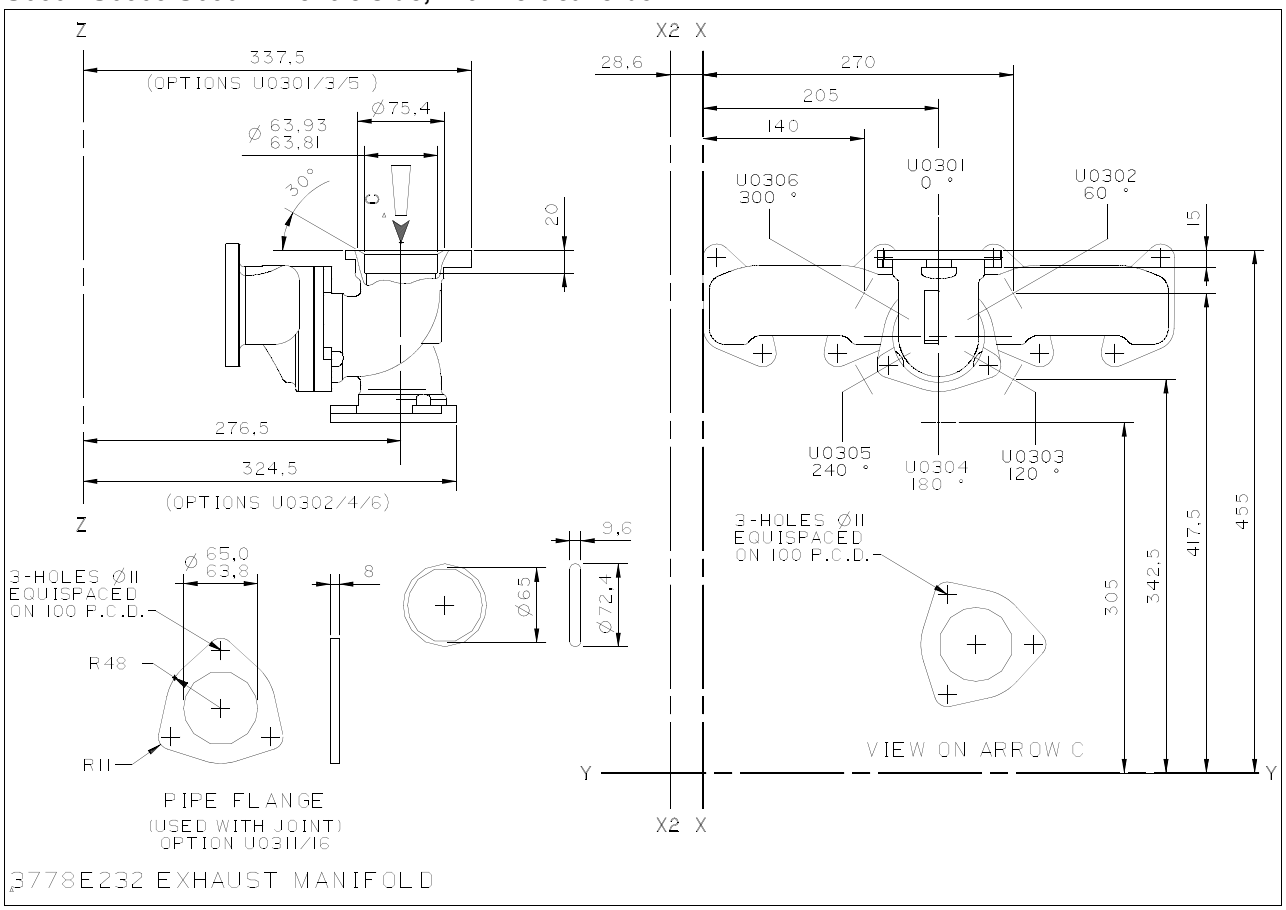
Exhaust hardware

Description	Option
Not required	UD000
Studs and nuts only	UD002
Studs, nuts, flange and gaskets only	UD003

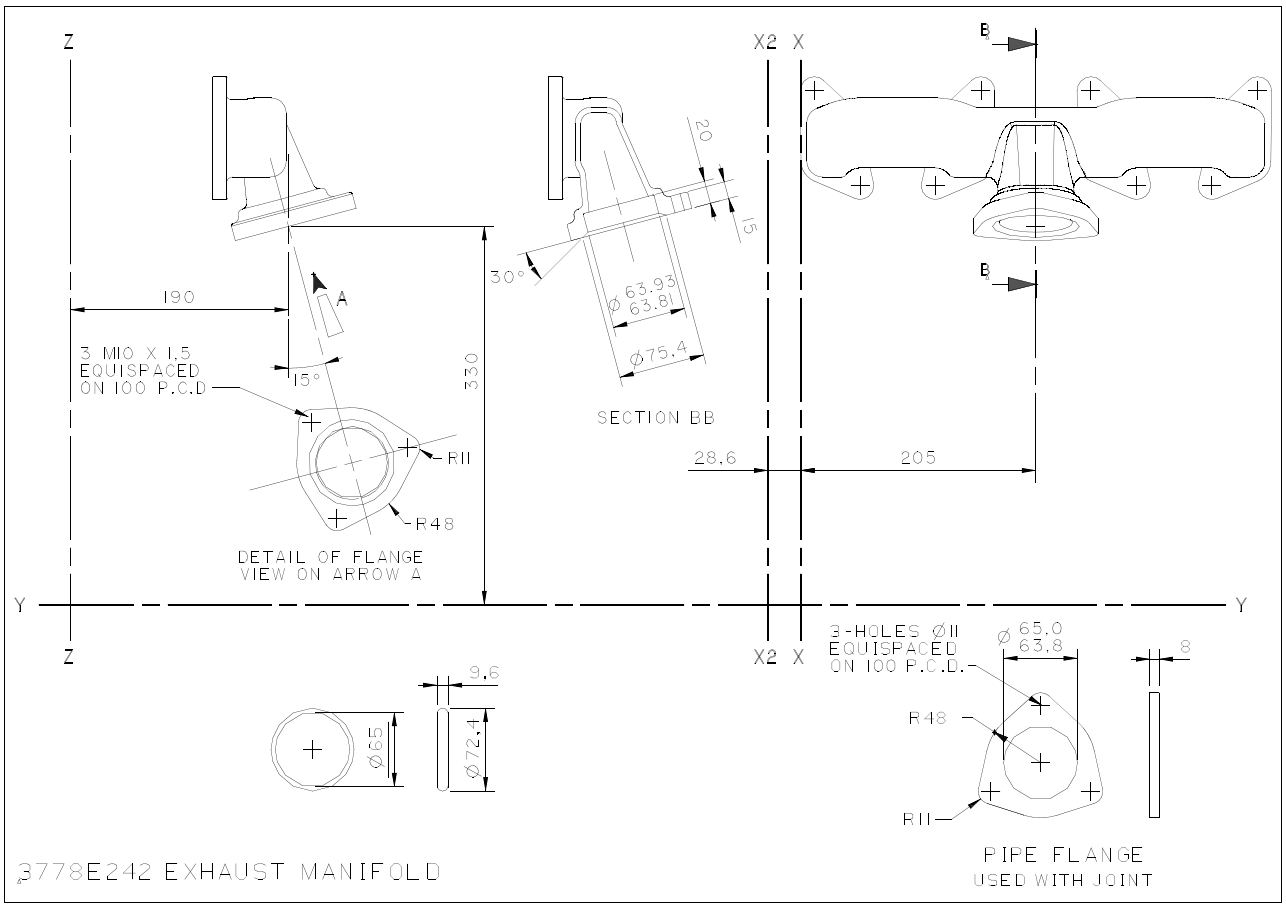
U0300 - Centre side



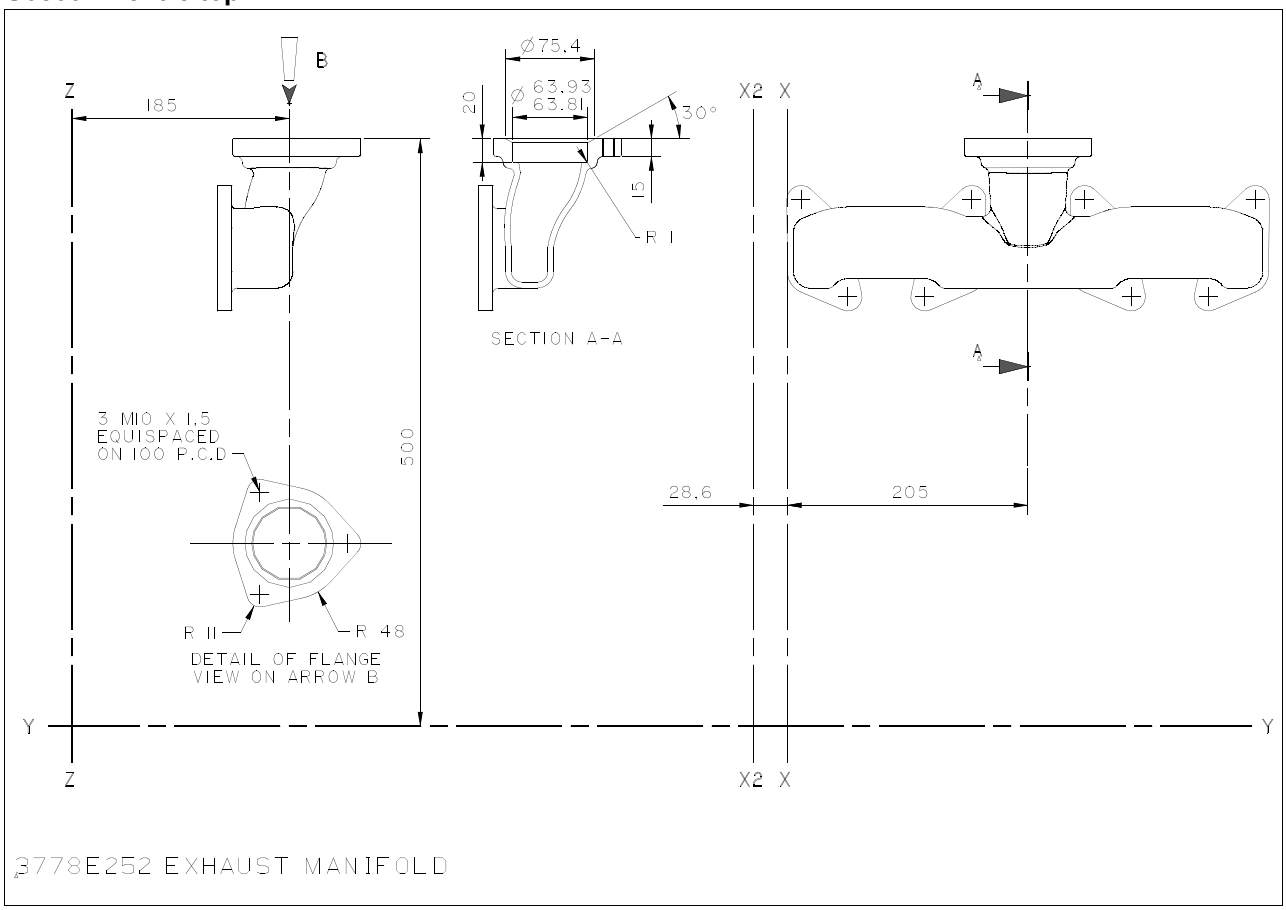
U0301/U0303/U0304 - Centre side, with vertical elbow



U0400 - Centre down



U0500 - Centre top



Fuel filters secondary

Spin on filter canister

Description	Option
Single, LHS, centre of cylinder head (1) (2)	V1001

(1). Electric lift pump supplied loose, only available as 12 volt.
(2). Incompatible with H03**, HD004.

Replaceable filter elements

Description	Option
Single, LHS, centre of cylinder head, FIP boost capsule fuel return to tank (1) (2)	V2201
Single LHS, off centre of cylinder head, FIP boost capsule fuel return to filter (1) (3)	V3201

(1). Complete with integral electric lift pump.
(2). Incompatible with G2002/HD005
(3). Incompatible with HD005.

Due to the significance of the fuel boost control function on the 1104D-44T/1104D-44TA engines, these engines will be offered with a choice of low pressure fuel options when using the integral electric lift pump and filter (was option V1201).

Option V3201 will be standard and for installation will be the same as the previous option V1201.

Option V2201 provides improved engine response from low speed with the potential for increased black smoke under certain modes of operation, these typically being rapid engine speed and load cycling e.g. truck loading and material handling applications. Option V2201 will be most suitable for machine applications such as agriculture tractors. Option V2201 requires a second fuel return line to be installed to the top of the fuel tank.

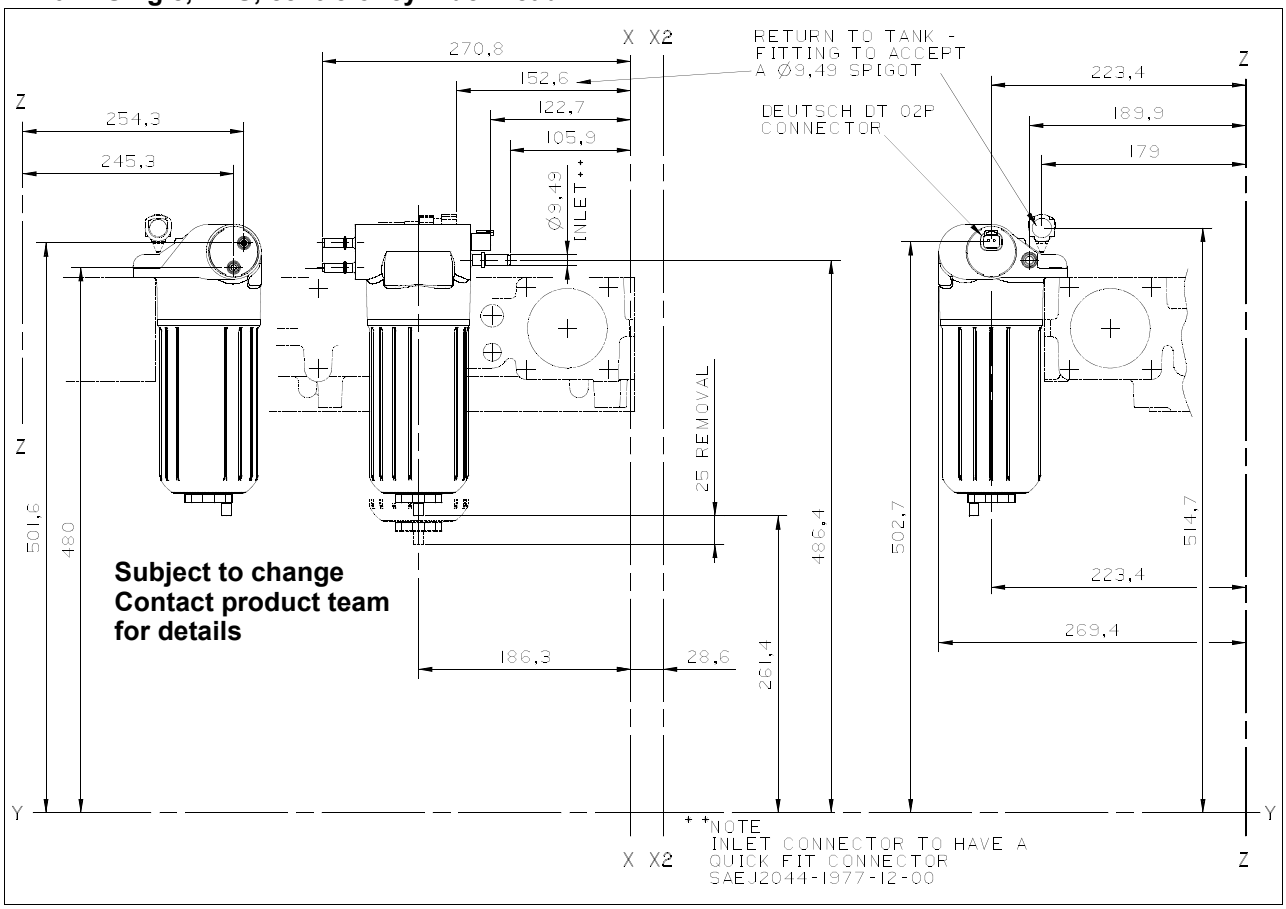
For further details on selecting and installing these low pressure fuel options please refer to the PerkinsApplication team and the Application and installation guide.

Fuel filter - secondary branding

Description	Option
Standard	VD001

V1001 - Single, LHS, centre of cylinder head

V2201 - Single, LHS, centre of cylinder head

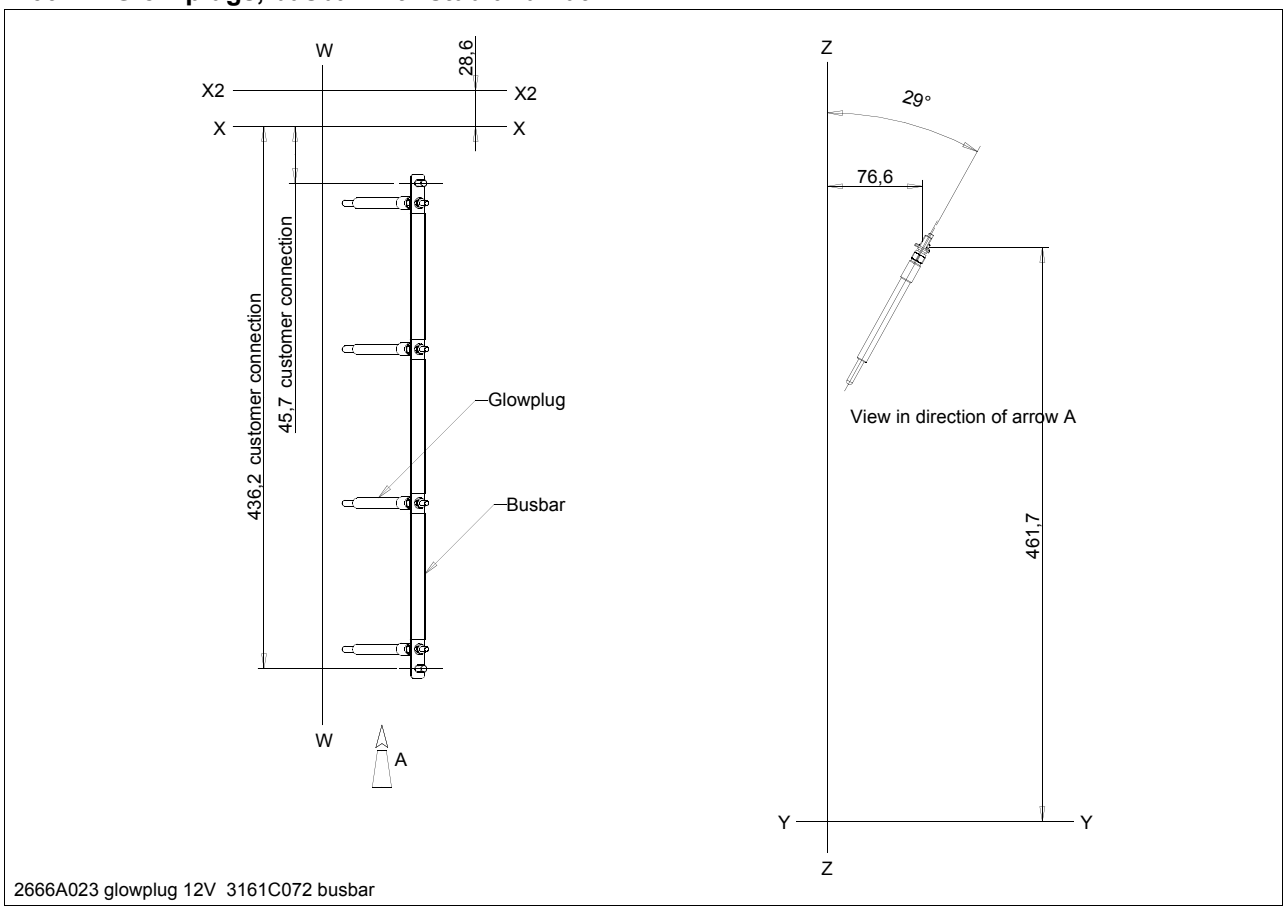


V3201 - Single LHS, off centre of cylinder head, FIP boost capsule fuel return to filter

Cold start aids

Description	Option
Cold start not required	W0000
Glow plugs, busbar, stud and Deutsch connector	W0008
Glow plugs, busbar with stud and nut *available Q2 2008*	W0011

W0011 - Glow plugs, busbar with stud and nut

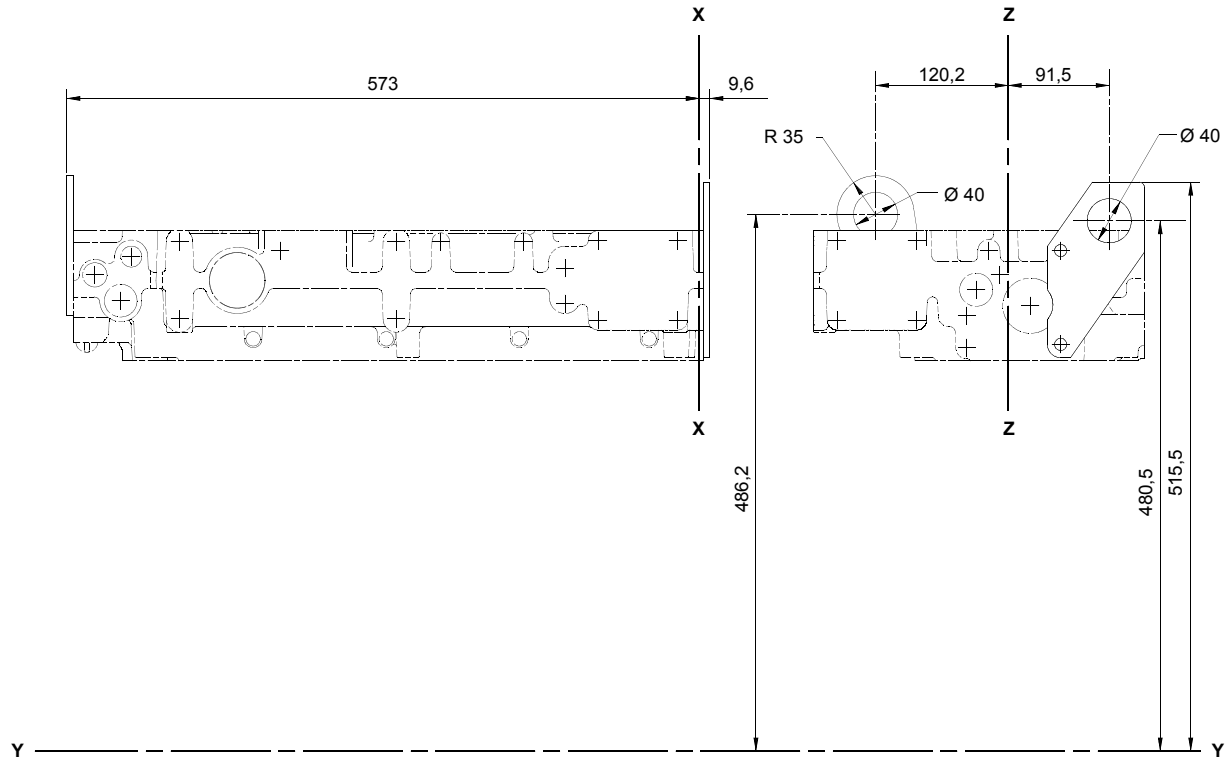


Lifting eyes

Description	Option
Front LHS and rear RHS (1) (2)	X0001
Front RHS and rear LHS (1) (3) (4)	X0002
Front RHS and rear LHS (1) (3) (4)	X0003

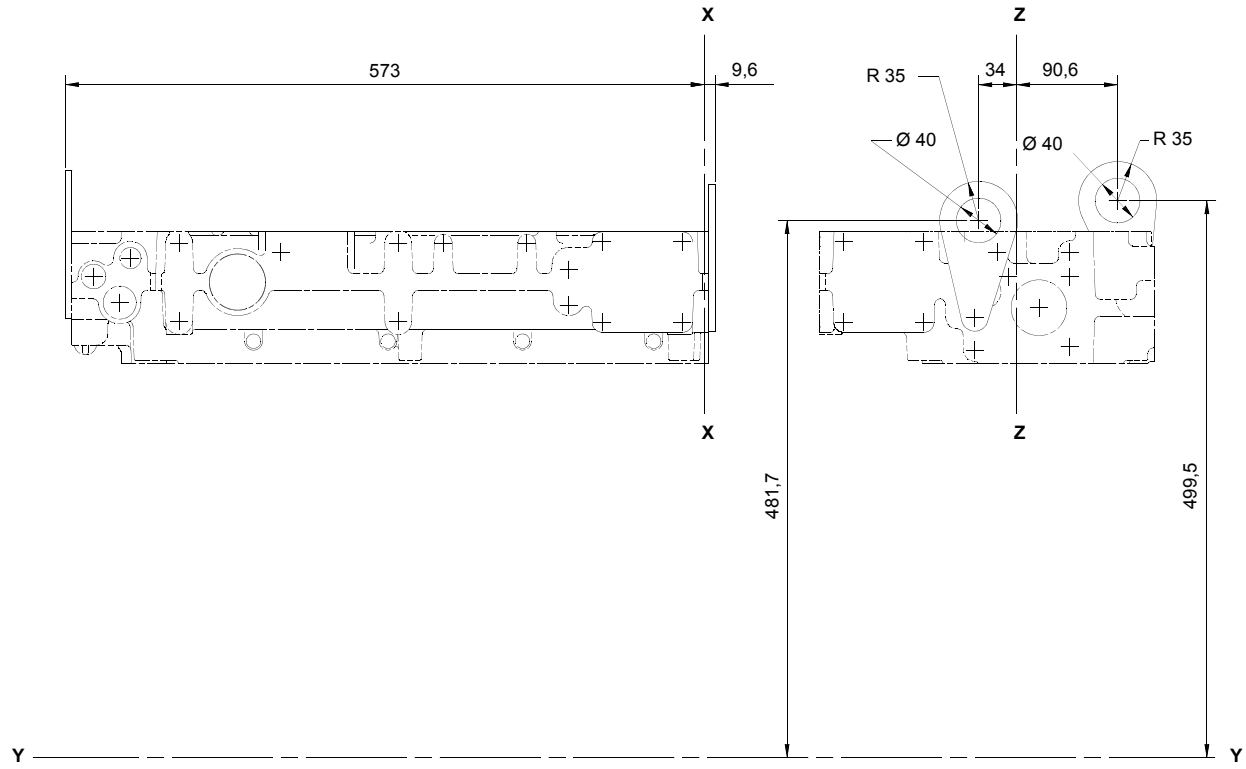
(1). Maximum load 600 kg using a spreader bar or a two leg sling with 2 lifting eye brackets.
(2). Not compatible with L0052.
(3). Not compatible with L0053.
(4). Incompatible with S0101/S0111/S0121/S0151/S1114/S1115.

X0001 - Front LHS and rear RHS



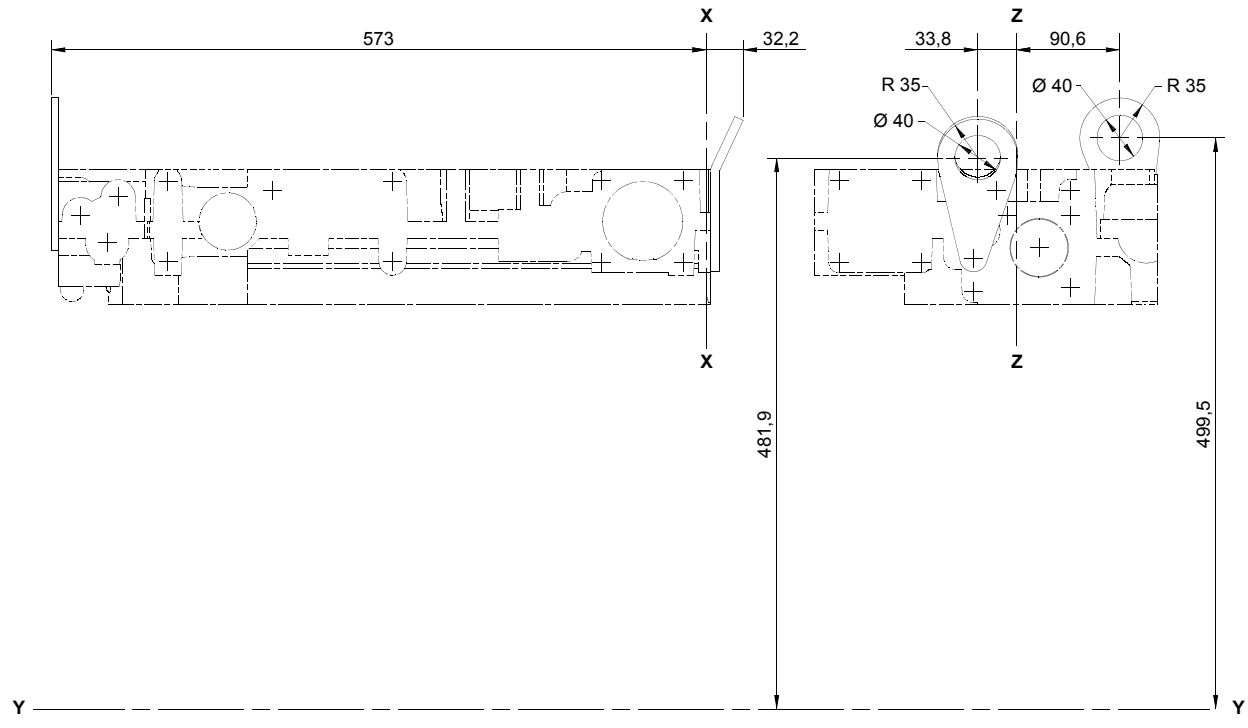
3617A015 front LHS, 3624A016 rear RHS

X0002 - Front RHS and rear LHS



3617A015 rear lifting bracket, 3617A015 front lifting bracket

X0003 - Front RHS and rear LHS



Front plate 3617A015, rear 3647A007

Paint

Description	Option
Lacquer	Y0000
Croda protection	Y9008
Light grey	Y9018
Blue with heavy preservative	Y9034
Light grey primer, with light preservative	Y9036

5

Accessories

Introduction

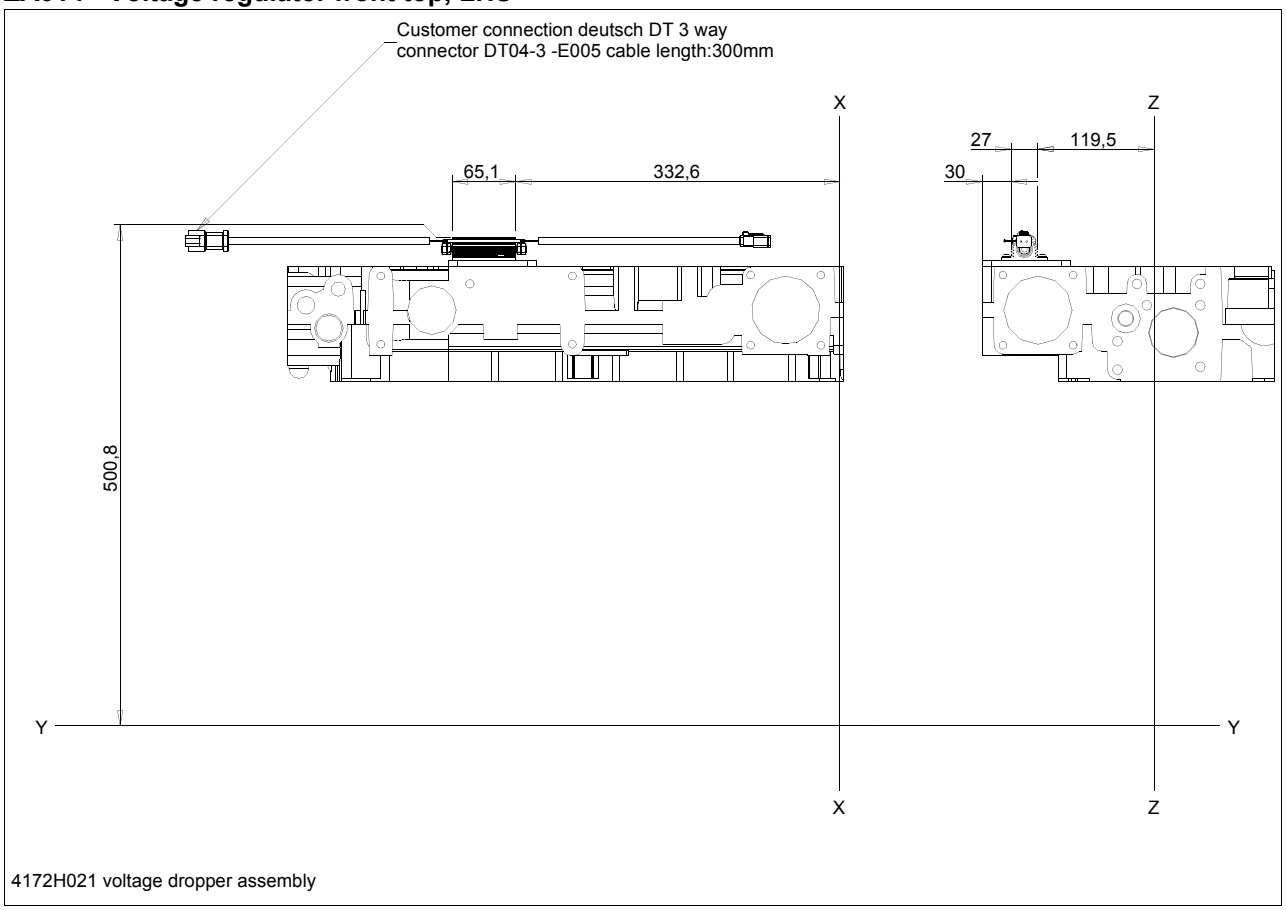
This chapter contains all information relating to the mechanical accessories for the **1104D (Mechanical FIE)** engine range.
Before specifying an accessory, read carefully any notes relating to the accessory as these will indicate any restrictions if this accessory is selected.

Resistors and regulators

Description	Option
Not required (1)	ZA000
Voltage regulator front top, LHS (2) (3)	ZA014
Voltage regulator rear top, LHS (2) (4)	ZA015
Voltage regulator supplied loose (2)	ZA016

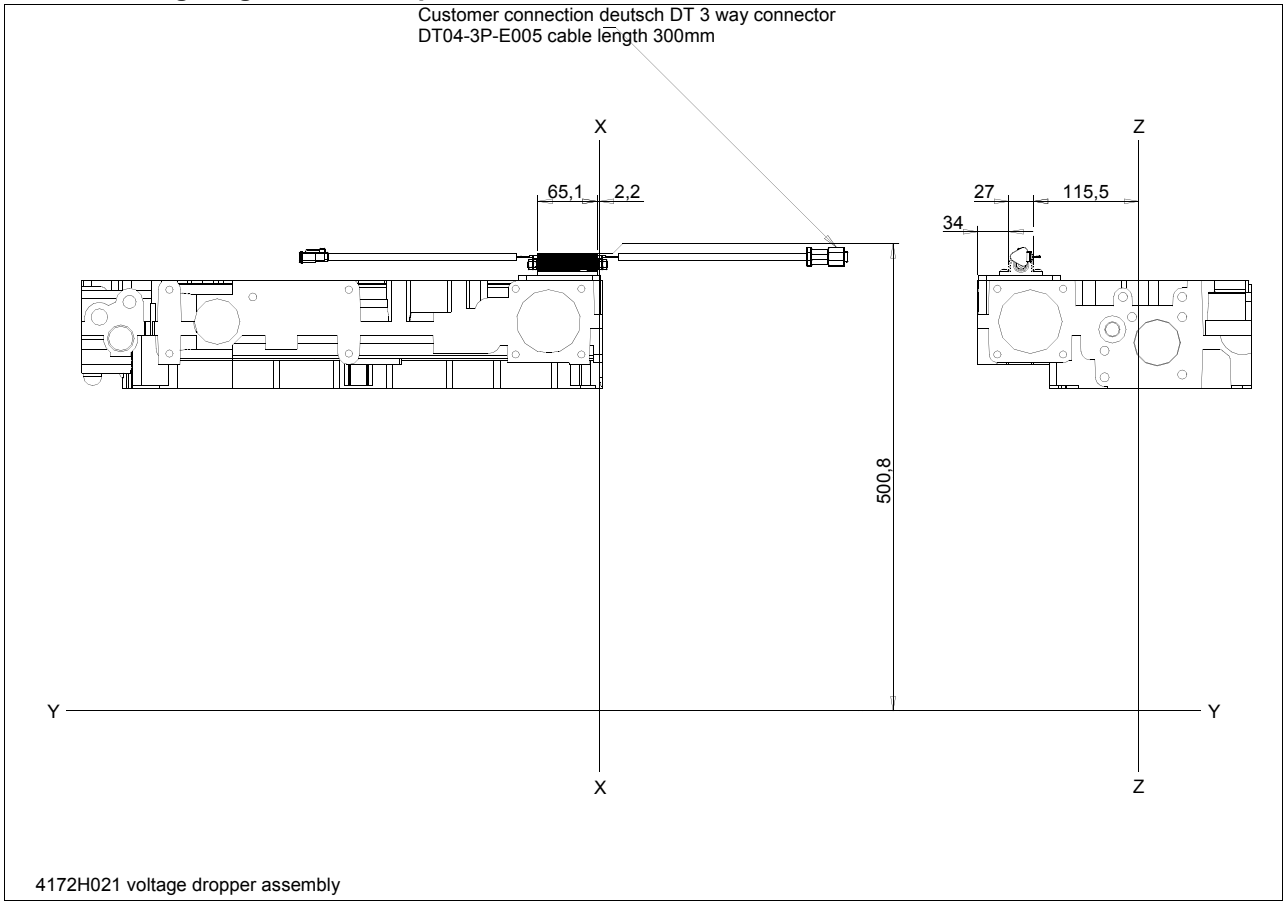
(1). 12 volt engines only.
(2). 24 volt engines only.
(3). Incompatible with H03** on turbo and turbo aftercooled engines.
(4). Incompatible with S0111/S0114/S0115/S0121/S0151/S0251/T4010/T4050/T4060.

ZA014 - Voltage regulator front top, LHS



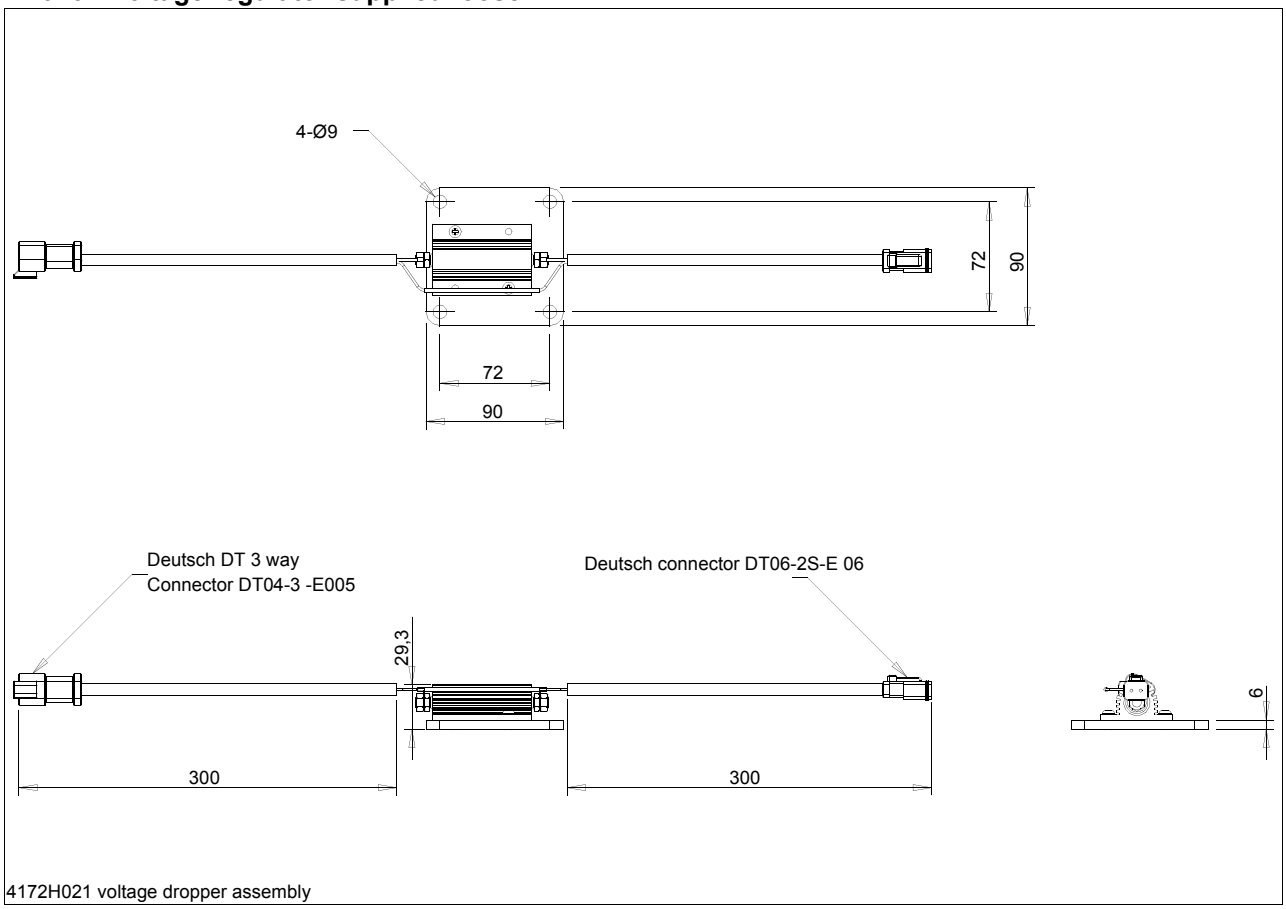
4172H021 voltage dropper assembly

ZA015 - Voltage regulator rear top, LHS



4172H021 voltage dropper assembly

ZA016 - Voltage regulator supplied loose



4172H021 voltage dropper assembly

Fuel systems

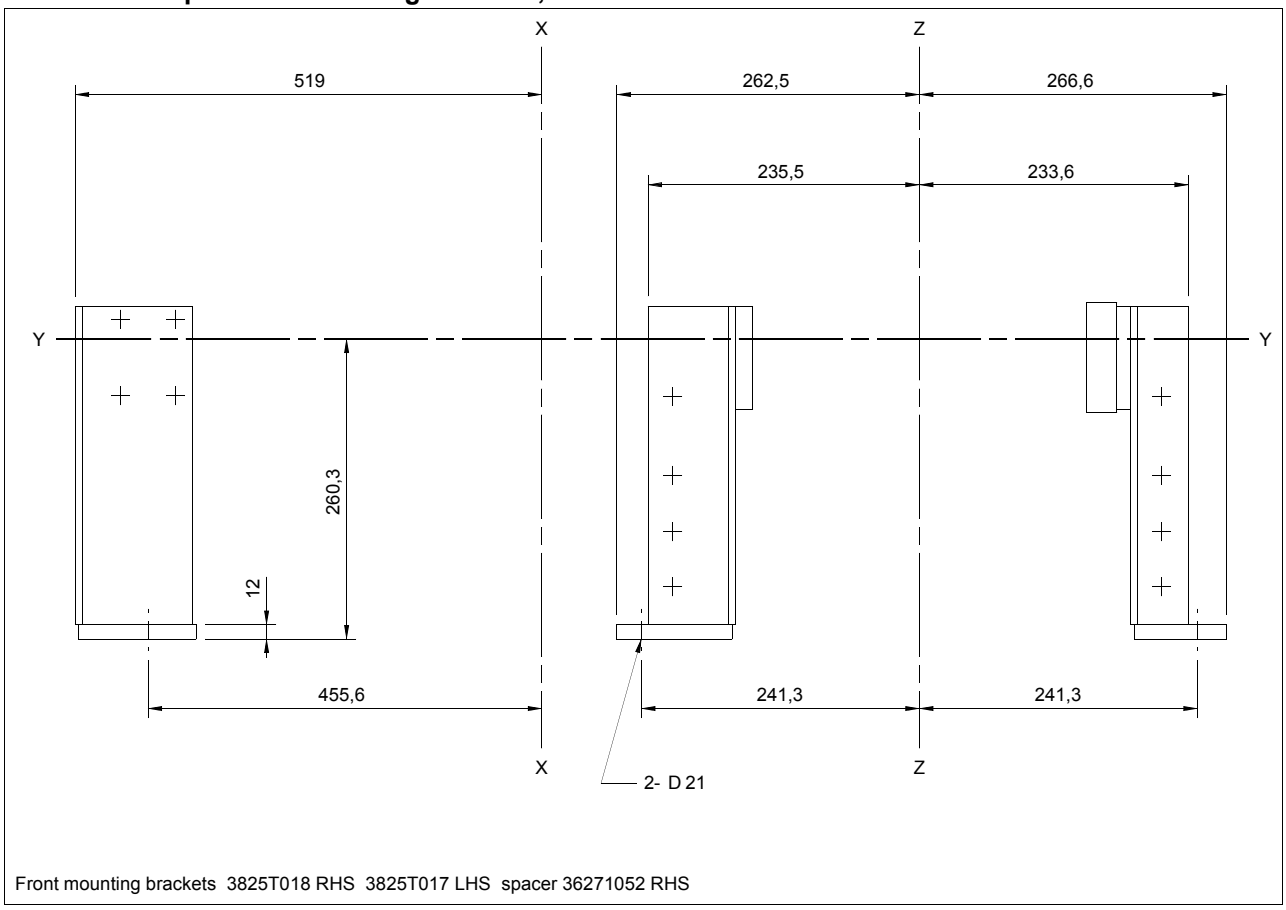
Description	Option
Fuel cooler not supplied	ZB000

Engine mounting brackets

Description	Code
Not required, blanking plugs only (1)	ZC000
Front pedestal mounting brackets, LHS and RHS (2) (3)	ZC002
Rear brackets, LHS and RHS (1) (3) (4)	ZC003
ZC002 and ZC003 (1) (2) (3) (4)	ZC004
Front mounting studs only (1) (3)	ZC012
Front mounting studs in rear holes only (1) (3)	ZC014
Front mounting brackets, LHS and RHS (with flywheel housing plugs) (3) (5)	ZC016
Front pedestal brackets LHS and RHS (<75 kW) and ZC003 (3) (4)	ZC018
Front mounting brackets, LHS and RHS (for high peak loads, 10g) (3) (5) (6)	ZC019

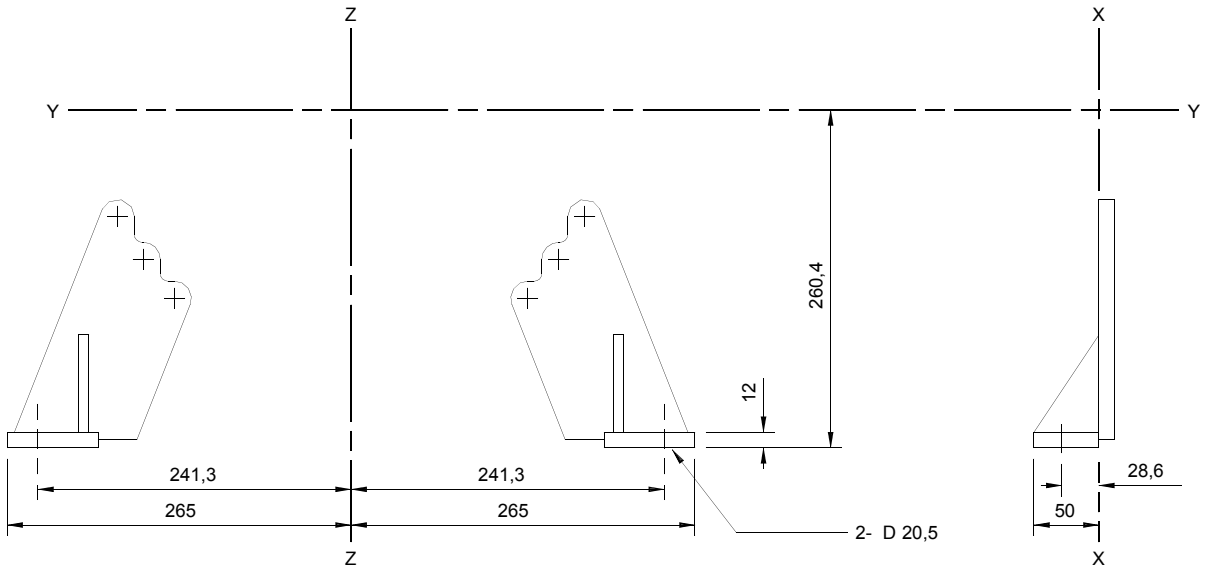
(1). Not available with ZM101/ZM102/ZM103/ZM110.
(2). Incompatible with Q4***.
(3). Engines with non stressed block only.
(4). Incompatible with C0006/C0010/C0021/C0026/C0033/C0036/C0050/C0051.
(5). Not for use with radiator options.
(6). Incompatible with D0053/D0056/D0062/D0065/D0066/D0067/D0068, J0030/J0031/J0070/J0071.

ZC002 - Front pedestal mounting brackets, LHS and RHS



Front mounting brackets 3825T018 RHS 3825T017 LHS spacer 36271052 RHS

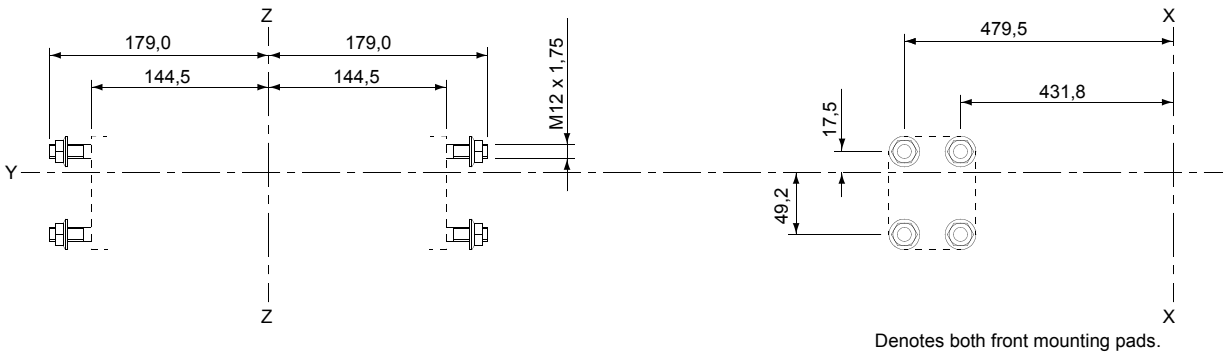
ZC003 - Rear brackets, LHS and RHS



Engine rear mounting brackets 3821M003, 3821M004.

ZC012 - Front mounting studs only

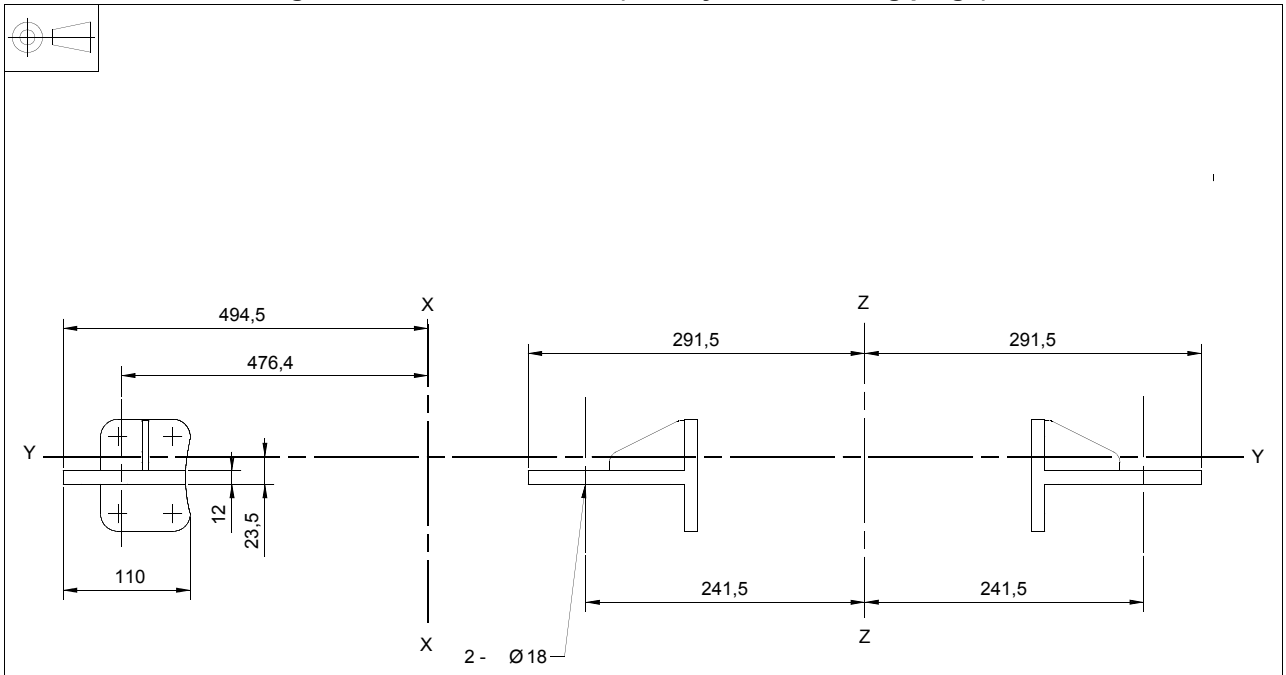
ZC012



Denotes both front mounting pads.

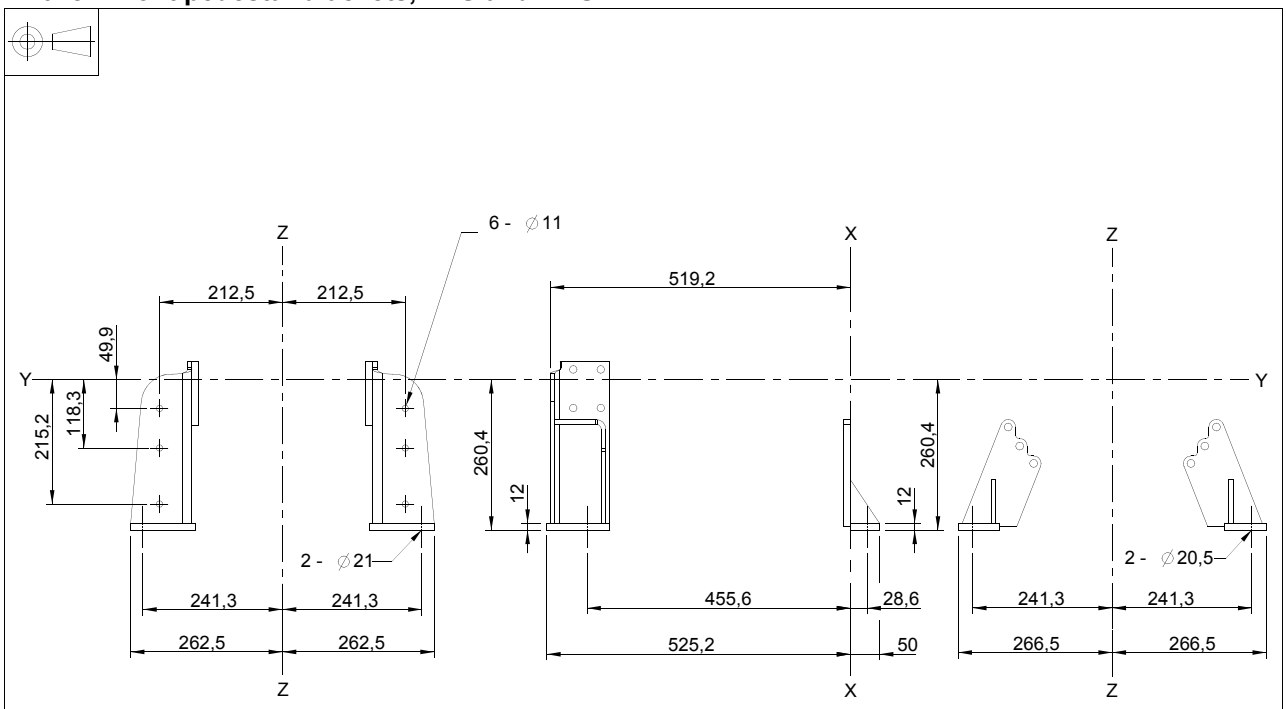
Stud 2312M101, nut 2318A605

ZC016 - Front mounting brackets, LHS and RHS (with flywheel housing plugs)



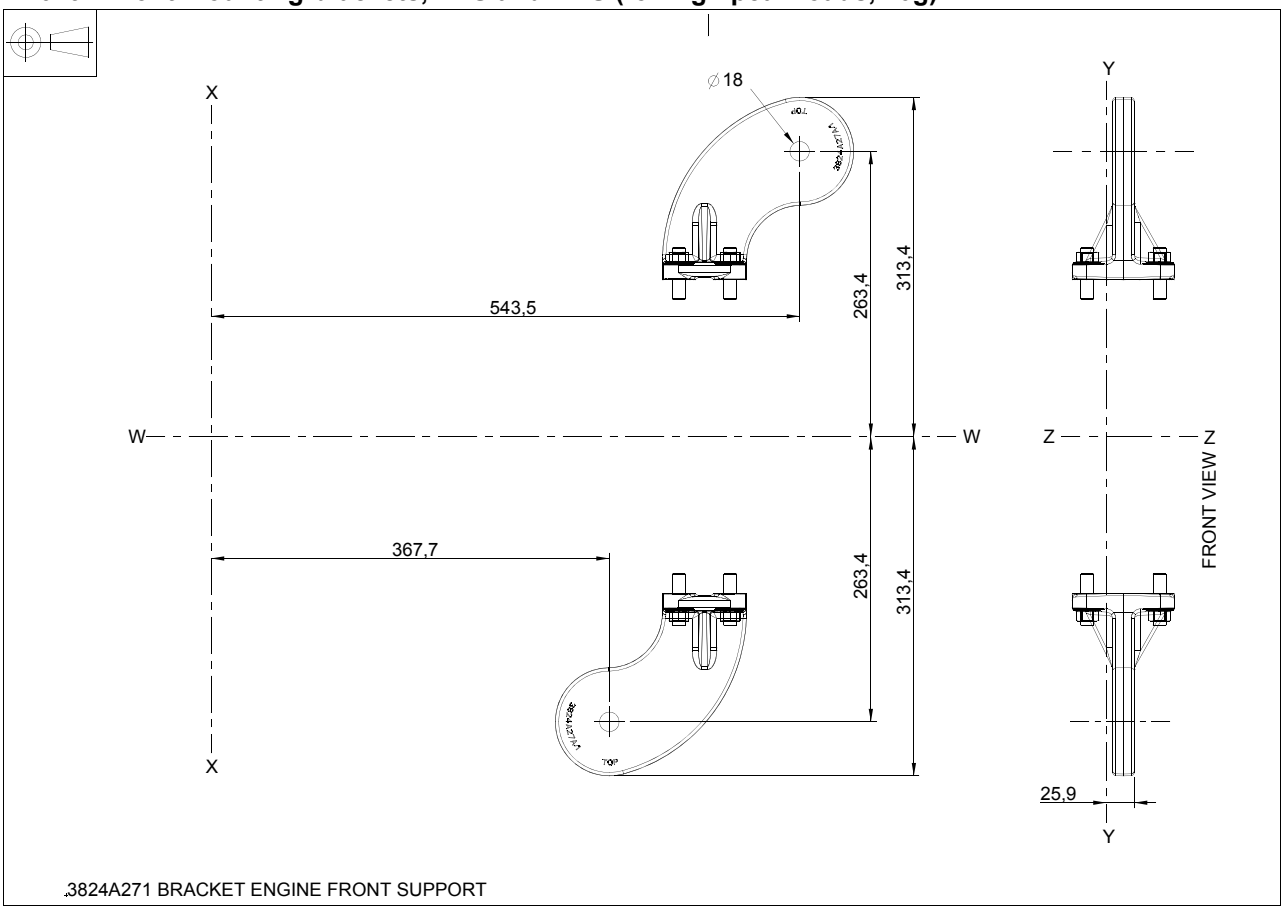
Front mounting brackets 3823A036/37

ZC018 - Front pedestal brackets, LHS and RHS



3861A081 FRONT BRACKET LHS 3821M004 REAR BRACKET LHS
3861A082 FRONT BRACKET RHS 3821M003 REAR BRACKET RHS

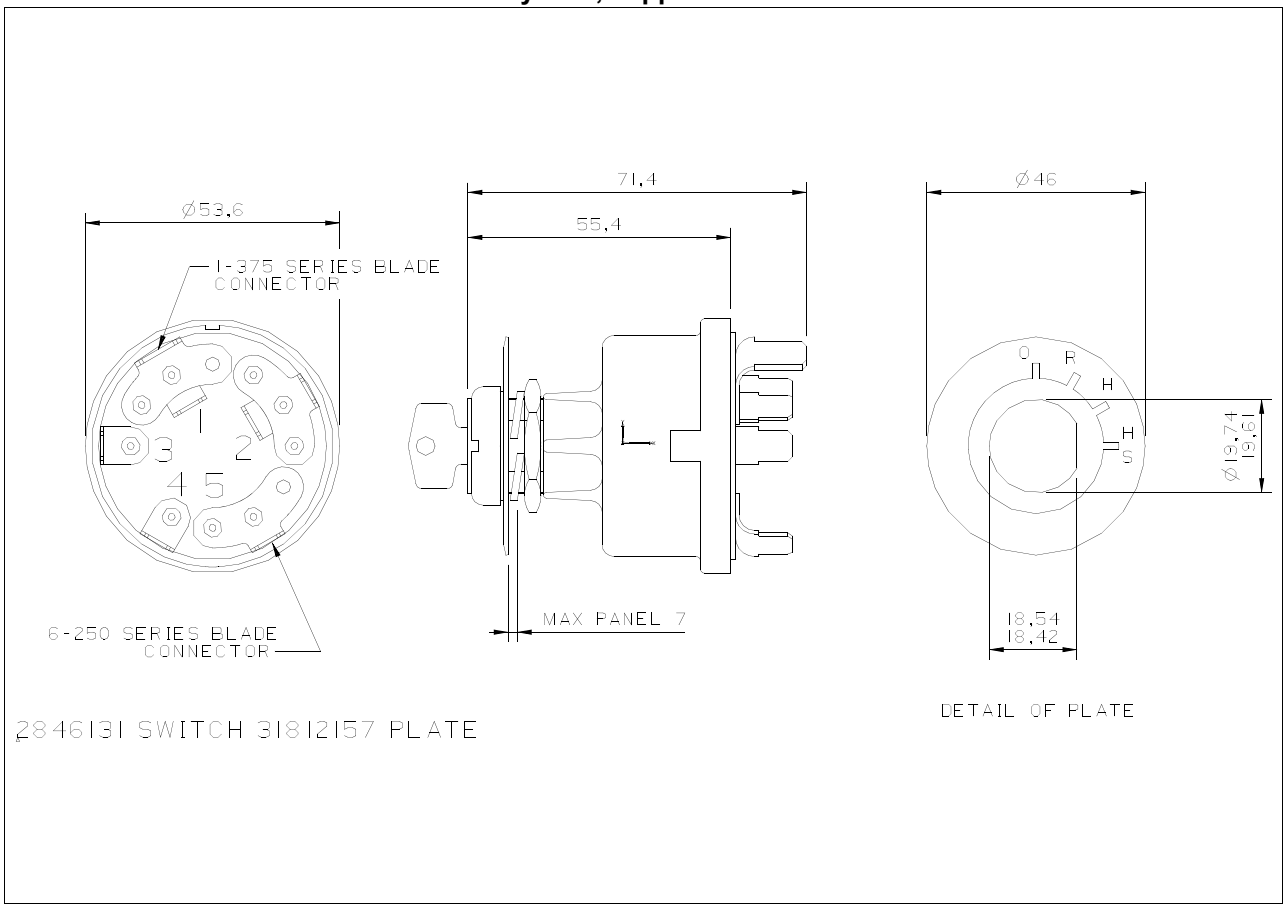
ZC019 - Front mounting brackets, LHS and RHS (for high peak loads, 10g)



Heater/starter switch

Description	Code
Not required	ZE000
Heater/starter switch and security lock, supplied loose	ZE001
Heater/starter switch, supplied loose	ZE005

ZE001 - Heater/starter switch and security lock, supplied loose



Sump drain

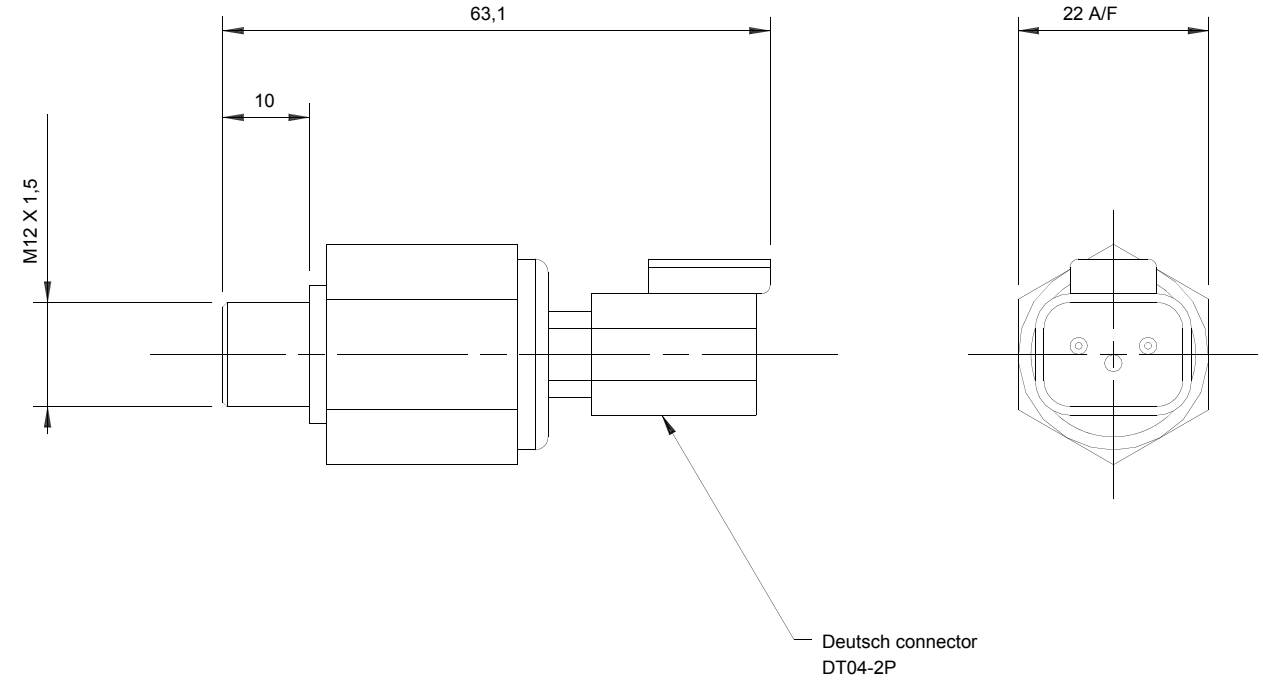
Description	Code
Standard sump plug	ZG000

Lubricating oil switches and valves

Description	Code
Not required	ZJ000
Lubricating oil pressure switch - Deutsch (1)	ZJ003
Lubricating oil sampling valve, fitted in lubricating oil filter head (2)	ZJ005
Lubricating oil pressure switch - Deutsch connector (Earth return) fitted in cylinder block (3)	ZJ006
Lubricating oil sampling valve, fitted in pressure rail (4)	ZJ008

(1). Not available when selected with J0011/J0021/J0060/J0061/J0130 and Q**38.
(2). Incompatible with J0130.
(3). Incompatible with Q1023/Q1024/Q1025/Q1026/Q1038/Q2038.
(4). Incompatible with Q**28/Q**38.

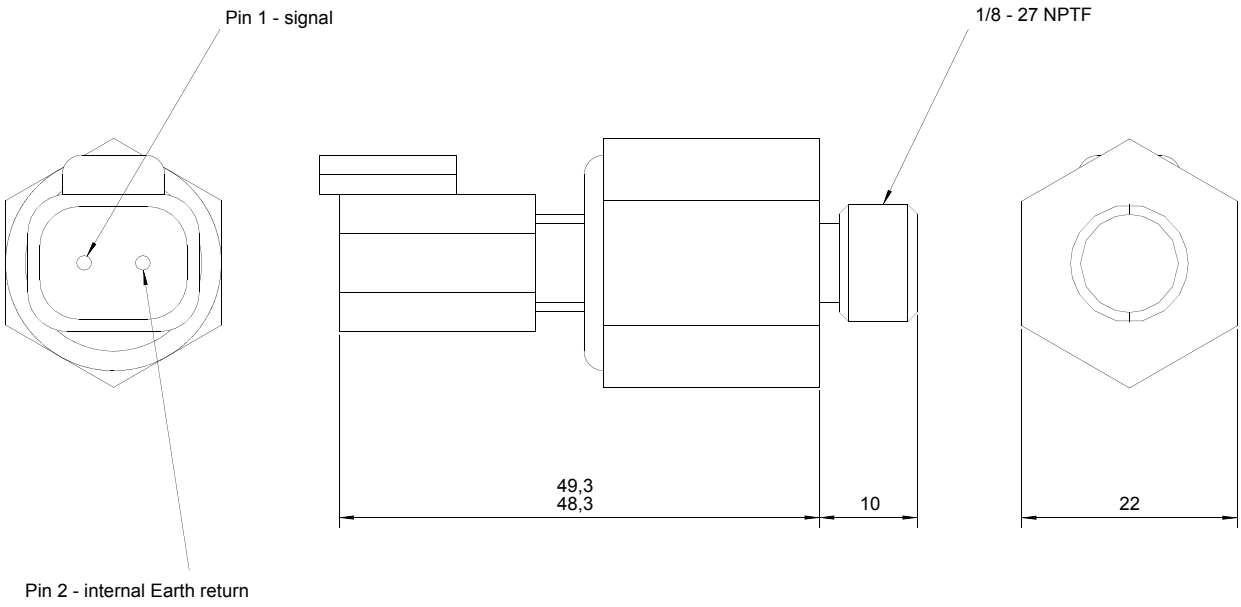
ZJ003 - Lubricating oil pressure switch fitted in oil filter head - Deutsch connector



2848A071 switch lub. oil pressure

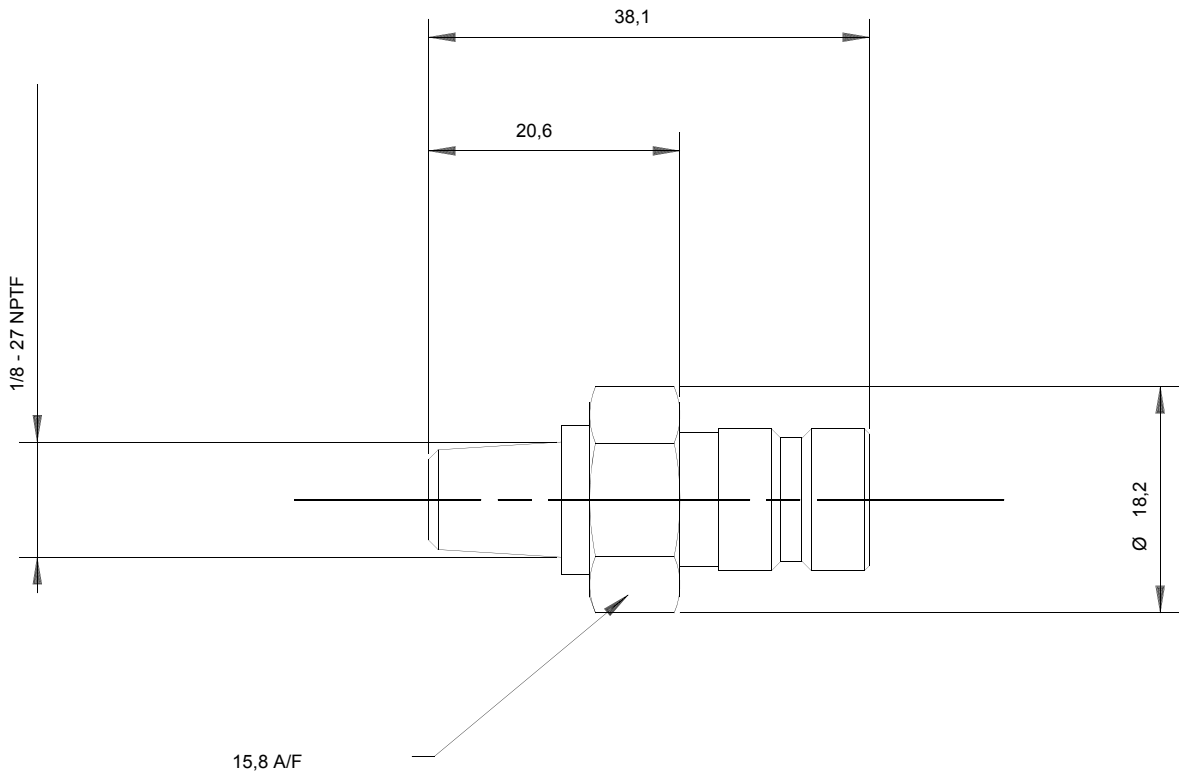
ZJ005 - Lubricating oil sampling valve, fitted in lubricating oil filter head

ZJ006 - Lubricating oil pressure switch fitted in cylinder block - Deutsch connector



2848A051 - lub oil pressure switch

ZJ008 - Lubricating oil sampling valve fitted in pressure rail



2658301 valve lub. oil sampling

Coolant temperature sender and gauge

Description	Code
Not required	ZL000
Temperature sender and gauge	ZL001
Temperature switch	ZL002
Temperature sender only	ZL004

Radiator

Description	Code
Not required	ZM000
Radiator supplied loose (1)	ZM101
Radiator fitted, without fan guards (1)	ZM102
Radiator fitted, with fan guards (1) (2)	ZM103
Radiator fitted with fan guard, to suit LHS SAE-B PTO (1) (3)	ZM110
Radiator with intercooler fitted, without fan guards (1) (2) (4) (5)	ZM121
Radiator with intercooler fitted, with fan guards (1) (2) (4) (5) (6)	ZM122
Radiator with intercooler fitted, with fan guards, to suit twin PTO (1) (2) (4) (5) (6)	ZM130
Radiator with intercooler fitted, with fan guard to suit LHS SAE-B PTO (1) (3) (4) (5) (6)	ZM131

(1). Compatible with non-stressed block only.
(2). Incompatible with Q4042/Q4055/Q3030.
(3). Incompatible with Q1023/Q1024/Q1025/Q1026/Q1100/Q3000.
(4). Incompatible with J0030/J0070/J0071.
(5). Incompatible with G0401/G11**/G2***.
(6). Incompatible with H1210/HD101.

Notes:

- ZM101/ZM102/ZM103/ZM110 to be used on turbocharged engines only.
- ZM121/ZM122/ZM130/ZM131 to be used on turbocharged air to air cooled engines only.

***Cautions*:**

- *An engine is at risk if a heat exchangers effectiveness becomes reduced through environmental contamination.*
- *Customers of Perkins engines should give appropriate maintenance details in their operator and service documents to prevent this.*

Warning! *If the radiator is to be supplied without fan guards,* ***the customer must sign a letter accepting responsibility and liability to provide and fit fan guards****.*

Engine wiring harnesses

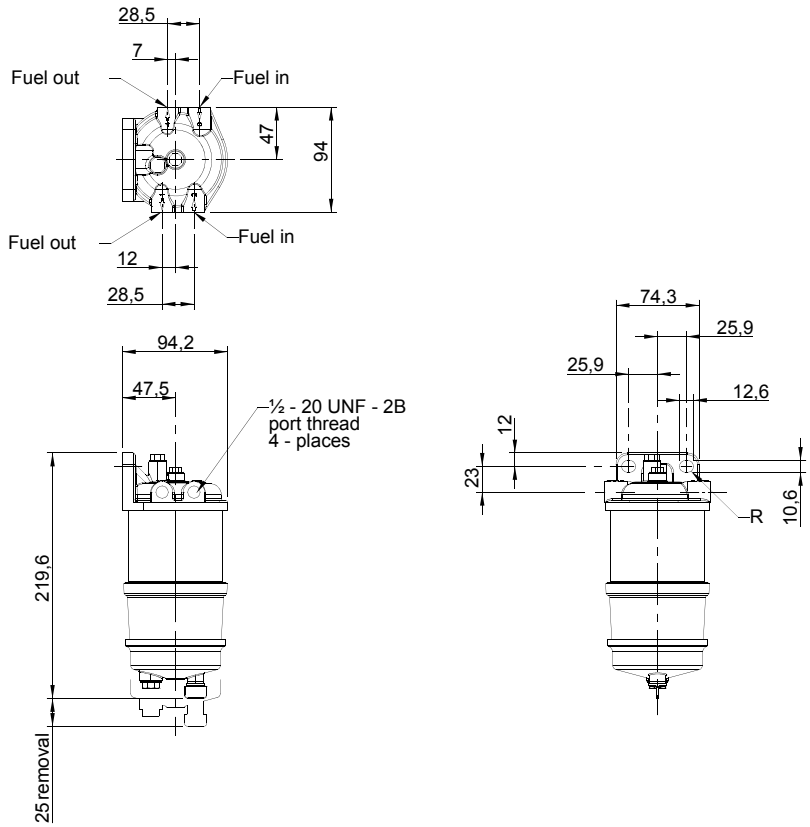
Description	Code
No wiring harness required	ZN000

Fuel filter-primary

Spin on filters

Description	Code
Customer to supply filter (1)	ZV000
Single filter including water separator, supplied loose	ZV011
Single filter with water separator and sensor, supplied loose	ZV021

(1). A pre filter must be fitted on all engines that is capable of handling a fuel flow of between 1.5 l/min and 2.5 l/min. Please contact Perkins Applications for more details if customer supplied.



2656F823 fuel filter water separator

Labels

Description	Code
Emissions label, LHS block, front low and Perkins decal (1) (2)	ZY003
Emissions label, LHS block, rear low and Perkins decal (1)	ZY004
Emissions label, RHS block, front low and Perkins decal	ZY005
Emissions label, LHS block, rear low (1)	ZY014
Emissions label, LHS block, front low and Perkins decal with additional emissions label supplied loose (1) (2)	ZY023
Emissions label, LHS block, rear low and Perkins decal with additional emissions label supplied loose (1)	ZY024

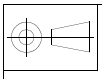
(1). Incompatible with Q**38.
(2). Incompatible with Q1023/Q1024/Q1025/Q1026.

Cab heater connections

Description	Code
Not required (1)	ZZ000
Without connections, rear of cylinder head plugged with threaded insert (1) (2)	ZZ001
Feed rear cylinder head, straight return to rear of the timing case (1) (2)	ZZ002
Feed LHS cylinder head, straight return to rear of the timing case (1)	ZZ004
Feed rear cylinder head, angled return to rear of the timing case (1) (2)	ZZ012
Feed LHS cylinder head, angled return to rear of the timing case	ZZ014
Feed rear cylinder head, plugged, angled return to rear of timing case (1) (2)	ZZ015
No feed, angled return to rear of timing case	ZZ016

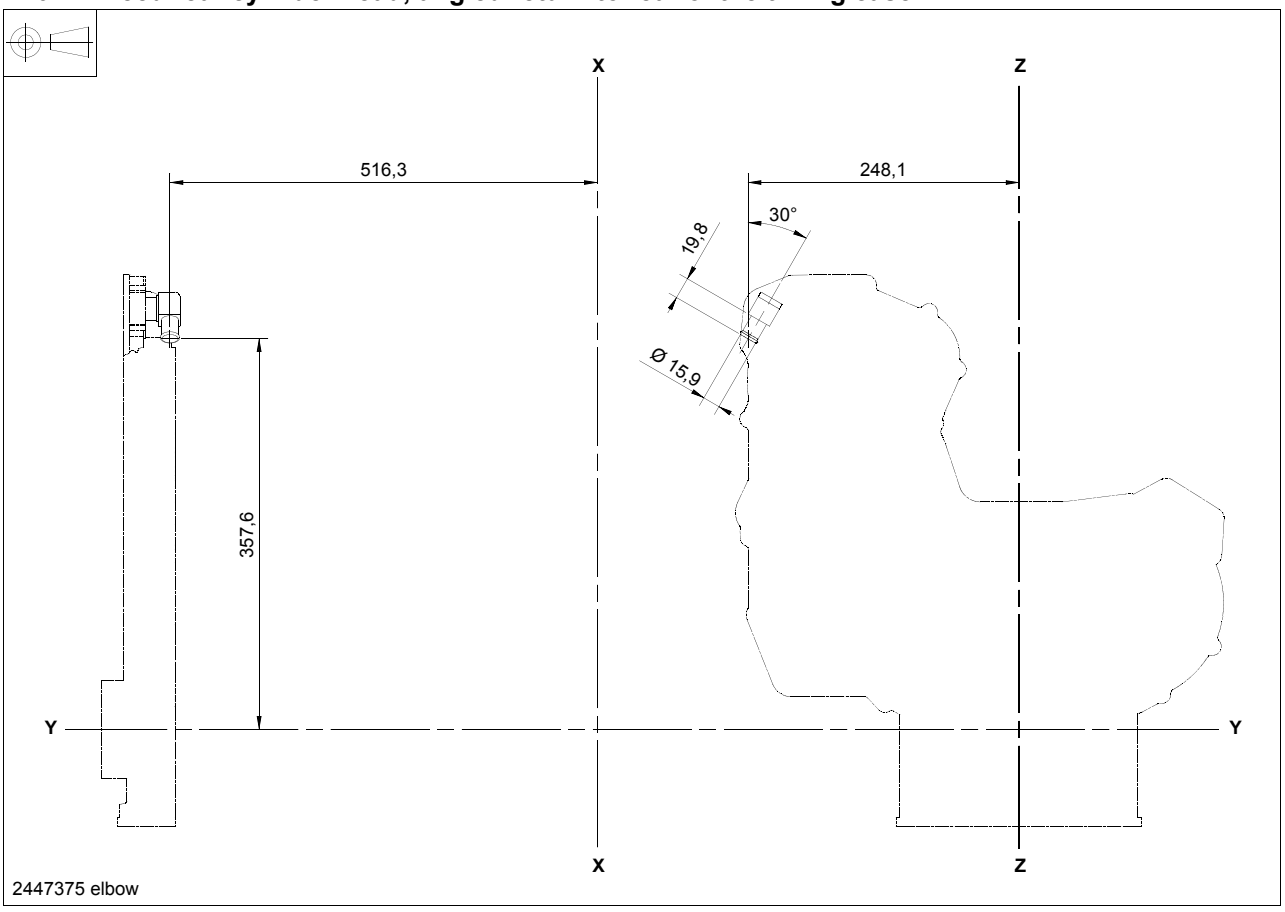
(1). Incompatible with Q1023/Q1024/Q1025/Q1026/Q4042.
(2). Not compatible with T6070.

ZZ001 - Without connections, rear of cylinder head plugged with threaded insert



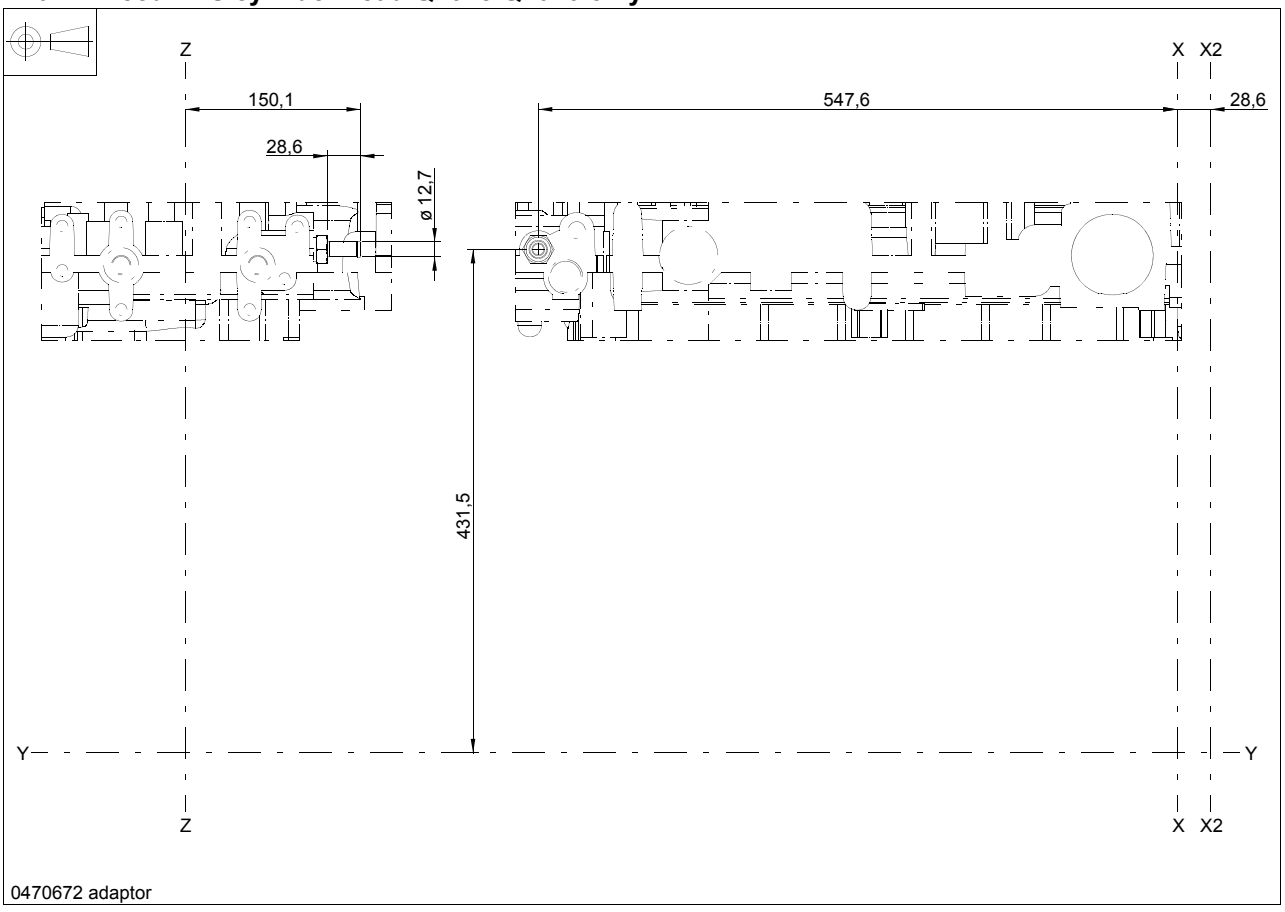
Drawing not available at time of print

ZZ012 - Feed rear cylinder head, angled return to rear of the timing case



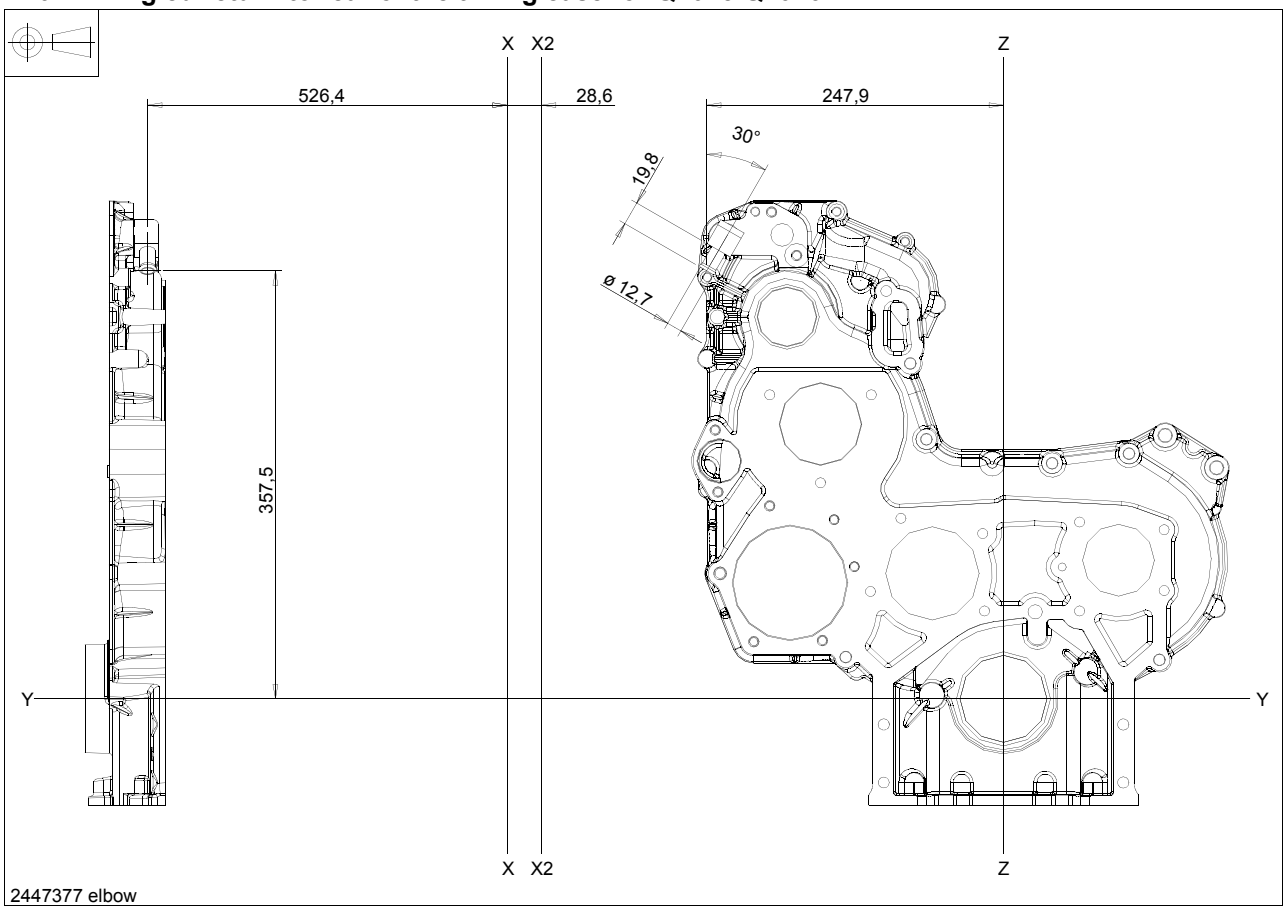
2447375 elbow

ZZ014 - Feed LHS cylinder head Q1025/Q1026 only



0470672 adaptor

ZZ014 - Angled return to rear of the timing case for Q1025/Q1026



6

Technical data

Introduction

The information given in the following chapter contains preliminary and target data and should only be used for preliminary calculations to assist the user to select the option for the 1104D (Mechanical FIE) project engine specifications.

If more information is required refer to the 1104D product team.

1100 series Electronic Applications and Installation Guide

https://ediscovery.cat.com/cda/files/124844/7/AandIguide_12.doc

1104D and 1106D Electrical and Electronic Installation Guide

https://ediscovery.cat.com/cda/files/245830/7/EEAIG_1106D_09AUG05_d3.2.pdf

Basic technical data

Models NK

Engine type: 1104D-44

Cylinder arrangement ... Vertical in-line

Cycle ... 4 stroke

Induction system ... Naturally Aspirated

Combustion system ... Direct injection

Bore ... 105,0 mm (4.13 in)

Stroke ... 127,0 mm (5.00 in)

Compression ratio ... 18.2 : 1

Cubic capacity ... 4,4 litres (269 in³)

Firing order ... 1, 3, 4, 2

Rotation ... Clockwise, viewed from front

Basic thread form ... Metric

Cooling system ... Liquid

0verall dimensions

Note: shown on general arrangement drawings (1)

Length (2) ... 663 mm (26.1 in)

Width ... 470 mm (18.5 in)

Height ... 810 mm (31.9 in)

Engine weights - non-stressed

Bare engine (dry) (3) ... 291 kg

Bare engine (wet) (3) ... TBA

Engine weights - stressed

Bare engine (dry) (3) ... 357 kg

Bare engine (wet) (3) ... TBA

Note: All values are with standard engine parts fitted, unless otherwise stated.

(1). Final weight and dimensions will depend on complete specification.
(2). Dimension from rear face of cylinder block to fan drive pulley face.
(3). Excludes flywheel housing, flywheel, and electrics.

Models NL

Engine type: 1104D-44T

Cylinder arrangement ..... Vertical in-line

Cycle ..... 4 stroke

Induction system ..... Turbocharged

Combustion system ..... Direct injection

Bore ..... 105,0 mm (4.13 in)

Stroke ..... 127,0 mm (5.00 in)

Compression ratio ..... 18·2 : 1

Cubic capacity ..... 4,4 litres (269 in³)

Firing order 1, 3, 4, 2

Rotation ..... Clockwise, viewed from front

Basic thread form ..... Metric

Cooling system ..... Liquid

0verall dimensions

Note: shown on general arrangement drawings (1)

Length (2) ..... 663 mm (26.1 in)

Width ..... 597 mm (23.5 in)

Height ..... 810 mm (31.9 in)

Engine weights - non-stressed

Bare engine (dry) (3) ..... 306 kg

Bare engine (wet) (3) ..... TBA

Engine weights - stressed

Bare engine (dry) (3) ..... 372 kg

Bare engine (wet) (3) ..... TBA

Note: All values are with standard engine parts fitted, unless otherwise stated.

(1). Final weight and dimensions will depend on complete specification.
(2). Dimension from rear face of cylinder block to fan drive pulley face.
(3). Excludes flywheel housing, flywheel, and electrics.

Models NM

Engine type: 1104D-44TA

Cylinder arrangement ... ... Vertical in-line

Cycle .. .. 4 stroke

Induction system ... ... Turbocharged air/air after cooling

Combustion system ... ... Direct injection

Bore ... ... 105,0 mm (4.13 in)

Stroke. ... ... 127,0 mm (5.00 in)

Compression ratio.. ... ... 18·2 : 1

Cubic capacity ... ... 4,4 litres (269 in³)

Firing order. 1, 3, 4, 2

Rotation.. ... ... Clockwise, viewed from front

Basic thread form... ... ... Metric

Cooling system .. .. Liquid

0verall dimensions

Note: shown on general arrangement drawings (1)

Length (2) ... ... 663 mm (26.1 in)

Width . ... 620 mm (24.4 in)

Height ... ... 775 mm (30.5 in)

Engine weights - non-stressed

Bare engine (dry) (3) ... ... 306 kg

Bare engine (wet) (3)... ... ... TBA

Engine weights - stressed

Bare engine (dry) (3) ... ... 372 kg

Bare engine (wet) (3)... ... ... TBA

Note: All values are with standard engine parts fitted, unless otherwise stated.

(1). Final weight and dimensions will depend on complete specification.
(2). Dimension from rear face of cylinder block to fan drive pulley face.
(3). Excludes flywheel housing, flywheel, and electrics.

Power curves

1104D-44 - T2968, (non-balanced)

Perkins

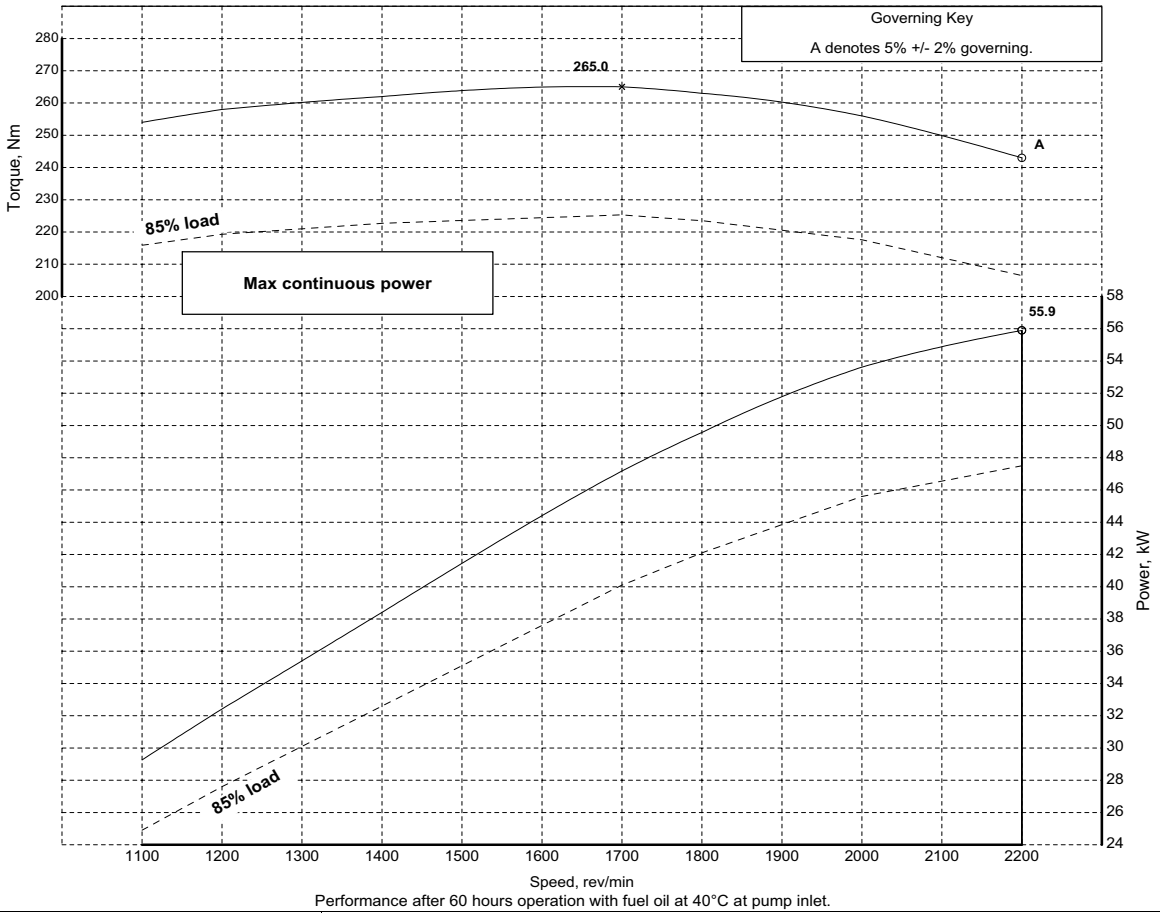
Engine Model:
1104D-44
Not certified to EPA legislation.
Not for operation in USA or Canada

Curve: T 2968 **Sheet 1**
Issue: 4 **Date:** 20-Jul-2007

Development Target - May be Subject to Change

Rating Standards:	ISO 14396: 2002
Production Tolerance On Power Output:	+5%, -5%
Total Barometric Pressure (kPa):	100
Vapour Pressure (kPa):	1
Air Inlet Temperature (°C):	25

Fuel Types:	Europe Off Highway	Europe Off Highway
Fuel Specification:	CEC RF-06-99	CEC RF-06-99
Density (kg/l @ 15°C):	0.833 - 0.837	0.833 - 0.837
Viscosity (mm²/s @ 40°C):	2.3 - 3.5	2.3 - 3.5
Sulphur Content (% mass):	0.03 max	0.03 max
Cetane No:	52 - 54	52 - 54



Performance after 60 hours operation with fuel oil at 40°C at pump inlet.

Notes:
1. For duty cycle refer to Perkins Engines (Peterborough) Limited statement on Product Duty Usage Limitations.

2. For power and torque data below 1100 rev/min refer to Perkins Engines Limited.

Auxiliaries fitted to engine:
Alternator - off load.
Balancer - not fitted.
Fan - not fitted.

Exhaust Quality Standard	**Certification Refs (Rated Speeds)**
Smoke:	
Emissions:	
EU NRMM 97/68/EC Stage 3A.	e11*97/68JA*2004/26*0892* (2200)

Power Standard	**Certification Refs (Rated Speeds)**
UN/ECE R120	120R-000080 (2200)

Approved by:	**Accepted by:**	**Issued by:**
R.C. Adams (Program Manager)	C. Herring (PE Manager)	J.H. Boorman (Legislation Engineer)
Date: 13-Jul-2007	**Date:** 20-Jul-2007	

Rating Curves Data Sheet

Curve T 2968 **Sheet 2**

Note1: Unless otherwise specified, all stated data is for maximum rated speed and 100% load.

General Data

Engine Model:	1104D-44
Number Of Cylinders:	4
Bore (mm):	105.0
Stroke (mm):	127.0
Configuration:	Vertical In Line
Displacement (litres):	4.4
Aspiration:	Naturally Aspirated
Compression Ratio:	18.2 : 1
Combustion Bowl:	Re-entrant

Fuel System

Fuel Pump Model:	Delphi DP310
Injection Timing (°BTDC) - Static:	
- Dynamic (needle lift pick-up):	-0.4
Lift Pump Pressure (Out) (kPa):	
Fuel Pump Pressure (In) (kPa):	
Fuel Filter Max Particle Size (micron):	
Fuel Return System Type:	

Lubrication System

Lubricating Oil Specification:	See Engine Specification Manual

Exhaust System

Exhaust Flow (kg/min):	4.84 (12.2 m³/min)
Exhaust Temperature (°C):	685

Cold Start Capability

Unaided Start Limit (°C):	-10
Aided Start Limit (°C):	-25
Start Aid (Optional):	Glowplugs fitted as standard
Minimum Cranking Speed (rev/min) - unaided:	Not applicable
- aided:	

Cooling System

Heat Rejected @ Rated Speed (kW):	36.8
Heat Rejected @ Peak Torque (kW):	29.1
Coolant Flow (litres/min):	184.0
Thermostat - Start To Open (°C):	82
Thermostat - Fully Open (°C):	93
Recommended Cap Pressure (kPa):	
Max Top Tank Pressure (kPa):	

Air System

Engine Air Flow (kg/min):	4.61 (3.96 m³/min)
Induction Manifold Pressure (kPa):	-3.0

Charge Air Cooler System

Charge Air Cooling System:	Not applicable
Max Total Pressure Drop inc Pipes (kPa):	Not applicable
Charge Air Cooler Heat Rejection (kW):	Not applicable
Manifold Charge Air Temperature (°C):	Not applicable

Turbocharger

Turbocharger Type:	Not applicable
Maximum Altitude (m):	600

Performance Data

Friction Power @ Rated Speed (kW):	
Friction Power @ Peak Torque (kW):	
Unboosted Torque @ 800 rev/min (Nm):	250
Unboosted Torque @ 1000 rev/min (Nm):	252

For further performance data see table below.

Performance Data — **Rating Standard:** ISO 14396: 2002

Speed (rev/min)	Torque (Nm)	Power (kW)	Max Exhaust Back Pressure (kPa)	Max Inlet Restriction (kPa)	Governing Categories (key on sht 1)
2200	243	55.9	10.0	3.0	A
2000	256	53.6	8.9		
1800	263	49.6	7.6		
1700	265	47.2	6.8		
1400	262	38.4	5.3		
1200	258	32.4	3.5		
1100	254	29.3	3.0		

Further Notes:

Released for operation on 48+ Cetane Number fuels only.

Internal References

Curve Issue No:	4	**DCP Number(s):**	TBD **TAN Number:**
Curve Issue Date :	20-Jul-2007		**FIE EDR Number**

1104D-44 - T2969, (balanced)

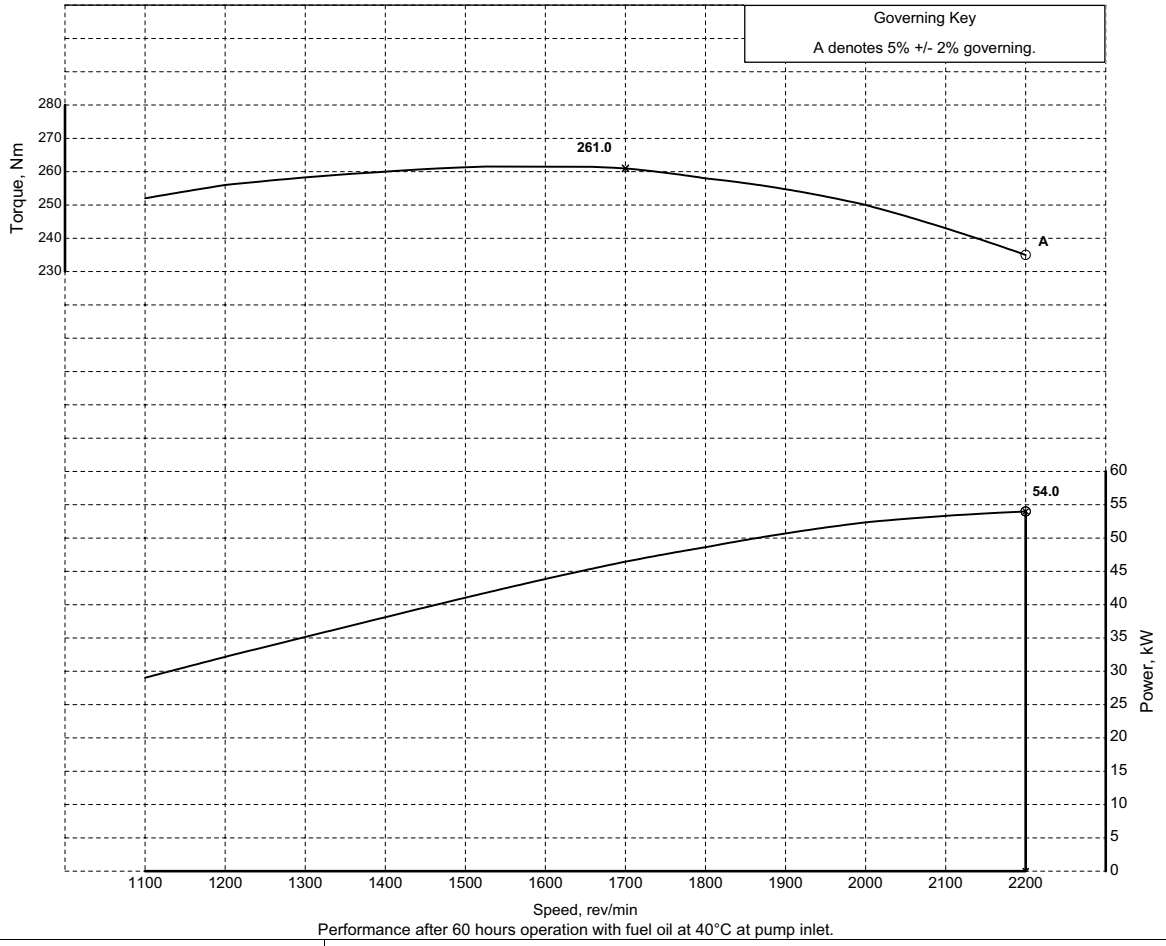
Perkins

Engine Model:
1104D-44
Not certified to EPA legislation.
Not for operation in USA or Canada

Curve: T 2969 **Sheet 1**
Issue: 4 **Date:** 20-Jul-2007

Development Target - May be Subject to Change

Rating Standards:	ISO 14396: 2002	**Fuel Types:**	Europe Off Highway
Production Tolerance On Power Output:	+5%, -5%	Fuel Specification:	CEC RF-06-99
Total Barometric Pressure (kPa):	100	Density (kg/l @ 15°C):	0.833 - 0.837
Vapour Pressure (kPa):	1	Viscosity (mm²/s @ 40°C):	2.3 - 3.5
Air Inlet Temperature (°C):	25	Sulphur Content (% mass):	0.03 max
		Cetane No:	52 - 54



Performance after 60 hours operation with fuel oil at 40°C at pump inlet.

Notes:
1. For duty cycle refer to Perkins Engines (Peterborough) Limited statement on Product Duty Usage Limitations.

2. For power and torque data below 1100 rev/min refer to Perkins Engines Limited.

Auxiliaries fitted to engine:
Alternator - off load.
Balancer - fitted.
Fan - not fitted.

Exhaust Quality Standard	**Certification Refs (Rated Speeds)**
Smoke:	
Emissions:	
EU NRMM 97/68/EC Stage 3A.	e11*97/68JA*2004/26*0892* (2200)

Power Standard	**Certification Refs (Rated Speeds)**
UN/ECE R120	120R-000080 (2200)

Approved by:	**Accepted by:**	**Issued by:**
R.C. Adams (Program Manager)	C. Herring (PE Manager)	J.H. Boorman (Legislation Engineer)
Date: 13-Jul-2007	**Date:** 20-Jul-2007	

Rating Curves Data Sheet

Curve T 2969 **Sheet 2**

Note1: Unless otherwise specified, all stated data is for maximum rated speed and 100% load.

General Data

Engine Model:	1104D-44
Number Of Cylinders:	4
Bore (mm):	105.0
Stroke (mm):	127.0
Configuration:	Vertical In Line
Displacement (litres):	4.4
Aspiration:	Naturally Aspirated
Compression Ratio:	18.2 : 1
Combustion Bowl:	Re-entrant

Fuel System

Fuel Pump Model:	Delphi DP310
Injection Timing (°BTDC) - Static:	
- Dynamic (needle lift pick-up):	
Lift Pump Pressure (Out) (kPa):	
Fuel Pump Pressure (In) (kPa):	
Fuel Filter Max Particle Size (micron):	
Fuel Return System Type:	

Lubrication System

Lubricating Oil Specification:	See Engine Specification Manual

Exhaust System

Exhaust Flow (kg/min):	4.84 (12.1 m³/min)
Exhaust Temperature (°C):	680

Cold Start Capability

Unaided Start Limit (°C):	-10
Aided Start Limit (°C):	-25
Start Aid (Optional):	Glowplugs fitted as standard
Minimum Cranking Speed (rev/min) - unaided:	Not applicable
- aided:	

Cooling System

Heat Rejected @ Rated Speed (kW):	36.8
Heat Rejected @ Peak Torque (kW):	29.1
Coolant Flow (litres/min):	184.0
Thermostat - Start To Open (°C):	82
Thermostat - Fully Open (°C):	93
Recommended Cap Pressure (kPa):	
Max Top Tank Pressure (kPa):	

Air System

Engine Air Flow (kg/min):	4.61 (3.96 m³/min)
Induction Manifold Pressure (kPa):	-3.0

Charge Air Cooler System

Charge Air Cooling System:	Not applicable
Max Total Pressure Drop inc Pipes (kPa):	Not applicable
Charge Air Cooler Heat Rejection (kW):	Not applicable
Manifold Charge Air Temperature (°C):	Not applicable

Turbocharger

Turbocharger Type:	Not applicable
Maximum Altitude (m):	600

Performance Data

Friction Power @ Rated Speed (kW):	
Friction Power @ Peak Torque (kW):	
Unboosted Torque @ 800 rev/min (Nm):	248
Unboosted Torque @ 1000 rev/min (Nm):	250

For further performance data see table below.

Performance Data — **Rating Standard:** ISO 14396: 2002

Speed (rev/min)	Torque (Nm)	Power (kW)	Max Exhaust Back Pressure (kPa)	Max Inlet Restriction (kPa)	Governing Categories (key on sht 1)
2200	235	54.0	10.0	3.0	A
2000	250	52.4	8.9		
1800	258	48.6	7.6		
1700	261	46.5	6.8		
1400	260	38.1	5.3		
1200	256	32.2	3.5		
1100	252	29.0	3.0		

Further Notes:

Released for operation on 48+ Cetane Number fuels only.

Internal References

Curve Issue No:	4	**DCP Number(s):**	TBD **TAN Number:**
Curve Issue Date :	20-Jul-2007		**FIE EDR Number**

1104D-44T - T2970, (non-balanced)

Perkins

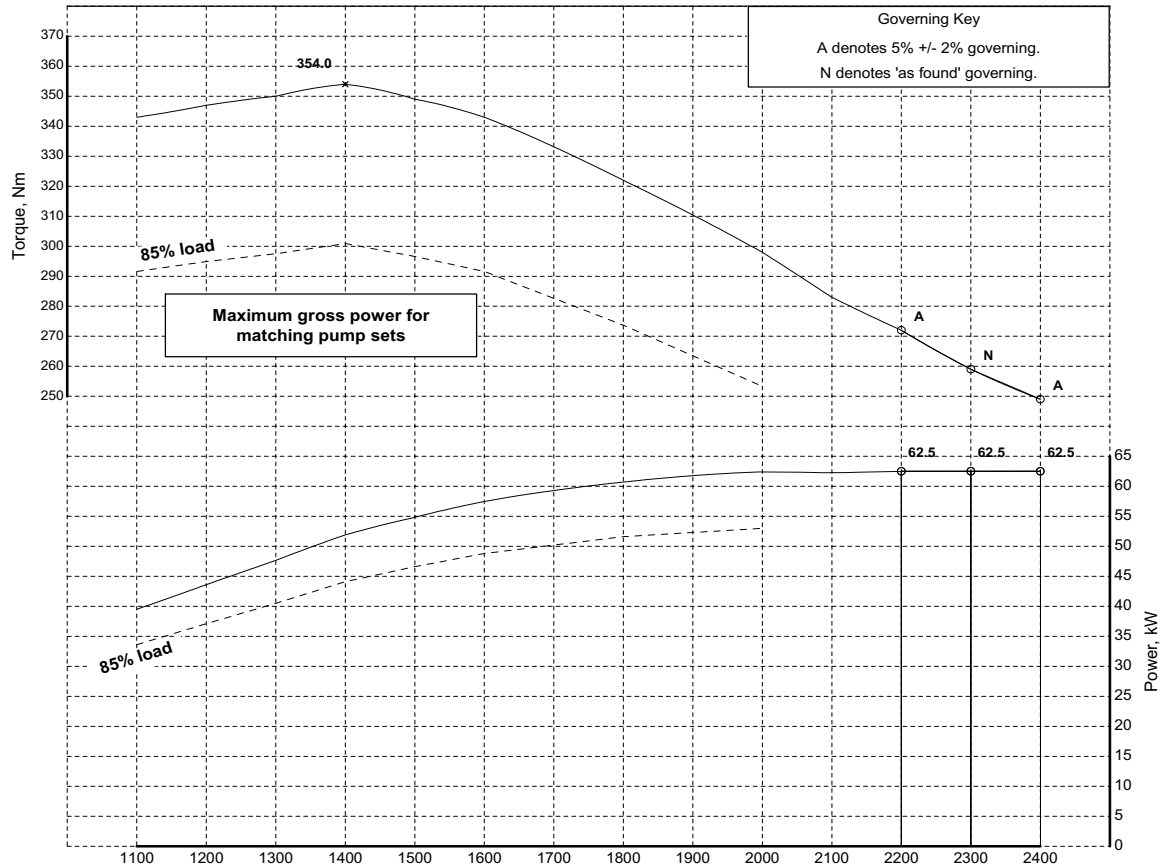
Engine Model: 1104D-44T

Curve: T 2970 **Sheet 1**
Issue: 4 **Date:** 9-Nov-2007

Development Target - May be Subject to Change

Rating Standards:	ISO 14396: 2002
Production Tolerance On Power Output:	+5%, -5%
Total Barometric Pressure (kPa):	100
Vapour Pressure (kPa):	1
Air Inlet Temperature (°C):	25

Fuel Types:	Europe Off Highway	USA FED Off Highway
Fuel Specification:	CEC RF-06-99	EPA 2D 89.330 2004
Density (kg/l @ 15°C):	0.833 - 0.837	0.840 - 0.865
Viscosity (mm²/s @ 40°C):	2.3 - 3.5	2.0 - 3.2
Sulphur Content (% mass):	0.03 max	0.03 - 0.2
Cetane No:	52 - 54	40 - 48



Performance after 60 hours operation with fuel oil at 40°C at pump inlet.

Notes:

1. For duty cycle refer to Perkins Engines (Peterborough) Limited statement on Product Duty Usage Limitations.

2. For power and torque data below 1100 rev/min refer to Perkins Engines Limited.

3. Smoke may be higher in some modes of operation than equivalent 1104C rating. For further details refer to section 6 of ESM or contact local Perkins Applications Team.

Auxiliaries fitted to engine:
Alternator - off load.
Balancer - not fitted.
Fan - not fitted.

Exhaust Quality Standard	**Certification Refs (Rated Speeds)**
Smoke: See Note 3.	
Emissions:	
EU NRMM 97/68/EC Stage 3A.	e11*97/68JA*2004/26*0884* (2400, 2300, 2200)
US EPA 40 CFR Part 89 Tier 3.	PKXL04.4NL1 (2400, 2300, 2200)
Power Standard	**Certification Refs (Rated Speeds)**
UN/ECE R120	120R-000079 (2400, 2300, 2200)

Approved by:	**Accepted by:**	**Issued by:**
E. Hughes (Product Manager)	C. Herring (PE Manager)	J.H. Boorman (Legislation Engineer)
Date: 8-Nov-2007	**Date:** 8-Nov-2007	

Rating Curves Data Sheet

Curve T 2970 **Sheet 2**

Note1: Unless otherwise specified, all stated data is for maximum rated speed and 100% load.

General Data

Engine Model:	1104D-44T
Number Of Cylinders:	4
Bore (mm):	105.0
Stroke (mm):	127.0
Configuration:	Vertical In Line
Displacement (litres):	4.4
Aspiration:	Turbocharged
Compression Ratio:	18.2 : 1
Combustion Bowl:	Re-entrant

Fuel System

Fuel Pump Model:	Delphi DP310
Injection Timing (°BTDC) - Static:	
- Dynamic (needle lift pick-up):	
Lift Pump Pressure (Out) (kPa):	
Fuel Pump Pressure (In) (kPa):	
Fuel Filter Max Particle Size (micron):	
Fuel Return System Type:	

Lubrication System

Lubricating Oil Specification:	See Engine Specification Manual

Exhaust System

Exhaust Flow (kg/min):	6.87 (13.9 m³/min)
Exhaust Temperature (°C):	535 (ATC)

Cold Start Capability

Unaided Start Limit (°C):	-10
Aided Start Limit (°C):	-25
Start Aid (Optional):	Glowplugs fitted as standard
Minimum Cranking Speed (rev/min) - unaided:	Not applicable
- aided:	

Cooling System

Heat Rejected @ Rated Speed (kW):	46.7
Heat Rejected @ Peak Torque (kW):	34.5
Coolant Flow (litres/min):	201.0
Thermostat - Start To Open (°C):	82
Thermostat - Fully Open (°C):	93
Recommended Cap Pressure (kPa):	
Max Top Tank Pressure (kPa):	

Air System

Engine Air Flow (kg/min):	6.60 (5.67 m³/min)
Induction Manifold Pressure (kPa):	92.6

Charge Air Cooler System

Charge Air Cooling System:	Not applicable
Max Total Pressure Drop inc Pipes (kPa):	Not applicable
Charge Air Cooler Heat Rejection (kW):	Not applicable
Manifold Charge Air Temperature (°C):	Not applicable

Turbocharger

Turbocharger Type:	
Maximum Altitude (m):	3000

Performance Data

Friction Power @ Rated Speed (kW):	
Friction Power @ Peak Torque (kW):	
Unboosted Torque @ 800 rev/min (Nm):	240
Unboosted Torque @ 1000 rev/min (Nm):	240

For further performance data see table below.

Performance Data — **Rating Standard:** ISO 14396: 2002

Speed (rev/min)	Torque (Nm)	Power (kW)	Max Exhaust Back Pressure (kPa)	Max Inlet Restriction (kPa)	Governing Categories (key on sht 1)
2400	249	62.5	15.0	5.0	A
2300	259	62.5	15.0	5.0	N
2200	272	62.5	15.0	5.0	A
2100	283	62.2	13.9		
2000	298	62.4	12.6		
1800	322	60.7	10.5		
1600	343	57.5	9.7		
1500	349	54.8	9.1		
1400	354	51.9	8.0	2.7	
1300	350	47.6	6.9		
1200	347	43.6	5.5		
1100	343	39.5	4.6		

Further Notes:

Internal References

Curve Issue No:	4	**DCP Number(s):**	ECR002775	**TAN Number:**	
Curve Issue Date :	9-Nov-2007			**FIE EDR Number**	

1104D-44T - T2971, (balanced)

Perkins

Engine Model: 1104D-44T

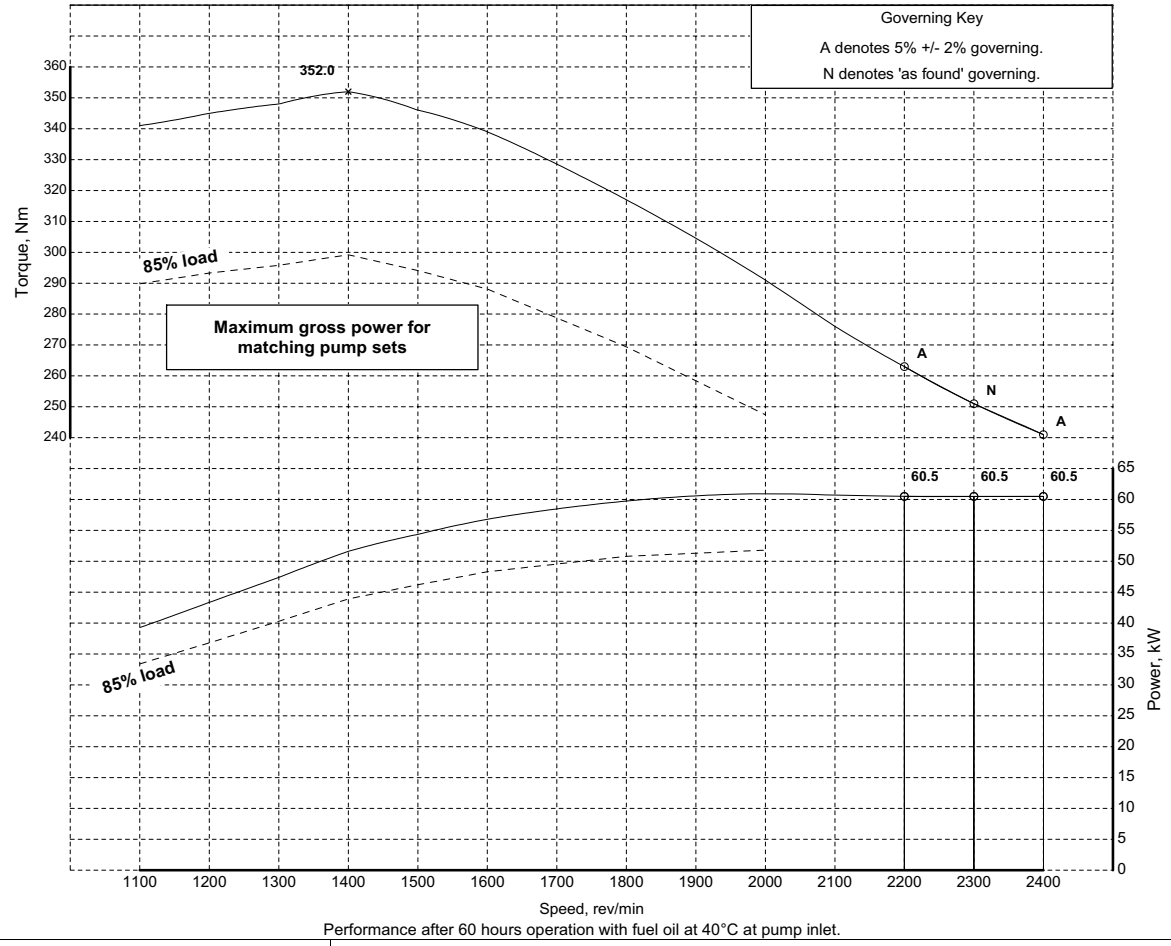
Curve: T 2971 **Sheet 1**

Issue: 4 **Date:** 9-Nov-2007

Development Target - May be Subject to Change

Rating Standards:	ISO 14396: 2002
Production Tolerance On Power Output:	+5%, -5%
Total Barometric Pressure (kPa):	100
Vapour Pressure (kPa):	1
Air Inlet Temperature (°C):	25

Fuel Types:	Europe Off Highway	USA FED Off Highway
Fuel Specification:	CEC RF-06-99	EPA 2D 89.330 2004
Density (kg/l @ 15°C):	0.833 - 0.837	0.840 - 0.865
Viscosity (mm²/s @ 40°C):	2.3 - 3.5	2.0 - 3.2
Sulphur Content (% mass):	0.03 max	0.03 - 0.2
Cetane No:	52 - 54	40 - 48



Performance after 60 hours operation with fuel oil at 40°C at pump inlet.

Notes:

1. For duty cycle refer to Perkins Engines (Peterborough) Limited statement on Product Duty Usage Limitations.

2. For power and torque data below 1100 rev/min refer to Perkins Engines Limited.

3. Smoke may be higher in some modes of operation than equivalent 1104C rating. For further details refer to section 6 of ESM or contact local Perkins Applications Team.

Auxiliaries fitted to engine:
Alternator - off load.
Balancer - fitted.
Fan - not fitted.

Exhaust Quality Standard	**Certification Refs (Rated Speeds)**
Smoke:	
See Note 3.	
77/537/EEC- Includes FAS.	
Emissions:	
EU NRMM 97/68/EC Stage 3A.	e11*97/68JA*2004/26*0884* (2400, 2300, 2200)
US EPA 40 CFR Part 89 Tier 3.	PKXL04.4NL1 (2400, 2300, 2200)
Power Standard	**Certification Refs (Rated Speeds)**
UN/ECE R120	120R-000079 (2400, 2300, 2200)

Approved by:	**Accepted by:**	**Issued by:**
E. Hughes (Product Manager)	C. Herring (PE Manager)	J.H. Boorman (Legislation Engineer)
Date: 8-Nov-2007	**Date:** 8-Nov-2007	

Rating Curves Data Sheet

Curve T 2971 **Sheet 2**

Note1: Unless otherwise specified, all stated data is for maximum rated speed and 100% load.

General Data

Engine Model:	1104D-44T
Number Of Cylinders:	4
Bore (mm):	105.0
Stroke (mm):	127.0
Configuration:	Vertical In Line
Displacement (litres):	4.4
Aspiration:	Turbocharged
Compression Ratio:	18.2 : 1
Combustion Bowl:	Re-entrant

Fuel System

Fuel Pump Model:	Delphi DP310
Injection Timing (°BTDC) - Static:	
- Dynamic (needle lift pick-up):	
Lift Pump Pressure (Out) (kPa):	
Fuel Pump Pressure (In) (kPa):	
Fuel Filter Max Particle Size (micron):	
Fuel Return System Type:	

Lubrication System

Lubricating Oil Specification:	See Engine Specification Manual

Exhaust System

Exhaust Flow (kg/min):	6.87 (13.9 m³/min)
Exhaust Temperature (°C):	535 (ATC)

Cold Start Capability

Unaided Start Limit (°C):	-10
Aided Start Limit (°C):	-25
Start Aid (Optional):	Glowplugs fitted as standard
Minimum Cranking Speed (rev/min) - unaided:	Not applicable
- aided:	

Cooling System

Heat Rejected @ Rated Speed (kW):	46.7
Heat Rejected @ Peak Torque (kW):	34.5
Coolant Flow (litres/min):	201.0
Thermostat - Start To Open (°C):	82
Thermostat - Fully Open (°C):	93
Recommended Cap Pressure (kPa):	
Max Top Tank Pressure (kPa):	

Air System

Engine Air Flow (kg/min):	6.60 (5.67 m³/min)
Induction Manifold Pressure (kPa):	92.1

Charge Air Cooler System

Charge Air Cooling System:	Not applicable
Max Total Pressure Drop inc Pipes (kPa):	Not applicable
Charge Air Cooler Heat Rejection (kW):	Not applicable
Manifold Charge Air Temperature (°C):	Not applicable

Turbocharger

Turbocharger Type:	
Maximum Altitude (m):	3000

Performance Data

Friction Power @ Rated Speed (kW):	
Friction Power @ Peak Torque (kW):	
Unboosted Torque @ 800 rev/min (Nm):	238
Unboosted Torque @ 1000 rev/min (Nm):	238

For further performance data see table below.

Performance Data — **Rating Standard:** ISO 14396: 2002

Speed (rev/min)	Torque (Nm)	Power (kW)	Max Exhaust Back Pressure (kPa)	Max Inlet Restriction (kPa)	Governing Categories (key on sht 1)
2400	241	60.5	15.0	5.0	A
2300	251	60.5	15.0	5.0	N
2200	263	60.5	15.0	5.0	A
2100	276	60.7	13.9		
2000	291	60.9	12.6		
1800	317	59.8	10.5		
1600	339	56.8	9.7		
1500	346	54.3	9.1		
1400	352	51.6	8.0		
1300	348	47.4	6.9		
1200	345	43.4	5.5		
1100	341	39.3	4.6		

Further Notes:

Internal References

Curve Issue No: 4 **DCP Number(s):** ECR002775 **TAN Number:**

Curve Issue Date : 9-Nov-2007 **FIE EDR Number**

1104D-44TA - T2972, (balanced)

Perkins

Engine Model: 1104D-44TA

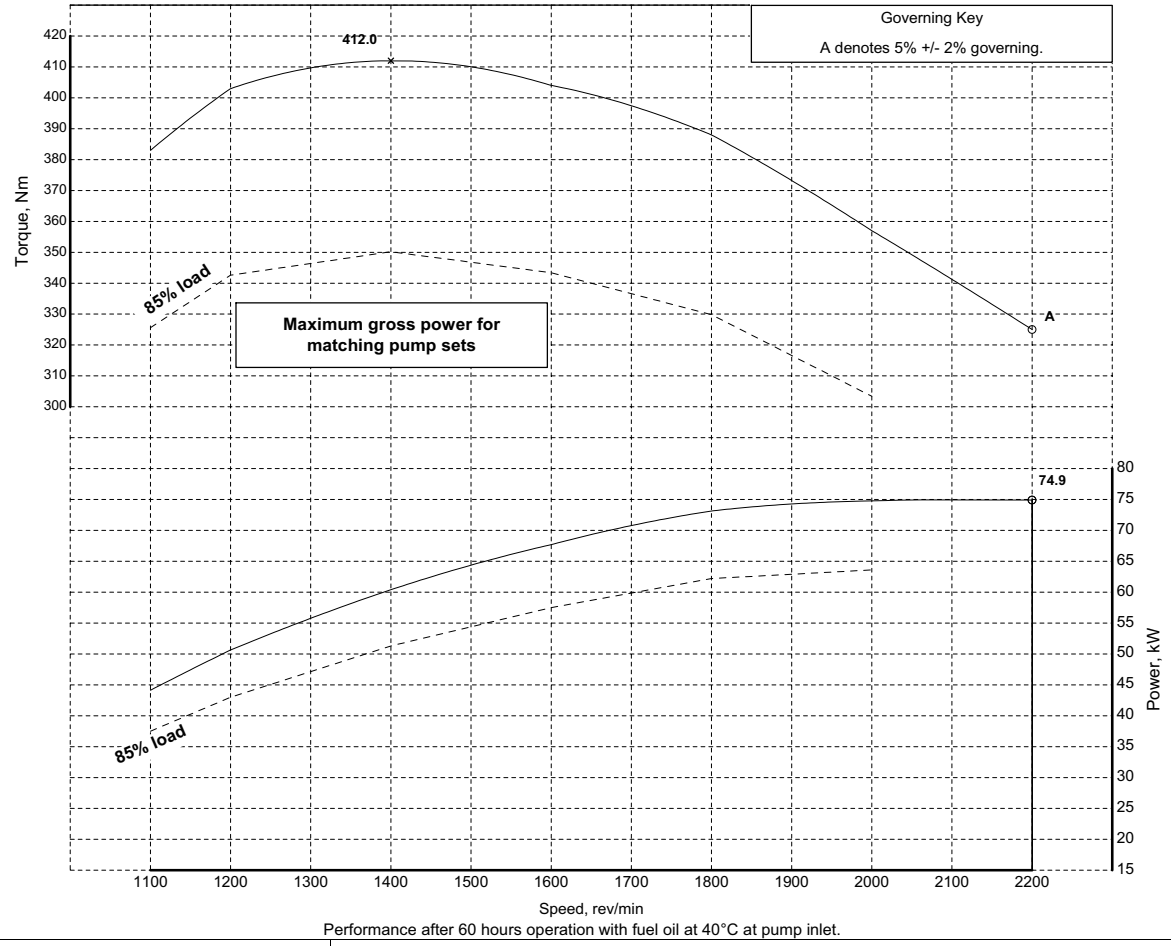
Curve: T 2972 **Sheet 1**

Issue: 4 **Date:** 9-Nov-2007

Development Target - May be Subject to Change

Rating Standards:	ISO 14396: 2002
Production Tolerance On Power Output:	+5%, -5%
Total Barometric Pressure (kPa):	100
Vapour Pressure (kPa):	1
Air Inlet Temperature (°C):	25

Fuel Types:	Europe Off Highway	USA FED Off Highway
Fuel Specification:	CEC RF-06-99	EPA 2D 89.330 2004
Density (kg/l @ 15°C):	0.833 - 0.837	0.840 - 0.865
Viscosity (mm²/s @ 40°C):	2.3 - 3.5	2.0 - 3.2
Sulphur Content (% mass):	0.03 max	0.03 - 0.2
Cetane No:	52 - 54	40 - 48



Performance after 60 hours operation with fuel oil at 40°C at pump inlet.

Notes:

1. For duty cycle refer to Perkins Engines (Peterborough) Limited statement on Product Duty Usage Limitations.

2. For power and torque data below 1100 rev/min refer to Perkins Engines Limited.

3. Smoke may be higher in some modes of operation than equivalent 1104C rating. For further details refer to section 6 of ESM or contact local Perkins Applications Team.

Auxiliaries fitted to engine:
Alternator - off load.
Balancer - fitted.
Fan - not fitted.

Exhaust Quality Standard	**Certification Refs (Rated Speeds)**
Smoke:	
See Note 3.	
77/537/EEC- Includes FAS.	
Emissions:	
EU NRMM 97/68/EC Stage 3A.	e11*97/68JA*2004/26*0879* (2200)
US EPA 40 CFR Part 89 Tier 3.	PKXL04.4NM2 (2200)
Power Standard	**Certification Refs (Rated Speeds)**
UN/ECE R120	120R-000078 (2200)

Approved by:	**Accepted by:**	**Issued by:**
E. Hughes (Product Manager)	C. Herring (PE Manager)	J.H. Boorman (Legislation Engineer)
Date: 8-Nov-2007	**Date:** 8-Nov-2007	

Rating Curves Data Sheet

Curve T 2972 **Sheet 2**

Note1: Unless otherwise specified, all stated data is for maximum rated speed and 100% load.

General Data

Engine Model:	1104D-44TA
Number Of Cylinders:	4
Bore (mm):	105.0
Stroke (mm):	127.0
Configuration:	Vertical In Line
Displacement (litres):	4.4
Aspiration:	Turbocharged
Compression Ratio:	18.2 : 1
Combustion Bowl:	Re-entrant

Fuel System

Fuel Pump Model:	Delphi DP310
Injection Timing (°BTDC) - Static:	
- Dynamic (needle lift pick-up):	-3.4
Lift Pump Pressure (Out) (kPa):	
Fuel Pump Pressure (In) (kPa):	
Fuel Filter Max Particle Size (micron):	
Fuel Return System Type:	

Lubrication System

Lubricating Oil Specification:	See Engine Specification Manual

Exhaust System

Exhaust Flow (kg/min):	7.94 (15.5 m³/min)
Exhaust Temperature (°C):	505 (ATC)

Cold Start Capability

Unaided Start Limit (°C):	-10
Aided Start Limit (°C):	-25
Start Aid (Optional):	Glowplugs fitted as standard
Minimum Cranking Speed (rev/min) - unaided:	Not applicable
- aided:	

Cooling System

Heat Rejected @ Rated Speed (kW):	45.7
Heat Rejected @ Peak Torque (kW):	37.2
Coolant Flow (litres/min):	184.0
Thermostat - Start To Open (°C):	82
Thermostat - Fully Open (°C):	93
Recommended Cap Pressure (kPa):	
Max Top Tank Pressure (kPa):	

Air System

Engine Air Flow (kg/min):	7.64 (6.56 m³/min)
Induction Manifold Pressure (kPa):	101.0

Charge Air Cooler System

Charge Air Cooling System:	Air-to-Air
Max Total Pressure Drop inc Pipes (kPa):	10.0
Charge Air Cooler Heat Rejection (kW):	8.6
Manifold Charge Air Temperature (°C):	55.0

Turbocharger

Turbocharger Type:	
Maximum Altitude (m):	3000

Performance Data

Friction Power @ Rated Speed (kW):	
Friction Power @ Peak Torque (kW):	
Unboosted Torque @ 800 rev/min (Nm):	265
Unboosted Torque @ 1000 rev/min (Nm):	265

For further performance data see table below.

Performance Data **Rating Standard:** ISO 14396: 2002

Speed (rev/min)	Torque (Nm)	Power (kW)	Max Exhaust Back Pressure (kPa)	Max Inlet Restriction (kPa)	Governing Categories (key on sht 1)
2200	325	74.9	15.0	5.0	A
2000	357	74.8	12.6		
1800	388	73.1	11.1		
1600	404	67.7	9.2		
1400	412	60.4	6.7		
1200	403	50.6	4.3		
1100	383	44.1	3.3		

Further Notes:

Internal References

Curve Issue No:	4	**DCP Number(s):**	ECR002775	**TAN Number:**	
Curve Issue Date :	9-Nov-2007			**FIE EDR Number**	

1104D-44T - T2978, (non-balanced)

Perkins

Engine Model: 1104D-44T

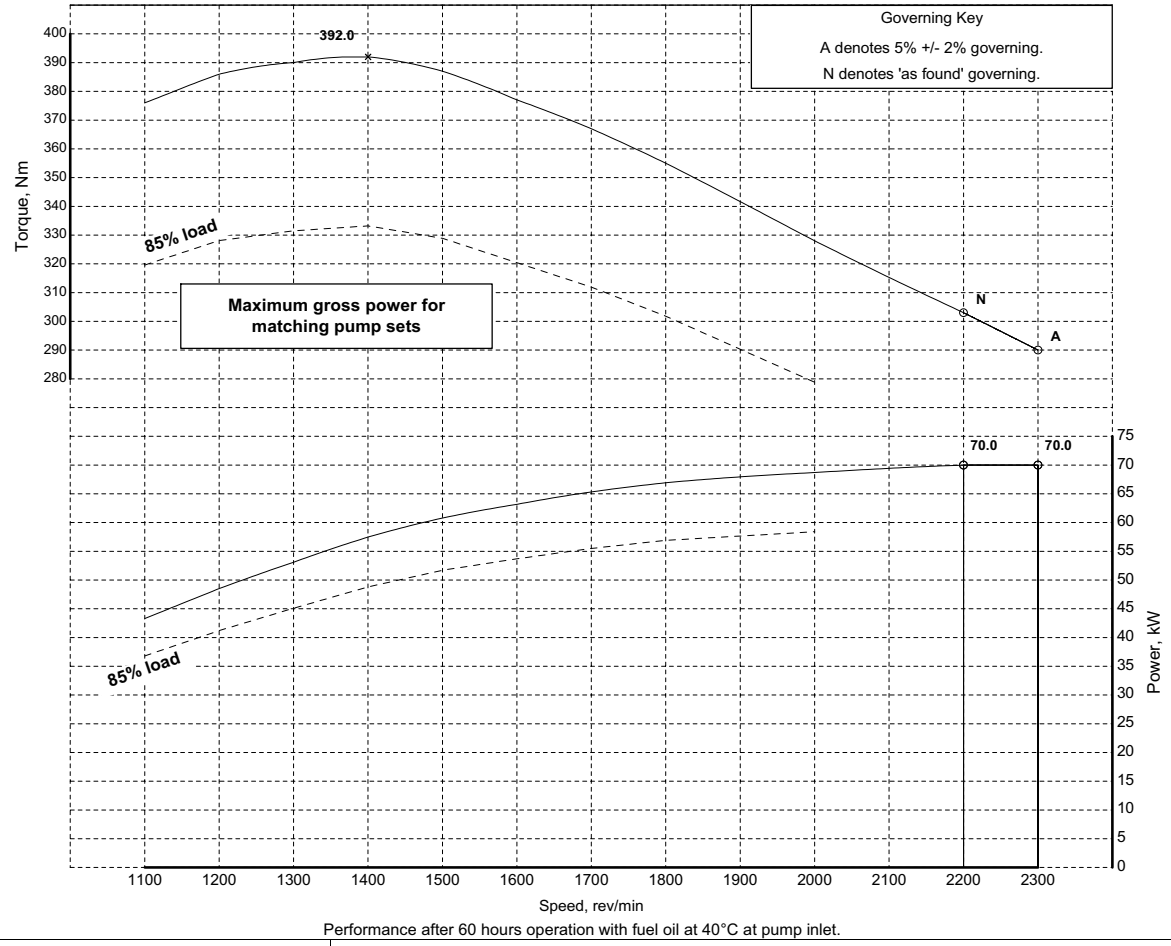
Curve: T 2978 **Sheet 1**

Issue: 4 **Date:** 9-Nov-2007

Development Target - May be Subject to Change

Rating Standards:	ISO 14396: 2002
Production Tolerance On Power Output:	+5%, -5%
Total Barometric Pressure (kPa):	100
Vapour Pressure (kPa):	1
Air Inlet Temperature (°C):	25

Fuel Types:	Europe Off Highway	USA FED Off Highway
Fuel Specification:	CEC RF-06-99	EPA 2D 89.330 2004
Density (kg/l @ 15°C):	0.833 - 0.837	0.840 - 0.865
Viscosity (mm²/s @ 40°C):	2.3 - 3.5	2.0 - 3.2
Sulphur Content (% mass):	0.03 max	0.03 - 0.2
Cetane No:	52 - 54	40 - 48



Performance after 60 hours operation with fuel oil at 40°C at pump inlet.

Notes:

1. For duty cycle refer to Perkins Engines (Peterborough) Limited statement on Product Duty Usage Limitations.

2. For power and torque data below 1100 rev/min refer to Perkins Engines Limited.

3. Smoke may be higher in some modes of operation than equivalent 1104C rating. For further details refer to section 6 of ESM or contact local Perkins Applications Team.

Auxiliaries fitted to engine:
Alternator - off load.
Balancer - not fitted.
Fan - not fitted.

Exhaust Quality Standard	**Certification Refs (Rated Speeds)**
Smoke:	
See Note 3.	
Emissions:	
EU NRMM 97/68/EC Stage 3A.	e11*97/68JA*2004/26*0884* (2300, 2200)
US EPA 40 CFR Part 89 Tier 3.	PKXL04.4NL1 (2300, 2200)
Power Standard	**Certification Refs (Rated Speeds)**
UN/ECE R120	120R-000079 (2300, 2200)

Approved by:	**Accepted by:**	**Issued by:**
E. Hughes (Product Manager)	C. Herring (PE Manager)	J.H. Boorman (Legislation Engineer)
Date: 8-Nov-2007	**Date:** 8-Nov-2007	

Rating Curves Data Sheet

Curve T 2978 **Sheet 2**

Note1: Unless otherwise specified, all stated data is for maximum rated speed and 100% load.

General Data

Engine Model:	1104D-44T
Number Of Cylinders:	4
Bore (mm):	105.0
Stroke (mm):	127.0
Configuration:	Vertical In Line
Displacement (litres):	4.4
Aspiration:	Turbocharged
Compression Ratio:	18.2 : 1
Combustion Bowl:	Re-entrant

Fuel System

Fuel Pump Model:	Delphi DP310
Injection Timing (°BTDC) - Static:	
- Dynamic (needle lift pick-up):	0.1
Lift Pump Pressure (Out) (kPa):	
Fuel Pump Pressure (In) (kPa):	
Fuel Filter Max Particle Size (micron):	
Fuel Return System Type:	

Lubrication System

Lubricating Oil Specification:	See Engine Specification Manual

Exhaust System

Exhaust Flow (kg/min):	7.58 (15.3 m³/min)
Exhaust Temperature (°C):	530 (ATC)

Cold Start Capability

Unaided Start Limit (°C):	-10
Aided Start Limit (°C):	-25
Start Aid (Optional):	Glowplugs fitted as standard
Minimum Cranking Speed (rev/min) - unaided:	Not applicable
- aided:	

Cooling System

Heat Rejected @ Rated Speed (kW):	50.4
Heat Rejected @ Peak Torque (kW):	40.4
Coolant Flow (litres/min):	193.0
Thermostat - Start To Open (°C):	82
Thermostat - Fully Open (°C):	93
Recommended Cap Pressure (kPa):	
Max Top Tank Pressure (kPa):	

Air System

Engine Air Flow (kg/min):	7.29 (6.26 m³/min)
Induction Manifold Pressure (kPa):	112.0

Charge Air Cooler System

Charge Air Cooling System:	Not applicable
Max Total Pressure Drop inc Pipes (kPa):	Not applicable
Charge Air Cooler Heat Rejection (kW):	Not applicable
Manifold Charge Air Temperature (°C):	Not applicable

Turbocharger

Turbocharger Type:	
Maximum Altitude (m):	3000

Performance Data

Friction Power @ Rated Speed (kW):	
Friction Power @ Peak Torque (kW):	
Unboosted Torque @ 800 rev/min (Nm):	240
Unboosted Torque @ 1000 rev/min (Nm):	240

For further performance data see table below.

Performance Data — **Rating Standard:** ISO 14396: 2002

Speed (rev/min)	Torque (Nm)	Power (kW)	Max Exhaust Back Pressure (kPa)	Max Inlet Restriction (kPa)	Governing Categories (key on sht 1)
2300	290	70.0	15.0	5.0	A
2200	303	70.0	15.0	5.0	N
2000	328	68.7	13.3		
1800	355	66.9	11.6		
1700	367	65.3	11.0		
1600	377	63.2	10.5		
1500	387	60.8	9.3		
1400	392	57.5	8.0		
1300	390	53.1	6.9		
1200	386	48.5	5.7		
1100	376	43.3	4.5		

Further Notes:

Internal References

Curve Issue No: 4 **DCP Number(s):** ECR002775 **TAN Number:**

Curve Issue Date : 9-Nov-2007 **FIE EDR Number**

1104D-44T - T2979, (balanced)

Perkins

Engine Model: 1104D-44T

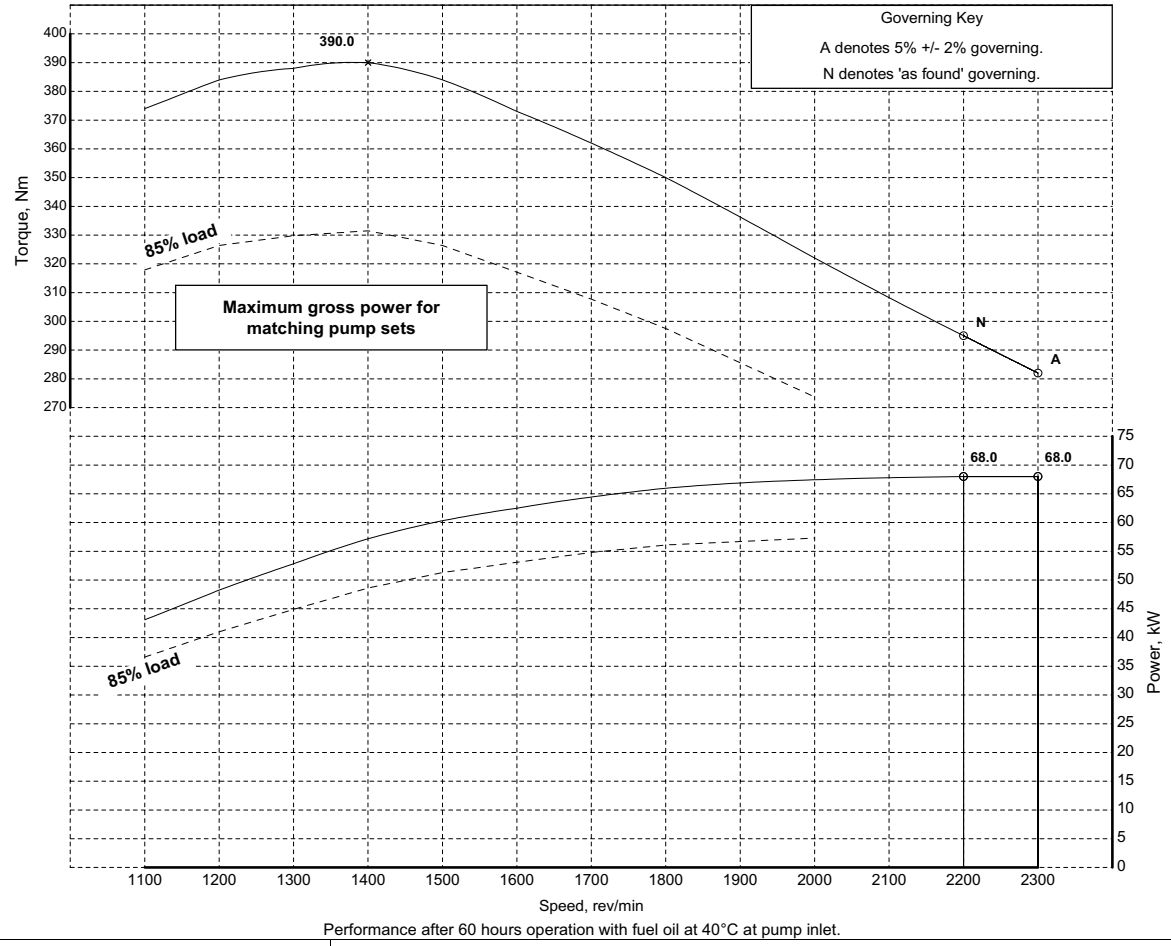
Curve: T 2979 **Sheet 1**

Issue: 4 **Date:** 9-Nov-2007

Development Target - May be Subject to Change

Rating Standards:	ISO 14396: 2002
Production Tolerance On Power Output:	+5%, -5%
Total Barometric Pressure (kPa):	100
Vapour Pressure (kPa):	1
Air Inlet Temperature (°C):	25

Fuel Types:	Europe Off Highway	USA FED Off Highway
Fuel Specification:	CEC RF-06-99	EPA 2D 89.330 2004
Density (kg/l @ 15°C):	0.833 - 0.837	0.840 - 0.865
Viscosity (mm²/s @ 40°C):	2.3 - 3.5	2.0 - 3.2
Sulphur Content (% mass):	0.03 max	0.03 - 0.2
Cetane No:	52 - 54	40 - 48



Performance after 60 hours operation with fuel oil at 40°C at pump inlet.

Notes:

1. For duty cycle refer to Perkins Engines (Peterborough) Limited statement on Product Duty Usage Limitations.

2. For power and torque data below 1100 rev/min refer to Perkins Engines Limited.

3. Smoke may be higher in some modes of operation than equivalent 1104C rating. For further details refer to section 6 of ESM or contact local Perkins Applications Team.

Auxiliaries fitted to engine:
Alternator - off load.
Balancer - fitted.
Fan - not fitted.

Exhaust Quality Standard	**Certification Refs (Rated Speeds)**
Smoke:	
See Note 3.	
77/537/EEC- Includes FAS.	
Emissions:	
EU NRMM 97/68/EC Stage 3A.	e11*97/68JA*2004/26*0884* (2300, 2200)
US EPA 40 CFR Part 89 Tier 3.	PKXL04.4NL1 (2300, 2200)
Power Standard	**Certification Refs (Rated Speeds)**
UN/ECE R120	120R-000079 (2300, 2200)

Approved by:	**Accepted by:**	**Issued by:**
E. Hughes (Product Manager)	C. Herring (PE Manager)	J.H. Boorman (Legislation Engineer)
Date: 8-Nov-2007	**Date:** 8-Nov-2007	

Rating Curves Data Sheet

Curve T 2979 **Sheet 2**

Note1: Unless otherwise specified, all stated data is for maximum rated speed and 100% load.

General Data

Engine Model:	1104D-44T
Number Of Cylinders:	4
Bore (mm):	105.0
Stroke (mm):	127.0
Configuration:	Vertical In Line
Displacement (litres):	4.4
Aspiration:	Turbocharged
Compression Ratio:	18.2 : 1
Combustion Bowl:	Re-entrant

Fuel System

Fuel Pump Model:	Delphi DP310
Injection Timing (°BTDC) - Static:	
- Dynamic (needle lift pick-up):	0.1
Lift Pump Pressure (Out) (kPa):	
Fuel Pump Pressure (In) (kPa):	
Fuel Filter Max Particle Size (micron):	
Fuel Return System Type:	

Lubrication System

Lubricating Oil Specification:	See Engine Specification Manual

Exhaust System

Exhaust Flow (kg/min):	7.58 (15.3 m³/min)
Exhaust Temperature (°C):	530 (ATC)

Cold Start Capability

Unaided Start Limit (°C):	-10
Aided Start Limit (°C):	-25
Start Aid (Optional):	Glowplugs fitted as standard
Minimum Cranking Speed (rev/min) - unaided:	Not applicable
- aided:	

Cooling System

Heat Rejected @ Rated Speed (kW):	50.8
Heat Rejected @ Peak Torque (kW):	40.3
Coolant Flow (litres/min):	193.0
Thermostat - Start To Open (°C):	82
Thermostat - Fully Open (°C):	93
Recommended Cap Pressure (kPa):	
Max Top Tank Pressure (kPa):	

Air System

Engine Air Flow (kg/min):	7.29 (6.26 m³/min)
Induction Manifold Pressure (kPa):	112.0

Charge Air Cooler System

Charge Air Cooling System:	Not applicable
Max Total Pressure Drop inc Pipes (kPa):	Not applicable
Charge Air Cooler Heat Rejection (kW):	Not applicable
Manifold Charge Air Temperature (°C):	Not applicable

Turbocharger

Turbocharger Type:	
Maximum Altitude (m):	3000

Performance Data

Friction Power @ Rated Speed (kW):	
Friction Power @ Peak Torque (kW):	
Unboosted Torque @ 800 rev/min (Nm):	238
Unboosted Torque @ 1000 rev/min (Nm):	238

For further performance data see table below.

Performance Data — **Rating Standard:** ISO 14396: 2002

Speed (rev/min)	Torque (Nm)	Power (kW)	Max Exhaust Back Pressure (kPa)	Max Inlet Restriction (kPa)	Governing Categories (key on sht 1)
2300	282	68.0	15.0	5.0	A
2200	295	68.0	15.0	5.0	N
2000	322	67.4	13.2		
1800	350	66.0	11.6		
1700	362	64.4	11.0		
1600	373	62.5	10.5		
1500	384	60.3	9.2		
1400	390	57.2	8.0		
1300	388	52.8	6.9		
1200	384	48.3	5.7		
1100	374	43.1	4.5		

Further Notes:

Internal References

Curve Issue No:	4	**DCP Number(s):**	ECR002775	**TAN Number:**	
Curve Issue Date :	9-Nov-2007			**FIE EDR Number**	

1104D-44TA - T3055, (balanced)

Perkins

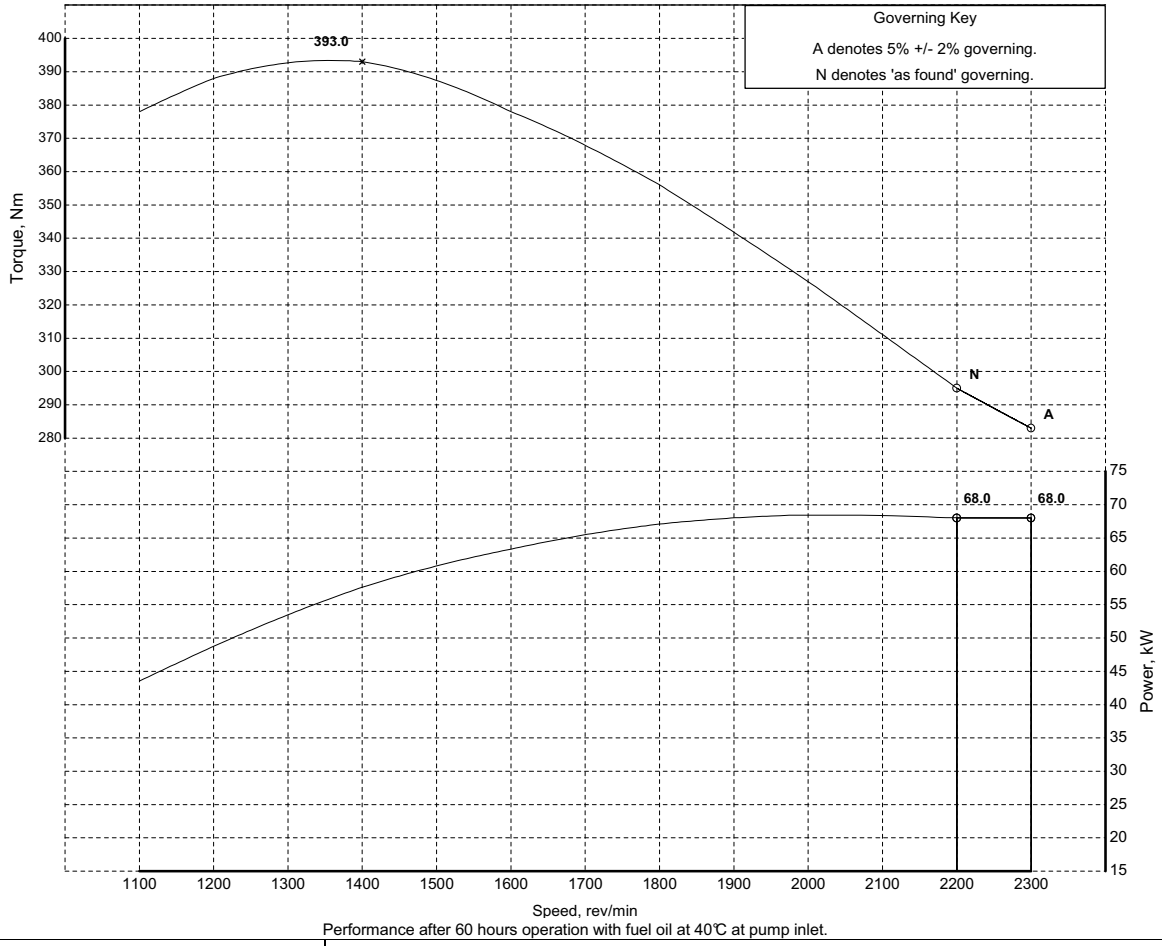
Engine Model: 1104D-44TA

Curve: T 3055 **Sheet 1**
Issue: 5 **Date:** 9-Jan-2008

Development Target - May be Subject to Change

Rating Standards:	ISO 14396: 2002
Production Tolerance On Power Output:	+5%, -5%
Total Barometric Pressure (kPa):	100
Vapour Pressure (kPa):	1
Air Inlet Temperature (°C):	25

Fuel Types:	Europe Off Highway	USA FED Off Highway
Fuel Specification:	CEC RF-06-99	EPA 2D 89.330 2004
Density (kg/l @ 15℃):	0.833 - 0.837	0.840 - 0.865
Viscosity (mm²/s @ 40℃):	2.3 - 3.5	2.0 - 3.2
Sulphur Content (% mass):	0.03 max	0.03 - 0.2
Cetane No:	52 - 54	40 - 48



Performance after 60 hours operation with fuel oil at 40℃ at pump inlet.

Notes:

1. For duty cycle refer to Perkins Engines (Peterborough) Limited statement on Product Duty Usage Limitations.

2. For power and torque data below 1100 rev/min refer to Perkins Engines Limited.

Exhaust Quality Standard	**Certification Refs (Rated Speeds)**
Smoke:	
77/537/EEC- Includes FAS.	
Emissions:	
EU NRMM 97/68/EC Stage 3A.	e11*97/68JA*2004/26*0879* (2300, 2200
US EPA 40 CFR Part 89 Tier 3.	PKXL04.4NM2 (2300, 2200
Power Standard	**Certification Refs (Rated Speeds)**
UN/ECE R120	120R-000078 (2300, 2200

Auxiliaries fitted to engine:
Alternator - off load.
Balancer - fitted.
Fan - not fitted.

Approved by:	**Accepted by:**	**Issued by:**
E. Hughes (Product Manager)	C. Herring (PE Manager)	J.H. Boorman (Legislation Engineer)
Date: 7-Jan-2008	**Date:** 2-Jan-2008	

Rating Curves Data Sheet

Curve T 3055 **Sheet 2**

Note1: Unless otherwise specified, all stated data is for maximum rated speed and 100% load.

General Data

Engine Model:	1104D-44TA
Number Of Cylinders:	4
Bore (mm):	105.0
Stroke (mm):	127.0
Configuration:	Vertical In Line
Displacement (litres):	4.4
Aspiration:	Turbocharged
Compression Ratio:	18.2 : 1
Combustion Bowl:	Re-entrant

Fuel System

Fuel Pump Model:	Delphi DP310
Injection Timing (°BTDC) - Static:	
- Dynamic (needle lift pick-up):	-3.8
Lift Pump Pressure (Out) (kPa):	
Fuel Pump Pressure (In) (kPa):	
Fuel Filter Max Particle Size (micron):	
Fuel Return System Type:	

Lubrication System

Lubricating Oil Specification: See Engine Specification Manual

Exhaust System

Exhaust Flow (kg/min):	7.89 (15.6 m³/min)
Exhaust Temperature (°C):	515 (ATC)

Cold Start Capability

Unaided Start Limit (°C):	-10
Aided Start Limit (°C):	-25
Start Aid (Optional):	Glowplugs fitted as standard
Minimum Cranking Speed (rev/min) - unaided:	Not applicable
- aided:	

Cooling System

Heat Rejected @ Rated Speed (kW):	50.0
Heat Rejected @ Peak Torque (kW):	40.1
Coolant Flow (litres/min):	193.0
Thermostat - Start To Open (°C):	82
Thermostat - Fully Open (°C):	93
Recommended Cap Pressure (kPa):	
Max Top Tank Pressure (kPa):	

Air System

Engine Air Flow (kg/min):	7.60 (6.53 m³/min)
Induction Manifold Pressure (kPa):	96.4

Charge Air Cooler System

Charge Air Cooling System:	Air-to-Air
Max Total Pressure Drop inc Pipes (kPa):	10.0
Charge Air Cooler Heat Rejection (kW):	8.2
Manifold Charge Air Temperature (°C):	55.0

Turbocharger

Turbocharger Type:	
Maximum Altitude (m):	3000

Performance Data

Friction Power @ Rated Speed (kW):	
Friction Power @ Peak Torque (kW):	
Unboosted Torque @ 800 rev/min (Nm):	288
Unboosted Torque @ 1000 rev/min (Nm):	288

For further performance data see table below.

Performance Data **Rating Standard:** ISO 14396: 2002

Speed (rev/min)	Torque (Nm)	Power (kW)	Max Exhaust Back Pressure (kPa)	Max Inlet Restriction (kPa)	Governing Categories (key on sht 1)
2300	283	68.0	15.0	5.0	A
2200	295	68.0	15.0	5.0	N
2000	327	68.5			
1800	356	67.1			
1600	378	63.3			
1400	393	57.6			
1200	388	48.8			
1100	378	43.5			

Further Notes:

Internal References

Curve Issue No:	5	**DCP Number(s):**	TBD	**TAN Number:**	
Curve Issue Date :	9-Jan-2008			**FIE EDR Number**	

1104D-44TA - T3056, (non-balanced)

Perkins

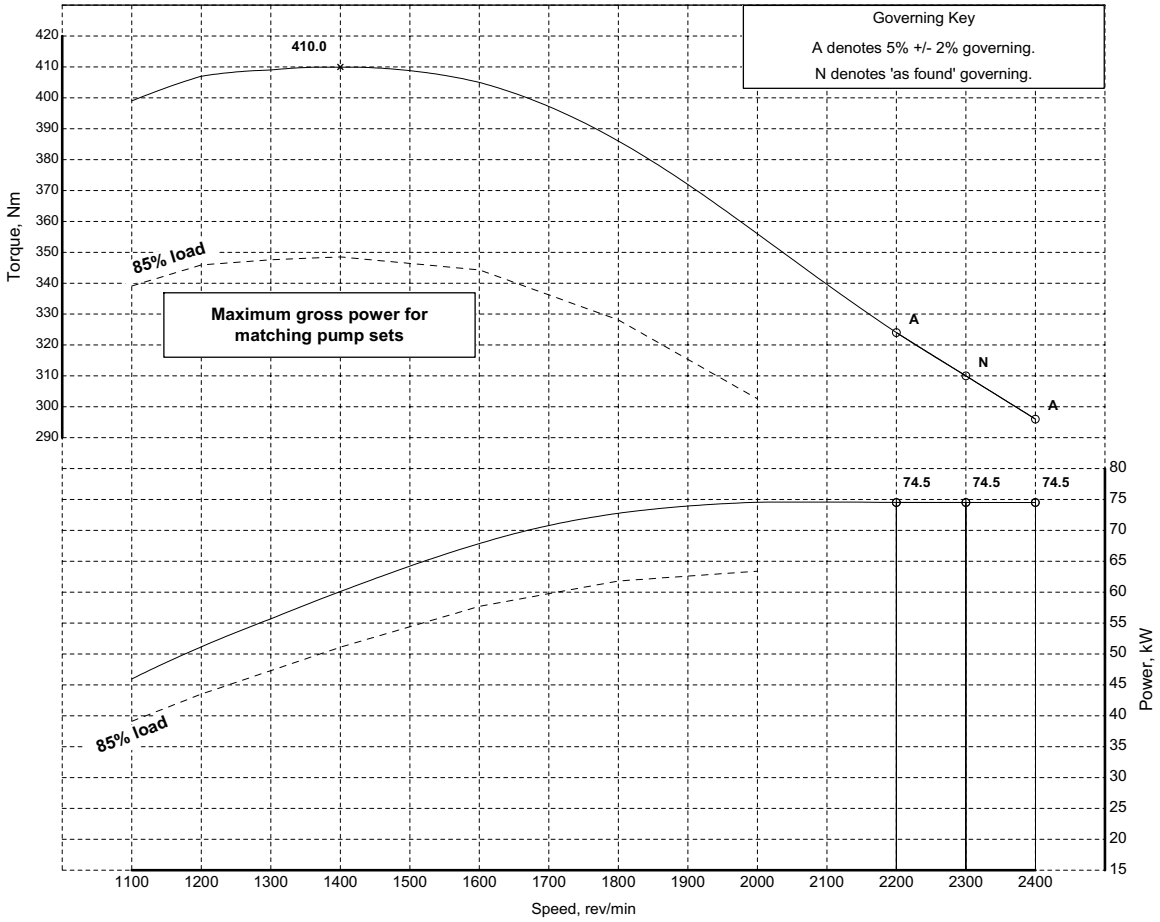
Engine Model: 1104D-44TA

Curve: T 3056 **Sheet 1**
Issue: 4 **Date:** 9-Nov-2007

Development Target - May be Subject to Change

Rating Standards:	ISO 14396: 2002
Production Tolerance On Power Output:	+5%, -5%
Total Barometric Pressure (kPa):	100
Vapour Pressure (kPa):	1
Air Inlet Temperature (°C):	25

Fuel Types:	Europe Off Highway	USA FED Off Highway
Fuel Specification:	CEC RF-06-99	EPA 2D 89.330 2004
Density (kg/l @ 15°C):	0.833 - 0.837	0.840 - 0.865
Viscosity (mm²/s @ 40°C):	2.3 - 3.5	2.0 - 3.2
Sulphur Content (% mass):	0.03 max	0.03 - 0.2
Cetane No:	52 - 54	40 - 48



Performance after 60 hours operation with fuel oil at 40°C at pump inlet.

Notes:

1. For duty cycle refer to Perkins Engines (Peterborough) Limited statement on Product Duty Usage Limitations.

2. For power and torque data below 1100 rev/min refer to Perkins Engines Limited.

3. Smoke may be higher in some modes of operation than equivalent 1104C rating. For further details refer to section 6 of ESM or contact local Perkins Applications Team.

Auxiliaries fitted to engine:
Alternator - off load.
Balancer - not fitted.
Fan - not fitted.

Exhaust Quality Standard	**Certification Refs (Rated Speeds)**
Smoke:	
See Note 3.	
Emissions:	
EU NRMM 97/68/EC Stage 3A.	e11*97/68JA*2004/26*0879* (2400, 2300, 2200)
US EPA 40 CFR Part 89 Tier 3.	PKXL04.4NM2 (2400, 2300, 2200)
Power Standard	**Certification Refs (Rated Speeds)**
UN/ECE R120	120R-000078 (2400, 2300, 2200)

Approved by:	**Accepted by:**	**Issued by:**
E. Hughes (Product Manager)	C. Herring (PE Manager)	J.H. Boorman (Legislation Engineer)
Date: 8-Nov-2007	**Date:** 8-Nov-2007	

Rating Curves Data Sheet

Curve T 3056 **Sheet 2**

Note1: Unless otherwise specified, all stated data is for maximum rated speed and 100% load.

General Data

Engine Model:	1104D-44TA
Number Of Cylinders:	4
Bore (mm):	105.0
Stroke (mm):	127.0
Configuration:	Vertical In Line
Displacement (litres):	4.4
Aspiration:	Turbocharged
Compression Ratio:	18.2 : 1
Combustion Bowl:	Re-entrant

Fuel System

Fuel Pump Model:	Delphi DP310
Injection Timing (°BTDC) - Static:	
- Dynamic (needle lift pick-up):	-1.7
Lift Pump Pressure (Out) (kPa):	
Fuel Pump Pressure (In) (kPa):	
Fuel Filter Max Particle Size (micron):	
Fuel Return System Type:	

Lubrication System

Lubricating Oil Specification:	See Engine Specification Manual

Exhaust System

Exhaust Flow (kg/min):	8.81 (16.6 m³/min)
Exhaust Temperature (°C):	478 (ATC)

Cold Start Capability

Unaided Start Limit (°C):	-10
Aided Start Limit (°C):	-25
Start Aid (Optional):	Glowplugs fitted as standard
Minimum Cranking Speed (rev/min) - unaided:	Not applicable
- aided:	

Cooling System

Heat Rejected @ Rated Speed (kW):	46.4
Heat Rejected @ Peak Torque (kW):	36.6
Coolant Flow (litres/min):	201.0
Thermostat - Start To Open (°C):	82
Thermostat - Fully Open (°C):	93
Recommended Cap Pressure (kPa):	
Max Top Tank Pressure (kPa):	

Air System

Engine Air Flow (kg/min):	8.50 (7.30 m³/min)
Induction Manifold Pressure (kPa):	102.0

Charge Air Cooler System

Charge Air Cooling System:	Air-to-Air
Max Total Pressure Drop inc Pipes (kPa):	10.0
Charge Air Cooler Heat Rejection (kW):	10.4
Manifold Charge Air Temperature (°C):	55.0

Turbocharger

Turbocharger Type:	
Maximum Altitude (m):	3000

Performance Data

Friction Power @ Rated Speed (kW):	
Friction Power @ Peak Torque (kW):	
Unboosted Torque @ 800 rev/min (Nm):	265
Unboosted Torque @ 1000 rev/min (Nm):	265

For further performance data see table below.

Performance Data — **Rating Standard:** ISO 14396: 2002

Speed (rev/min)	Torque (Nm)	Power (kW)	Max Exhaust Back Pressure (kPa)	Max Inlet Restriction (kPa)	Governing Categories (key on sht 1)
2400	296	74.5	15.0	5.0	A
2300	310	74.5	15.0	5.0	N
2200	324	74.5	15.0	5.0	A
2000	356	74.6	11.0		
1800	386	72.8	10.0		
1600	405	67.9	9.0		
1400	410	60.1	6.5		
1300	409	55.7	5.3		
1200	407	51.1	4.5		
1100	399	46.0	3.5		

Further Notes:

Internal References

Curve Issue No:	4	**DCP Number(s):**	TBD	**TAN Number:**	
Curve Issue Date :	9-Nov-2007			**FIE EDR Number**	

1104D-44TA - T3058, (non-balanced)

Perkins

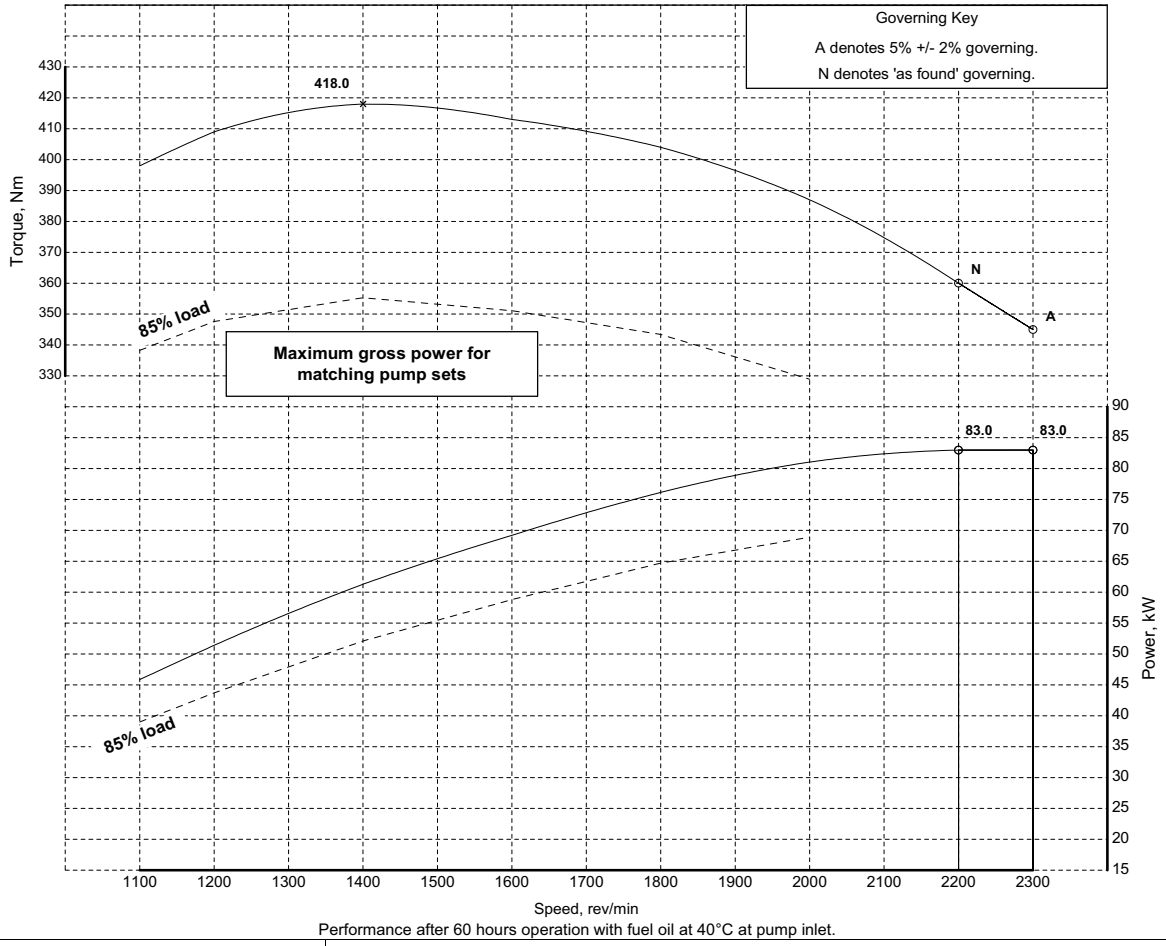
Engine Model: 1104D-44TA

Curve: T 3058 **Sheet 1**
Issue: 6 **Date:** 9-Nov-2007

Development Target - May be Subject to Change

Rating Standards:	ISO 14396: 2002
Production Tolerance On Power Output:	+5%, -5%
Total Barometric Pressure (kPa):	100
Vapour Pressure (kPa):	1
Air Inlet Temperature (°C):	25

Fuel Types:	Europe Off Highway	USA FED Off Highway
Fuel Specification:	CEC RF-06-99	EPA 2D 89.330 2004
Density (kg/l @ 15°C):	0.833 - 0.837	0.840 - 0.865
Viscosity (mm²/s @ 40°C):	2.3 - 3.5	2.0 - 3.2
Sulphur Content (% mass):	0.03 max	0.03 - 0.2
Cetane No:	52 - 54	40 - 48



Performance after 60 hours operation with fuel oil at 40°C at pump inlet.

Notes:

1. For duty cycle refer to Perkins Engines (Peterborough) Limited statement on Product Duty Usage Limitations.

2. For power and torque data below 1100 rev/min refer to Perkins Engines Limited.

3. Smoke may be higher in some modes of operation than equivalent 1104C rating. For further details refer to section 6 of ESM or contact local Perkins Applications Team.

Auxiliaries fitted to engine:
Alternator - off load.
Balancer - not fitted.
Fan - not fitted.

Exhaust Quality Standard	**Certification Refs (Rated Speeds)**
Smoke:	
See Note 3.	
Emissions:	
EU NRMM 97/68/EC Stage 3A.	e11*97/68IA*2004/26*0883* (2300, 2200)
US EPA 40 CFR Part 89 Tier 3.	PKXL04.4NM1 (2300, 2200)
Power Standard	**Certification Refs (Rated Speeds)**
UN/ECE R120	120R-000078 (2300, 2200)

Approved by:	**Accepted by:**	**Issued by:**
E. Hughes (Product Manager)	C. Herring (PE Manager)	J.H. Boorman (Legislation Engineer)
Date: 8-Nov-2007	**Date:** 8-Nov-2007	

Rating Curves Data Sheet

Curve T 3058 **Sheet 2**

Note1: Unless otherwise specified, all stated data is for maximum rated speed and 100% load.

General Data

Engine Model:	1104D-44TA
Number Of Cylinders:	4
Bore (mm):	105.0
Stroke (mm):	127.0
Configuration:	Vertical In Line
Displacement (litres):	4.4
Aspiration:	Turbocharged
Compression Ratio:	18.2 : 1
Combustion Bowl:	Re-entrant

Fuel System

Fuel Pump Model:	Delphi DP310
Injection Timing (°BTDC) - Static:	
- Dynamic (needle lift pick-up):	3.3
Lift Pump Pressure (Out) (kPa):	
Fuel Pump Pressure (In) (kPa):	
Fuel Filter Max Particle Size (micron):	
Fuel Return System Type:	

Lubrication System

Lubricating Oil Specification: See Engine Specification Manual

Exhaust System

Exhaust Flow (kg/min):	8.95 (18.9 m³/min)
Exhaust Temperature (°C):	569 (ATC)

Cold Start Capability

Unaided Start Limit (°C):	-10
Aided Start Limit (°C):	-20
Start Aid (Optional):	Glowplugs fitted as standard
Minimum Cranking Speed (rev/min) - unaided:	Not applicable
- aided:	

Cooling System

Heat Rejected @ Rated Speed (kW):	51.0
Heat Rejected @ Peak Torque (kW):	36.9
Coolant Flow (litres/min):	254.0
Thermostat - Start To Open (°C):	82
Thermostat - Fully Open (°C):	95
Recommended Cap Pressure (kPa):	
Max Top Tank Pressure (kPa):	

Air System

Engine Air Flow (kg/min):	8.60 (7.39 m³/min)
Induction Manifold Pressure (kPa):	115.0

Charge Air Cooler System

Charge Air Cooling System:	Air-to-Air
Max Total Pressure Drop inc Pipes (kPa):	10.0
Charge Air Cooler Heat Rejection (kW):	12.0
Manifold Charge Air Temperature (°C):	50.0

Turbocharger

Turbocharger Type:	Garrett GT25 with wastegate
Maximum Altitude (m):	3000

Performance Data

Friction Power @ Rated Speed (kW):	
Friction Power @ Peak Torque (kW):	
Unboosted Torque @ 800 rev/min (Nm):	250
Unboosted Torque @ 1000 rev/min (Nm):	250

For further performance data see table below.

Performance Data — **Rating Standard:** ISO 14396: 2002

Speed (rev/min)	Torque (Nm)	Power (kW)	Max Exhaust Back Pressure (kPa)	Max Inlet Restriction (kPa)	Governing Categories (key on sht 1)
2300	345	83.0	15.0	5.0	A
2200	360	83.0	15.0	5.0	N
2000	387	81.1	12.3		
1800	404	76.2	10.1		
1600	413	69.2	8.3		
1400	418	61.3	6.4		
1200	409	51.4	4.6		
1100	398	45.8	4.0		

Further Notes:

Internal References

Curve Issue No: 6 **DCP Number(s):** ECR002775 **TAN Number:**

Curve Issue Date : 9-Nov-2007 **FIE EDR Number**

1104D-44TA - T3059, (balanced)

Perkins

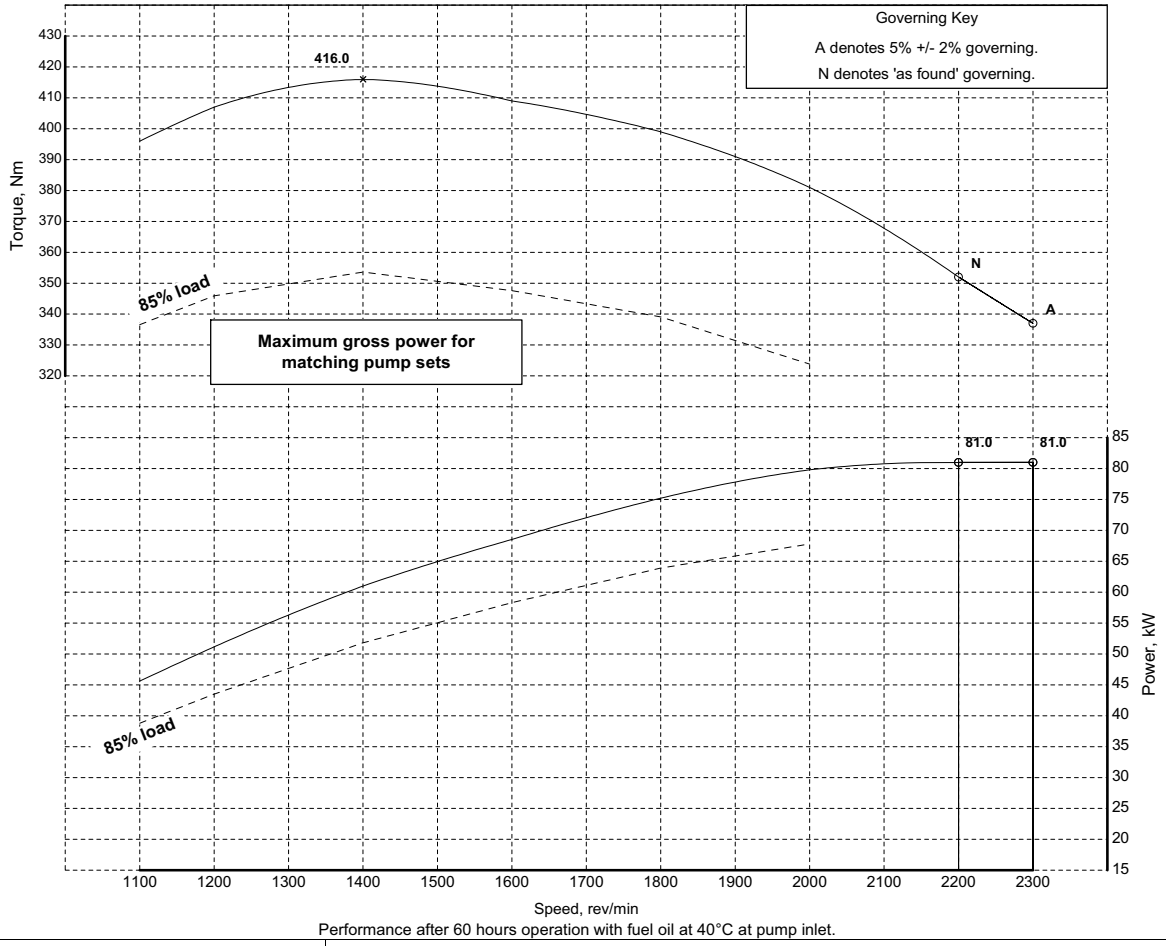
Engine Model: 1104D-44TA

Curve: T 3059 **Sheet 1**
Issue: 5 **Date:** 9-Nov-2007

Development Target - May be Subject to Change

Rating Standards:	ISO 14396: 2002
Production Tolerance On Power Output:	+5%, -5%
Total Barometric Pressure (kPa):	100
Vapour Pressure (kPa):	1
Air Inlet Temperature (°C):	25

Fuel Types:	Europe Off Highway	USA FED Off Highway
Fuel Specification:	CEC RF-06-99	EPA 2D 89.330 2004
Density (kg/l @ 15°C):	0.833 - 0.837	0.840 - 0.865
Viscosity (mm²/s @ 40°C):	2.3 - 3.5	2.0 - 3.2
Sulphur Content (% mass):	0.03 max	0.03 - 0.2
Cetane No:	52 - 54	40 - 48



Performance after 60 hours operation with fuel oil at 40°C at pump inlet.

Notes:

1. For duty cycle refer to Perkins Engines (Peterborough) Limited statement on Product Duty Usage Limitations.

2. For power and torque data below 1100 rev/min refer to Perkins Engines Limited.

3. Smoke may be higher in some modes of operation than equivalent 1104C rating. For further details refer to section 6 of ESM or contact local Perkins Applications Team.

Auxiliaries fitted to engine:
Alternator - off load.
Balancer - fitted.
Fan - not fitted.

Exhaust Quality Standard	**Certification Refs (Rated Speeds)**
Smoke:	
See Note 3.	
77/537/EEC- Includes FAS.	
Emissions:	
EU NRMM 97/68/EC Stage 3A.	e11*97/68IA*2004/26*0883* (2300, 2200)
US EPA 40 CFR Part 89 Tier 3.	PKXL04.4NM1 (2300, 2200)
Power Standard	**Certification Refs (Rated Speeds)**
UN/ECE R120	120R-000078 (2300, 2200)

Approved by:	**Accepted by:**	**Issued by:**
E. Hughes (Product Manager)	C. Herring (PE Manager)	J.H. Boorman (Legislation Engineer)
Date: 8-Nov-2007	**Date:** 8-Nov-2007	

Rating Curves Data Sheet

Curve T 3059 **Sheet 2**

Note1: Unless otherwise specified, all stated data is for maximum rated speed and 100% load.

General Data

Engine Model:	1104D-44TA
Number Of Cylinders:	4
Bore (mm):	105.0
Stroke (mm):	127.0
Configuration:	Vertical In Line
Displacement (litres):	4.4
Aspiration:	Turbocharged
Compression Ratio:	18.2 : 1
Combustion Bowl:	Re-entrant

Fuel System

Fuel Pump Model:	Delphi DP310
Injection Timing (°BTDC) - Static:	
- Dynamic (needle lift pick-up):	3.3
Lift Pump Pressure (Out) (kPa):	
Fuel Pump Pressure (In) (kPa):	
Fuel Filter Max Particle Size (micron):	
Fuel Return System Type:	

Lubrication System

Lubricating Oil Specification: See Engine Specification Manual

Exhaust System

Exhaust Flow (kg/min):	8.96 (18.9 m³/min)
Exhaust Temperature (°C):	569 (ATC)

Cold Start Capability

Unaided Start Limit (°C):	-10
Aided Start Limit (°C):	-20
Start Aid (Optional):	Glowplugs fitted as standard
Minimum Cranking Speed (rev/min) - unaided:	Not applicable
- aided:	

Cooling System

Heat Rejected @ Rated Speed (kW):	51.0
Heat Rejected @ Peak Torque (kW):	36.9
Coolant Flow (litres/min):	254.0
Thermostat - Start To Open (°C):	82
Thermostat - Fully Open (°C):	93
Recommended Cap Pressure (kPa):	
Max Top Tank Pressure (kPa):	

Air System

Engine Air Flow (kg/min):	8.61 (7.40 m³/min)
Induction Manifold Pressure (kPa):	115.0

Charge Air Cooler System

Charge Air Cooling System:	Air-to-Air
Max Total Pressure Drop inc Pipes (kPa):	10.0
Charge Air Cooler Heat Rejection (kW):	12.0
Manifold Charge Air Temperature (°C):	50.0

Turbocharger

Turbocharger Type:	Garrett GT25 with wastegate
Maximum Altitude (m):	3000

Performance Data

Friction Power @ Rated Speed (kW):	
Friction Power @ Peak Torque (kW):	
Unboosted Torque @ 800 rev/min (Nm):	248
Unboosted Torque @ 1000 rev/min (Nm):	248

For further performance data see table below.

Performance Data — **Rating Standard:** ISO 14396: 2002

Speed (rev/min)	Torque (Nm)	Power (kW)	Max Exhaust Back Pressure (kPa)	Max Inlet Restriction (kPa)	Governing Categories (key on sht 1)
2300	337	81.0	15.0	5.0	A
2200	352	81.0	15.0	5.0	N
2000	381	79.8	13.0		
1800	399	75.2	10.0		
1600	409	68.5	8.6		
1400	416	61.0	6.9		
1200	407	51.1	4.7		
1100	396	45.6	4.0		

Further Notes:

Internal References

Curve Issue No: 5 **DCP Number(s):** ECR002775 **TAN Number:**

Curve Issue Date : 9-Nov-2007 **FIE EDR Number**

1104D-44T - T3060, (non-balanced)

Perkins

Engine Model: 1104D-44T

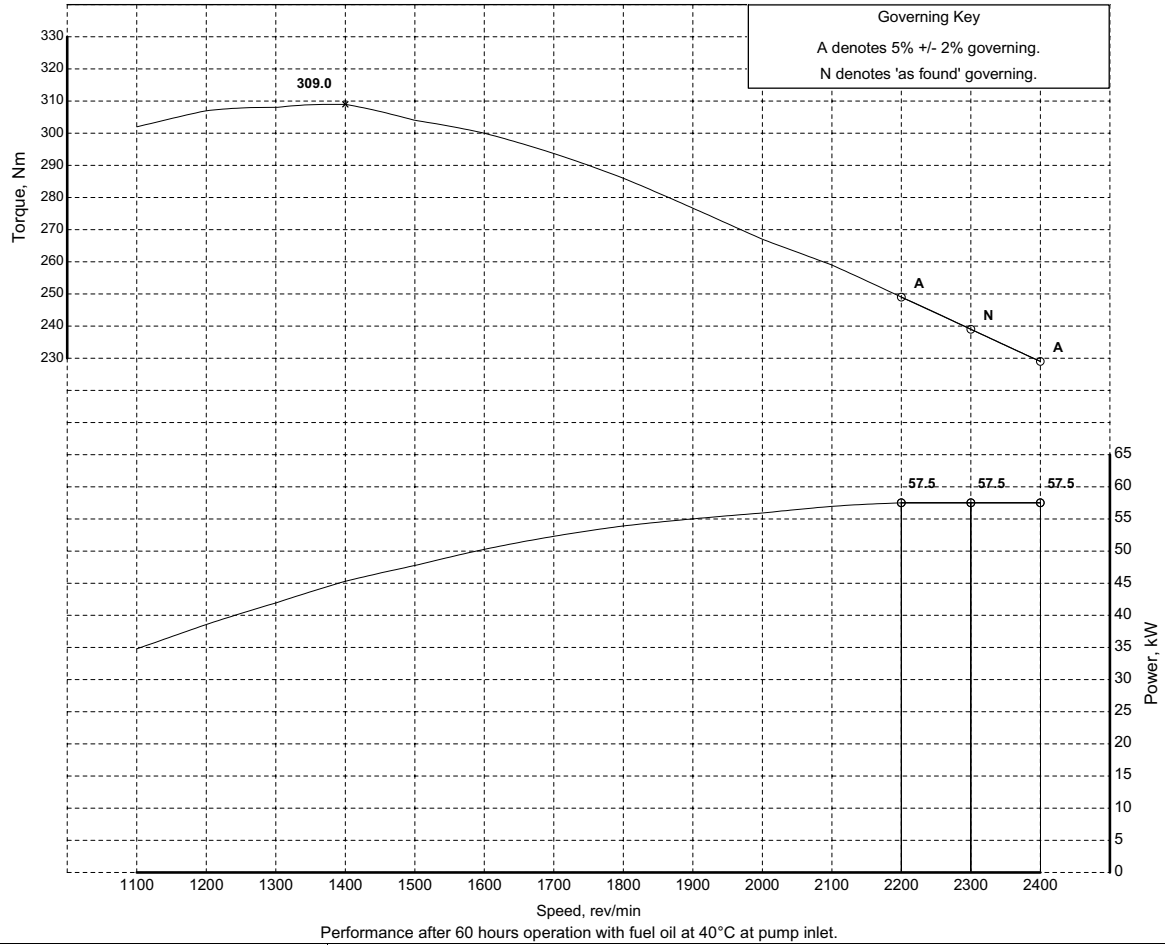
Curve: T 3060 **Sheet 1**

Issue: 4 **Date:** 9-Nov-2007

Development Target - May be Subject to Change

Rating Standards:	ISO 14396: 2002
Production Tolerance On Power Output:	+5%, -5%
Total Barometric Pressure (kPa):	100
Vapour Pressure (kPa):	1
Air Inlet Temperature (°C):	25

Fuel Types:	Europe Off Highway	USA FED Off Highway
Fuel Specification:	CEC RF-06-99	EPA 2D 89.330 2004
Density (kg/l @ 15°C):	0.833 - 0.837	0.840 - 0.865
Viscosity (mm²/s @ 40°C):	2.3 - 3.5	2.0 - 3.2
Sulphur Content (% mass):	0.03 max	0.03 - 0.2
Cetane No:	52 - 54	40 - 48



Performance after 60 hours operation with fuel oil at 40°C at pump inlet.

Notes:

1. For duty cycle refer to Perkins Engines (Peterborough) Limited statement on Product Duty Usage Limitations.

2. For power and torque data below 1100 rev/min refer to Perkins Engines Limited.

3. Smoke may be higher in some modes of operation than equivalent 1104C rating. For further details refer to section 6 of ESM or contact local Perkins Applications Team.

Auxiliaries fitted to engine:
Alternator - off load.
Balancer - not fitted.
Fan - not fitted.

Exhaust Quality Standard	**Certification Refs (Rated Speeds)**
Smoke:	
See Note 3.	
Emissions:	
EU NRMM 97/68/EC Stage 3A.	e11*97/68JA*2004/26*0884* (2400, 2300, 2200)
US EPA 40 CFR Part 89 Tier 3.	PKXL04.4NL1 (2400, 2300, 2200)
Power Standard	**Certification Refs (Rated Speeds)**
UN/ECE R120	120R-000079 (2400, 2300, 2200)

Approved by:	**Accepted by:**	**Issued by:**
E. Hughes (Product Manager)	C. Herring (PE Manager)	J.H. Boorman (Legislation Engineer)
Date: 8-Nov-2007	**Date:** 8-Nov-2007	

Rating Curves Data Sheet

Curve T 3060 **Sheet 2**

Note1: Unless otherwise specified, all stated data is for maximum rated speed and 100% load.

General Data

Engine Model:	1104D-44T
Number Of Cylinders:	4
Bore (mm):	105.0
Stroke (mm):	127.0
Configuration:	Vertical In Line
Displacement (litres):	4.4
Aspiration:	Turbocharged
Compression Ratio:	18.2 : 1
Combustion Bowl:	Re-entrant

Fuel System

Fuel Pump Model:	Delphi DP310
Injection Timing (°BTDC) - Static:	
- Dynamic (needle lift pick-up):	
Lift Pump Pressure (Out) (kPa):	
Fuel Pump Pressure (In) (kPa):	
Fuel Filter Max Particle Size (micron):	
Fuel Return System Type:	

Lubrication System

Lubricating Oil Specification:	See Engine Specification Manual

Exhaust System

Exhaust Flow (kg/min):	6.96 (13.5 m³/min)
Exhaust Temperature (°C):	500 (ATC)

Cold Start Capability

Unaided Start Limit (°C):	-10
Aided Start Limit (°C):	-25
Start Aid (Optional):	Glowplugs fitted as standard
Minimum Cranking Speed (rev/min) - unaided:	Not applicable
- aided:	

Cooling System

Heat Rejected @ Rated Speed (kW):	43.6
Heat Rejected @ Peak Torque (kW):	31.3
Coolant Flow (litres/min):	201.0
Thermostat - Start To Open (°C):	82
Thermostat - Fully Open (°C):	93
Recommended Cap Pressure (kPa):	
Max Top Tank Pressure (kPa):	

Air System

Engine Air Flow (kg/min):	6.71 (5.76 m³/min)
Induction Manifold Pressure (kPa):	91.6

Charge Air Cooler System

Charge Air Cooling System:	Not applicable
Max Total Pressure Drop inc Pipes (kPa):	Not applicable
Charge Air Cooler Heat Rejection (kW):	Not applicable
Manifold Charge Air Temperature (°C):	Not applicable

Turbocharger

Turbocharger Type:	
Maximum Altitude (m):	3000

Performance Data

Friction Power @ Rated Speed (kW):	
Friction Power @ Peak Torque (kW):	
Unboosted Torque @ 800 rev/min (Nm):	240
Unboosted Torque @ 1000 rev/min (Nm):	240

For further performance data see table below.

Performance Data — **Rating Standard:** ISO 14396: 2002

Speed (rev/min)	Torque (Nm)	Power (kW)	Max Exhaust Back Pressure (kPa)	Max Inlet Restriction (kPa)	Governing Categories (key on sht 1)
2400	229	57.5	15.0	5.0	A
2300	239	57.5	15.0	5.0	N
2200	249	57.5	15.0	5.0	A
2100	259	57.0			
2000	267	55.9			
1800	286	53.9			
1600	300	50.3			
1500	304	47.8			
1400	309	45.3	7.3		
1300	308	41.9			
1200	307	38.6			
1100	302	34.8			

Further Notes:

Internal References

Curve Issue No:	4	**DCP Number(s):**	ECR002775	**TAN Number:**	
Curve Issue Date :	9-Nov-2007			**FIE EDR Number**	

1104D-44T - T3061, (balanced)

Perkins

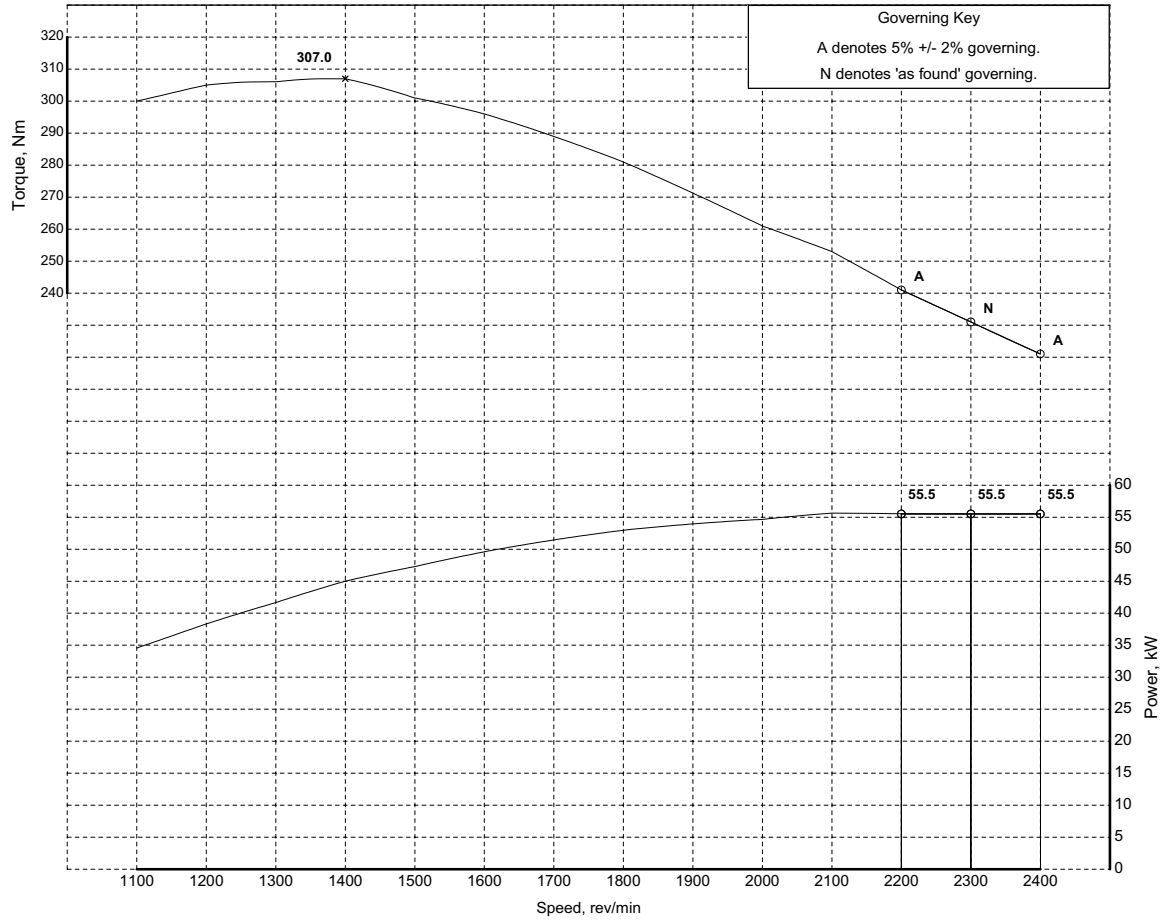
Engine Model: 1104D-44T

Curve: T 3061 **Sheet 1**
Issue: 4 **Date:** 9-Nov-2007

Development Target - May be Subject to Change

Rating Standards:	ISO 14396: 2002
Production Tolerance On Power Output:	+5%, -5%
Total Barometric Pressure (kPa):	100
Vapour Pressure (kPa):	1
Air Inlet Temperature (°C):	25

Fuel Types:	Europe Off Highway	USA FED Off Highway
Fuel Specification:	CEC RF-06-99	EPA 2D 89.330 2004
Density (kg/l @ 15°C):	0.833 - 0.837	0.840 - 0.865
Viscosity (mm²/s @ 40°C):	2.3 - 3.5	2.0 - 3.2
Sulphur Content (% mass):	0.03 max	0.03 - 0.2
Cetane No:	52 - 54	40 - 48



Performance after 60 hours operation with fuel oil at 40°C at pump inlet.

Notes:

1. For duty cycle refer to Perkins Engines (Peterborough) Limited statement on Product Duty Usage Limitations.

2. For power and torque data below 1100 rev/min refer to Perkins Engines Limited.

3. Smoke may be higher in some modes of operation than equivalent 1104C rating. For further details refer to section 6 of ESM or contact local Perkins Applications Team.

Auxiliaries fitted to engine:
Alternator - off load.
Balancer - fitted.
Fan - not fitted.

Exhaust Quality Standard	**Certification Refs (Rated Speeds)**
Smoke:	
See Note 3.	
77/537/EEC- Includes FAS.	
Emissions:	
EU NRMM 97/68/EC Stage 3A.	e11*97/68JA*2004/26*0884* (2400, 2300, 2200)
US EPA 40 CFR Part 89 Tier 3.	PKXL04.4NL1 (2400, 2300, 2200)
Power Standard	**Certification Refs (Rated Speeds)**
UN/ECE R120	120R-000079 (2400, 2300, 2200)

Approved by:	**Accepted by:**	**Issued by:**
E. Hughes (Product Manager)	C. Herring (PE Manager)	J.H. Boorman (Legislation Engineer)
Date: 8-Nov-2007	**Date:** 8-Nov-2007	

Rating Curves Data Sheet

Curve T 3061 **Sheet 2**

Note1: Unless otherwise specified, all stated data is for maximum rated speed and 100% load.

General Data

Engine Model:	1104D-44T
Number Of Cylinders:	4
Bore (mm):	105.0
Stroke (mm):	127.0
Configuration:	Vertical In Line
Displacement (litres):	4.4
Aspiration:	Turbocharged
Compression Ratio:	18.2 : 1
Combustion Bowl:	Re-entrant

Fuel System

Fuel Pump Model:	Delphi DP310
Injection Timing (°BTDC) - Static:	
- Dynamic (needle lift pick-up):	
Lift Pump Pressure (Out) (kPa):	
Fuel Pump Pressure (In) (kPa):	
Fuel Filter Max Particle Size (micron):	
Fuel Return System Type:	

Lubrication System

Lubricating Oil Specification:	See Engine Specification Manual

Exhaust System

Exhaust Flow (kg/min):	6.96 (13.5 m³/min)
Exhaust Temperature (°C):	500 (ATC)

Cold Start Capability

Unaided Start Limit (°C):	-10
Aided Start Limit (°C):	-25
Start Aid (Optional):	Glowplugs fitted as standard
Minimum Cranking Speed (rev/min) - unaided:	Not applicable
- aided:	

Cooling System

Heat Rejected @ Rated Speed (kW):	43.6
Heat Rejected @ Peak Torque (kW):	31.3
Coolant Flow (litres/min):	201.0
Thermostat - Start To Open (°C):	82
Thermostat - Fully Open (°C):	93
Recommended Cap Pressure (kPa):	
Max Top Tank Pressure (kPa):	

Air System

Engine Air Flow (kg/min):	6.71 (5.76 m³/min)
Induction Manifold Pressure (kPa):	90.0

Charge Air Cooler System

Charge Air Cooling System:	Not applicable
Max Total Pressure Drop inc Pipes (kPa):	Not applicable
Charge Air Cooler Heat Rejection (kW):	Not applicable
Manifold Charge Air Temperature (°C):	Not applicable

Turbocharger

Turbocharger Type:	
Maximum Altitude (m):	3000

Performance Data

Friction Power @ Rated Speed (kW):	
Friction Power @ Peak Torque (kW):	
Unboosted Torque @ 800 rev/min (Nm):	238
Unboosted Torque @ 1000 rev/min (Nm):	238

For further performance data see table below.

Performance Data **Rating Standard:** ISO 14396: 2002

Speed (rev/min)	Torque (Nm)	Power (kW)	Max Exhaust Back Pressure (kPa)	Max Inlet Restriction (kPa)	Governing Categories (key on sht 1)
2400	221	55.5	15.0	5.0	A
2300	231	55.5	15.0	5.0	N
2200	241	55.5	15.0	5.0	A
2100	253	55.6			
2000	261	54.7			
1800	281	53.0			
1600	296	49.6			
1500	301	47.3			
1400	307	45.0			
1300	306	41.7			
1200	305	38.3			
1100	300	34.6			

Further Notes:

Internal References

Curve Issue No:	4	**DCP Number(s):**	ECR002775	**TAN Number:**	
Curve Issue Date :	9-Nov-2007			**FIE EDR Number**	

1104D-44T - T3066, (non-balanced)

Perkins

Engine Model: 1104D-44T

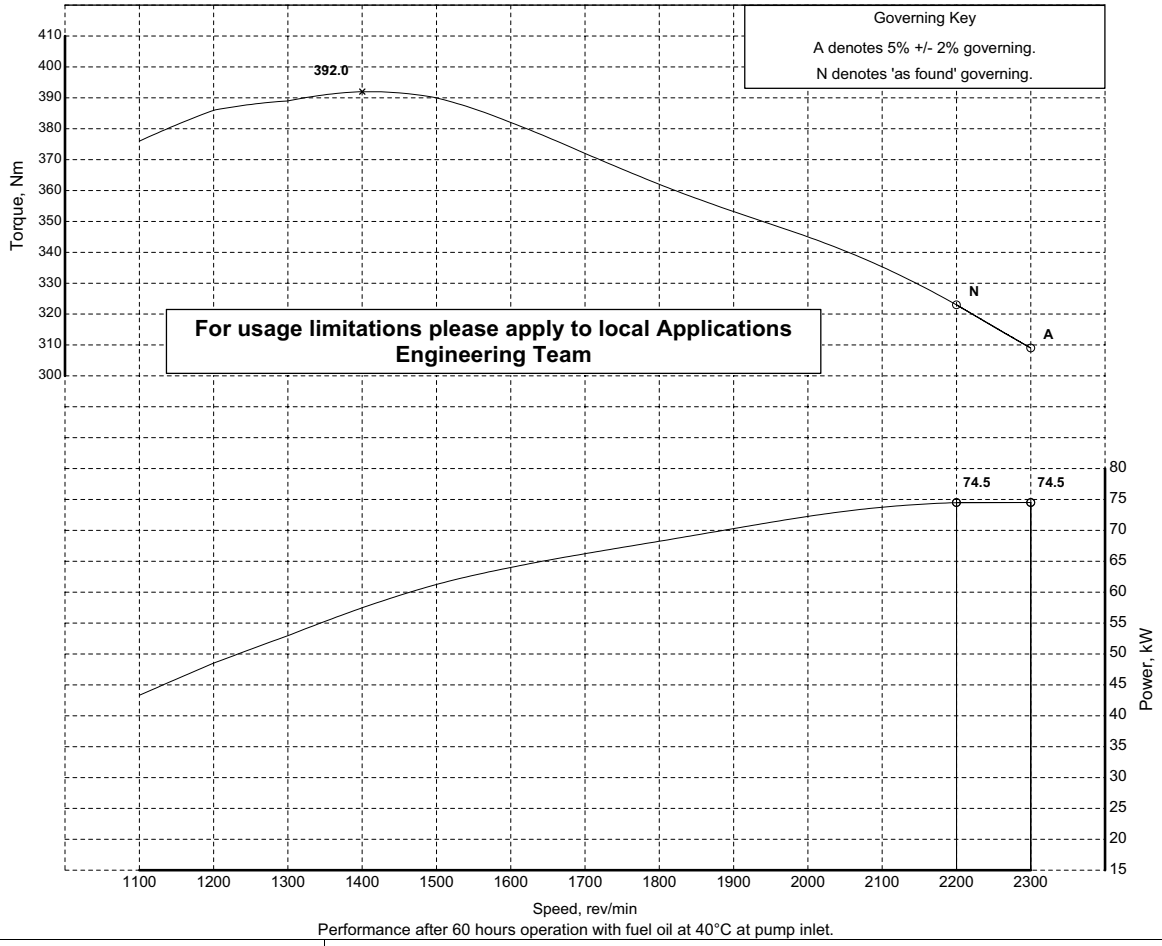
Curve: T 3066 **Sheet 1**

Issue: 4 **Date:** 9-Nov-2007

Development Target - May be Subject to Change

Rating Standards:	ISO 14396: 2002
Production Tolerance On Power Output:	+5%, -5%
Total Barometric Pressure (kPa):	100
Vapour Pressure (kPa):	1
Air Inlet Temperature (°C):	25

Fuel Types:	Europe Off Highway	USA FED Off Highway
Fuel Specification:	CEC RF-06-99	EPA 2D 89.330 2004
Density (kg/l @ 15°C):	0.833 - 0.837	0.840 - 0.865
Viscosity (mm²/s @ 40°C):	2.3 - 3.5	2.0 - 3.2
Sulphur Content (% mass):	0.03 max	0.03 - 0.2
Cetane No:	52 - 54	40 - 48



Performance after 60 hours operation with fuel oil at 40°C at pump inlet.

Notes:

1. For duty cycle refer to Perkins Engines (Peterborough) Limited statement on Product Duty Usage Limitations.

2. For power and torque data below 1100 rev/min refer to Perkins Engines Limited.

3. Smoke may be higher in some modes of operation than equivalent 1104C rating. For further details refer to section 6 of ESM or contact local Perkins Applications Team.

Auxiliaries fitted to engine:
Alternator - off load.
Balancer - not fitted.
Fan - not fitted.

Exhaust Quality Standard	**Certification Refs (Rated Speeds)**
Smoke:	
See Note 3.	
Emissions:	
EU NRMM 97/68/EC Stage 3A.	e11*97/68JA*2004/26*0884* (2300, 2200)
US EPA 40 CFR Part 89 Tier 3.	PKXL04.4NL1 (2300, 2200)
Power Standard	**Certification Refs (Rated Speeds)**
UN/ECE R120	120R-000079 (2300, 2200)

Approved by:	**Accepted by:**	**Issued by:**
E. Hughes (Product Manager)	C. Herring (PE Manager)	J.H. Boorman (Legislation Engineer)
Date: 8-Nov-2007	**Date:** 8-Nov-2007	

Rating Curves Data Sheet

Curve T 3066 **Sheet 2**

Note1: Unless otherwise specified, all stated data is for maximum rated speed and 100% load.

General Data

Engine Model:	1104D-44T
Number Of Cylinders:	4
Bore (mm):	105.0
Stroke (mm):	127.0
Configuration:	Vertical In Line
Displacement (litres):	4.4
Aspiration:	Turbocharged
Compression Ratio:	18.2 : 1
Combustion Bowl:	Re-entrant

Fuel System

Fuel Pump Model:	Delphi DP310
Injection Timing (°BTDC) - Static:	
- Dynamic (needle lift pick-up):	0.1
Lift Pump Pressure (Out) (kPa):	
Fuel Pump Pressure (In) (kPa):	
Fuel Filter Max Particle Size (micron):	
Fuel Return System Type:	

Lubrication System

Lubricating Oil Specification:	See Engine Specification Manual

Exhaust System

Exhaust Flow (kg/min):	7.70 (16.2 m³/min)
Exhaust Temperature (°C):	569 (ATC)

Cold Start Capability

Unaided Start Limit (°C):	-10
Aided Start Limit (°C):	-25
Start Aid (Optional):	Glowplugs fitted as standard
Minimum Cranking Speed (rev/min) - unaided:	Not applicable
- aided:	

Cooling System

Heat Rejected @ Rated Speed (kW):	54.1
Heat Rejected @ Peak Torque (kW):	41.1
Coolant Flow (litres/min):	193.0
Thermostat - Start To Open (°C):	82
Thermostat - Fully Open (°C):	93
Recommended Cap Pressure (kPa):	
Max Top Tank Pressure (kPa):	

Air System

Engine Air Flow (kg/min):	7.38 (6.34 m³/min)
Induction Manifold Pressure (kPa):	122.0

Charge Air Cooler System

Charge Air Cooling System:	Not applicable
Max Total Pressure Drop inc Pipes (kPa):	Not applicable
Charge Air Cooler Heat Rejection (kW):	Not applicable
Manifold Charge Air Temperature (°C):	Not applicable

Turbocharger

Turbocharger Type:	Garrett GT25 with wastegate
Maximum Altitude (m):	2250

Performance Data

Friction Power @ Rated Speed (kW):	
Friction Power @ Peak Torque (kW):	
Unboosted Torque @ 800 rev/min (Nm):	240
Unboosted Torque @ 1000 rev/min (Nm):	240

For further performance data see table below.

Performance Data — **Rating Standard:** ISO 14396: 2002

Speed (rev/min)	Torque (Nm)	Power (kW)	Max Exhaust Back Pressure (kPa)	Max Inlet Restriction (kPa)	Governing Categories (key on sht 1)
2300	309	74.5	15.0	5.0	A
2200	323	74.5	15.0	5.0	N
2000	345	72.3	12.2		
1800	362	68.2	11.2		
1700	372	66.2	11.0		
1600	382	64.0	9.8		
1500	390	61.3	8.7		
1400	392	57.5	7.6		
1300	389	53.0	6.4		
1200	386	48.5	5.3		
1100	376	43.3	4.3		

Further Notes:

For usage limitations please apply to local Applications Engineering team.

Internal References

Curve Issue No:	4	**DCP Number(s):**	ECR002775	**TAN Number:**	
Curve Issue Date :	9-Nov-2007			**FIE EDR Number**	

1104D-44T - T3067, (balanced)

Perkins

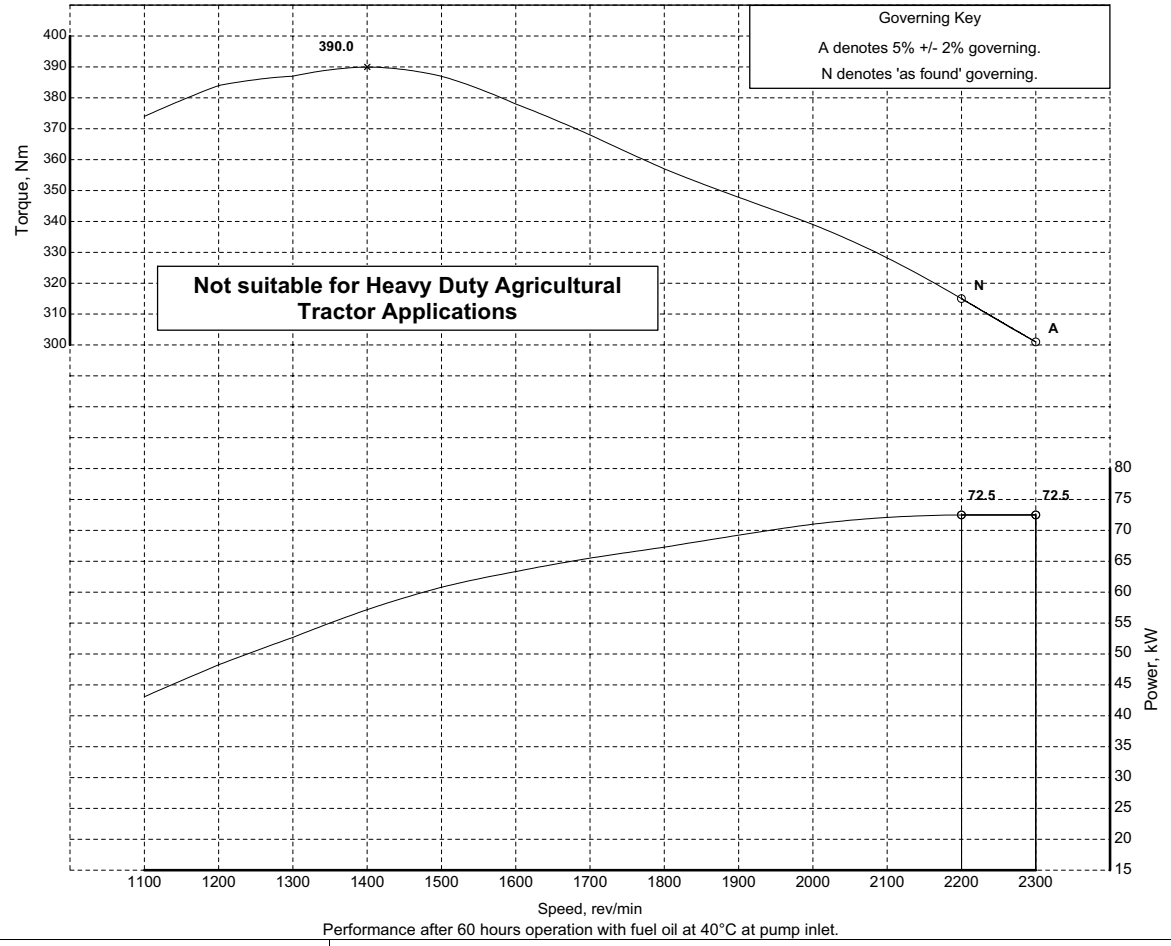
Engine Model: 1104D-44T

Curve: T 3067 **Sheet 1**
Issue: 3 **Date:** 9-Nov-2007

Development Target - May be Subject to Change

Rating Standards:	ISO 14396: 2002
Production Tolerance On Power Output:	+5%, -5%
Total Barometric Pressure (kPa):	100
Vapour Pressure (kPa):	1
Air Inlet Temperature (°C):	25

Fuel Types:	Europe Off Highway	USA FED Off Highway
Fuel Specification:	CEC RF-06-99	EPA 2D 89.330 2004
Density (kg/l @ 15°C):	0.833 - 0.837	0.840 - 0.865
Viscosity (mm²/s @ 40°C):	2.3 - 3.5	2.0 - 3.2
Sulphur Content (% mass):	0.03 max	0.03 - 0.2
Cetane No:	52 - 54	40 - 48



Performance after 60 hours operation with fuel oil at 40°C at pump inlet.

Notes:

1. For duty cycle refer to Perkins Engines (Peterborough) Limited statement on Product Duty Usage Limitations.

2. For power and torque data below 1100 rev/min refer to Perkins Engines Limited.

3. Smoke may be higher in some modes of operation than equivalent 1104C rating. For further details refer to section 6 of ESM or contact local Perkins Applications Team.

Auxiliaries fitted to engine:
Alternator - off load.
Balancer - fitted.
Fan - not fitted.

Exhaust Quality Standard	**Certification Refs (Rated Speeds)**
Smoke:	
See Note 3.	
77/537/EEC- Includes FAS.	
Emissions:	
EU NRMM 97/68/EC Stage 3A.	e11*97/68JA*2004/26*0884* (2300, 2200)
US EPA 40 CFR Part 89 Tier 3.	PKXL04.4NL1 (2300, 2200)
Power Standard	**Certification Refs (Rated Speeds)**
UN/ECE R120	120R-000079 (2300, 2200)

Approved by:	**Accepted by:**	**Issued by:**
E. Hughes (Product Manager)	C. Herring (PE Manager)	J.H. Boorman (Legislation Engineer)
Date: 8-Nov-2007	**Date:** 8-Nov-2007	

Rating Curves Data Sheet

Curve T 3067 **Sheet 2**

Note1: Unless otherwise specified, all stated data is for maximum rated speed and 100% load.

General Data

Engine Model:	1104D-44T
Number Of Cylinders:	4
Bore (mm):	105.0
Stroke (mm):	127.0
Configuration:	Vertical In Line
Displacement (litres):	4.4
Aspiration:	Turbocharged
Compression Ratio:	18.2 : 1
Combustion Bowl:	Re-entrant

Fuel System

Fuel Pump Model:	Delphi DP310
Injection Timing (°BTDC) - Static:	
- Dynamic (needle lift pick-up):	0.1
Lift Pump Pressure (Out) (kPa):	
Fuel Pump Pressure (In) (kPa):	
Fuel Filter Max Particle Size (micron):	
Fuel Return System Type:	

Lubrication System

Lubricating Oil Specification:	See Engine Specification Manual

Exhaust System

Exhaust Flow (kg/min):	7.70 (16.2 m³/min)
Exhaust Temperature (°C):	569 (ATC)

Cold Start Capability

Unaided Start Limit (°C):	-10
Aided Start Limit (°C):	-25
Start Aid (Optional):	Glowplugs fitted as standard
Minimum Cranking Speed (rev/min) - unaided:	Not applicable
- aided:	

Cooling System

Heat Rejected @ Rated Speed (kW):	54.1
Heat Rejected @ Peak Torque (kW):	41.1
Coolant Flow (litres/min):	193.0
Thermostat - Start To Open (°C):	82
Thermostat - Fully Open (°C):	93
Recommended Cap Pressure (kPa):	
Max Top Tank Pressure (kPa):	

Air System

Engine Air Flow (kg/min):	7.38 (6.34 m³/min)
Induction Manifold Pressure (kPa):	122.0

Charge Air Cooler System

Charge Air Cooling System:	Not applicable
Max Total Pressure Drop inc Pipes (kPa):	Not applicable
Charge Air Cooler Heat Rejection (kW):	Not applicable
Manifold Charge Air Temperature (°C):	Not applicable

Turbocharger

Turbocharger Type:	Garrett GT25 with wastegate
Maximum Altitude (m):	2250

Performance Data

Friction Power @ Rated Speed (kW):	
Friction Power @ Peak Torque (kW):	
Unboosted Torque @ 800 rev/min (Nm):	238
Unboosted Torque @ 1000 rev/min (Nm):	238

For further performance data see table below.

Performance Data **Rating Standard:** ISO 14396: 2002

Speed (rev/min)	Torque (Nm)	Power (kW)	Max Exhaust Back Pressure (kPa)	Max Inlet Restriction (kPa)	Governing Categories (key on sht 1)
2300	301	72.5	15.0	5.0	A
2200	315	72.5	15.0	5.0	N
2000	339	71.0	12.2		
1800	357	67.3	11.2		
1700	368	65.5	11.0		
1600	378	63.3	9.8		
1500	387	60.8	8.7		
1400	390	57.2	7.6		
1300	387	52.7	6.4		
1200	384	48.3	5.3		
1100	374	43.1	4.3		

Further Notes:

Not suitable for Heavy Duty Agricultural tractor applications.

Internal References

Curve Issue No: 3 **DCP Number(s):** ECR002775 **TAN Number:**

Curve Issue Date : 9-Nov-2007 **FIE EDR Number**

1104D-44T - T3360, (non-balanced)

Perkins

Engine Model: 1104D-44T

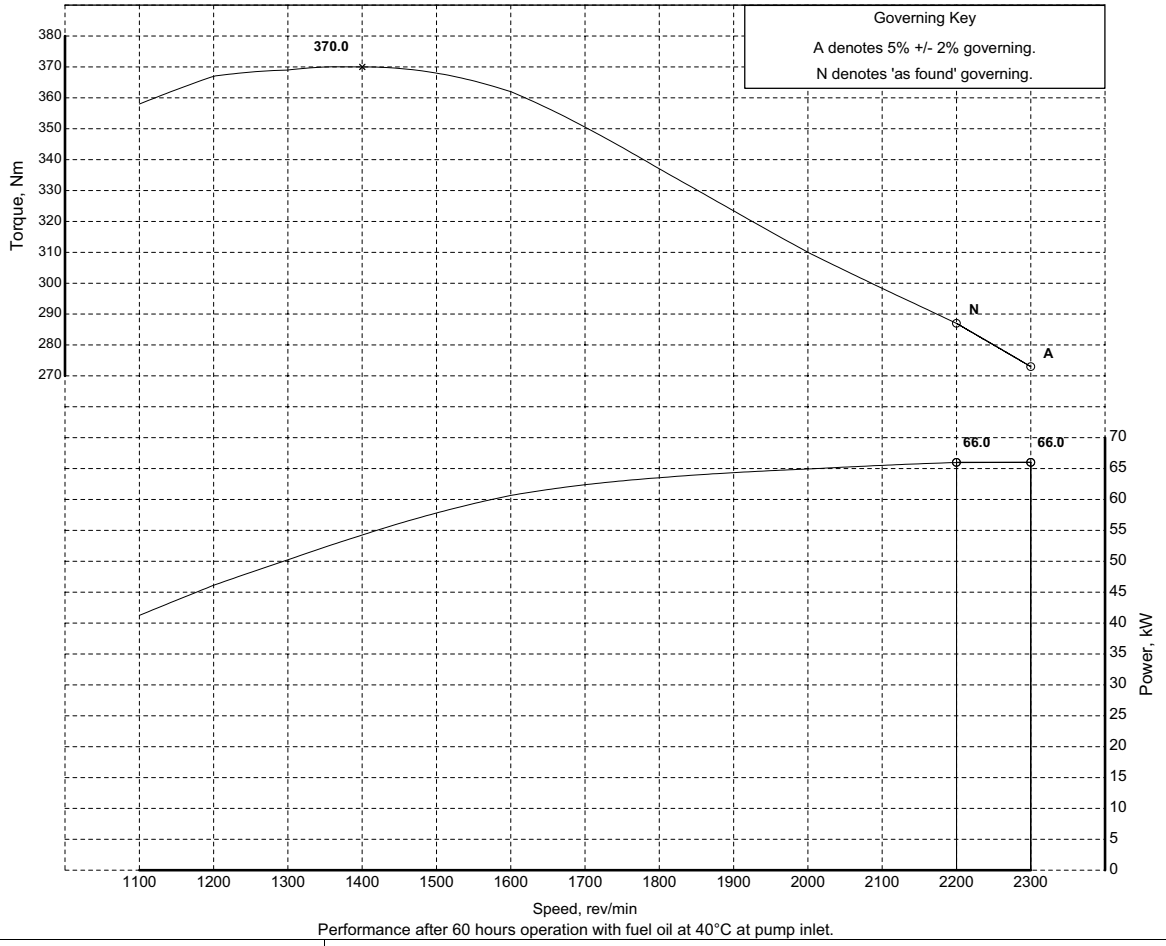
Curve: T 3360 **Sheet 1**

Issue: 3 **Date:** 9-Nov-2007

Development Target - May be Subject to Change

Rating Standards:	ISO 14396: 2002
Production Tolerance On Power Output:	+5%, -5%
Total Barometric Pressure (kPa):	100
Vapour Pressure (kPa):	1
Air Inlet Temperature (°C):	25

Fuel Types:	Europe Off Highway	USA FED Off Highway
Fuel Specification:	CEC RF-06-99	EPA 2D 89.330 2004
Density (kg/l @ 15°C):	0.833 - 0.837	0.840 - 0.865
Viscosity (mm²/s @ 40°C):	2.3 - 3.5	2.0 - 3.2
Sulphur Content (% mass):	0.03 max	0.03 - 0.2
Cetane No:	52 - 54	40 - 48



Performance after 60 hours operation with fuel oil at 40°C at pump inlet.

Notes:

1. For duty cycle refer to Perkins Engines (Peterborough) Limited statement on Product Duty Usage Limitations.

2. For power and torque data below 1100 rev/min refer to Perkins Engines Limited.

3. Smoke may be higher in some modes of operation than equivalent 1104C rating. For further details refer to section 6 of ESM or contact local Perkins Applications Team.

Auxiliaries fitted to engine:
Alternator - off load.
Balancer - not fitted.
Fan - not fitted.

Exhaust Quality Standard	**Certification Refs (Rated Speeds)**
Smoke:	
See Note 3.	
Emissions:	
EU NRMM 97/68/EC Stage 3A.	e11*97/68JA*2004/26*0884* (2300, 2200)
US EPA 40 CFR Part 89 Tier 3.	PKXL04.4NL1 (2300, 2200)
Power Standard	**Certification Refs (Rated Speeds)**
UN/ECE R120	120R-000079 (2300, 2200)

Approved by:	**Accepted by:**	**Issued by:**
E. Hughes (Product Manager)	C. Herring (PE Manager)	J.H. Boorman (Legislation Engineer)
Date: 8-Nov-2007	**Date:** 8-Nov-2007	

Rating Curves Data Sheet

Curve T 3360 **Sheet 2**

Note1: Unless otherwise specified, all stated data is for maximum rated speed and 100% load.

General Data

Engine Model:	1104D-44T
Number Of Cylinders:	4
Bore (mm):	105.0
Stroke (mm):	127.0
Configuration:	Vertical In Line
Displacement (litres):	4.4
Aspiration:	Turbocharged
Compression Ratio:	18.2 : 1
Combustion Bowl:	Re-entrant

Fuel System

Fuel Pump Model:	Delphi DP310
Injection Timing (°BTDC) - Static:	
- Dynamic (needle lift pick-up):	-0.5
Lift Pump Pressure (Out) (kPa):	
Fuel Pump Pressure (In) (kPa):	
Fuel Filter Max Particle Size (micron):	
Fuel Return System Type:	

Lubrication System

Lubricating Oil Specification:	See Engine Specification Manual

Exhaust System

Exhaust Flow (kg/min):	7.55 (14.8 m³/min)
Exhaust Temperature (°C):	507 (ATC)

Cold Start Capability

Unaided Start Limit (°C):	-10
Aided Start Limit (°C):	-25
Start Aid (Optional):	Glowplugs fitted as standard
Minimum Cranking Speed (rev/min) - unaided:	Not applicable
- aided:	

Cooling System

Heat Rejected @ Rated Speed (kW):	47.3
Heat Rejected @ Peak Torque (kW):	36.4
Coolant Flow (litres/min):	193.0
Thermostat - Start To Open (°C):	82
Thermostat - Fully Open (°C):	93
Recommended Cap Pressure (kPa):	
Max Top Tank Pressure (kPa):	

Air System

Engine Air Flow (kg/min):	7.28 (6.25 m³/min)
Induction Manifold Pressure (kPa):	118.0

Charge Air Cooler System

Charge Air Cooling System:	Not applicable
Max Total Pressure Drop inc Pipes (kPa):	Not applicable
Charge Air Cooler Heat Rejection (kW):	Not applicable
Manifold Charge Air Temperature (°C):	Not applicable

Turbocharger

Turbocharger Type:	
Maximum Altitude (m):	3000

Performance Data

Friction Power @ Rated Speed (kW):	
Friction Power @ Peak Torque (kW):	
Unboosted Torque @ 800 rev/min (Nm):	240
Unboosted Torque @ 1000 rev/min (Nm):	240

For further performance data see table below.

Performance Data **Rating Standard:** ISO 14396: 2002

Speed (rev/min)	Torque (Nm)	Power (kW)	Max Exhaust Back Pressure (kPa)	Max Inlet Restriction (kPa)	Governing Categories (key on sht 1)
2300	273	66.0	15.0	5.0	A
2200	287	66.0	15.0	5.0	N
2000	310	64.9	12.7	4.3	
1800	337	63.5	12.0	3.8	
1600	362	60.7	10.0	3.3	
1400	370	54.2	7.2	2.6	
1300	369	50.2	6.0	2.3	
1200	367	46.1	5.0	2.0	
1100	358	41.2	4.0	1.6	

Further Notes:

Internal References

Curve Issue No: 3 **DCP Number(s):** ECR002775 **TAN Number:**

Curve Issue Date : 9-Nov-2007 **FIE EDR Number**

1104D-44TA - T3496, (balanced)

Perkins

Engine Model: 1104D-44TA

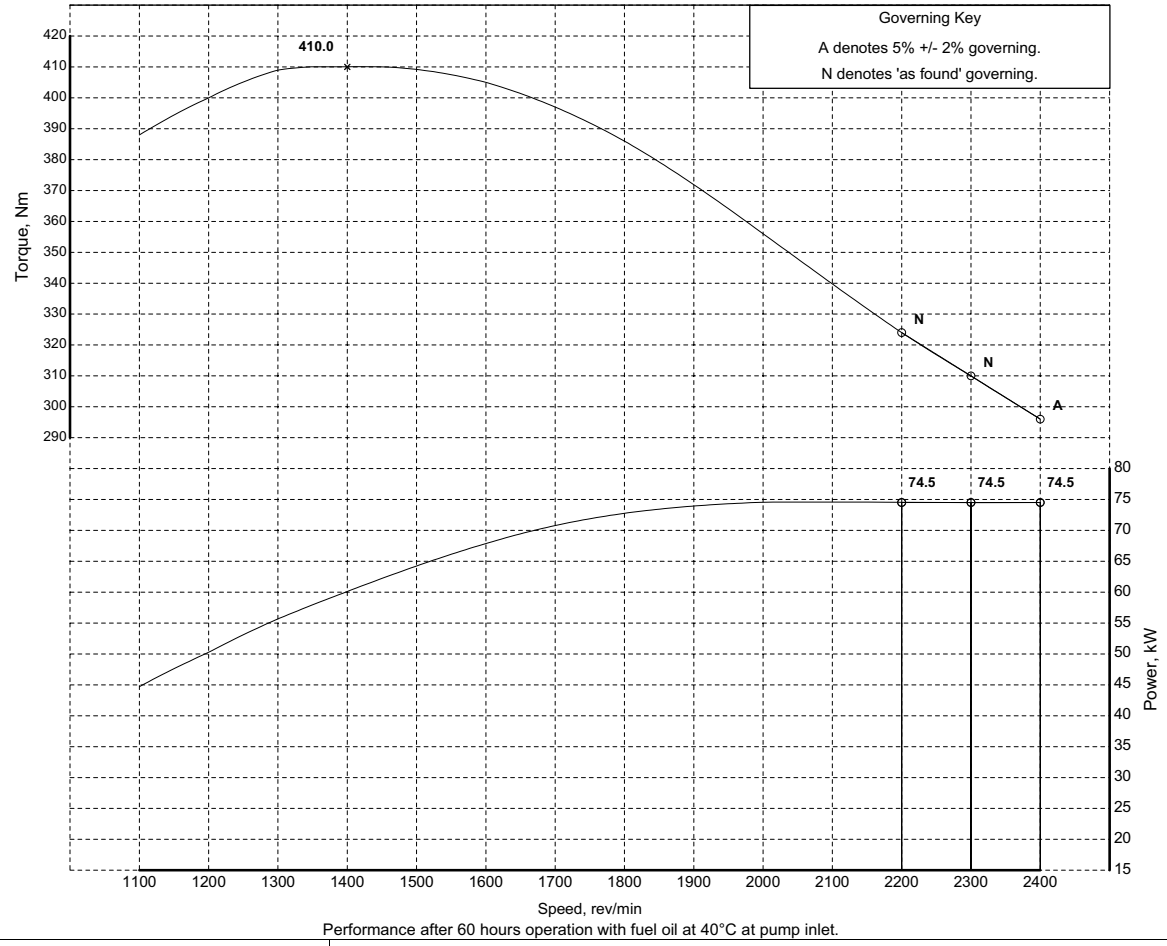
Curve: T 3496 **Sheet 1**

Issue: 1 **Date:** 11-Sep-2007

Development Target - May be Subject to Change

Rating Standards:	ISO 14396: 2002
Production Tolerance On Power Output:	+5%, -5%
Total Barometric Pressure (kPa):	100
Vapour Pressure (kPa):	1
Air Inlet Temperature (°C):	25

Fuel Types:	Europe Off Highway	USA FED Off Highway
Fuel Specification:	CEC RF-06-99	EPA 2D 89.330 2004
Density (kg/l @ 15°C):	0.833 - 0.837	0.840 - 0.865
Viscosity (mm²/s @ 40°C):	2.3 - 3.5	2.0 - 3.2
Sulphur Content (% mass):	0.03 max	0.03 - 0.2
Cetane No:	52 - 54	40 - 48



Performance after 60 hours operation with fuel oil at 40°C at pump inlet.

Notes:

1. For duty cycle refer to Perkins Engines (Peterborough) Limited statement on Product Duty Usage Limitations.

2. For power and torque data below 1100 rev/min refer to Perkins Engines Limited.

Auxiliaries fitted to engine:
Alternator - off load.
Balancer - not fitted.
Fan - not fitted.

Exhaust Quality Standard — **Certification Refs (Rated Speeds)**

Smoke:
77/537/EEC- Includes FAS.

Emissions:
EU NRMM 97/68/EC Stage 3A.
US EPA 40 CFR Part 89 Tier 3.

Power Standard — **Certification Refs (Rated Speeds)**
UN/ECE R120

Approved by:	**Accepted by:**	**Issued by:**
E. Hughes (Product Manager)	C. Herring (PE Manager)	J.H. Boorman (Legislation Engineer)
Date: 4-Sep-2007	**Date:** 24-Aug-2007	

Rating Curves Data Sheet

Curve T 3496 **Sheet 2**

Note1: Unless otherwise specified, all stated data is for maximum rated speed and 100% load.

General Data

Engine Model:	1104D-44TA
Number Of Cylinders:	4
Bore (mm):	105.0
Stroke (mm):	127.0
Configuration:	Vertical In Line
Displacement (litres):	4.4
Aspiration:	Turbocharged
Compression Ratio:	18.2 : 1
Combustion Bowl:	Re-entrant

Fuel System

Fuel Pump Model:	Delphi DP310
Injection Timing (°BTDC) - Static:	
- Dynamic (needle lift pick-up):	
Lift Pump Pressure (Out) (kPa):	
Fuel Pump Pressure (In) (kPa):	
Fuel Filter Max Particle Size (micron):	
Fuel Return System Type:	

Lubrication System

Lubricating Oil Specification:	See Engine Specification Manual

Exhaust System

Exhaust Flow (kg/min):	
Exhaust Temperature (°C):	478 (ATC)

Cold Start Capability

Unaided Start Limit (°C):	-10
Aided Start Limit (°C):	-25
Start Aid (Optional):	Glowplugs fitted as standard
Minimum Cranking Speed (rev/min) - unaided:	Not applicable
- aided:	

Cooling System

Heat Rejected @ Rated Speed (kW):	46.4
Heat Rejected @ Peak Torque (kW):	36.6
Coolant Flow (litres/min):	
Thermostat - Start To Open (°C):	82
Thermostat - Fully Open (°C):	93
Recommended Cap Pressure (kPa):	
Max Top Tank Pressure (kPa):	

Air System

Engine Air Flow (kg/min):	8.50 (7.30 m³/min)
Induction Manifold Pressure (kPa):	102.0

Charge Air Cooler System

Charge Air Cooling System:	Air-to-Air
Max Total Pressure Drop inc Pipes (kPa):	10.0
Charge Air Cooler Heat Rejection (kW):	10.4
Manifold Charge Air Temperature (°C):	55.0

Turbocharger

Turbocharger Type:	
Maximum Altitude (m):	3000

Performance Data

Friction Power @ Rated Speed (kW):	
Friction Power @ Peak Torque (kW):	
Unboosted Torque @ 800 rev/min (Nm):	290
Unboosted Torque @ 1000 rev/min (Nm):	290

For further performance data see table below.

Performance Data **Rating Standard:** ISO 14396: 2002

Speed (rev/min)	Torque (Nm)	Power (kW)	Max Exhaust Back Pressure (kPa)	Max Inlet Restriction (kPa)	Governing Categories (key on sht 1)
2400	296	74.5	15.0	5.0	A
2300	310	74.5	15.0	5.0	N
2200	324	74.5	15.0	5.0	N
2000	356	74.6	11.0		
1800	386	72.8	10.0		
1600	405	67.9	9.0		
1400	410	60.1	6.5		
1300	409	55.7	5.3		
1200	400	50.3	4.5		
1100	388	44.7	3.5		

Further Notes:

Internal References

Curve Issue No:	1	**DCP Number(s):**	TBD **TAN Number:**
Curve Issue Date :	11-Sep-2007		**FIE EDR Number**

1104D-44TA - T3499, (balanced)

Perkins

Engine Model: 1104D-44TA

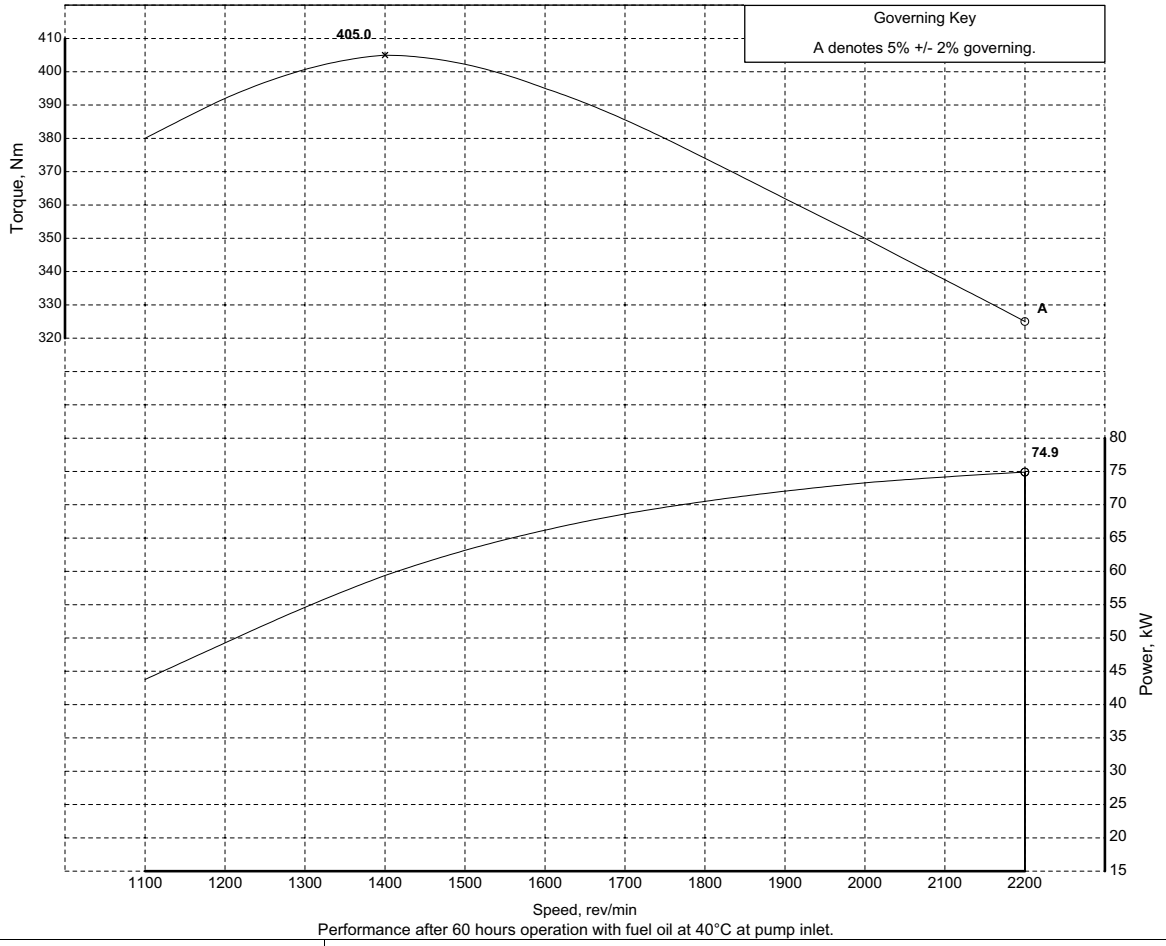
Curve: T 3499 **Sheet 1**

Issue: 2 **Date:** 17-Dec-2007

Development Target - May be Subject to Change

Rating Standards:	ISO 14396: 2002
Production Tolerance On Power Output:	+5%, -5%
Total Barometric Pressure (kPa):	100
Vapour Pressure (kPa):	1
Air Inlet Temperature (°C):	25

Fuel Types:	Europe Off Highway	USA FED Off Highway
Fuel Specification:	CEC RF-06-99	EPA 2D 89.330 2004
Density (kg/l @ 15°C):	0.833 - 0.837	0.840 - 0.865
Viscosity (mm²/s @ 40°C):	2.3 - 3.5	2.0 - 3.2
Sulphur Content (% mass):	0.03 max	0.03 - 0.2
Cetane No:	52 - 54	40 - 48



Performance after 60 hours operation with fuel oil at 40°C at pump inlet.

Notes:

1. For duty cycle refer to Perkins Engines (Peterborough) Limited statement on Product Duty Usage Limitations.

2. For power and torque data below 1100 rev/min refer to Perkins Engines Limited.

Exhaust Quality Standard — **Certification Refs (Rated Speeds)**

Smoke:
77/537/EEC- Includes FAS.

Emissions:
EU NRMM 97/68/EC Stage 3A.
US EPA 40 CFR Part 89 Tier 3.

Power Standard — **Certification Refs (Rated Speeds)**
UN/ECE R120

Auxiliaries fitted to engine:
Alternator - off load.
Balancer - fitted.
Fan - not fitted.

Approved by:	**Accepted by:**	**Issued by:**
E. Hughes (Product Manager)	C. Herring (PE Manager)	J.H. Boorman (Legislation Engineer)
Date: 17-Dec-2007	**Date:** 17-Dec-2007	

Rating Curves Data Sheet

Curve T 3499 **Sheet 2**

Note1: Unless otherwise specified, all stated data is for maximum rated speed and 100% load.

General Data

Engine Model:	1104D-44TA
Number Of Cylinders:	4
Bore (mm):	105.0
Stroke (mm):	127.0
Configuration:	Vertical In Line
Displacement (litres):	4.4
Aspiration:	Turbocharged
Compression Ratio:	18.2 : 1
Combustion Bowl:	Re-entrant

Fuel System

Fuel Pump Model:	Delphi DP310
Injection Timing (°BTDC) - Static:	
- Dynamic (needle lift pick-up):	0.5
Lift Pump Pressure (Out) (kPa):	
Fuel Pump Pressure (In) (kPa):	
Fuel Filter Max Particle Size (micron):	
Fuel Return System Type:	

Lubrication System

Lubricating Oil Specification:	See Engine Specification Manual

Exhaust System

Exhaust Flow (kg/min):	8.03 (17.1 m³/min)
Exhaust Temperature (°C):	575 (ATC)

Cold Start Capability

Unaided Start Limit (°C):	-10
Aided Start Limit (°C):	-25
Start Aid (Optional):	Glowplugs fitted as standard
Minimum Cranking Speed (rev/min) - unaided:	Not applicable
- aided:	

Cooling System

Heat Rejected @ Rated Speed (kW):	46.7
Heat Rejected @ Peak Torque (kW):	
Coolant Flow (litres/min):	184.0
Thermostat - Start To Open (°C):	82
Thermostat - Fully Open (°C):	93
Recommended Cap Pressure (kPa):	
Max Top Tank Pressure (kPa):	

Air System

Engine Air Flow (kg/min):	7.72 (6.63 m³/min)
Induction Manifold Pressure (kPa):	73.0

Charge Air Cooler System

Charge Air Cooling System:	Air-to-Air
Max Total Pressure Drop inc Pipes (kPa):	10.0
Charge Air Cooler Heat Rejection (kW):	7.2
Manifold Charge Air Temperature (°C):	50.0

Turbocharger

Turbocharger Type:	
Maximum Altitude (m):	3000

Performance Data

Friction Power @ Rated Speed (kW):	
Friction Power @ Peak Torque (kW):	
Unboosted Torque @ 800 rev/min (Nm):	290
Unboosted Torque @ 1000 rev/min (Nm):	290

For further performance data see table below.

Performance Data — **Rating Standard:** ISO 14396: 2002

Speed (rev/min)	Torque (Nm)	Power (kW)	Max Exhaust Back Pressure (kPa)	Max Inlet Restriction (kPa)	Governing Categories (key on sht 1)
2200	325	74.9	15.0	5.0	A
2000	350	73.3	12.6		
1800	374	70.5	11.1		
1600	395	66.2	9.2		
1400	405	59.4	6.7		
1200	392	49.3	4.3		
1100	380	43.8	3.3		

Further Notes:

Internal References

Curve Issue No:	2	**DCP Number(s):**	TBD	**TAN Number:**	
Curve Issue Date :	17-Dec-2007			**FIE EDR Number**	

1104D-44TA - T3500, (balanced)

Perkins

Engine Model: 1104D-44TA

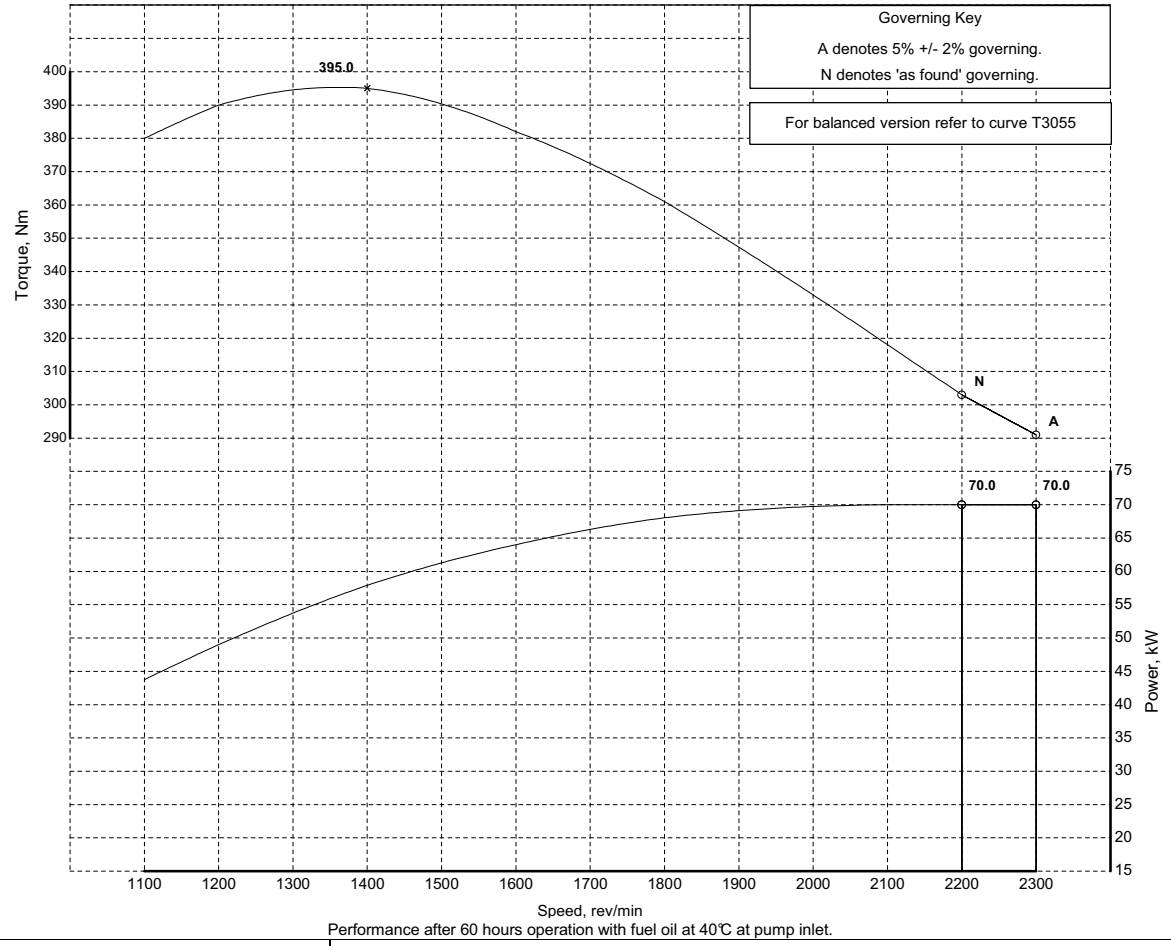
Curve: T 3500 **Sheet 1**

Issue: 2 **Date:** 9-Jan-2008

Development Target - May be Subject to Change

Rating Standards:	ISO 14396: 2002
Production Tolerance On Power Output:	+5%, -5%
Total Barometric Pressure (kPa):	100
Vapour Pressure (kPa):	1
Air Inlet Temperature (°C):	25

Fuel Types:	Europe Off Highway	USA FED Off Highway
Fuel Specification:	CEC RF-06-99	EPA 2D 89.330 2004
Density (kg/l @ 15℃):	0.833 - 0.837	0.840 - 0.865
Viscosity (mm²/s @ 40℃):	2.3 - 3.5	2.0 - 3.2
Sulphur Content (% mass):	0.03 max	0.03 - 0.2
Cetane No:	52 - 54	40 - 48



Performance after 60 hours operation with fuel oil at 40℃ at pump inlet.

Notes:

1. For duty cycle refer to Perkins Engines (Peterborough) Limited statement on Product Duty Usage Limitations.

2. For power and torque data below 1100 rev/min refer to Perkins Engines Limited.

Exhaust Quality Standard — **Certification Refs (Rated Speeds)**

Smoke:
77/537/EEC- Includes FAS.

Emissions:
EU NRMM 97/68/EC Stage 3A.
US EPA 40 CFR Part 89 Tier 3.

Power Standard — **Certification Refs (Rated Speeds)**
UN/ECE R120

Auxiliaries fitted to engine:
Alternator - off load.
Balancer - not fitted.
Fan - not fitted.

Approved by:	**Accepted by:**	**Issued by:**
E. Hughes (Product Manager)	C. Herring (PE Manager)	J.H. Boorman (Legislation Engineer)
Date: 7-Jan-2008	**Date:** 2-Jan-2008	

Rating Curves Data Sheet

Curve T 3500 **Sheet 2**

Note1: Unless otherwise specified, all stated data is for maximum rated speed and 100% load.

General Data

Engine Model:	1104D-44TA
Number Of Cylinders:	4
Bore (mm):	105.0
Stroke (mm):	127.0
Configuration:	Vertical In Line
Displacement (litres):	4.4
Aspiration:	Turbocharged
Compression Ratio:	18.2 : 1
Combustion Bowl:	Re-entrant

Fuel System

Fuel Pump Model:	Delphi DP310
Injection Timing (°BTDC) - Static:	
- Dynamic (needle lift pick-up):	2.0
Lift Pump Pressure (Out) (kPa):	
Fuel Pump Pressure (In) (kPa):	
Fuel Filter Max Particle Size (micron):	
Fuel Return System Type:	

Lubrication System

Lubricating Oil Specification: See Engine Specification Manual

Exhaust System

Exhaust Flow (kg/min):	8.10 (16.8 m³/min)
Exhaust Temperature (°C):	553 (ATC)

Cold Start Capability

Unaided Start Limit (°C):	-10
Aided Start Limit (°C):	-25
Start Aid (Optional):	Glowplugs fitted as standard
Minimum Cranking Speed (rev/min) - unaided:	Not applicable
- aided:	

Cooling System

Heat Rejected @ Rated Speed (kW):	44.9
Heat Rejected @ Peak Torque (kW):	36.3
Coolant Flow (litres/min):	193.0
Thermostat - Start To Open (°C):	82
Thermostat - Fully Open (°C):	93
Recommended Cap Pressure (kPa):	
Max Top Tank Pressure (kPa):	

Air System

Engine Air Flow (kg/min):	7.80 (6.70 m³/min)
Induction Manifold Pressure (kPa):	70.0

Charge Air Cooler System

Charge Air Cooling System:	Air-to-Air
Max Total Pressure Drop inc Pipes (kPa):	10.0
Charge Air Cooler Heat Rejection (kW):	7.2
Manifold Charge Air Temperature (°C):	50.0

Turbocharger

Turbocharger Type:	
Maximum Altitude (m):	3000

Performance Data

Friction Power @ Rated Speed (kW):	
Friction Power @ Peak Torque (kW):	
Unboosted Torque @ 800 rev/min (Nm):	290
Unboosted Torque @ 1000 rev/min (Nm):	290

For further performance data see table below.

Performance Data **Rating Standard:** ISO 14396: 2002

Speed (rev/min)	Torque (Nm)	Power (kW)	Max Exhaust Back Pressure (kPa)	Max Inlet Restriction (kPa)	Governing Categories (key on sht 1)
2300	291	70.0	15.0	5.0	A
2200	303	70.0	15.0	5.0	N
2000	333	69.7			
1800	361	68.0			
1600	382	64.0			
1400	395	57.9			
1200	390	49.0			
1100	380	43.8			

Further Notes:

Internal References

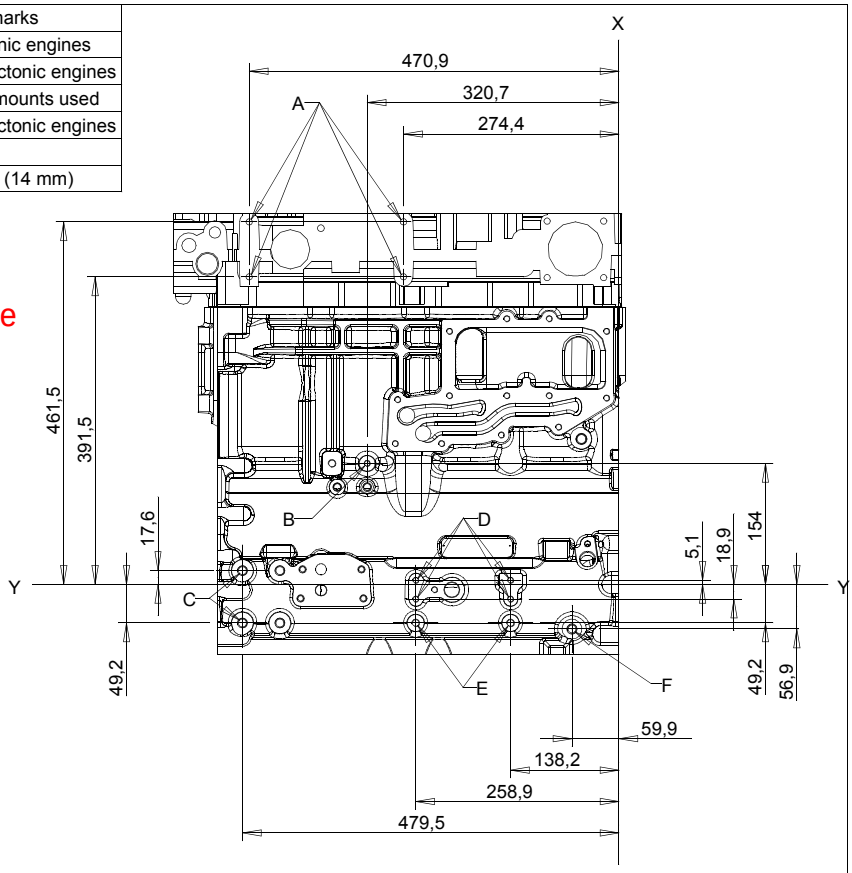
Curve Issue No:	2	**DCP Number(s):**	TBD **TAN Number:**
Curve Issue Date :	9-Jan-2008		**FIE EDR Number**

Cylinder block views non-stressed block

Non stressed block and head - left hand side view

Ref	Qty	Size	Remarks
A	4	M8x1,25x16	Available on non-electronic engines
B	1	M8x1,25x16	May be used on non-electonic engines
C	2	M12x1,75x20	Front 2 only when front mounts used
D	4	M8x1,25x16	May be used on non-electonic engines
E	2	M10x1,50x20	Customer fixing point
F	1	M12x1,75x14	Restricted tapping depth (14 mm)

drawings subject to change

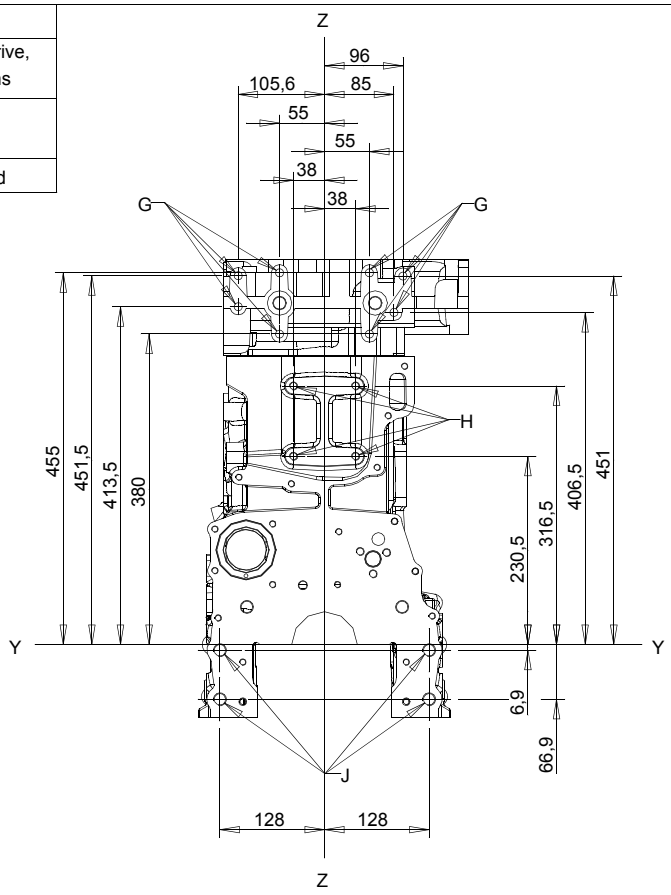


3711H211 cyl.block 3712H193 cyl.head

Non stressed block and head - front view

Ref	Qty	Size	Remarks
G	8	M10x1,50x18	2 to 6 available dependant on fan drive, lifting eye and air con.bracket options
H	4	M10x1,50x19	Available if head mounted fan drive option is used
J	4	M16x2,00x25	Available if side mounting pads used

drawings subject to change

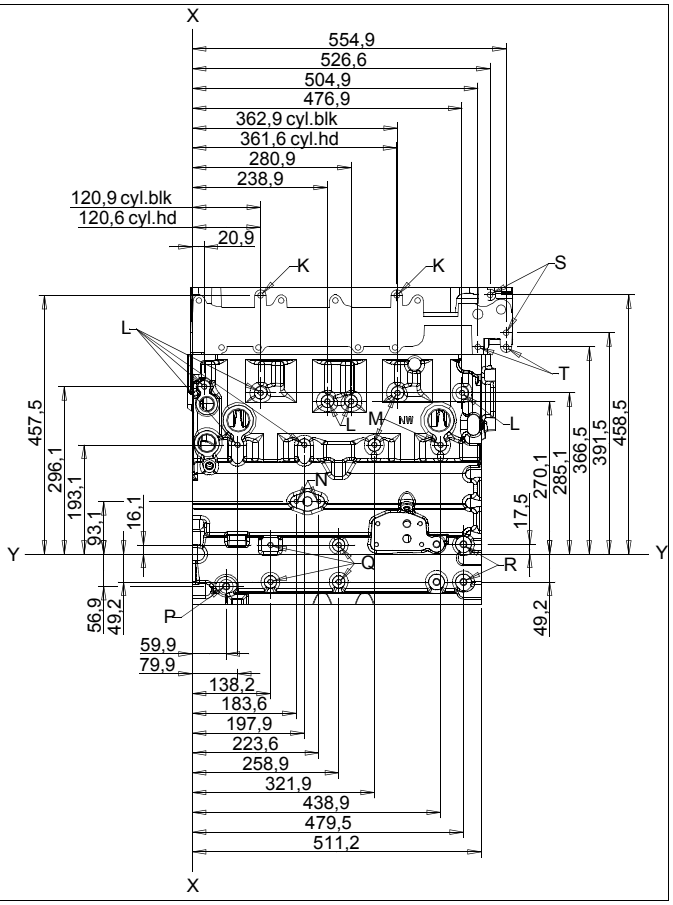


3711H211 cyl.block 3712H193 cyl.head

Non stressed block and head - right side view

Ref	Qty	Size	Remarks
K	2	M10x1,50x19	Available if top turbo heat shield or no cross over support bracket fitted
L	7	M10x1,50x15	Customer fixing point
M	3	M10x1,50x15	Except on side mounted turbo engines
N	2	M8x1,25x15	Only naturally aspirated engines
P	1	M12x1,75x14	Restricted tapping depth (14 mm)
Q	4	M10x1,50x20	Customer fixing point
R	2	M12x1,75x20	Front 2 only when front mounts used
S	2	M10x1,50x19	Available if rhs air con.bracket not fitted
T	2	M10x1,50x19	Available if alternator support bracket not fitted

drawings subject to change

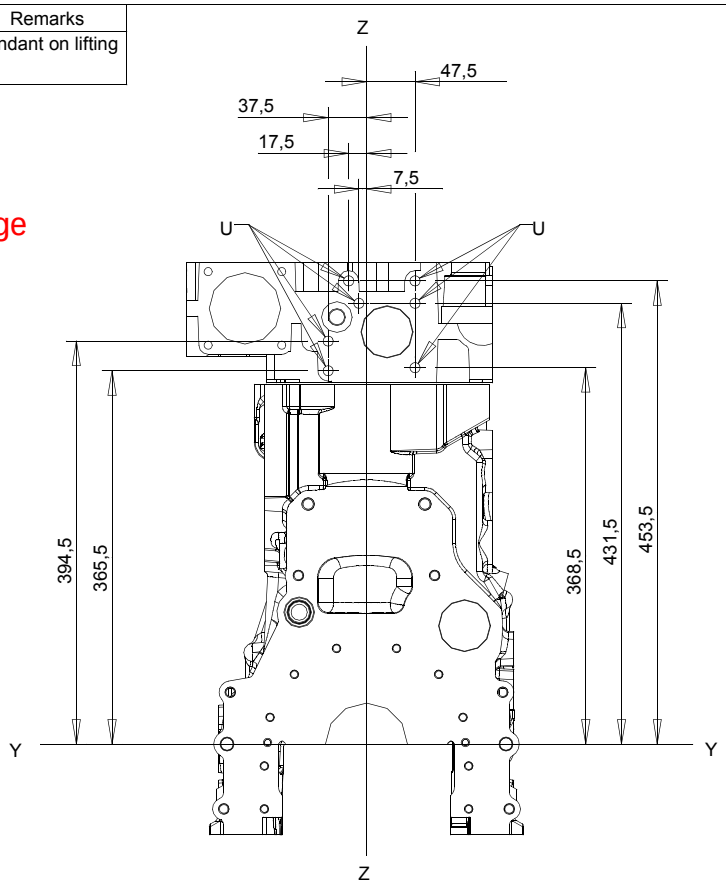


3711H211 cyl.block 3712H193 cyl.head

Non stressed block and head - rear side view

Ref	Qty	Size	Remarks
U	7	M10x1,50x19	5 holes available dependant on lifting eye option

drawings subject to change

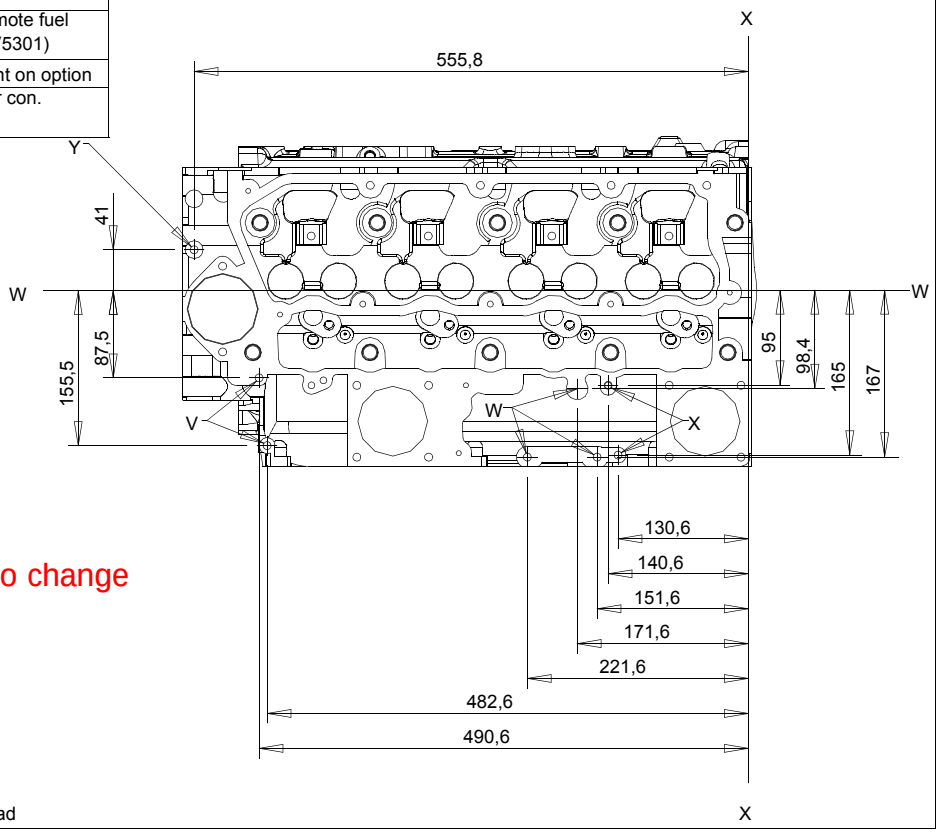


3711H211 cyl.block 3712H193 cyl.head

Non stressed block and head - plan view

Ref	Qty	Size	Remarks
V	2	M8x1,25x16	Available if lhs air con. bracket not fitted
W	3	M6x1,00x15	Available only if remote fuel filter fitted (option V5301)
X	2	M8x1,25x16	Available dependant on option
Y	1	M8x1,25x16	Available if RHS air con. bracket not fitted

drawings subject to change



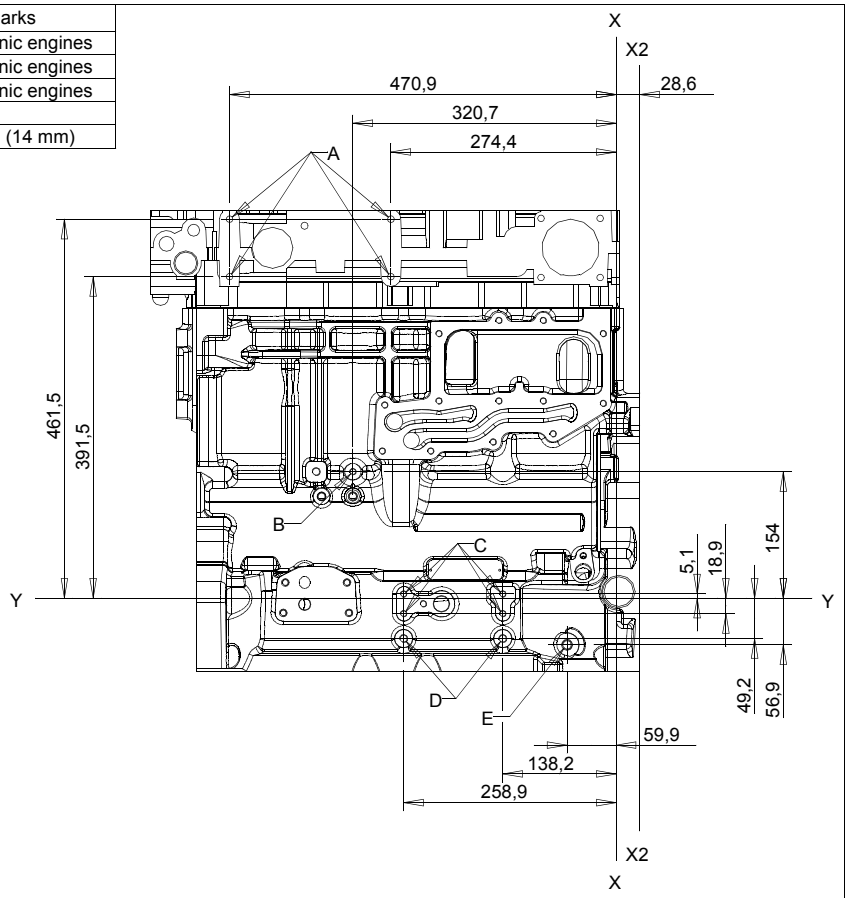
3711H211 cyl.block 3712H193 cyl.head

Cylinder block views stressed block

Stressed block and head - left hand side view

Ref	Qty	Size	Remarks
A	4	M8x1,25x16	Available on non-electronic engines
B	1	M8x1,25x16	Available on non-electronic engines
C	4	M8x1,25x16	Available on non-electronic engines
D	2	M10x1,50x20	Customer fixing point
E	1	M12x1,75x14	Restricted tapping depth (14 mm)

drawings subject to change

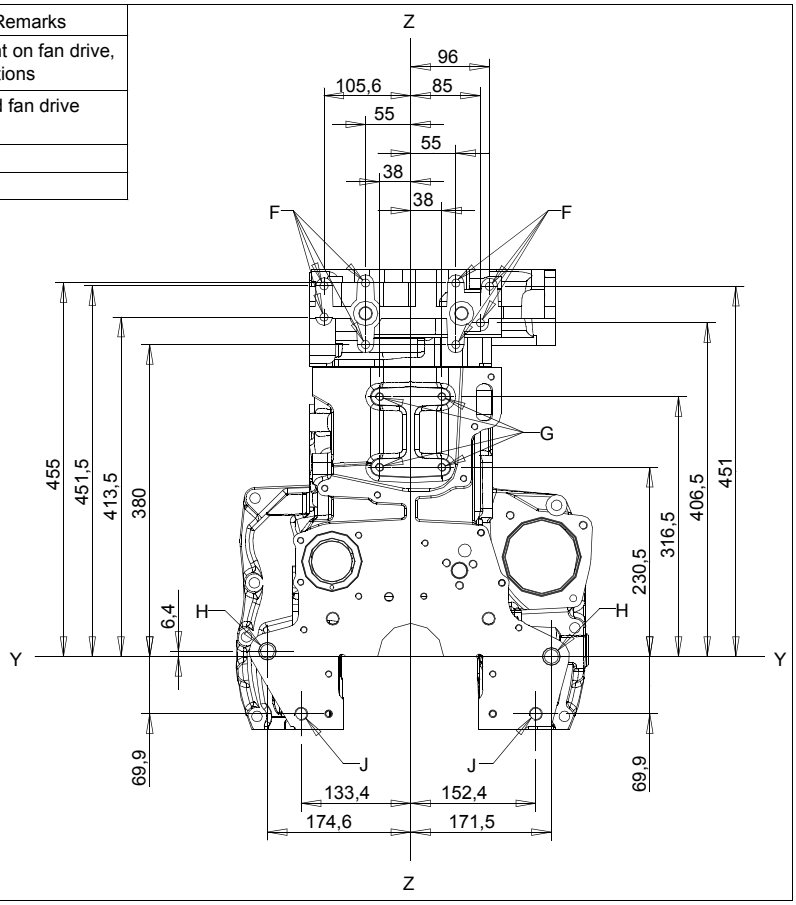


3711H221 cyl.block 3712H193 cyl.head

Stressed block and head - front view

Ref	Qty	Size	Remarks
F	8	M10x1,50x18	2 to 6 available dependant on fan drive, lifting eye and air con. options
G	4	M10x1,50x19	Available if head mounted fan drive option is used
H	2	c17	Engine mounting
J	2	M16x2,00x32	Engine mounting

drawings subject to change

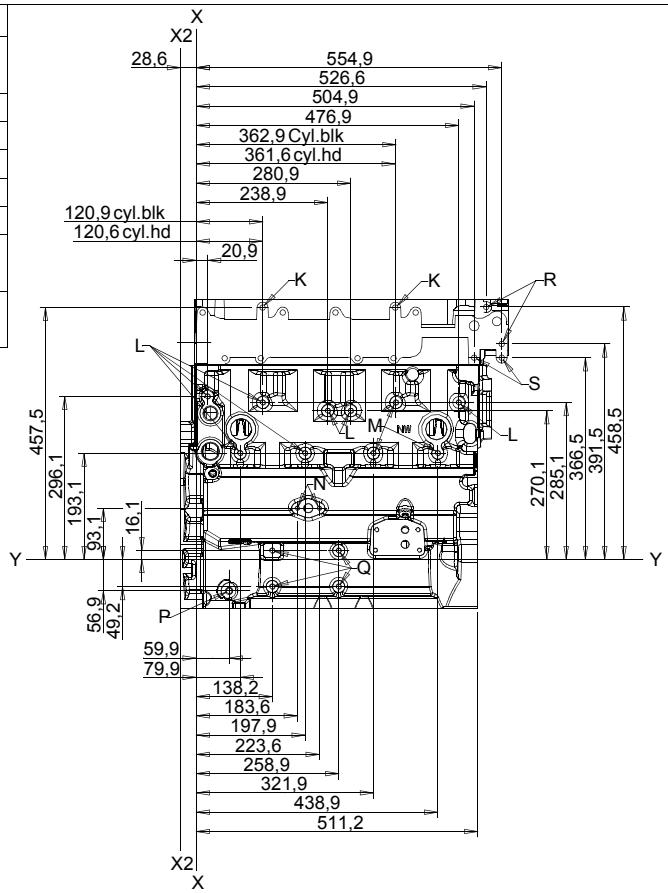


3711H221 cyl.block 3712H193 cyl.head

Stressed block and head - right side view

Ref	Qty	Size	Remarks
K	2	M10x1,50x19	Available if top turbo heat shield or cross over support bracket not fitted
L	7	M10x1,50x15	Customer fixing point
M	3	M10x1,50x15	Except on side mounted turbo engines
N	2	M8x1,25x15	Only naturally aspirated engines
P	1	M12x1,75x14	Restricted tapping depth (14 mm)
Q	4	M10x1,50x20	Customer fixing point
R	2	M10x1,50x19	Available if rhs air con.bracket not fitted
S	2	M10x1,50x19	Available if alternator support bracket not fitted

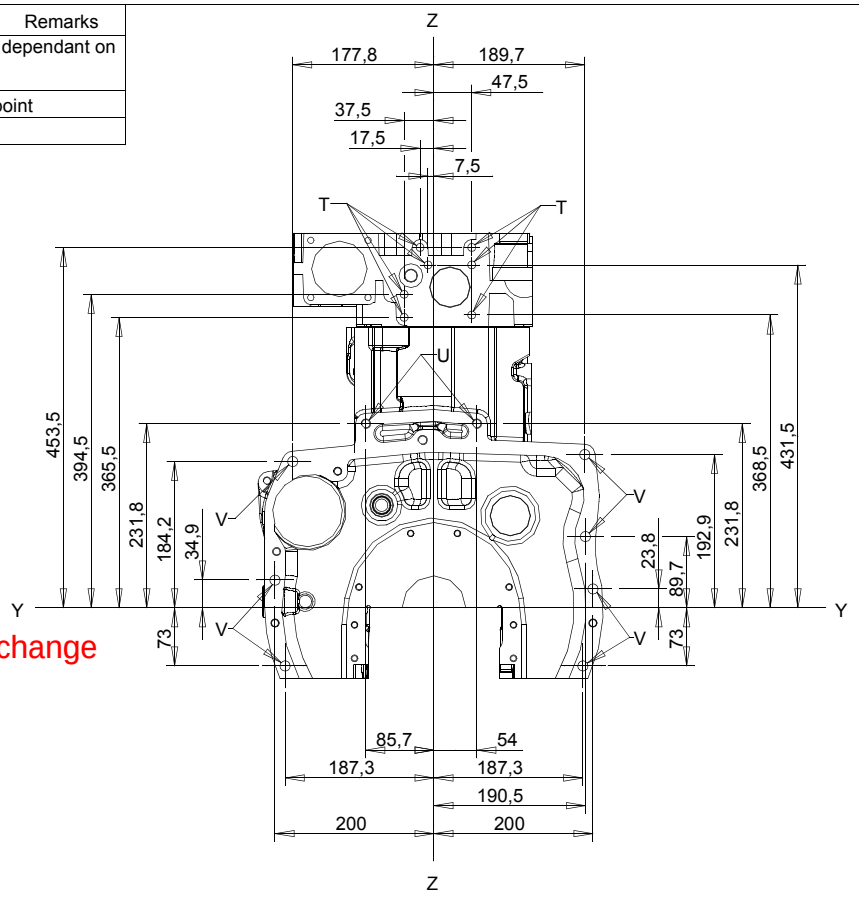
drawings subject to change



3711H221 cyl.block 3712H193 cyl.head

Stressed block and head - rear side view

Ref	Qty	Size	Remarks
T	7	M10x1,50x19	5 holes available dependant on lifting eye option
U	2	M12x1,75x25	Customer fixing point
V	7	c13	Engine mounting

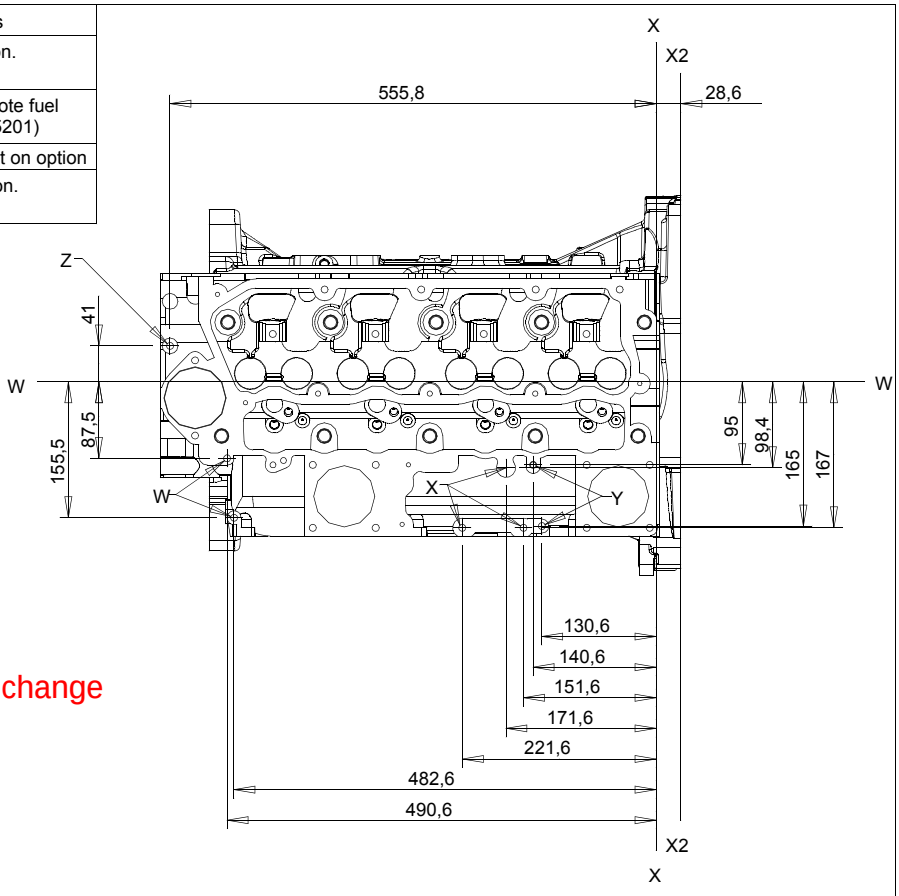


drawings subject to change

3711H221 cyl.block 3712H193 cyl.head

Stressed block and head - plan view

Ref	Qty	Size	Remarks
W	2	M8x1,25x16	Available if lhs air con. bracket not fitted
X	3	M6x1,00x15	Available only if remote fuel filter fitted (option V5201)
Y	2	M8x1,25x16	Available, dependant on option
Z	1	M8x1,25x16	Available if rhs air con. bracket not fitted



drawings subject to change

3711H221 cyl.block 3712H193 cyl.head

Cold start system

The conditions which follow will decide the minimum temperatures at which the engine will start:

- Starter motor performance
- Battery type
- Lubricating oil grade
- Cold start aid.

For more information on the minimum start temperatures and types of starter motors etc, refer to the Perkins Installation Manual or your local distributor.

Equipment required for cold temperatures

The chart below gives the minimum temperature at which a selection of engine oil, battery and starter motor will start the engine. The temperatures shown are for an engine fitted to a manual gearbox and with the clutch disengaged to give an increase in cranking speed.

Applications that use automatic gearboxes or other high drag equipment should use the next most powerful battery combination to get the same start temperature and engine cranking speed.

Cold start performance table

1104D-44T 1104D-44TA engine tested with 75% state of charge batteries and 1.7 mΩ cable resistance												
Starter information		**Temperature and oil grade with glow plugs**						**Temperature and oil grade without glow plugs**				
Voltage	Starter type	Max allowable CCA (SAE)	-5ºC 15W40	-10ºC 15W40	-15ºC 15W40	-20ºC 10W30	-25ºC 5W30	-5ºC 15W40	-10ºC 15W40	-15ºC 15W40	-20ºC 10W30	-25ºC 5W30
12V	Iskra AZE	950	750	850	Not used	Not used	Not used	750	850	Glow plugs must be used		
	Iskra AZF	2400	650	750	1125	1125	1500	650	750			
	Denso R2.7	1500	650	850	1300	1300	Not used	650	1300			
	Denso R4	1900	650	850	1300	1300	1900	650	850			
24V	Denso R4.5	750	650	650	650	650	650	650	650			

Ether start

Warning! *Ether start is not permitted with these engines.*

Battery performance

Battery selection tables, based on minimum 100 rev/min											
Voltage	Starter type	Max allowable CCA (SAE)	Temperature and oil grade with glow plugs					Temperature and oil grade without glow plugs			
			-5°C 15/40	-10°C 15/40	-15°C 15/40	-20°C 10/30	-25°C 5/30	-5°C 15/40	-10°C 15/40	-15°C 15/40	-20°C 10/30	-25°C 5/30
12V	AZE	950	750	850	Not used			650	950	Glow plugs must be used		
	AZF	2400	650	750	1125	1125	1500	650	750			
	R2.7	1500	650	850	1300	1300	Not used	650	950			
	R4	1900	650	850	1300	1300	1900	650	850			
24V	R4.5	750	650	650	650	650	650	650	650			

Notes:

- Larger batteries are necessary in machines with additional loads and to maintain 100 rev/min cranking speed
- Tested with 75% state of charge and 1.7 mΩ cable resistance.

Commercial reference number	code	Battery minimum performance		
		BS EN 50342 (1)	SAEJ 537 (BCI) (2)	DIN 43539 (3)
643	A	440	640	400
647	B	510	700	465
069	D	340	540	300
655	E	570	760	490
621	F	860	900	505

(1). Voltage no less than 7,5 Volts after 10 seconds, 6 Volts after 90 seconds at -18 °C (0 °F) across each 12 Volt battery.
(2). Voltage no less than 7,2 Volts after 30 seconds at -18 °C (0 °F) across each 12 Volt battery.
(3). Voltage no less than 6,0 Volts after 150 seconds at -18 °C (0 °F) across each 12 Volt battery.

Batteries that meet this specification will give suitable start performance. If the auxiliary loads are large it may be necessary to specify a battery with a higher ampere-hour capacity (or reserve capacity) or to use a separate battery system. Any battery which is chosen because of its higher reserve capacity must not have inferior high rate discharge characteristics.

Battery to starter lead resistance

The resistance of the lead(s) used between the battery/batteries and the starter motor must not be more than 0.0017 ohms for the 12 volt systems and 0.0034 ohms for the 24 volt systems. more detailed information on the types of battery is available in the Perkins Product Support Publications.

Cooling system

Maximum coolant temperature

With 1,0 Bar (14.7 lbf/in²) pressure cap fitted to the system the coolant temperature must not exceed 112 °C (234 °F) at sea level. This temperature must be reduced at high altitudes, see the tables in chapter 7 of the Perkins Installation Manual. The minimum requirement for temperature measurement, is a warning light or dial gauge which covers the coolant temperature range.

Note: If tests are to be conducted to establish the ambient clearance of a cooling system, the system must be filled with a solution of 50% antifreeze and 50% coolant and be suitable for operating worldwide in ambient temperatures of up to 46 °C (115 °F).

Engine coolant capacities - typical values

Engine type	Litre	UK Pint	US Quart
1104D	7	12.3	7.4

Radiators

The engine must be installed so that there is no air restriction to the flow of air through the radiator. The discharged hot air from the radiator must not be sent through the radiator again because the ambient air temperature will then be lifted above the safe temperature for engine operation. Baffles can be fitted to prevent this. When the radiator is installed, or a change made to the design of the basic cooling system for the purpose of radiator installation, or if the installation space is restricted, then a cooling test must be made before the installation can be approved. For more information about cooling tests refer to the Perkins Product Support Publications.

Radiator coolant flow rates

The engine must be installed to ensure that there is adequate ventilation and that the underbonnet temperatures do not exceed 105°C (221°F).

Engine type	Coolant pump ratio	Units	Engine speed rev/min							
			1000	1200	1400	1600	1800	2000	2200	2400
All engines below 75 kW	2 : 1	Litre/min	84	100	117	134	151	167	184	201
		UK gal/min	18.5	22	25.7	29.5	33.2	36.7	40.5	44.2
		US gal/min	22.2	26.4	30.9	35.4	39.9	44.1	48.6	53.1
All engines above 75 kW	2 : 1	Litre/min	110	133	155	177	199	221	243	265
		UK gal/min	24.2	29.3	34.1	38.9	73.8	48.6	53.5	58.3
		US gal/min	29.1	35.1	41	46.8	52.6	58.4	64.2	70

Caution: *Engine components may become damaged or fail due to excess temperature if coolers (fuel, air charge or coolant) are allowed to become clogged with debris. Customers should be made aware of this, particularly if their machine is likely to be operated in dirty/contaminated environment.*

Note: The table above shows coolant flow rates through a typical pressurised radiator system at normal operating temperature and with the thermostat fully open. The coolant flow rates are with a system resistance (radiator and piping) of 35 kPa (5 psi).

Heat Balance

The following tables show the total heat passed to radiation, exhaust and coolant for typical ratings. The values are for engines under full load conditions and different speeds. The total heat rejection figure includes the heat remove from the lubricant, and the heat removed by the air to air charge cooler.

The result has been established at an air temperature of 25 °C (77 °F), and a stabilised coolant temperature of 93 °C (200 °F).

Note: Data subject to change, contact Perkins for latest information.

1104D-44 Curve number T2968 (non-balanced)

Engine speed (rev/min)	Fuel energy (kW)	Power (kW)	Residual heat loss (kW)	Heat to exhaust (kW)	Heat to coolant inc oil (kW)
2200	166.3	56	12.6	60.9	36.8
2000	157.7	53.6	15	55.3	34.4
1800	140.4	49.6	13.3	47.1	31.2
1400	108	38.4	11.6	33.7	25

1104D-44 Curve number T2969 (balanced)

Engine speed (rev/min)	Fuel energy (kW)	Power (kW)	Residual heat loss (kW)	Heat to exhaust (kW)	Heat to coolant inc oil (kW)
2200	166.3	54	14.1	60.9	36.8
2000	157.7	52.4	16.3	55.3	34.4
1800	140.4	48.6	14.2	47.1	31.2
1400	108	38.1	11.9	33.7	25

1104D-44T Curve number T2970 (non-balanced)

Engine speed (rev/min)	Fuel energy (kW)	Power (kW)	Residual heat loss (kW)	Heat to exhaust (kW)	Heat to coolant inc oil (kW)
2400	194.4	62.5	14.9	68.6	48.4
2300	187.9	62.5	13.3	64.9	47.2
2200	182.9	62.5	12.8	61.5	46.1
2000	172.1	62.4	9.8	55.8	44.1
1800	162	60.7	7.3	52.2	41.8
1600	157	57.5	7.8	51.2	40.5
1400	139.7	51.9	7.2	44	36.6

1104D-44T Curve number T2971 (balanced)

Engine speed (rev/min)	Fuel energy (kW)	Power (kW)	Residual heat loss (kW)	Heat to exhaust (kW)	Heat to coolant inc oil (kW)
2400	194.4	60.5	16.9	68.6	48.4
2300	187.9	60.5	15.3	64.9	47.2
2200	182.9	60.5	14.8	61.5	46.1
2000	172.1	60.9	11.3	55.8	44.1
1800	162	59.8	8.2	52.2	41.8
1600	157	56.8	8.5	51.2	40.5
1400	139.7	51.6	7.5	44	36.6

1104D-44TA Curve number T2972 (balanced)

Engine speed (rev/min)	Fuel energy (kW)	Power (kW)	Residual heat loss (kW)	Heat to exhaust (kW)	Heat to coolant inc oil (kW)	Heat to charge cooler (kW)
2200	207.4	75	11.6	68.2	45.4	7.2
2000	202.3	74.8	12.7	64.1	44	6.7
1800	191.5	73.1	11.7	58.9	42.1	5.7
1600	185.8	67.7	16.8	56.4	39.7	5.2
1400	162.7	60.4	12.6	49	36.6	4.1

1104D-44T Curve number T2978 (non-balanced)

Engine speed (rev/min)	Fuel energy (kW)	Power (kW)	Residual heat loss (kW)	Heat to exhaust (kW)	Heat to coolant inc oil (kW)
2300	212.4	70	17.1	74.7	50.6
2200	206.6	70	15.6	71.5	49.5
2000	197.3	68.7	14.4	66.7	47.5
1800	186.5	66.9	11.1	63.1	45.4
1600	177.8	63.2	10	61	43.6
1400	163.4	57.5	10.8	54.5	40.6

1104D-44T Curve number T2979 (balanced)

Engine speed (rev/min)	Fuel energy (kW)	Power (kW)	Residual heat loss (kW)	Heat to exhaust (kW)	Heat to coolant inc oil (kW)
2300	212.4	68	19.1	74.7	50.6
2200	206.6	68	17.6	71.5	49.5
2000	197.3	67.4	15.7	66.7	47.5
1800	186.5	66	12	63.1	45.4
1600	177.8	62.5	10.7	61	43.6
1400	163.4	57.2	11.1	54.5	40.6

1104D-44TA Curve number T3055 (balanced)

Engine speed (rev/min)	Fuel energy (kW)	Power (kW)	Residual heat loss (kW)	Heat to exhaust (kW)	Heat to coolant inc oil (kW)	Heat to charge cooler (kW)
2300	207.4	68	10.3	70.9	50	8.2
2200	199.4	68	8	66.7	48.7	8
2000	190.8	68.5	6.4	61.4	47	7.5
1800	182.9	67.1	5.7	57.7	45.5	6.9
1600	175	63.3	6.1	55.5	43.8	6.3
1400	159.1	57.6	6.7	49.4	40.1	5.3

1104D-44TA Curve number T3056 (non-balanced)

Engine speed (rev/min)	Fuel energy (kW)	Power (kW)	Residual heat loss (kW)	Heat to exhaust (kW)	Heat to coolant inc oil (kW)	Heat to charge cooler (kW)
2400	223.2	74.5	15.9	77	47.3	8.5
2300	216	74.5	13	73.9	46.4	8.2
2200	208.8	74.5	10	70.6	45.8	7.9
2000	201.6	74.6	8.9	66.4	44.3	7.4
1800	201.6	72.8	12.8	65.2	43.2	7.6
1600	180	67.9	5.8	58.9	41	6.4
1400	165.6	60.1	13.4	50.6	36.7	4.8

1104D-44TA Curve number T3058 (non-balanced)

Engine speed (rev/min)	Fuel energy (kW)	Power (kW)	Residual heat loss (kW)	Heat to exhaust (kW)	Heat to coolant inc oil (kW)	Heat to charge cooler (kW)
2300	250.6	83	14.4	90.2	51	12
2200	241.9	83	12.5	86.1	49.8	10.5
2000	226.1	81.1	11.5	76.9	47.1	9.5
1800	206.6	76.2	9.6	68.1	43.9	8.8
1600	185.8	69.2	8.5	59.9	40.4	7.8
1400	164.2	61.3	8.6	51.3	36.8	6.2

1104D-44TA Curve number T3059 (balanced)

Engine speed (rev/min)	Fuel energy (kW)	Power (kW)	Residual heat loss (kW)	Heat to exhaust (kW)	Heat to coolant inc oil (kW)	Heat to charge cooler (kW)
2300	250.6	81	16.4	90.2	51	12
2200	241.9	81	14.5	86.1	49.8	10.5
2000	226.1	79.8	12.8	76.9	47.1	9.5
1800	206.6	75.2	10.6	68.1	43.9	8.8
1600	185.8	68.5	9.2	59.9	40.4	7.8
1400	164.2	61	8.9	51.3	36.8	6.2

1104D-44T Curve number T3060 (non-balanced)

Engine speed (rev/min)	Fuel energy (kW)	Power (kW)	Residual heat loss (kW)	Heat to exhaust (kW)	Heat to coolant inc oil (kW)
2400	187.2	57.5	19.8	64.5	45.4
2300	180	57.5	16.6	61.5	44.4
2200	172.8	57.5	14.5	57.7	43.1
2000	158.4	55.9	11.6	50.8	40.1
1800	151.2	53.9	13.9	45.7	37.7
1600	136.8	50.3	7.1	43.3	36.1
1400	122.4	45.3	6.4	38	32.7

1104D-44T Curve number T3061 (balanced)

Engine speed (rev/min)	Fuel energy (kW)	Power (kW)	Residual heat loss (kW)	Heat to exhaust (kW)	Heat to coolant inc oil (kW)
2400	186.5	55.5	21.1	64.5	45.4
2300	181.4	55.5	20	61.5	44.4
2200	174.2	55.5	17.9	57.7	43.1
2000	160.6	54.7	15	50.8	40.1
1800	149.8	53	13.4	45.7	37.7
1600	139.7	49.6	10.7	43.3	36.1
1400	125.3	45	9.6	38	32.7

1104D-44T Curve number T3066 (non-balanced)

Engine speed (rev/min)	Fuel energy (kW)	Power (kW)	Residual heat loss (kW)	Heat to exhaust (kW)	Heat to coolant inc oil (kW)
2300	220.3	74.5	14.3	77.4	54.1
2200	213.1	74.5	12	73.5	53.1
2000	200.9	72.3	11.4	67.2	50
1800	191.5	68.2	13.6	63.1	46.6
1700	187.2	66.2	12.6	61.5	46.9
1600	181.4	64	12.2	60.3	44.9
1500	173.5	61.3	43.1	26.6	42.5
1400	156.2	57.5	6.4	51.2	41.1

1104D-44T Curve number T3067 (balanced)

Engine speed (rev/min)	Fuel energy (kW)	Power (kW)	Residual heat loss (kW)	Heat to exhaust (kW)	Heat to coolant inc oil (kW)
2300	220.3	72.5	16.3	77.4	54.1
2200	213.1	72.5	14	73.5	53.1
2000	200.9	71	12.7	67.2	50
1800	191.5	67.3	14.5	63.1	46.6
1600	181.4	63.3	12.9	60.3	44.9
1400	156.2	57.2	6.7	51.2	41.1

1104D-44T Curve number T3360 (non-balanced)

Engine speed (rev/min)	Fuel energy (kW)	Power (kW)	Residual heat loss (kW)	Heat to exhaust (kW)	Heat to coolant inc oil (kW)
2300	204.5	66	16	73.5	49
2200	200.2	66	15.7	70.4	48.1
2000	191.5	64.9	15.3	65.1	46.2
1800	184.3	63.5	13.8	62.1	44.9
1600	180	60.7	14	61.3	44
1400	159.1	54.2	12.3	52.9	39.7

1104D-44T Curve number T3361 (balanced)

Engine speed (rev/min)	Fuel energy (kW)	Power (kW)	Residual heat loss (kW)	Heat to exhaust (kW)	Heat to coolant inc oil (kW)
2300	204.5	64	18	73.5	49
2200	200.2	64	17.7	70.4	48.1
2000	191.5	63.7	16.5	65.1	46.2
1800	184.3	62.6	14.7	62.1	44.9
1600	180.0	60.0	14.7	61.3	44
1400	159.1	54.0	12.5	52.9	39.7

1104D-44TA Curve number T3496 (non-balanced)

Engine speed (rev/min)	Fuel energy (kW)	Power (kW)	Residual heat loss (kW)	Heat to exhaust (kW)	Heat to coolant inc oil (kW)	Heat to charge cooler (kW)
2200	222.5	74.5	13.3	81	46.5	7.2
2000		73.5				
1800		71.1				
1600		66				
1400	163.4	58.6	9.3	53.5	36.6	5.4

1104D-44TA Curve number T3499 (non-balanced)

Engine speed (rev/min)	Fuel energy (kW)	Power (kW)	Residual heat loss (kW)	Heat to exhaust (kW)	Heat to coolant inc oil (kW)	Heat to charge cooler (kW)
2200	222.5	75	12.4	81.2	46.7	7.2
2000		73.3				
1800		70.5				
1600		66.2				
1400		59.4				

1104D-44TA Curve number T3500 (non-balanced)

Engine speed (rev/min)	Fuel energy (kW)	Power (kW)	Residual heat loss (kW)	Heat to exhaust (kW)	Heat to coolant inc oil (kW)	Heat to charge cooler (kW)
2300	213.1	70	12.4	78.6	44.9	7.2
2200	207.4	70	11.2	75.2	44.1	6.9
2000		69.7				
1800		68				
1600		64				
1400	161.3	57.9	8.6	53.2	36.3	5.3

Exhaust system

In the table below, exhaust gas flow rate is quoted against the maximum permitted back pressure (at rated speeds) of 15 kPa, 0,153 kgf/cm³, 112 mm Hg (4.43 in Hg) for typical ratings. Exhaust back pressure should be measured within 305 mm (12.0 in) of the turbocharger outlet.

Note: Data subject to change, contact Perkins for latest information.

1104D-44 Curve number T2968 (non-balanced)

Engine speed (rev/min)	Torque (Nm)	Exhaust back pressure (kPa)	Exhaust temp manifold out (° C)	Exhaust mass flow wet (kg/min)	Exhaust volume flow wet (m³/min)
2200	242.6	10	685	4.84	12.16
2000	256	8.9	681	4.41	11.13
1800	263	7.6	653	3.95	9.79
1400	262	5.3	608	3.06	7.38

1104D-44 Curve number T2969 (balanced)

Engine speed (rev/min)	Torque (Nm)	Exhaust back pressure (kPa)	Exhaust temp manifold out (° C)	Exhaust mass flow wet (kg/min)	Exhaust volume flow wet (m³/min)
2200	235	10	680	4.84	12.09
2000	250	8.9	665	4.41	10.95
1800	258	7.6	649	3.95	9.75
1400	260	5.3	605	3.06	7.36

1104D-44T Curve number T2970 (non-balanced)

Engine speed (rev/min)	Torque (Nm)	Exhaust back pressure (kPa)	Exhaust temp manifold out (° C)	Exhaust mass flow wet (kg/min)	Exhaust volume flow wet (m³/min)
2400	248.7	15	574	6.78	14.39
2300	259	15	565	6.57	13.8
2200	272	15	554	6.57	13.61
2000	298	12.6	532	6.05	12.47
1800	322	10.5	522	5.74	11.89
1600	343	9.7	528	5.53	11.63
1400	354	8	510	4.9	10.24

1104D-44T Curve number T2971 (balanced)

Engine speed (rev/min)	Torque (Nm)	Exhaust back pressure (kPa)	Exhaust temp manifold out (° C)	Exhaust temp turbo in (° C)	Exhaust temp turbo out (° C)	Exhaust mass flow wet (kg/min)	Exhaust volume flow wet (m³/min)
2400	240.7	15			574	6.78	14.39
2300	251	15			565	6.57	13.8
2200	262.6	15			554	6.36	13.19
2000	291	12.6			532	6.05	12.47
1800	317	10.5			522	5.74	11.9
1600	339	9.7			528	5.53	11.64
1400	352	8			510	4.9	10.25

1104D-44TA Curve number T2972 (balanced)

Engine speed (rev/min)	Torque (Nm)	Exhaust back pressure (kPa)	Exhaust temp manifold out (° C)	Exhaust temp turbo in (° C)	Exhaust temp turbo out (° C)	Exhaust mass flow wet (kg/min)	Exhaust volume flow wet (m^3/min)
2200	325	15		638	525	7.43	14.86
2000	357	12.9		643	524	7	14.24
1800	388	10.9		664	529	6.34	13.22
1600	404	9.4		659	540	5.91	12.66
1400	412	7.5		649	535	5.2	11.26

1104D-44T Curve number T2978 (non-balanced)

Engine speed (rev/min)	Torque (Nm)	Exhaust back pressure (kPa)	Exhaust temp manifold out (° C)	Exhaust mass flow wet (kg/min)	Exhaust volume flow wet (m^3/min)
2300	290	15	562	7.44	15.57
2200	303	15	559	7.14	14.89
2000	328	13.2	544	6.86	14.26
1800	355	11.8	535	6.51	13.57
1600	377	10.8	544	6.26	13.31
1400	392	9.1	537	5.76	12.32

1104D-44T Curve number T2979 (balanced)

Engine speed (rev/min)	Torque (Nm)	Exhaust back pressure (kPa)	Exhaust temp manifold out (° C)	Exhaust temp turbo in (° C)	Exhaust temp turbo out (° C)	Exhaust mass flow wet (kg/min)	Exhaust volume flow wet (m^3/min)
2300	282	15			562	7.44	15.57
2200	295	15			559	7.14	14.89
2000	322	13.2			544	6.86	14.27
1800	350	11.8			535	6.52	13.57
1600	373	10.8			544	6.27	13.32
1400	390	9.1			537	5.76	12.33

1104D-44TA Curve number T3055 (balanced)

Engine speed (rev/min)	Torque (Nm)	Exhaust back pressure (kPa)	Exhaust temp manifold out (° C)	Exhaust temp turbo in (° C)	Exhaust temp turbo out (° C)	Exhaust mass flow wet (kg/min)	Exhaust volume flow wet (m^3/min)
2300	283	15			515	7.89	15.58
2200	295	15			503	7.64	14.86
2000	327				495	7.15	0
1800	356				504	6.58	0
1600	378				522	6.08	0
1400	393				522	5.38	0

1104D-44TA Curve number T3056 (non-balanced)

Engine speed (rev/min)	Torque (Nm)	Exhaust back pressure (kPa)	Exhaust temp manifold out (° C)	Exhaust temp turbo in (° C)	Exhaust temp turbo out (° C)	Exhaust mass flow wet (kg/min)	Exhaust volume flow wet (m³/min)
2400	296	15		601	531	8.29	16.71
2300	310	15		600	527	8.03	16.1
2200	324	15		594	521	7.77	15.47
2000	356	11		593	521	7.29	15.03
1800	386	10		622	548	6.74	14.5
1600	405	9		624	541	6.19	13.33
1400	410	6.5		618	526	5.48	11.85

1104D-44TA Curve number T3058 (non-balanced)

Engine speed (rev/min)	Torque (Nm)	Exhaust back pressure (kPa)	Exhaust temp manifold out (° C)	Exhaust temp turbo in (° C)	Exhaust temp turbo out (° C)	Exhaust mass flow wet (kg/min)	Exhaust volume flow wet (m³/min)
2300	345	15			569	8.95	18.88
2200	360	15			565	8.84	18.56
2000	387	12.6			550	8.12	17.1
1800	404	10.2			528	7.49	15.69
1600	413	8.1			520	6.66	14.08
1400	418	6.1			524	5.63	12.19

1104D-44TA Curve number T3059 (balanced)

Engine speed (rev/min)	Torque (Nm)	Exhaust back pressure (kPa)	Exhaust temp manifold out (° C)	Exhaust temp turbo in (° C)	Exhaust temp turbo out (° C)	Exhaust mass flow wet (kg/min)	Exhaust volume flow wet (m³/min)
2300	337	15			569	8.96	18.9
2200	352	15			565	8.84	18.57
2000	381	12.6			550	8.12	17.11
1800	399	10.2			528	7.49	15.7
1600	409	8.1			520	6.67	14.1
1400	416	6.1			524	5.64	12.2

1104D-44T Curve number T3060 (non-balanced)

Engine speed (rev/min)	Torque (Nm)	Exhaust back pressure (kPa)	Exhaust temp manifold out (° C)	Exhaust temp turbo in (° C)	Exhaust temp turbo out (° C)	Exhaust mass flow wet (kg/min)	Exhaust volume flow wet (m³/min)
2400	229	15	545	6.73	13.8	229	15
2300	239	15	533	6.58	13.3	239	15
2200	249	15	517	6.4	12.68	249	15
2000	267	12.9	486	6.04	11.71	267	12.9
1800	286	10.8	474	5.59	10.86	286	10.8
1600	300	9.6	480	5.23	10.35	300	9.6
1400	309	7.6	475	4.63	9.28	309	7.6

1104D-44T Curve number T3061 (balanced)

Engine speed (rev/min)	Torque (Nm)	Exhaust back pressure (kPa)	Exhaust temp manifold out (° C)	Exhaust temp turbo in (° C)	Exhaust temp turbo out (° C)	Exhaust mass flow wet (kg/min)	Exhaust volume flow wet (m^3/min)
2400	221	15			545	6.73	13.79
2300	231	15			533	6.58	13.29
2200	241	15			516	6.4	12.66
2000	261	12.9			485	6.05	11.7
1800	281	10.8			474	5.59	10.86
1600	296	9.6			479	5.23	10.34
1400	307	7.6			475	4.64	9.29

1104D-44T Curve number T3066 (non-balanced)

Engine speed (rev/min)	Torque (Nm)	Exhaust back pressure (kPa)	Exhaust temp manifold out (° C)	Exhaust temp turbo in (° C)	Exhaust temp turbo out (° C)	Exhaust mass flow wet (kg/min)	Exhaust volume flow wet (m^3/min)
2300	309	15		686	569	7.7	16.24
2200	323	15		679	558	7.48	15.58
2000	345	12.2		662	538	7.12	14.83
1800	362	11.2		665	528	6.82	14.17
1600	382	9.8		660	527	6.53	13.72
1400	392	7.6		640	510	5.78	12.11

1104D-44T Curve number T3067 (balanced)

Engine speed (rev/min)	Torque (Nm)	Exhaust back pressure (kPa)	Exhaust temp manifold out (° C)	Exhaust temp turbo in (° C)	Exhaust temp turbo out (° C)	Exhaust mass flow wet (kg/min)	Exhaust volume flow wet (m^3/min)
2300	301	15		686	569	7.7	16.25
2200	315	15		679	558	7.48	15.58
2000	339	12.2		662	538	7.12	14.83
1800	357	11.2		665	528	6.83	14.17
1600	378	9.8		660	527	6.54	13.73
1400	390	7.6		640	510	5.78	12.12

1104D-44T Curve number T3360 (non-balanced)

Engine speed (rev/min)	Torque (Nm)	Exhaust back pressure (kPa)	Exhaust temp manifold out (° C)	Exhaust temp turbo in (° C)	Exhaust temp turbo out (° C)	Exhaust mass flow wet (kg/min)	Exhaust volume flow wet (m^3/min)
2300	273	15	552	7.59	15.69	273	15
2200	287	15	551	7.27	15.02	287	15
2000	310	13.3	537	6.93	14.27	310	13.3
1800	337	12	537	6.6	13.75	337	12
1600	362	11.2	551	6.32	13.49	362	11.2
1400	370	8.9	533	5.66	12.07	370	8.9

1104D-44TA Curve number T3496 (non-balanced)

Engine speed (rev/min)	Torque (Nm)	Exhaust back pressure (kPa)	Exhaust temp manifold out (° C)	Exhaust temp turbo in (° C)	Exhaust temp turbo out (° C)	Exhaust mass flow wet (kg/min)	Exhaust volume flow wet (m³/min)
2200	324	15		664	572	8.01	16.96
2000	351						
1800	377						
1600	394						
1400	400			633	545	5.53	0

1104D-44TA Curve number T3499 (non-balanced)

Engine speed (rev/min)	Torque (Nm)	Exhaust back pressure (kPa)	Exhaust temp manifold out (° C)	Exhaust temp turbo in (° C)	Exhaust temp turbo out (° C)	Exhaust mass flow wet (kg/min)	Exhaust volume flow wet (m³/min)
2300	325	15		664	575	8.03	17.07
2200	350	12.6					
2000	374	11.1					
1800	395	9.2					
1600	405	6.7					
1400	325	15		664	575	8.03	17.07

1104D-44TA Curve number T3500 (non-balanced)

Engine speed (rev/min)	Torque (Nm)	Exhaust back pressure (kPa)	Exhaust temp manifold out (° C)	Exhaust temp turbo in (° C)	Exhaust temp turbo out (° C)	Exhaust mass flow wet (kg/min)	Exhaust volume flow wet (m³/min)
2300	291	15		641	553	8.1	16.76
2200	303	15		633	544	7.89	16.15
2000	333						
1800	361						
1600	382						
1400	395			634	546	5.52	0

Induction system

Air filters

Perkins classifies air filters according to duty, which relates to dust-holding capacity. The choice of duty depends upon the engine type, the dust concentration in which it will operate, and the service life required. The two duty categories considered by Perkins:

- Medium Duty: Specification – minimum dust-holding capacity (tested to S.A.E J726b or ISO 5011): 10 gram SAE coarse test dust/cu. ft./min of airflow
- Heavy Duty: Specification – minimum dust-holding capacity (tested to S.A.E. J726b or ISO 5011): 25 gram SAE coarse test dust/cu. ft./min of airflow.

Inlet restriction

The following table shows the maximum allowable depression at the engine for **clean** filters. It also shows the depression at the engine at which **dirty** elements must be replaced.

Engine type	Measurement taken at	Units	Maximum permitted depression at rated speed	
			Clean filter	Dirty filter
1104D-44T 1104D-44TA	Turbocharger intake	mm H_20	510	810
		in H_20	20	32
		kPa	5,0	8,0
1104D-44		kPa	3	6,5

Restriction indicator

For all filters a restriction indicator should be fitted, as it enables maximum life to be obtained from the air filter element without exceeding the engine restriction limits. Without an indicator the filter must be serviced at fixed periods. However, dust conditions vary so much that this results in either premature element renewal or excessive induction restriction.

Details of filter restriction indicators used by Perkins:

- Mechanical floating ball systems
- Indicators are set to operate at 8 kPa.

It is recommended that either vacuator valves or a cyclone system is fitted to air filters. This provides auto emptying of dust/water from the filter; thereby increasing it’s service life.

Air flow data tables

The following table shows airflow rates for typical ratings. The air flow rate is quoted at the maximum permitted back pressure of (at maximum rated speed) 5 kPa, 0.051 kgf/cm², 37,5 mm Hg, (20.09 in H_20).

Note: Data subject to change, contact Perkins for latest information.

1104D-44 Curve number T2968 (non-balanced)

Engine speed (rev/min)	Torque (Nm)	Air volume flow wet (m³ / min)	Air mass flow wet (kg/min)	Air inlet manifold (kPa)	Air pressure inlet filter out		Peak torque	Rating point
					Clean (kPa)	Dirty (kPa)		
2200	242.6	3.96	4.61	-2.8	3	8		Yes
2000	256	3.6	4.19	-2.5				
1800	263	3.22	3.75	-2.1				
1400	262	2.5	2.91	-1.4				

1104D-44 Curve number T2969 (balanced)

Engine speed (rev/min)	Torque (Nm)	Air volume flow wet (m³ / min)	Air mass flow wet (kg/min)	Air inlet manifold (kPa)	Air pressure inlet filter out		Peak torque	Rating point
					Clean (kPa)	Dirty (kPa)		
2200	235	3.96	4.61	-2.8	3	8		Yes
2000	250	3.6	4.19	-2.5				
1800	258	3.22	3.75	-2.1				
1400	260	2.5	2.91	-1.4				

1104D-44T Curve number T2970 (non-balanced)

Engine speed (rev/min)	Torque (Nm)	Air volume flow wet (m³ / min)	Air mass flow wet (kg/min)	Air inlet manifold (kPa)	Air pressure inlet filter out		Peak torque	Rating point
					Clean (kPa)	Dirty (kPa)		
2400	248.7	5.58	6.5	86	5	8		Yes
2300	259	5.41	6.3	86	5	8		
2200	272	5.41	6.3	91.5	5	8		
2000	298	4.98	5.8	86.1	4.7			
1800	322	4.73	5.5	85.2	4.3			
1600	343	4.55	5.3	85	4			
1400	354	4.04	4.7	74.8	3.2		Yes	

1104D-44T Curve number T2971 (balanced)

Engine speed (rev/min)	Torque (Nm)	Air volume flow wet (m³ / min)	Air mass flow wet (kg/min)	Air inlet manifold (kPa)	Air pressure inlet filter out		Peak torque	Rating point
					Clean (kPa)	Dirty (kPa)		
2400	240.7	5.58	6.5	86	5	8		Yes
2300	251	5.41	6.3	86	5	8		
2200	262.6	5.24	6.1	86.4	5	8		
2000	291	4.98	5.8	86.1	4.7			
1800	317	4.73	5.5	85.2	4.3			
1600	339	4.55	5.3	85	4			
1400	352	4.04	4.7	74.8	3.2		Yes	

1104D-44TA Curve number T2972 (balanced)

Engine speed (rev/min)	Torque (Nm)	Air volume flow wet (m³ / min)	Air mass flow wet (kg/min)	Air inlet manifold (kPa)	Air pressure inlet filter out		Peak torque	Rating point
					Clean (kPa)	Dirty (kPa)		
2300	290	6.13	7.14	114.7	5	8		Yes
2200	303	5.88	6.85	113.4	5	8		
2000	328	5.65	6.58	113.7				
1800	355	5.37	6.25	113.1				
1600	377	5.16	6.01	111.8				

1104D-44T Curve number T2978 (non-balanced)

Engine speed (rev/min)	Torque (Nm)	Air volume flow wet (m³ / min)	Air mass flow wet (kg/min)	Air inlet manifold (kPa)	Air pressure inlet filter out		Peak torque	Rating point
					Clean (kPa)	Dirty (kPa)		
2300	290	6.13	7.14	114.7	5	8		2300
2200	303	5.88	6.85	113.4	5	8		2200
2000	328	5.65	6.58	113.7				2000
1800	355	5.37	6.25	113.1				1800
1600	377	5.16	6.01	111.8				1600
1400	392	4.75	5.53	105.1			Yes	1400

1104D-44T Curve number T2979 (balanced)

Engine speed (rev/min)	Torque (Nm)	Air volume flow wet (m³ / min)	Air mass flow wet (kg/min)	Air inlet manifold (kPa)	Air pressure inlet filter out		Peak torque	Rating point
					Clean (kPa)	Dirty (kPa)		
2300	282	6.13	7.14	111.3	5	8		Yes
2200	295	5.88	6.85	110.3	5	8		
2000	322	5.65	6.58	111.7				
1800	350	5.37	6.25	111				
1600	373	5.16	6.01	111.5				
1400	390	4.75	5.53	105.4			Yes	

1104D-44TA Curve number T3055 (balanced)

Engine speed (rev/min)	Torque (Nm)	Air volume flow wet (m³ / min)	Air mass flow wet (kg/min)	Air inlet manifold (kPa)	Air Temp BCC (° C)	Air pressure drop across ACC (kPa)	Air Temp ACC out (° C)	Air inlet manifold (kPa)	Air pressure inlet filter out		Peak torque
									Clean (kPa)	Dirty (kPa)	
2300	283	6.53	7.6	119	10	55	96.4	5	8		Yes
2200	295	6.32	7.36	119	10	55	97.4	5	8		
2000	327	5.91	6.88	117			98.8				
1800	356	5.43	6.32	115			99.3				
1600	378	5.01	5.83	113			99.2				
1400	393	4.43	5.16	106			90.2			Yes	

1104D-44TA Curve number T3056 (non-balanced)

Engine speed (rev/min)	Torque (Nm)	Air volume flow wet (m³ / min)	Air mass flow wet (kg/min)	Air inlet manifold (kPa)	Air Temp BCC (° C)	Air pressure drop across ACC (kPa)	Air Temp ACC out (° C)	Air inlet manifold (kPa)	Air pressure inlet filter out		Peak torque
									Clean (kPa)	Dirty (kPa)	
2400	296	6.86	7.98	120	10	55	96	5	8		Yes
2300	310	6.63	7.72	118	10	55	95.5	5	8		
2200	324	6.42	7.47	117.6	10	55	95	5	8		
2000	356	6.01	7	116.8			98.4				
1800	386	5.55	6.46	116.4			101.7				
1600	405	5.09	5.93	114.2			99.7				
1400	410	4.51	5.25	108.5			91.7			Yes	

1104D-44TA Curve number T3058 (non-balanced)

Engine speed (rev/min)	Torque (Nm)	Air volume flow wet (m³ / min)	Air mass flow wet (kg/min)	Air inlet manifold (kPa)	Air Temp BCC (° C)	Air pressure drop across ACC (kPa)	Air Temp ACC out (° C)	Air inlet manifold (kPa)	Air pressure inlet filter out		Peak torque
									Clean (kPa)	Dirty (kPa)	
2300	345	7.39	8.6	130	10	55	115	5	8		Yes
2200	360	7.3	8.5	127	10	55	116	5	8		
2000	387	6.7	7.8	124			117				
1800	404	6.19	7.2	123			116				
1600	413	5.5	6.4	119			112				
1400	418	4.64	5.4	110		45	96			Yes	
2300	345	7.39	8.6	130	10	55	115	5	8		Yes

1104D-44TA Curve number T3059 (balanced)

Engine speed (rev/min)	Torque (Nm)	Air volume flow wet (m³ / min)	Air mass flow wet (kg/min)	Air inlet manifold (kPa)	Air Temp BCC (° C)	Air pressure drop across ACC (kPa)	Air Temp ACC out (° C)	Air inlet manifold (kPa)	Air pressure inlet filter out		Peak torque
									Clean (kPa)	Dirty (kPa)	
2300	337	7.4	8.61	130	10	55	115	5	8		Yes
2200	352	7.3	8.5	127	10	55	116	5	8		
2000	381	6.7	7.8	124			117				
1800	399	6.19	7.2	123			116				
1600	409	5.5	6.4	119			112				
1400	416	4.64	5.4	110		45	96			Yes	

1104D-44T Curve number T3060 (non-balanced)

Engine speed (rev/min)	Torque (Nm)	Air volume flow wet (m³ / min)	Air mass flow wet (kg/min)	Air inlet manifold (kPa)	Air pressure inlet filter out		Peak torque	Rating point
					Clean (kPa)	Dirty (kPa)		
2400	229	5.56	6.47	82.9	5	8		Yes
2300	239	5.44	6.33	83.8	5	8		
2200	249	5.29	6.16	85.5	5	8		
2000	267	5	5.82	85.9				
1800	286	4.62	5.38	80				
1600	300	4.32	5.03	75.7				
1400	309	3.83	4.46	65			Yes	

1104D-44T Curve number T3061 (balanced)

Engine speed (rev/min)	Torque (Nm)	Air volume flow wet (m³ / min)	Air mass flow wet (kg/min)	Air inlet manifold (kPa)	Air pressure inlet filter out		Peak torque	Rating point
					Clean (kPa)	Dirty (kPa)		
2400	221	5.56	6.47	83	5	8		Yes
2300	231	5.44	6.33	84	5	8		
2200	241	5.29	6.16	86	5	8		
2000	261	5	5.82	86				
1800	281	4.62	5.38	80				
1600	296	4.32	5.03	76				
1400	307	3.83	4.46	65			Yes	

1104D-44T Curve number T3066 (non-balanced)

Engine speed (rev/min)	Torque (Nm)	Air volume flow wet (m³ / min)	Air mass flow wet (kg/min)	Air inlet manifold (kPa)	Air pressure inlet filter out		Peak torque	Rating point
					Clean (kPa)	Dirty (kPa)		
2300	309	6.34	7.38	122	5	8		Yes
2200	323	6.16	7.17	120	5	8		
2000	345	5.87	6.83	119				
1800	362	5.64	6.56	117				
1600	382	5.4	6.28	114				
1400	392	4.77	5.55	100			Yes	

1104D-44T Curve number T3067 (balanced)

Engine speed (rev/min)	Torque (Nm)	Air volume flow wet (m³ / min)	Air mass flow wet (kg/min)	Air inlet manifold (kPa)	Air pressure inlet filter out		Peak torque	Rating point
					Clean (kPa)	Dirty (kPa)		
2300	301	6.34	7.38	122	5	8		Yes
2200	315	6.16	7.17	120	5	8		
2000	339	5.87	6.83	119				
1800	357	5.64	6.56	117				
1600	378	5.4	6.28	114				
1400	390	4.77	5.55	100			Yes	

1104D-44T Curve number T3360 (non-balanced)

Engine speed (rev/min)	Torque (Nm)	Air volume flow wet (m³ / min)	Air mass flow wet (kg/min)	Air inlet manifold (kPa)	Air pressure inlet filter out		Peak torque	Rating point
					Clean (kPa)	Dirty (kPa)		
2300	273	6.27	7.3	118	5	8		Yes
2200	287	6.01	6.99	116	5	8		
2000	310	5.72	6.66	115	4.6			
1800	337	5.45	6.34	113	4.1			
1600	362	5.21	6.07	114	3.7			
1400	370	4.67	5.44	102	3.1		Yes	

1104D-44T Curve number T3361 (balanced)

Engine speed (rev/min)	Torque (Nm)	Air volume flow wet (m³ / min)	Air mass flow wet (kg/min)	Air inlet manifold (kPa)	Air pressure inlet filter out		Peak torque	Rating point
					Clean (kPa)	Dirty (kPa)		
2300	265.7	6.27	7.3	118	5	8		Yes
2200	277.8	6.01	6.99	116	5	8		
2000	304	5.72	6.66	115	4.6			
1800	332	5.45	6.34	113	4.1			
1600	358	5.21	6.07	114	3.7			
1400	368	4.67	5.44	102	3.1		Yes	

1104D-44T Curve number T3496 (non-balanced)

Engine speed (rev/min)	Torque (Nm)	Air volume flow wet (m³ / min)	Air mass flow wet (kg/min)	Air inlet manifold (kPa)	Air pressure inlet filter out		Peak torque	Rating point
					Clean (kPa)	Dirty (kPa)		
2200	324	6.62	7.7		10	50	73	5
2000	351	0						
1800	377	0						
1600	394	0						
1400	400	4.55	5.3				85	

1104D-44T Curve number T3499 (non-balanced)

Engine speed (rev/min)	Torque (Nm)	Air volume flow wet (m³ / min)	Air mass flow wet (kg/min)	Air inlet manifold (kPa)	Air Temp BCC (° C)	Air pressure drop across ACC (kPa)	Air Temp ACC out (° C)	Air inlet manifold (kPa)	Air pressure inlet filter out		Peak torque
									Clean (kPa)	Dirty (kPa)	
2200	325	6.63	7.72		10	50	73	5	8		Yes
2000	350	0									
1800	374	0									
1600	395	0									
1400	405	0								Yes	

1104D-44T Curve number T3500 (non-balanced)

Engine speed (rev/min)	Torque (Nm)	Air volume flow wet (m³ / min)	Air mass flow wet (kg/min)	Air inlet manifold (kPa)	Air Temp BCC (° C)	Air pressure drop across ACC (kPa)	Air Temp ACC out (° C)	Air inlet manifold (kPa)	Air pressure inlet filter out		Peak torque
									Clean (kPa)	Dirty (kPa)	
2300	291	6.7	7.8		10	50	70	5	8		Yes
2200	303	6.53	7.6		10	50	70	5	8		
2000	333	0									
1800	361	0									
1600	382	0									
1400	395	4.55	5.3				84.5			Yes	
2300	291	6.7	7.8		10	50	70	5	8		Yes

Fuel Specifications

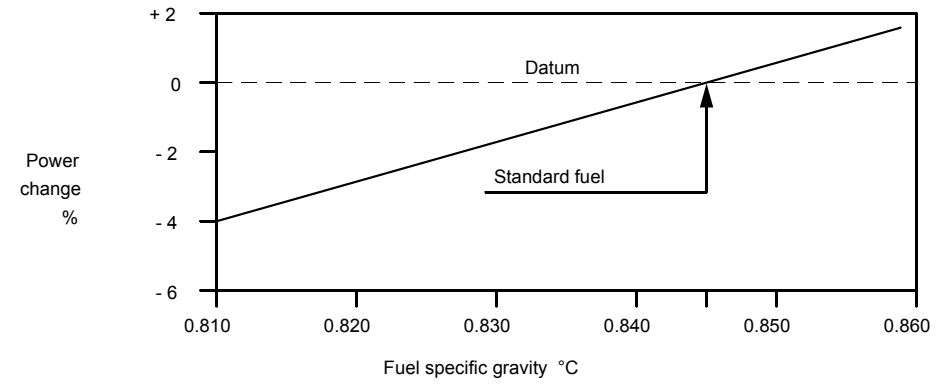
Perkins recommend the use of the following fuel specifications:

- DIN E 590 DERV Grade A, B, C, E, F, Class 0, 1, 2, 3, and 4
- BS2869 Class A2 Off-highway Gas Oil Red Diesel
- ASTM D975-91 Class 1-1D and Class 2-2D.

For further information on fuel specifications and restrictions, refer to “Fluid Recommendations (Fuel Specification)” in the OMM for this engine.

Fuel specific gravity

Engine power is affected by changes of the specific gravity of the fuel oil. The results are shown in the graphs below.



Fuel tank location

The fuel oil feed pipe and the fuel oil return pipe, must be fitted to the fuel tank so that their exit and entry positions in the fuel tank are at the same height. The distance between these points on the horizontal plane must not be less than 150 mm (5,90 in).

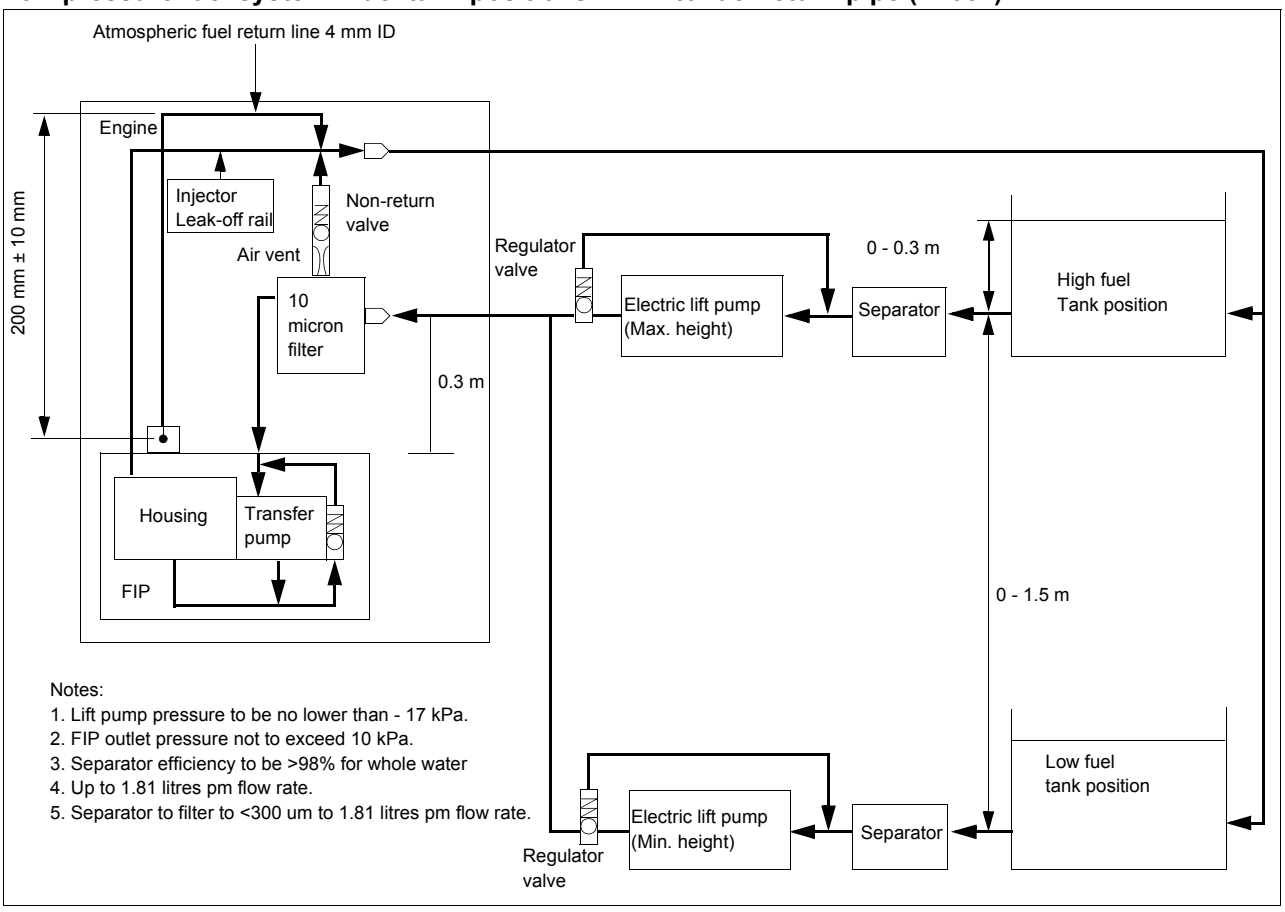
For the highest and the lowest fuel tank locations see the following illustrations.

If all the conditions for tank height, pipe length, and pipe sizes cannot be met, the installation may still be acceptable if the following conditions are met:

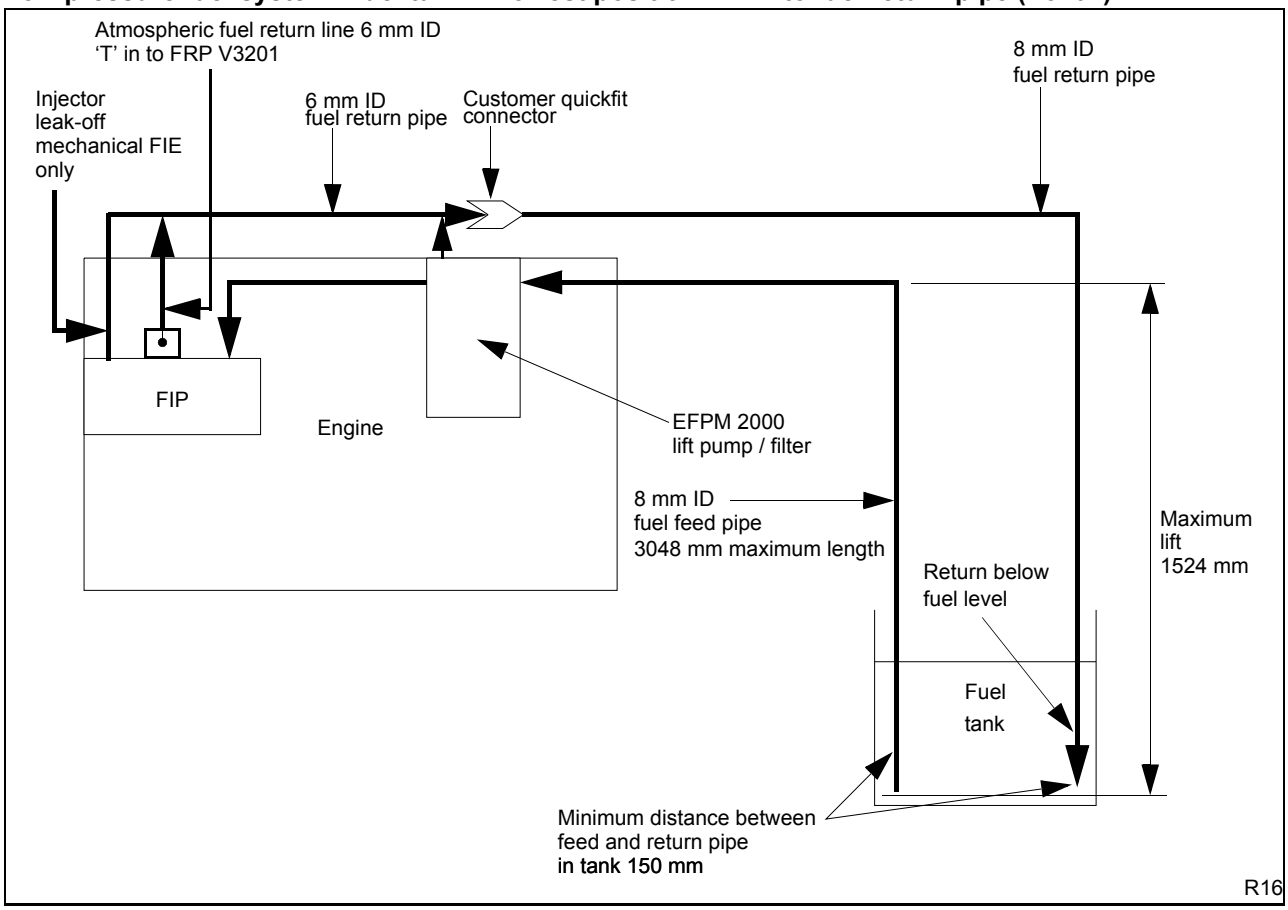
- If the fuel tank is to be fitted below the level of the fuel lift pump, the depression measured at the inlet to the fuel lift pump must not exceed -17 kPa. Fuel temperature is to be 30 °C (86 °F) for this measurement, engine running at rated speed
- If the fuel tank is to be fitted above the level of the fuel lift pump, a stop cock must be fitted to prevent fuel leakages during service.
- The return line back pressure must not exceed 10 kPa, measured at the fuel injection pump outlet with the engine running at idle.

For recommended layouts see page 231.

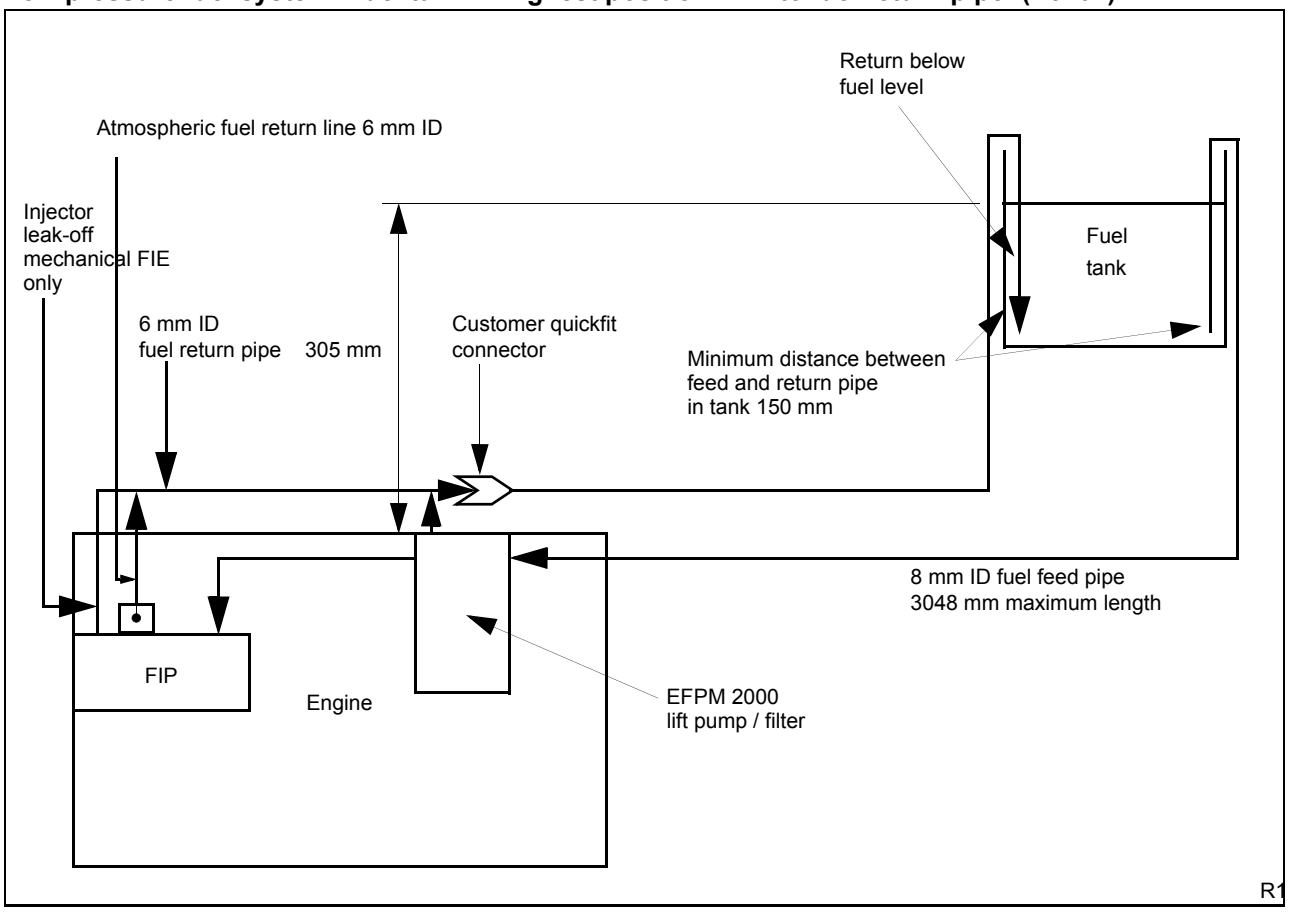
Low pressure fuel system - fuel tank positions - 'T' into fuel return pipe (V1001)



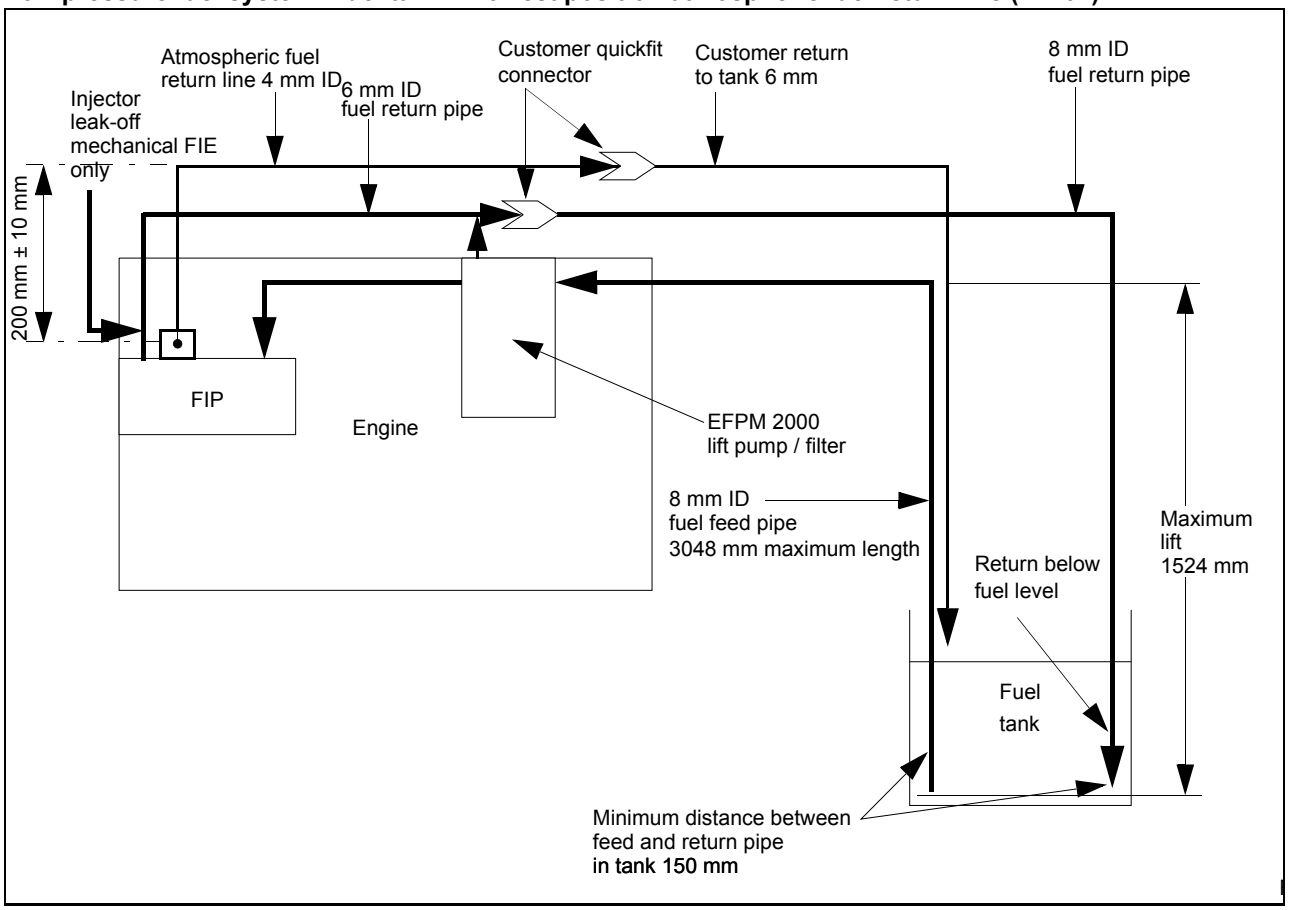
Low pressure fuel system - fuel tank in lowest position - 'T' into fuel return pipe (V3201)



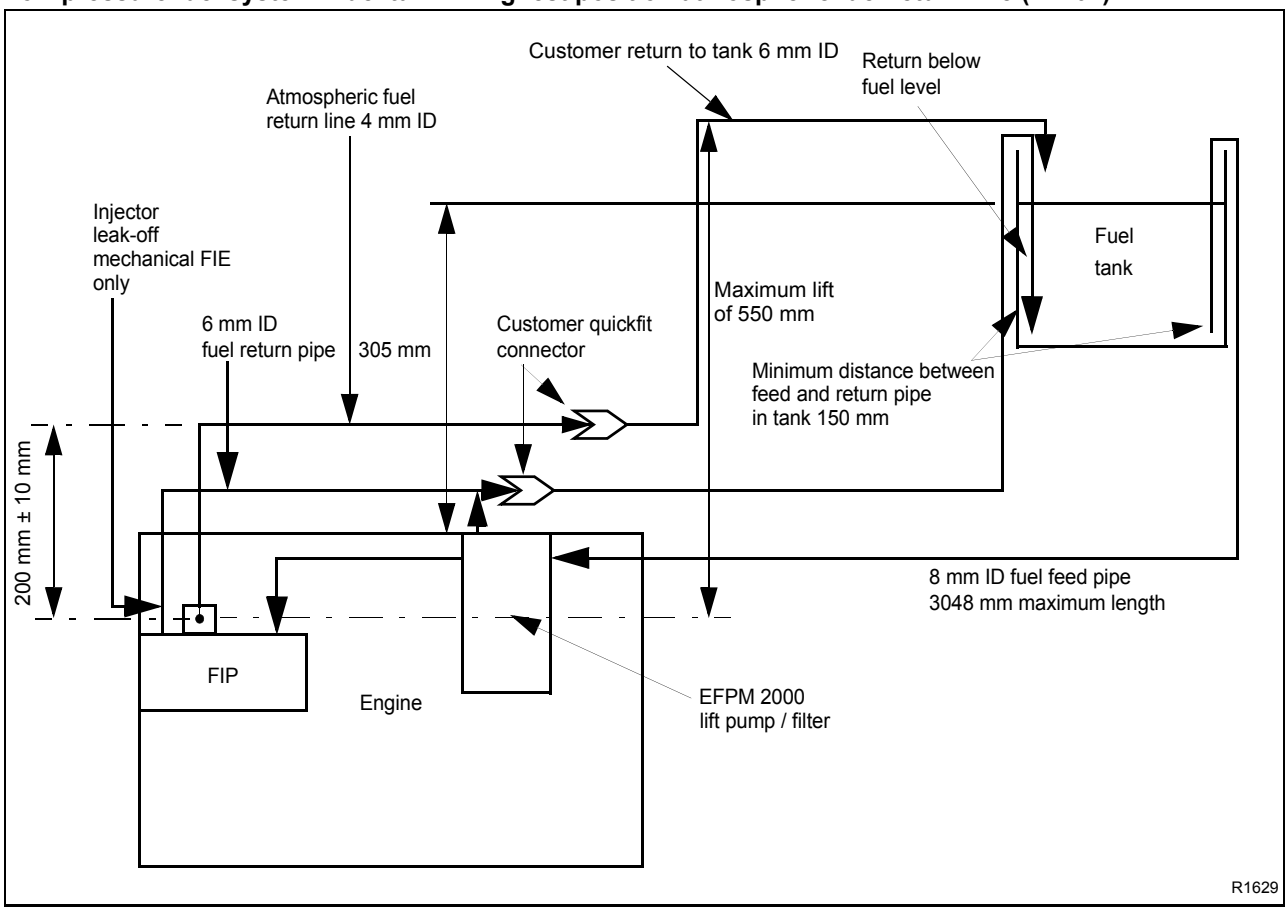
Low pressure fuel system - fuel tank in highest position 'T' into fuel return pipe `(V3201)



Low pressure fuel system - fuel tank in lowest position atmospheric fuel return line (V2201)



Low pressure fuel system - fuel tank in highest position atmospheric fuel return line (V2201)

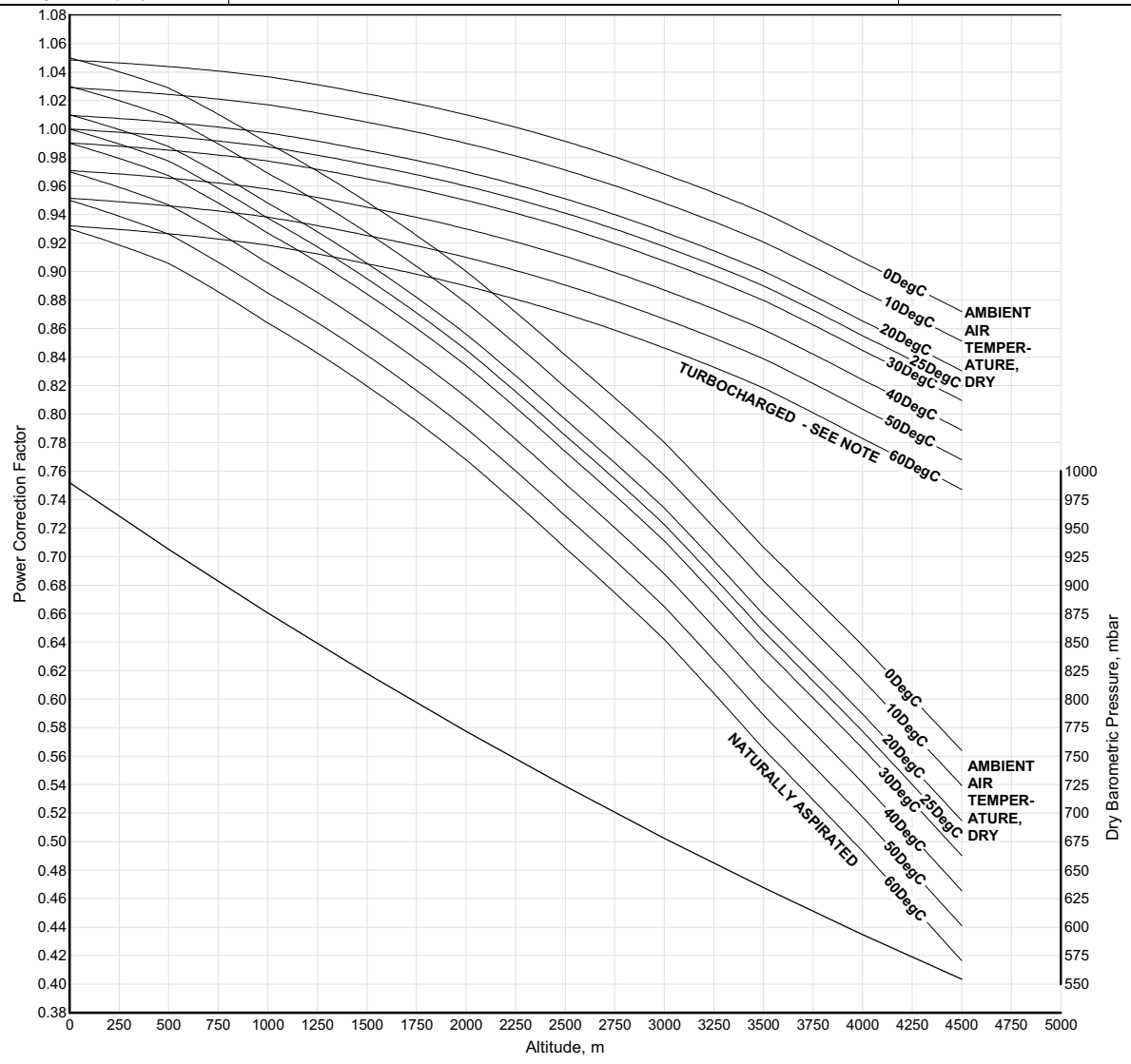


S8001 - Altitude and temperature

Perkins

Diagram For:
ESTIMATING THE EFFECTS OF ALTITUDE & TEMPERATURE ON POWER OUTPUT RELATIVE TO ISO AND SAE REFERENCE CONDITIONS AT SEA-LEVEL.
APPLICABLE TO ENGINES WITH MECHANICAL FIE ONLY.

Curve: S 8001 **Sheet 1**
Issue: 1
Date: 11-Apr-2006



NOTE

For air-to-water charge cooled turbocharged engines the power correction shown above does not apply.
For these engines the reference temperature of 25℃ should be used and not the actual ambient (engine inlet) air temperature.
For power correction due to humidity refer to curve S8002.

The above diagram is applicable to correct Engine Power quoted to the following Rating Standards:

Rating Standard	Total Barometric Pressure (kPa)	Vapour Pressure (kPa)	Air Inlet Temperature (℃)
ISO 14396: 2002	100	1	25
80/1269/EEC	100	1	25
88/195/EEC	100	1	25
ISO 1585: 1992	100	1	25
ISO 2288: 1989	100	1	25
ISO 3046-1: 1995	100	1	25
ISO 8665: 1994	100	1	25
ISO 9249: 1989	100	1	25
SAE J1349 4.2.4	100	1	25
SAE J1995 3.1	100	1	25
UN/ECE R120	100	1	25

Drawn by:
A. Bradley

Date: 11-Apr-2006

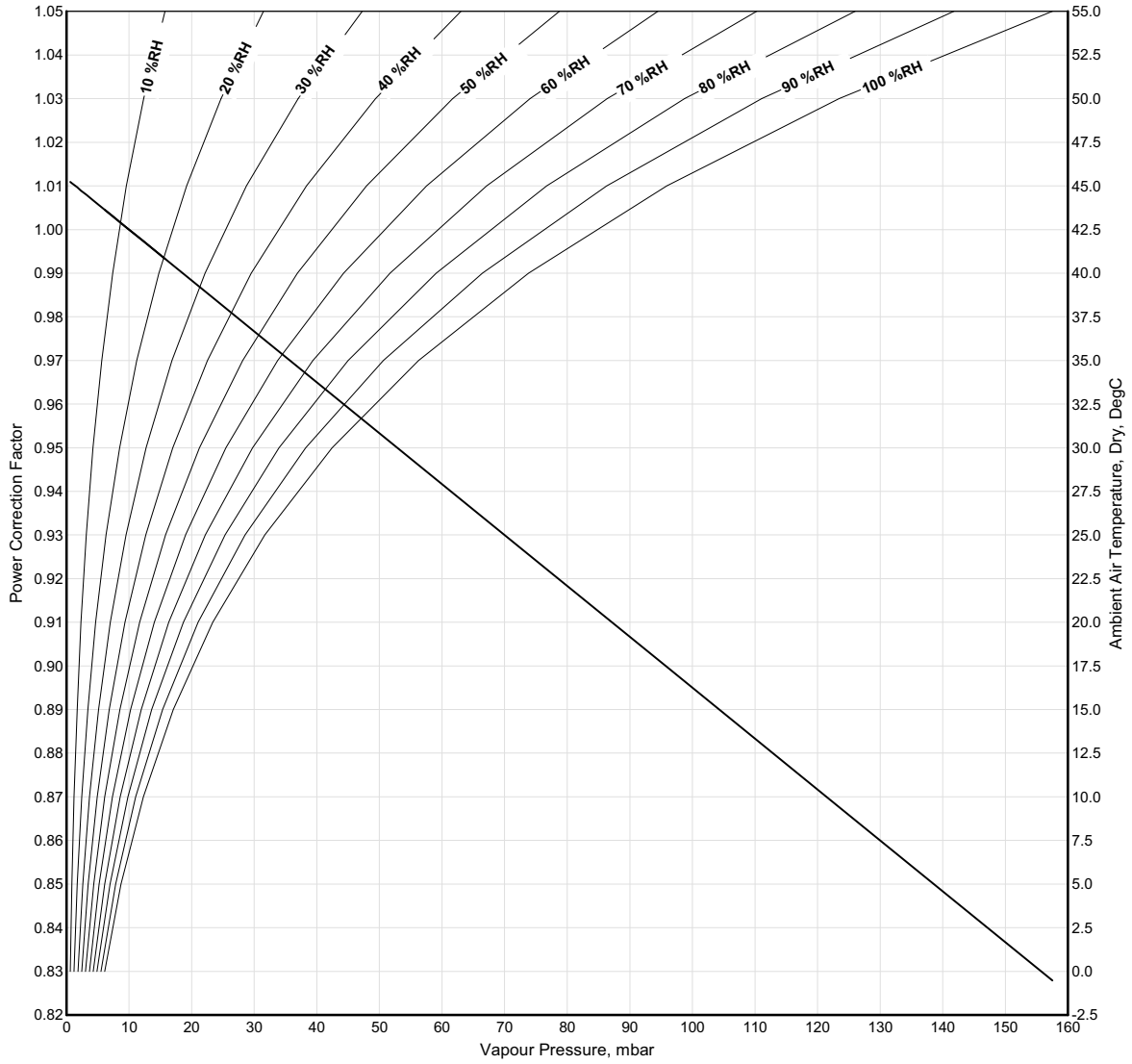
Issued by:
P. Knight
(Legislation Engineer)

S8002 - Humidity

Perkins

Diagram For:
ESTIMATING THE EFFECTS OF HUMIDITY
ON POWER OUTPUT RELATIVE TO ISO AND SAE REFERENCE CONDITIONS.
APPLICABLE TO ENGINES WITH MECHANICAL FIE ONLY.

Curve: S 8002 **Sheet 1**
Issue: 1
Date: 11-Apr-2006



NOTE

When estimating the power correction due to humidity, the relative humidity must be coupled with the AMBIENT AIR TEMPERATURE at which the humidity is measured, and not the air inlet temperature which may be locally heated, to obtain the vapour pressure. The effect of inlet air temperature on power output must be considered separately using diagram S8001.
When humidity is expressed in terms of vapour pressure, the power correction can be read off from the diagonal line.

The above diagram is applicable to correct Engine Power quoted to the following Rating Standards:

Rating Standard	Total Barometric Pressure (kPa)	Vapour Pressure (kPa)	Air Inlet Temperature (℃)
ISO 14396: 2002	100	1	25
80/1269/EEC	100	1	25
88/195/EEC	100	1	25
ISO 1585: 1992	100	1	25
ISO 2288: 1989	100	1	25
ISO 3046-1: 1995	100	1	25
ISO 8665: 1994	100	1	25
ISO 9249: 1989	100	1	25
SAE J1349 4.2.4	100	1	25
SAE J1995 3.1	100	1	25
UN/ECE R120	100	1	25

Drawn by:
A. Bradley

Date: 11-Apr-2006

Issued by:
P. Knight
(Legislation Engineer)

Lubrication system

Lubricating pressure instrumentation

As a minimum, Perkins require the use of a warning light for the lubricating oil pressure.

Installation angle and gradients of operation

The installation must be designed so that air will flow freely over the engine lubricating oil sump and filters. The operation of the engine at gradients above that approved, either on the side, or front to rear, can cause engine failure. The installation angle must be taken into account when selecting sump gradability. The angle of installation can be up to 10°s on the side and/or up to 7°s down at the rear. If it is necessary to install the engine at angles greater than these, or if it is to be installed downwards at the front, **then you must consult your local distributor**.

Satisfactory engine operation on significant gradients can be achieved by specification of the appropriate lubricating oil sump. Where continuous operation under these conditions is required, contact your local distributor.

Lubricating oil specification

Use only good quality lubricating oil which is equivalent to or above them minimum specification show in the table below. Some oil additives may not be compatible with engine components that contain lead or copper. This may cause the components to become chemically active and show increased levels of these elements in the oil analysis.Consult with oil supplier and obtain commitment to ensure satisfactory performance of the product.Target oil specifications are:

Engine type	Specification
1104D-44 1104D-44T 1104D-44TA	API CG4*/CH4/CI4

Oil change period is 500 hrs. on CH4 oils and higher specifications.

* Use of CG4 is dependant on rating, duty and application. Service period may be less than 500 hrs. Consult the Perkins Product Team.

Lubricating oil pressure

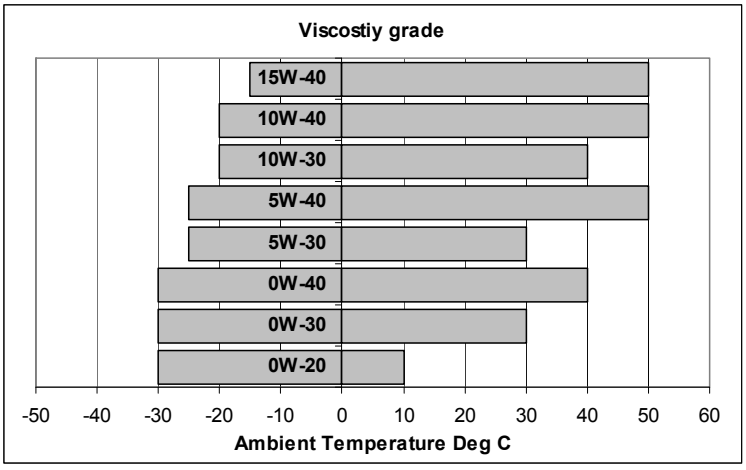
At normal operating temperatures, the lubricating oil pressure for a warm engine throughout the maximum torque speed to rated speed range, should be 300 - 400 kPa.

Lubricating oil temperatures

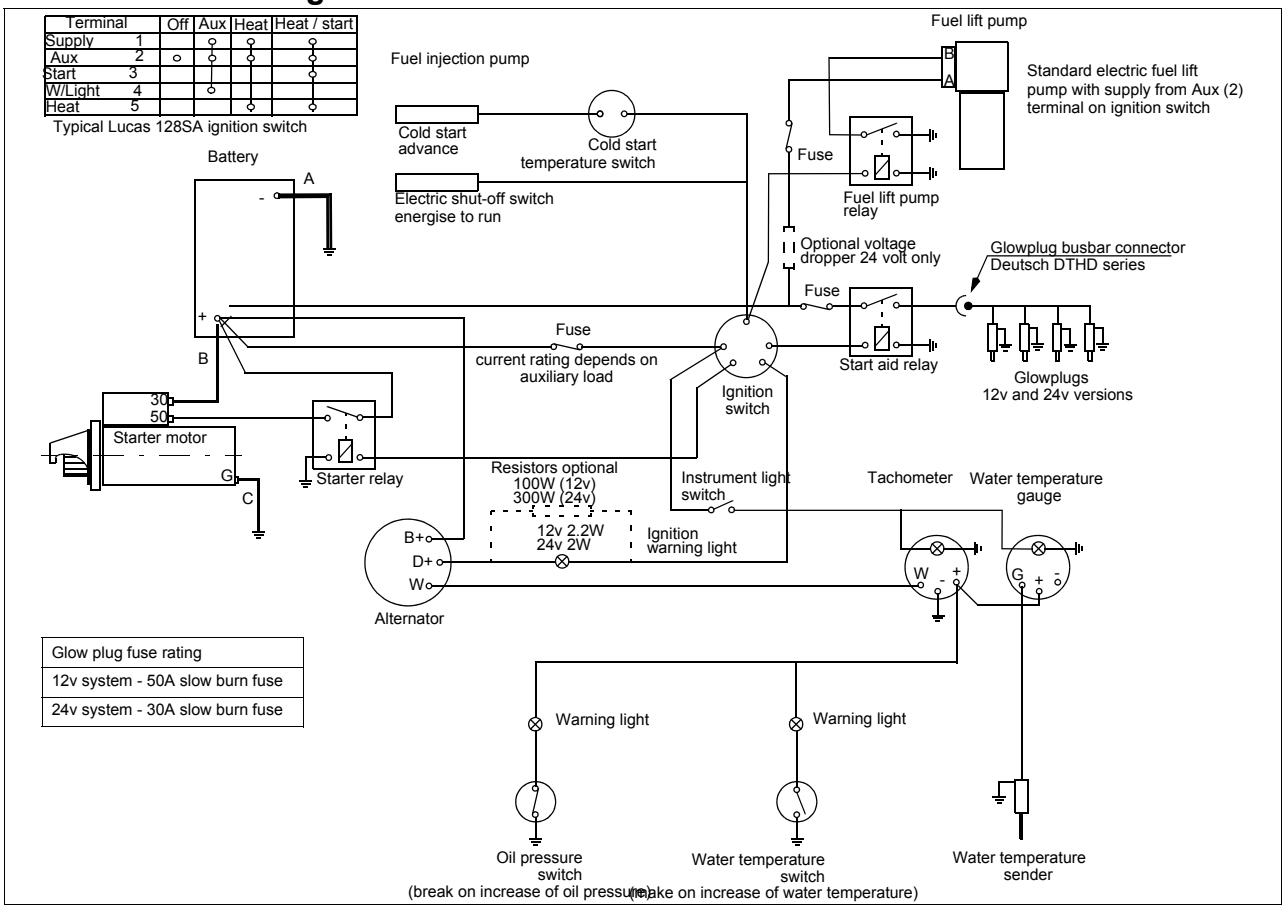
The maximum permissible lubricating oil temperature measured in the main gallery is 125 °C (257.4 °F) for continuous operation, and 135 °C (275 °F) for intermittent operation.

Recommended viscosity grades

Caution: *Always ensure that the correct viscosity grade of lubricating oil is used for the ambient temperature range in which the engine will run as shown in the chart below.*



Electrical circuit diagram



Starter motors

Model	Voltage	Solenoid current		Max volts drop in solenoid circuit
		Max pull-in amps	Max hold-in amps	
Iskra AZE/AZF	12	68	20	0.65
R4.5	24	45	15	1.0

Note: Resistance of battery cables A, B, and C not to exceed 0.0017 ohm.

Alternators

Model	Rating	Min cable size for rating	Max circuit Volt drop
A115i	14V 65A	8,50 mm²	0.5V
	14V 75A	16,00 mm²	
	14V 85A	16,00 mm²	
A127iR	14V 100A	25,00 mm²	
	14V 120A	25,00 mm²	
A127iM	28V 55A	8,50 mm²	1.0V
	28V 75A	16,00 mm²	

Suggested cable sizes

Cross-section area mm²	Max current amps	Resistance m ohm / m
1,00	16.5	18,5
1,25	18.5	14,9
1,50	21.0	12
2,00	25.0	8,95
2,50	29.0	7,29
3,00	33.0	6,15
4,00	39.0	4,60
6,00	50.0	3,14
8,50	63.0	2,20
10,00	70.0	1,82
16,00	94.0	1,16
25,00	125.0	0,74

Notes:

- Ratings quoted for +30 °C (86 °F) above ambient in free air. For wires bundled in harness, derate values by 50% assuming all cables are carrying rated current at the same time
- Minimum cable size 1 mm² for mechanical strength rather than current capacity.

All cable runs to be kept as short as possible to minimise volt drop within a general limit of 0.5 volt (12V), and 1.0 volt (24V) unless specified otherwise.

Engine mountings

Standard methods

There are four standard methods available:

1 The engine can be installed on solid mountings, independent of the driven machinery but on a common base.

2 The complete engine and machine, can be installed on solid mountings on a frame. Install the frame on flexible mountings on a solid base.

3 Install the engine on flexible mountings, independent of the machine and install a drive shaft between the engine and the machine.

4 Connect the engine and machine together, and install the complete unit on flexible mountings.

Flexible mountings

The purpose of the flexible mountings must be to:

- Control the movement of the engine at normal speed and during engine start and stop procedure.
- Remove as much vibration as possible from the frame of the machine.
- Give the engine support and hold it during sudden increase or decrease in speed, shock loads or operation on gradients.
- Prevent stress to the engine, caused through distortion of the machine and the engine frame.
- Control the movement of the engine inside the capacity of any drive shaft.

Note: Further information about engine mountings can be found in the Perkins Product Support Publications.

Power take-off

The various methods of transmitting drive from the engine and data required for satisfactory operation is given in this power take-off section.

Crankshaft thrust loading

Maximum permissible thrust loads for crankshaft (continuous operation) [1]	
With typical torque converter transmission	With clutch operation
2135 N (480 lbf)	3381 N (760 lbf)

(1). The thrust loads shown in the table above, apply to both forward or rearward movement of the crankshaft.

Note: If additional components are to be fitted to the crankshaft pulley of the engine, installation approval must be obtained from the Perkins Applications Department.

Crankshaft PTO

All axial PTO applications are to be approved by Perkins Applications Department.

Alternative side mounted PTO

Gear driven PTO arrangements are available in a variety of locations by selecting different options.

When viewed from the rear:

Q1000:Located at the rear of the timing case, on the left hand side of the engine - for light duty operation.

Q1030:Located at the rear of the timing case, on the left hand side - for heavy duty loads.

Q2000:Located at the rear of the timing case, on both the left and the right hand side of the engine.

Q3030:Located at the rear of the timing case, on the right hand side of the engine.

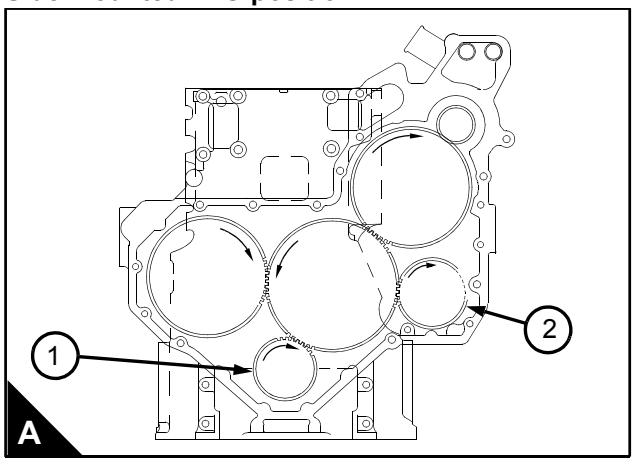
Q4***:Located at the rear of the timing case, on the left hand side hand side of the engine,

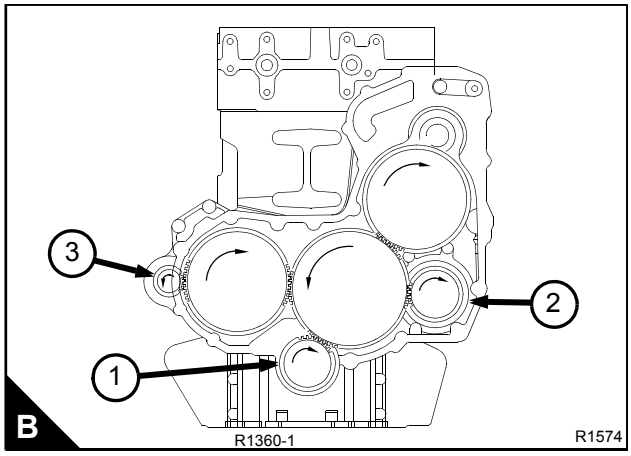
for heavy duty operation.

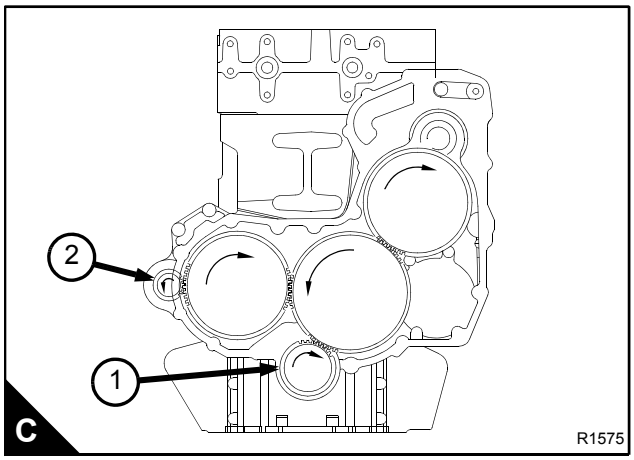
Note: For rotation, ratio and speed, see illustration and tables on the following pages.

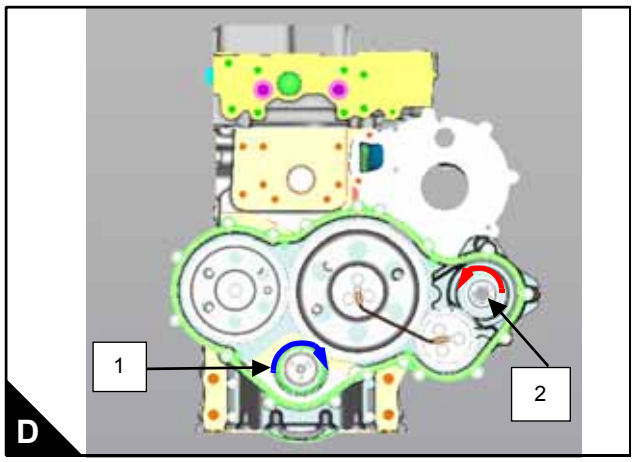
Caution: *The power and torque transmitted through the PTO at any speed, must not exceed the figures shown in the following tables.*

Side mounted PTO position









PTO position				
A1/B1/C1/D1	**A2**	**B2/B3**	**C2**	**D2**
Crankshaft	Q1000	Q2000	Q3000/Q3030	Q4***

Note: The view of the gear train in the above illustration is when seen from the front of the engine.

Side mounted PTO operating data

Typical examples of use are lifting equipment such as loaders, telescopic handlers and fork lift trucks where the PTO is used at a high load for short periods (approximately 30 seconds) for a relatively low proportion of the engine life.

Where the PTO gear is not supplied by Perkins, details for suitable gear designs should be obtained from Perkins.

Option code	Rotation viewed from front of engine	PTO gear teeth	Engine speed ratio	Max PTO drive torque (1)	
				Nm	lbf ft
Q1000 Q1005 Q1015 Q1016	Clockwise concentric to PTO spigot	33	1 : 1.03	138	102
Q1000 Q1009	Clockwise off-set to PTO spigot	34	1 : 1.0	142	105
Q1030 Q1035 Q1036 Q1037	Clockwise	33	1 : 1.03	204	150
Q1030	Clockwise	34	1 : 1.0	210	155
Q2000 (2) Q2005 (2) Q2015 (2) Q2016 (2)	Clockwise concentric to PTO spigot	33	1 : 1.03	204	150
Q2000 (2)	Clockwise off-set to PTO spigot	34	1 : 1.0	210	155
Q2000 (2)	Anti-clockwise	20	1 : 1.7	76	56
Q3000	Anti-clockwise off-set to PTO spigot	20	1 : 1.7	38 (3)	28 (3)
				76 (4)	56 (4)
Q3000	Anti-clockwise concentric to PTO spigot	17	1 : 20	33 (3)	24 (3)
				65 (4)	48 (4)
Q3030 (5)	Anti-clockwise off-set to PTO spigot	20	1 : 1.7	76 (3)	56 (3)
	Anti-clockwise concentric to PTO spigot	17	1 : 20	65 (3)	48 (3)
Q4042	TBA	TBA	TBA	TBA	TBA
Q4055 Q4059	Anti-clockwise	34	1 : 1.0	280	206

(1). Torque values are for intermittent use only.
(2). When a combination of both RHS and LHS PTO are used, the total flywheel torque should be no more than 210 Nm, i.e. A + C must be lower or equal to 210 Nm, and B + C must be lower or equal to 210 Nm.
(3). Torque values are for continuous loading
(4). Torque values for intermittent use only, defined as follows:
Maximum of 2 seconds of load up to peak rating of 130 Nm (measured at the crankshaft) with at least 2 seconds of less than the continuous rating of 65 Nm before re-applying
Overshoot should not exceed 10%
Rate of pressure rise to be less than 4000 bar/second.
(5). Due to potential high rotational speeds of the hydraulic pump, approval should be obtained from the pump manufacturers.

Customer supplied pumps

Customer supplied pumps, that are driven by the side mounted PTO, **must** be fitted with a rear support bracket **if**, the mass of the pump **exceeds** the static bending moments shown in the table below.

Engine speed rev/min	Maximum static bending moment customer supplied pumps	
	Nm	lbf ft
2200	10,0	7.3
2300	10,0	7,3
2400	7,0	5,2

Torsional vibration

In generators, pumps and compressors etc., where the moment of inertia of the driven machinery is high, torsional vibration can cause extra stresses at certain speeds. It is strongly recommended that applications such as these are analysed by Perkins.

Similar stresses can also occur with low inertia equipment that is driven off the front of the engine. As a general guideline the inertia of any equipment driven off the front of the engine should be less than 0.02 kgm². This equipment could include auxiliary crankshaft pulleys for belt driven PTO and couplings for axial PTO taken directly off the crankshaft nose. Higher inertia arrangements may be acceptable, however it is strongly recommended that these be analysed by Perkins.

For the system to be analysed and to ensure the correct performance of the engine etc., the information required by Perkins is the mass/elastic details of all the equipment driven from the front and rear of the engine. More information about the mass/elastic system calculations is given in the Perkins installation manual.

Flywheel/cylinder block bending moments

Large static bending moments in the vertical plane at the flywheel housing/cylinder block interface should be avoided at all times, since these can lead to a failure of either component. The table below shows the values that should not be exceeded for safe operation. Further information can be found in the Perkins installation manual.

Application	Acceptable static bending moment values		
	Nm	lbf ft	kgf m
Off-highway vehicles	510	4500	51,8
Fork-lift truck	850	7500	86,4

Centre of gravity

Note: For a dry engine with standard parts fitted.

Naturally aspirated - non stressed block

Engine	Specification	Weight kg (lbf)	From rear face of cylinder block mm (in)	height above crankshaft centre-line mm (in)	Offset to RHS from centre-line mm (in)
1104D-44	Base engine	291 (642)	292.6 (11.51)	205.8 (810)	-5.6 (0.22)
	Fan to flywheel	386 (851)	227.2 (8.94)	160.4 (6.31)	8.1 (0.31)
	Radiator to flywheel				

Naturally aspirated - stressed block

Engine	Specification	Weight kg (lbf)	From rear face of cylinder block mm (in)	height above crankshaft centre-line mm (in)	Offset to RHS from centre-line mm (in)
1104D-44	Base engine	357 (787)	306.6 (12.07)	134.1 (5.28)	5.9 (0.23)
	Fan to flywheel	395 (871)	291.4 (11.47)	132.7 (5.22)	4.7 (0.19)
	Radiator to flywheel				

Turbocharged and turbocharged aftercooled - non stressed block

Engine	Specification	Weight kg (lbf)	From rear face of cylinder block mm (in)	height above crankshaft centre-line mm (in)	Offset to RHS from centre-line mm (in)
1104D-44T 1104D-E44TA	Base engine	306 (675)	292.6 (11.51)	205.8 (810)	-5.6 (0.22)
	Fan to flywheel	401 (884)	227.2 (8.94)	160.4 (6.31)	8.1 (0.31)
	Radiator to flywheel				

Turbocharged and turbocharged aftercooled - stressed block

Engine	Specification	Weight kg (lbf)	From rear face of cylinder block mm (in)	height above crankshaft centre-line mm (in)	Offset to RHS from centre-line mm (in)
1104D-44T 1104D-E44TA	Base engine	357 (787)	306.6 (12.07)	134.1 (5.28)	5.9 (0.23)
	Fan to flywheel	395 (871)	291.4 (11.47)	132.7 (5.22)	4.7 (0.19)
	Radiator to flywheel				

Ratings

Low speed torque

The 1104D-44T/1104D-44TA engines utilisze a boost control unit on the fuel pump to control exhaust smoke emissions during rapid acceleration of the engine. The boost control unit will limit the maximum fuel delivery (un-boosted fuel) and therefore torque (un-boosted torque) until the air boost pressure from the turbocharger reaches a preset level. Once this threshold boost pressure is achieved the engine will deliver torque levels shown on the first page of the power curves.

During operation below 1000 rev/min engine speed the intake air pressure will typically be below the threshold to achieve fully boosted torque and therefore the real torque available will be lower than that shown in the torque curves. This lower, un boosted torque level is shown on the second page of the power curves, at both 800 rev/min and 1000 rev/min engine speed.

As the boost control unit acts upon differential pressure between the intake manifold and ambient this feature will not affect the engine torque as a function of the increasing altitude.

The boost control were used on many 1104C-44T/1104C-44TA ratings, the un-boosted torque levels on 1104D-44T/1104D-44TA are lower. In some machine applications this may result in a loss of performance in terms of engine response and load acceptance when changing over to the 1104D-44T/1104D-44TA.

It is important when making engine selections that the machine torque requirements at low speed are taken into account. For machines with high torque demands at low speed this is especially important.

For further assistance with machine torque requirements and engine suitability please refer to the Perkins Applications department.

Transient smoke

The 1104D-44T/1104D-44TA engines have been designed to comply with the transient smoke requirements of the US EPA 40 CFR Part 89 Tier 3 legislation and the former EU 77/537/EEC standard for agriculture tractors.

Smoke opacity may be higher than a similarly rated 1104C-44T/1104C-44TA engine in some modes of transient operation due to the technologies used to develop mechanical engines to the more stringent, cleaner exhaust emission levels.

It is important when making engine selections that the customer takes into account the impact of any potential increase in operational black smoke over their current product.

For further assistance with the transient smoke emissions and engine selection please refer to the Perkins Applications Engineering Department.

Allowances for engine driven auxiliary equipment

If the engine operates in the ambient conditions shown on the power curve, the only allowances which must be made are for the power used by accessories such as the fan and the alternator. The amount of power used by accessories driven by the engine must be decided so that the net horsepower available at the flywheel can be found. For details of the power absorbed by the compressors, the exhauster and the fans, see “Ratings” on page 245 to page 257.

De-rating

If the engine operates in ambient conditions other than the conditions shown on the power curve, then suitable allowances must be made for any change in inlet temperature, barometric pressure or humidity.

Inlet air temperature

High inlet air temperature to the engine can cause loss of power and heat problems with the cooling system, the lubricating oil and hydraulic systems. This may be either due to high ambient temperatures, or because the engine is being used inside a building or structure of a machine which requires more air flow.

Altitude

The 1104D naturally aspirated engine is capable of operating at altitudes up to 600 metres.

The 1104D turbocharged engine is capable of operating at altitudes of up to 3000 metres without derate.

Turbochargers are approved for operation up to 3000 metres.

Note: See “S8001 - Altitude and temperature” on page 234 for further details.

Humidity

The amount by which the rating will be reduced because of humidity, will be according to the percentage humidity and the ambient temperature (not the inlet air temperature).

Note: See “S8002 - Humidity” on page 235 for further details.

Temperature

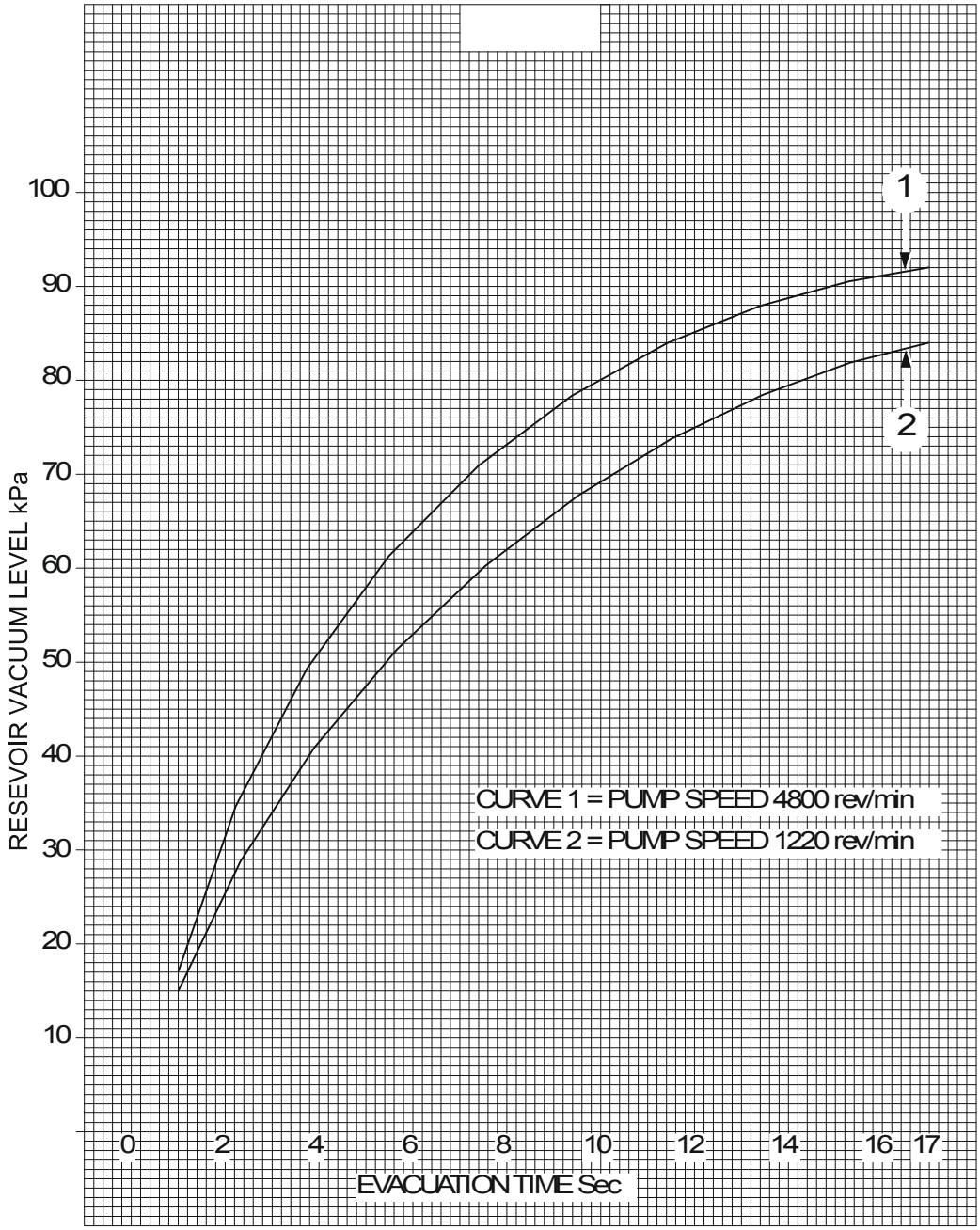
For the effects on the fuel oil changes in temperature and specific gravity, refer to Perkins Application Engineers.

Engine ratings given by Perkins are corrected to the reference conditions shown in the rating standards.

Note: See “S8001 - Altitude and temperature” on page 234 for further details.

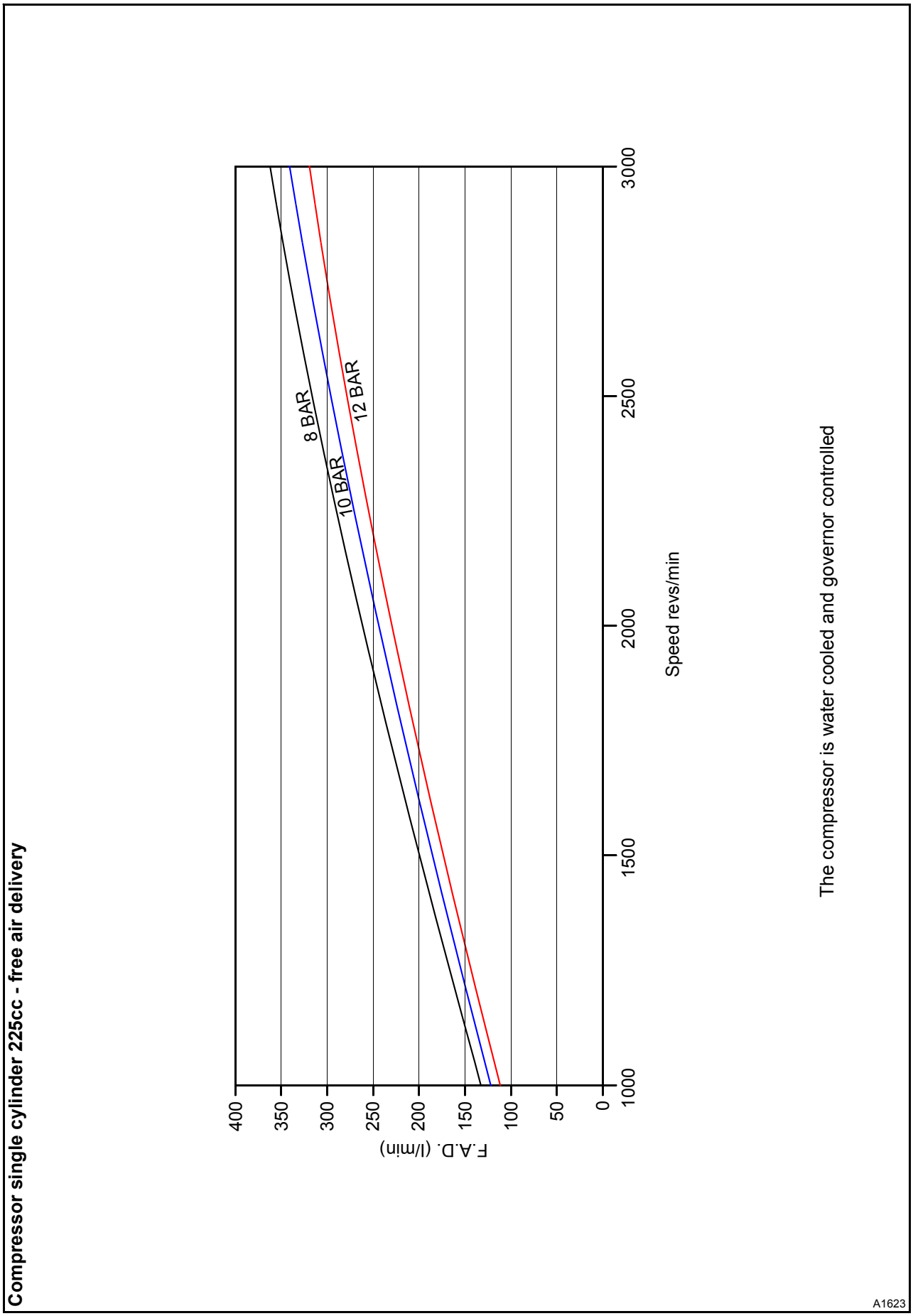
Exhauster, curve 5608

Barometric pressure - 101.6 kPa
Vacuum reservoir capacity - 8 litre
Exhauster swept volume - 87,5 cc

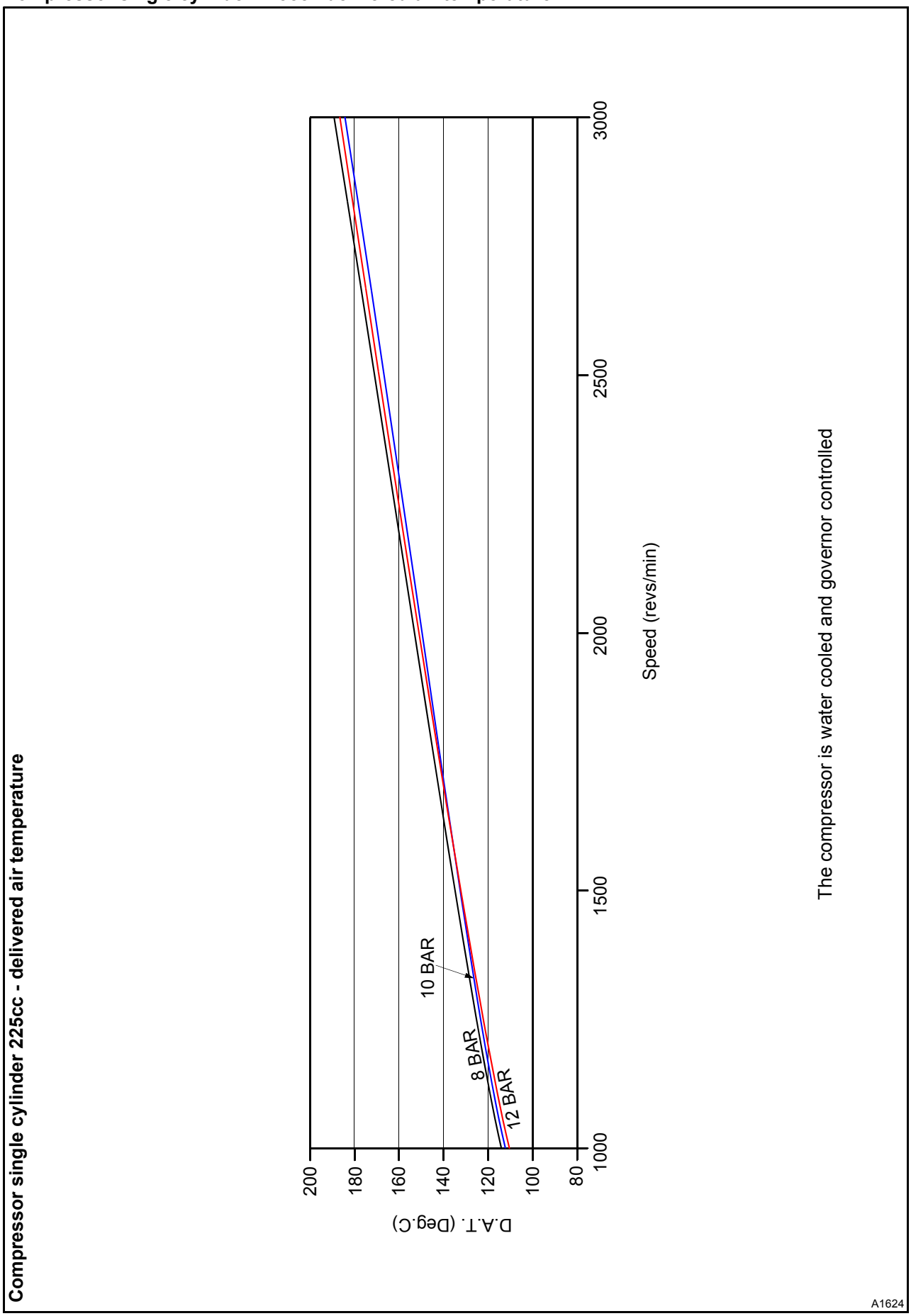


A1313

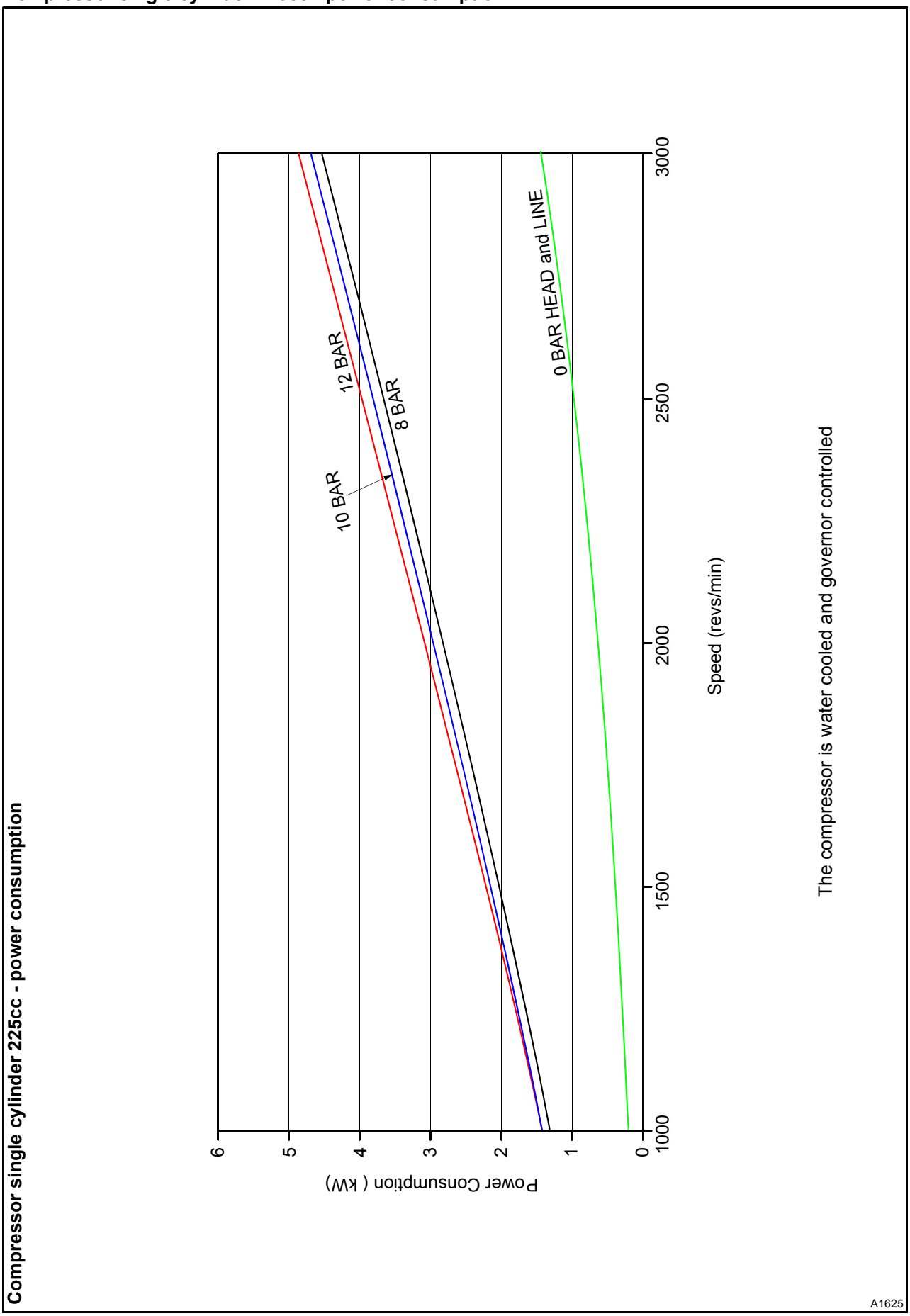
Compressor single cylinder 225cc - free air delivery



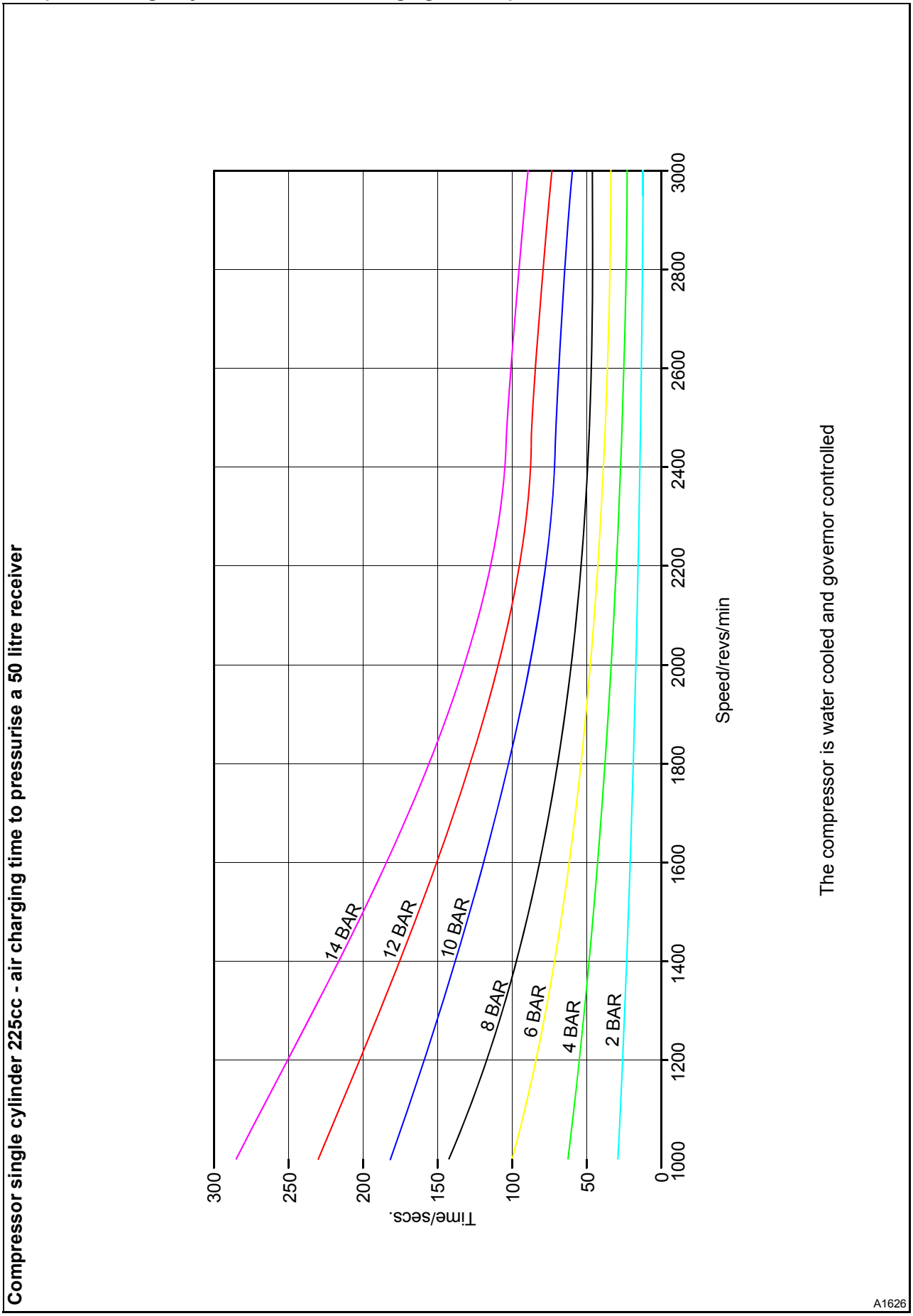
Compressor single cylinder 225cc - delivered air temperature



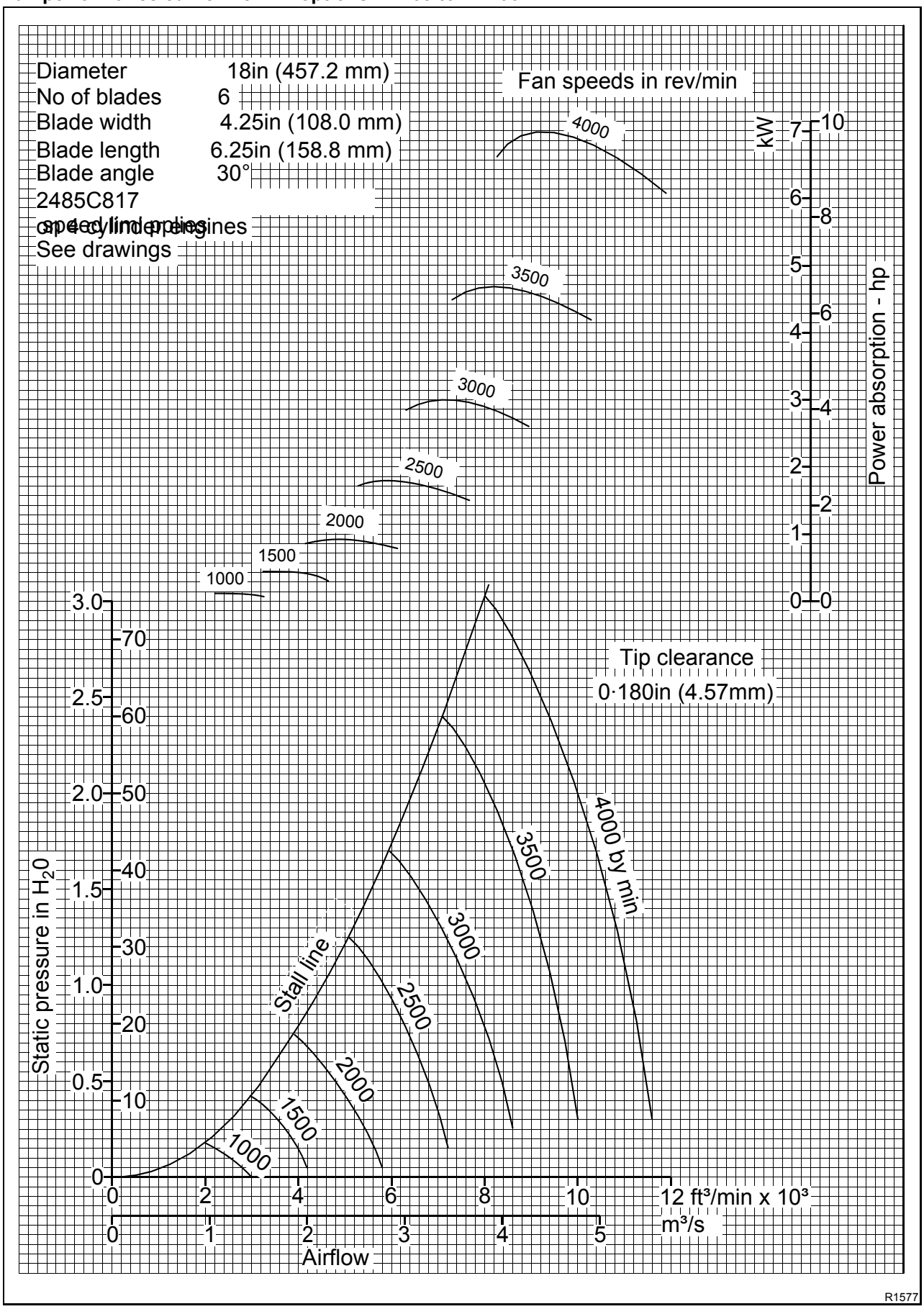
Compressor single cylinder 225cc - power consumption



Compressor single cylinder 225cc - air charging time to pressurise a 50 litre receiver



Fan performance curve 2184/C - options M2203 to M2206



Fan performance curve 5441 - options M3313 to M3316

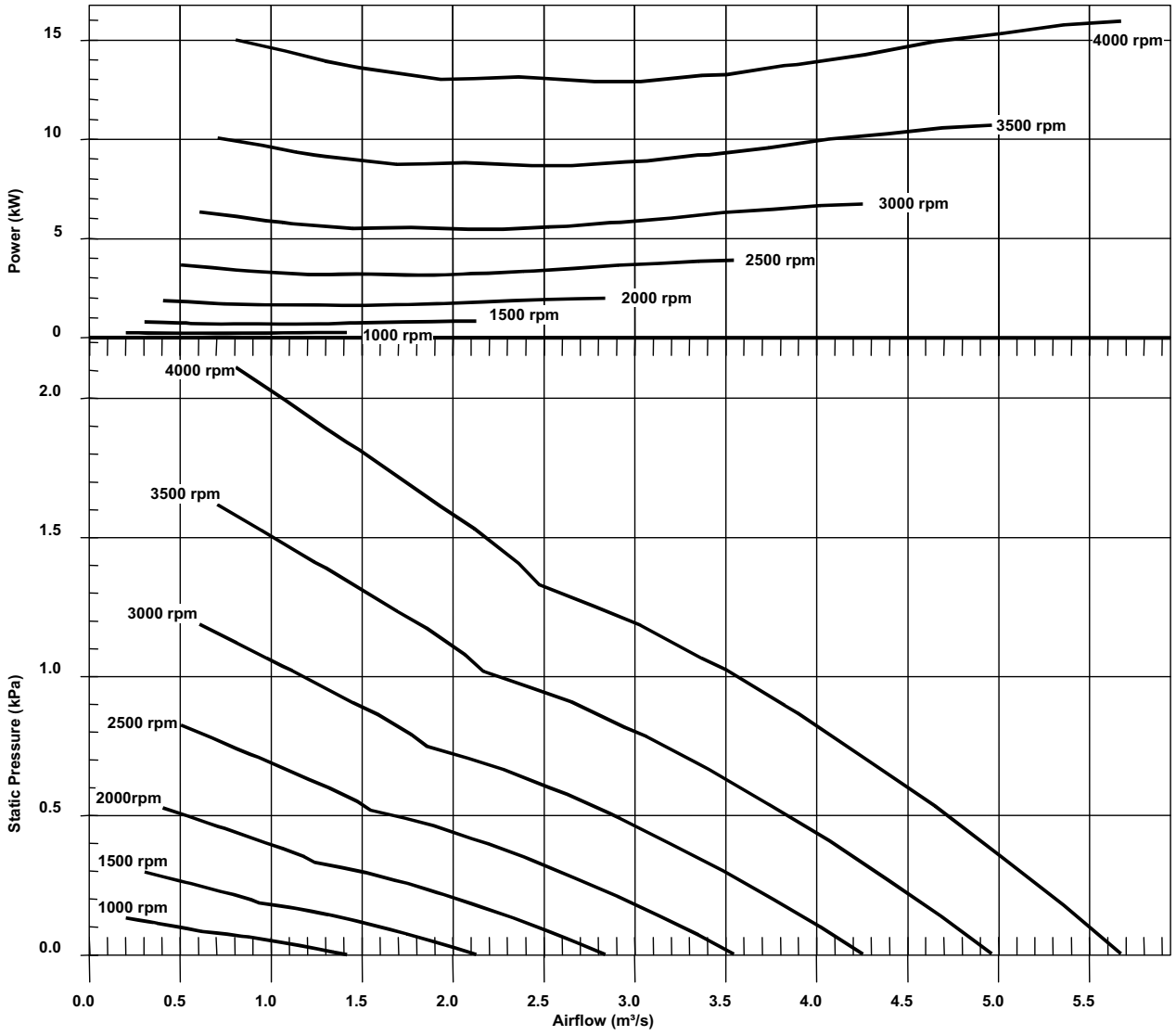
Perkins

Fan Performance Curve for:

Perkins Part Number	Manufacturer	Manufacturer's Part Number	Supplier	Supplier's Part Number
2485C517	Borg Warner	4035-41045-43	Borg Warner	4035-41045-43

Curve: 5441
Issue: 2
Date: 25-Oct-2004

Perkins Part Number	Diameter (mm)	Number of Blades	Blade Width (mm)	Blade Length (mm)	Blade Angle (°)	Fan Type	Minimum Tip Clearance, mm, for Shroud Mounted on:		Maximum Continuous Speed, rpm
							Engine	Radiator	
2485C517	508.0	7	81.3	167.0	45.0	Puller	6.00	15.00	4200



DCP Number: 04-0172

Based On: Borg Warner Test ID Z10705

Drawn by:
A. Bradley

Date: 6-Oct-2004

Fan performance curve 5442 - options M3323 to M3326

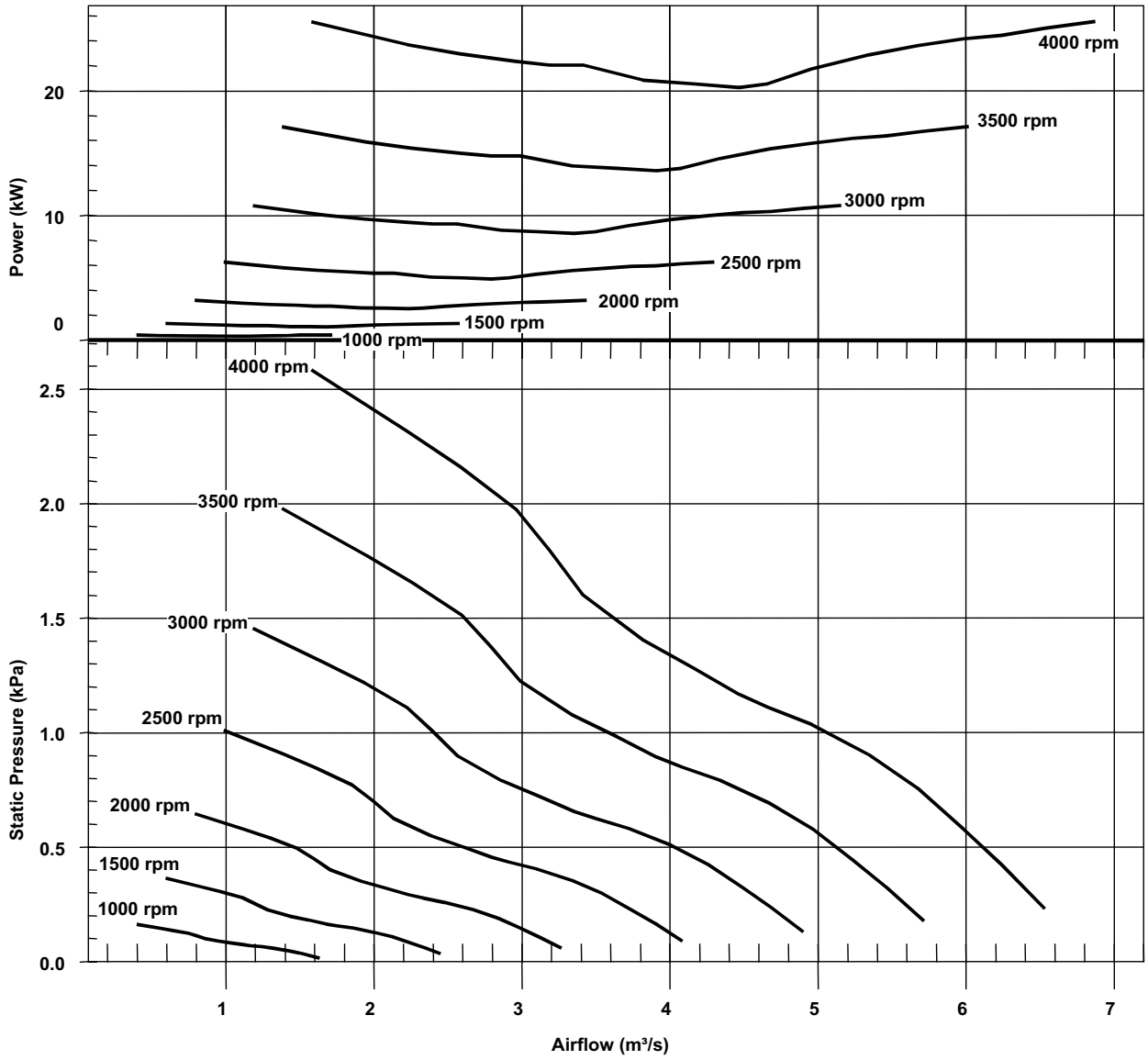
Perkins

Fan Performance Curve for:

Perkins Part Number	Manufacturer	Manufacturer's Part Number	Supplier	Supplier's Part Number
2485C518	Borg Warner	4035-38449-86	Borg Warner	4035-38449-86

Curve: 5442
Issue: 2
Date: 25-Oct-2004

Perkins Part Number	Diameter (mm)	Number of Blades	Blade Width (mm)	Blade Length (mm)	Blade Angle (°)	Fan Type	Minimum Tip Clearance, mm, for Shroud Mounted on:		Maximum Continuous Speed, rpm
							Engine	Radiator	
2485C518	508.0	10	89.0	167.0	39.5	Puller	6.00	15.00	4200



DCP Number: 04-0172

Based On: Borg Warner Test ID Z12037

Drawn by:
A. Bradley

Date: 6-Oct-2004

Fan performance curve 5443 - options M3415 to M3416

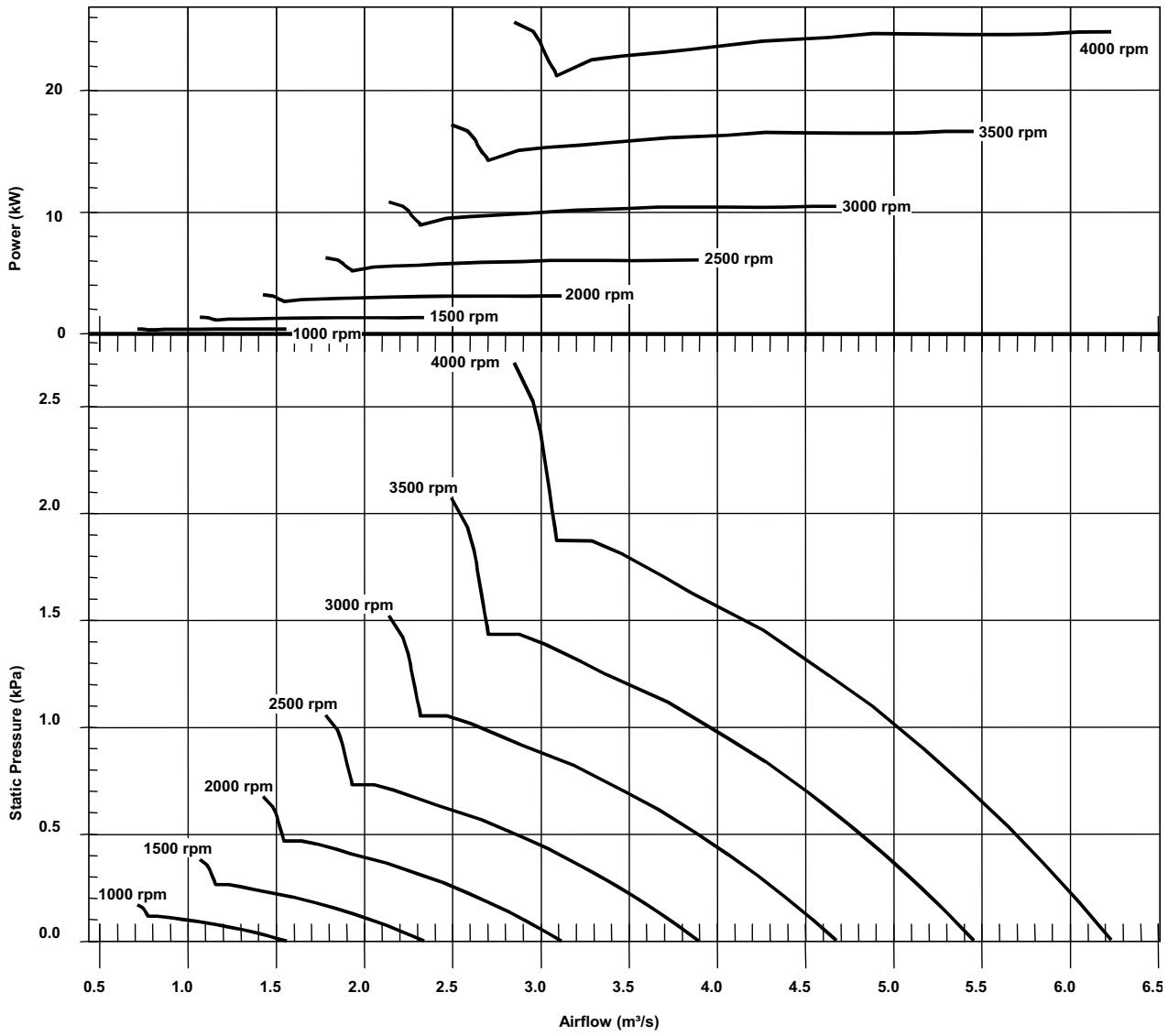
Perkins

Fan Performance Curve for:

Perkins Part Number	Manufacturer	Manufacturer's Part Number	Supplier	Supplier's Part Number
2485C514	Borg Warner	4035-41296-03	Borg Warner	4035-41296-03

Curve: 5443
Issue: 2
Date: 25-Oct-2004

Perkins Part Number	Diameter (mm)	Number of Blades	Blade Width (mm)	Blade Length (mm)	Blade Angle (°)	Fan Type	Minimum Tip Clearance, mm, for Shroud Mounted on:		Maximum Continuous Speed, rpm
							Engine	Radiator	
2485C514	508.0	7	203.0	167.0	32.0	Pusher	6.00	15.00	4200



DCP Number: 04-0172

Based On: Borg Warner Test ID Z10750

Drawn by:
A. Bradley

Date: 6-Oct-2004

Fan performance curve 9500 - option M4326

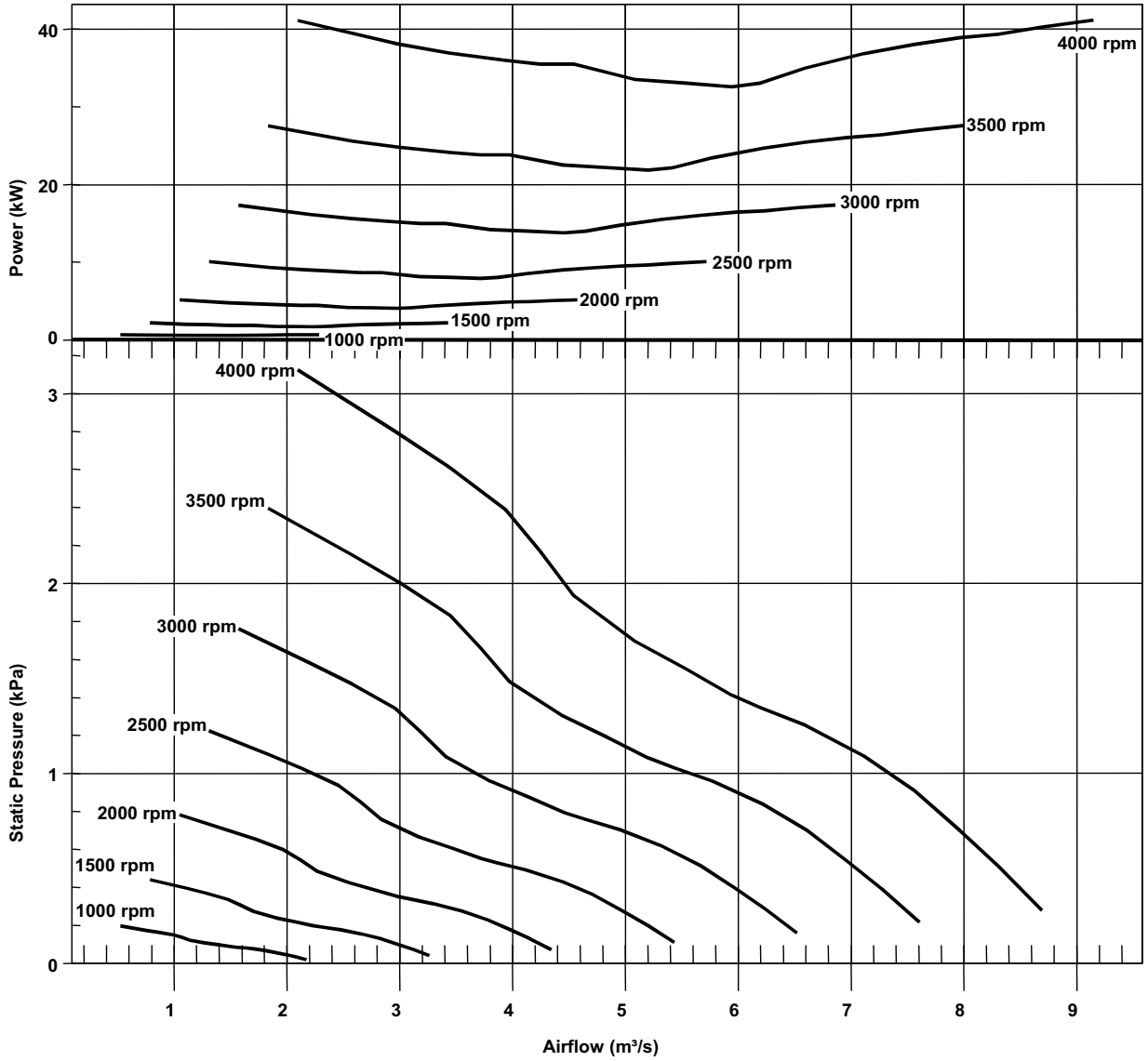
Perkins

Fan Performance Curve for:

Perkins Part Number	Manufacturer	Manufacturer's Part Number	Supplier	Supplier's Part Number
2485C521	Borg Warner	4035-38449-87	Borg Warner	4035-38449-87

Curve: 9500
Issue: 1
Date: 25-Oct-2004

Perkins Part Number	Diameter (mm)	Number of Blades	Blade Width (mm)	Blade Length (mm)	Blade Angle (°)	Fan Type	Minimum Tip Clearance, mm, for Shroud Mounted on:		Maximum Continuous Speed, rpm
							Engine	Radiator	
2485C521	558.8	10		182.4		Puller	6.00	15.00	3825



DCP Number: 04-0172

Based On: Borg Warner Test ID Z12037

Drawn by:
A. Bradley

Date: 6-Oct-2004

Fan performance curve 9501 - option M2323 to M2326

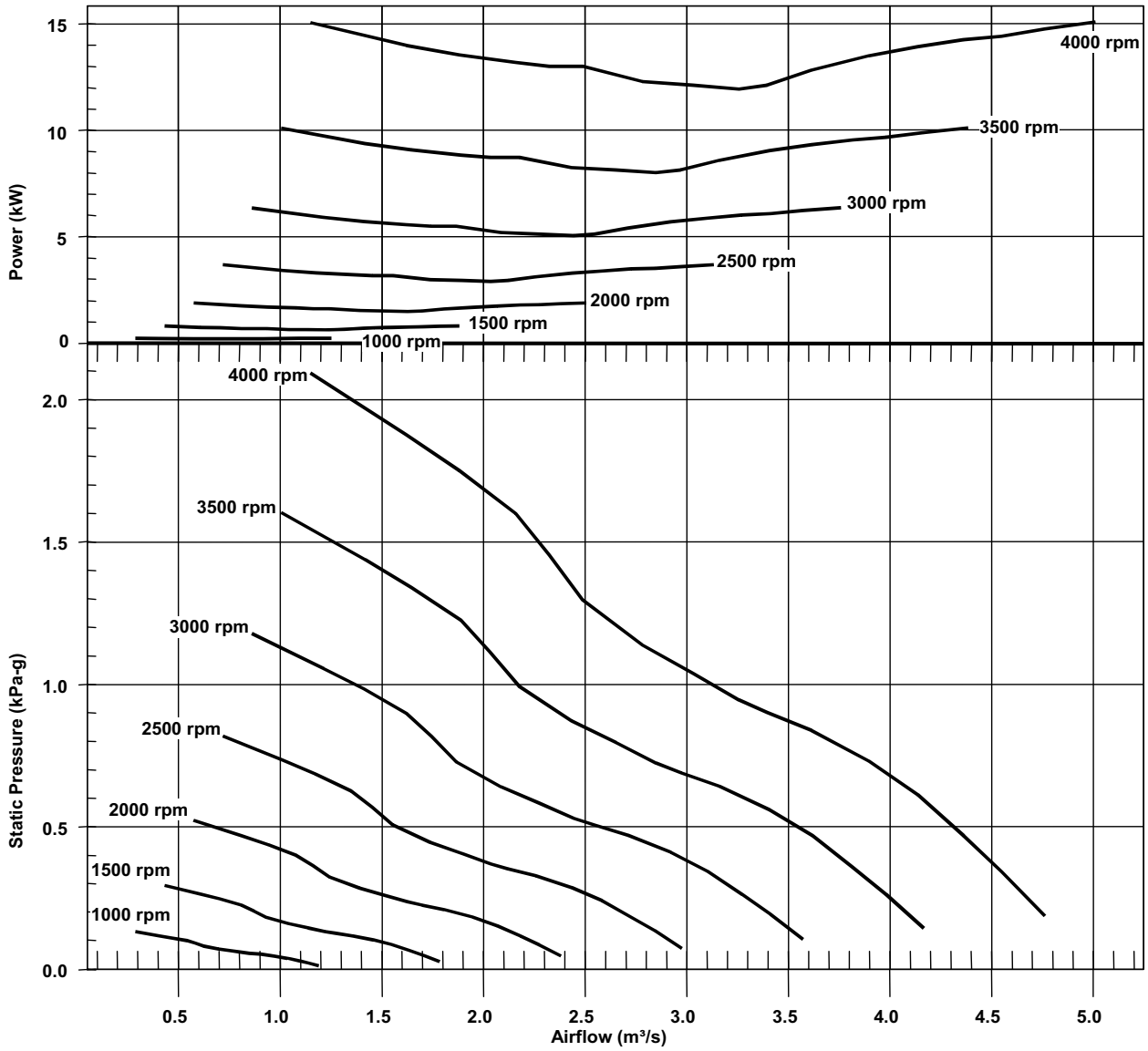
Perkins

Fan Performance Curve for:

Perkins Part Number	Manufacturer	Manufacturer's Part Number	Supplier	Supplier's Part Number
2485C522	Borg Warner	4035-38449-83	Borg Warner	4035-38449-83

Curve: 9501
Issue: 1
Date: 25-Oct-2004

Perkins Part Number	Diameter (mm)	Number of Blades	Blade Width (mm)	Blade Length (mm)	Blade Angle (°)	Fan Type	Minimum Tip Clearance, mm, for Shroud Mounted on:		Maximum Continuous Speed, rpm
							Engine	Radiator	
2485C522	457.2	10		131.6		Puller	6.00	15.00	4675



DCP Number: 04-0172

Based On: Borg Warner Test ID Z12037

Drawn by:
A. Bradley

Date: 6-Oct-2004

Important notes

Company liability

The engine supplied must only be used for the purpose given in the Companies 'Acknowledgement of Order' and to the Companies specific instructions for its installation and operation. It must not be used, or passed to any other person, for any other purpose or be installed by any other method except with the Companies written approval.

The application and installation of the engine must be suitable for the needs of the machine in which it is installed and the conditions in which it will have to operate.

The Company does not have direct control of the type of application and how the engine is installed and used in it and cannot be held responsible for any loss or damage where the person or persons that installed the engine, or the user, have not followed the advice given by the Company.

It is very important to ensure that the installation of the engine is according to the health and safety legislation of the country in which the engine is to operate.

Installation

The engine must:

- have the necessary power and torque characteristics for the machine in which it is installed so that it can operate in all necessary environmental conditions
- be connected securely and correctly to the driven load according to operation needs and torsional vibration characteristics
- be given protection from adverse atmospheric conditions and supplied with the correct clean fuel, lubricating oil and air
- have the correct maintenance and operation according to Perkins instructions as given in the installation, operation and service books.

It is also important that:

- All parts that rotate, such as pulleys, flywheels, fans, shafts, couplings and drive belt systems must have a protection guard fitted over them with a warning that fingers must not be put through the guards
- Electrical terminations are shielded to prevent external short circuits. All electrical cables that supply current must be protected by insulation and all electrical equipment must have a suitable and secure connection to ground
- The exhaust system must have a suitable heat shield or lagging where it can be a danger to persons.

Warning! *All build lists referenced in this publication exclude any fan guarding or hot surface protection features. To the extent that it is lawfully possible, the Company accepts no responsibility whatsoever for any injury, damage or death, whether to property or persons, arising directly or indirectly from this exclusion.*

Legislation

Specific legislation for each country cannot be given here because of the amount and continuous changes that occur. The subjects which can effect operation are:

- Noise
- Emissions
- Operation in explosive atmosphere or areas where there are flammable materials
- Operation where ventilation is limited or health is important.

Warranty

This can be made invalid if the engine is not installed or operated/maintained according to Perkins instructions.

California Proposition 65

California State law, USA, now stipulates that all equipment that is powered by a diesel engine must carry a warning label that is clearly visible to the operator of that equipment. All Original Equipment Manufacturers that fit Perkins engines to their equipment must comply with this legislation. An example of this label (actual size) is shown below.

Warnings to place on Equipment