HOT MIX PLANT (HMP 6-10)

Operation, Service, and Maintenance Manual

GEM Contract No. GEMC-511687759342116 Date 26-OCT-2022
Supply of 04 Nos. Portable Mobile Hot Mix Plant 6-10 TPH

AKONA ENGINEERING (PVT) LTD.
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IMPORTANT NOTE

THE DATA'S INDICATED IN THIS OPERATING INSTRUCTION MAY DIFFER FROM PLANT TO PLANT IN AN ACCORDANCE WITH CONSTANT IMPROVEMENT, AND WE RESERVE ALL RIGHT TO CHANGE OR MODIFY ANY PARTS AT ANY TIME WITHOUT ANY PRIOR NOTIFICATION

ATTENTION

THE NON-APPLICATION OF THE USE AND MAINTENANCE RULES MENTIONED WITH THE PRESENT MANUAL WILL ENTAIL THE AUTOMATIC LOSS OF ALL WARRANTY INSURANCE COVERINGS.

For Service or any other query, Call our Toll-free number: 1800-121-257-257

Visit us at: www.akonaindia.com

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FOREWORD

Dear Customer,

We are happy to provide you HOT MIX PLANT, Model HMP 6-10 with One DG Set OEM model with latest technology.

HOT MIX PLANT 6-10 TPH with silent type DG set and control system, has been developed for wide range of application as per your requirements.

All necessary safety precautions and regulations have been adhered to in the designing and manufacturing of HMP 6-10 TPH series.

This manual provides technical specifications, operation guidelines, routine maintenance, and service maintenance procedures. The performance of HOT MIX PLANT largely depends on its proper maintenance. Hence please maintain your machines properly using the guidelines and schedules given in this manual. We recommend that only trained personals should perform the operation and maintenance task of the Hydraulic control System or the complete machine.

Continuous improvements in the product design are incorporate from time to time which may not be included in this manual.

If you have any query or service call, fully equipped and well-trained team from Akona Customer care is always available to provide best services.

In case of any difficulty Please contact

Akona Engineering Pvt. Ltd.,

Customer Support
Hycon House, A-455, Hindon Vihar,
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NOTE: - All the information in this manual is based on latest product information available.
A.E.P.L. reserves the right to make changes at any point of time without any notice & incurring any obligations thereof.

STANDARD WARRANTY FOR HOTMIX PLANT AKONA MAKE HMP 6-10 TPH MODEL

This warranty applies to HMP - 6-10 TPH, WITH ONE DG SET AND PLC operated.

WARRANTY CARD

In the event of any defective part being discovered within a period of one year from the date of delivery/commissioning (as per S.O.) then said defective part/s will have to be returned to dealer/workshop on freight basis. We shall inspect such part/s thoroughly. On satisfaction, if the defect is found due to faulty material or poor workmanship, the same will be repaired or replaced with a new one free of cost but freight charges will be borne by the customer. The defective part/s, which has been replaced or repaired, will be sole property of the A.E.P.L.

The benefit of warranty is given to the owner and cannot be transferred if the machine resold or send out.

Warranty is not applicable for: -

1. Starter, Capacitor, Hydraulic element, electronic component, Belt, Pulleys, Chains, Gear, Couplings, Plumbing's accessories, tyres, tubes, & Bearings etc. However, the company will passion to the customer the benefit of any guarantee/warrantee of the electronic motors, pumps and engines given by the manufacturers and will on behalf of the customer take up with such manufacturers any complains which they may have regarding the workmanship.
2. Defect due to wear and tear, accident, improper adjustment, misuse, or lack of maintenance.
3. Spare manufactured by the party/customer and then fitted to mixer supplied by the Akona Engineering Pvt. Ltd.

Limitations and Exclusions:

1. To fair wear and tear or to damage due to negligence or improper handling or incorrect application or improper handling or incorrect applications or incorrect installation by the purchaser, or his employees or agents or in the case of repairs or alterations carried out by the purchaser without or knowledge and written approval.
2. Any damage due to use of lubrication oil, fuel quality and grade not recommended by us.
3. Any damage resulting from improper shutdown.
4. Any failure to meet its obligations here under which are due to circumstances beyond its reasonable control including but not limited to industrial disputes, fire, severe weather conditions, government decisions, material shortage, power or machinery breakdown or failure or war.
5. We will not be responsible for loss or damage to goods beyond the delivery point as stated in our tender and we will repair or replace free of charge goods damaged in transit up to the point of delivery (consignee location) as specified above.
6. Strike, Lockout, Fire, Theft, Accident during transit from consignee location to user end and anything by the act of God constituting the force Majeure.

OUR QUALITY POLICY

We would like to introduce ourselves as a leading construction equipment manufacturer since 1991, in northern India.

Akona is devoted and engaged in manufacturing of Asphalt Batch Mix Plants (ABMP) with recycling, Hot Mix Plants (Drum Type), Concrete Batch Mix Plants (CBMP), Wet Mix Macadam (WMM) and Cement Treated Sub Base (CTSB) plants in mobile and stationary setup. All types capacities supported.

Our qualified & well-trained engineers capable to manufacturer the equipment, plant as per customer specification or requirements.

"To Offer the Products and services to the satisfaction of the Customer and strive Continuously Upgrade Quality in all Respect Through the Joint Efforts of all Employee"

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OPERATION AND MAINTENNANCE MANUAL
MODEL: HMP 6-10
CAPACITY: 6-10 TPH

AKONA ENGINEERING PVT LTD.

AN ISO 9001:2008 CERTIFIED COMPANY

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Technical Specifications of Hot Mix Plant 6 to 10 TPH with 40 KVA Gen Set

Introduction

The drum type hot mix plant is adopted for laying bituminous mix. In the drum Mix Plant, aggregate heating, drying, and bitumen mixing are done in same drum. It has been widely adopted due to its following features:

- *Portability*
- *Higher efficiency*
- *Economy in basic cost*
- *Lower fuel consumption*
- *Reduction in manpower*
- *Less maintenance*
- *Trouble free operation*
- *Ability to produce large quantity of mix at relatively low energy use*
- *Environmentally friendly.*

HMP 6 to 10 TPH plant is parallel flow type. In parallel flow type drum mix plant, aggregates, and hot gases flow in same direction inside the same drum.

The Hot Mix Drum Type Plant has the following components:

1. Aggregate Hopper and Slinger Conveyor
2. Single deck vibrating screen for rejection of oversize material
3. Drying and Mixing Unit
4. Dryer Burner
5. Pollution Control Unit and Exhaust Fan Assembly
6. Bitumen Supply System (Bitumen Tank, Bitumen Pump and Bitumen Metering)
7. Fuel Tank for Burners
8. Control panel
9. DG Set
10. Plant chassis with foundation leg and Mobility setup (wheel, axle).

APPLICATION (PURPOSE) OF HOT MIX PLANT

The purpose of hot mix plant is:

- *To blend different size of aggregate in specification portion.*
- *To dry aggregate (reduce moisture content to below .5%) and heat them to the specified temperature.*
- *To heat the bitumen uniformly at specified temperature.*
- *To feed controlled quantity of bitumen and filler in the specified proportion.*
- *To mix the aggregate with bitumen and filler thoroughly and uniformly to produce homogenous mix at the specified temperature.*

CAPACITY OF HOT MIX PLANT

The capacity of hot mix plant is given in ton per hour and is specified in the following manner for two different values of the moisture content in the aggregates:

1. *Output of plant at 6 percent moisture content in aggregate.*
2. *Output of plant at 2 percent moisture content in aggregate.*

The hot mix plant 6-10 TPH capacity shall produce an output of 6 TPH at 6 percent moisture content present in aggregates and 10 TPH at 2 percent moisture content present in aggregate, other factors such as dust content and altitude may affect the performance (IRC 90:2010).

SALIENT FEATURES OF HMP 6-10

- Modern hot mix technology.
- Produce high quality mix.
- High production rate.
- Easy to operate.
- Modular Design for Containerized transport.
- Fully Automatic Computerized Control Panel Board.
- A heavy-duty oil bath spur gear box to operate mixer shaft.
- Easy to erect and dismantle due to bolted type design.

TECHNICAL DESCRIPTION & COMPONENT FUNCTION OF HMP 6-10

1. *AGGREGATE HOPPER WITH Slinger CONVEYOR*

The aggregate hopper is a sturdy structure installed above the vibrating screen, it has an aggregate holding capacity of 4.5 ton, this hopper ensures a surge of aggregate is maintained while the plant is operating, resulting in higher productivity.

Slinger conveyor discharges aggregate into the dryer after receiving the material from the vibrating screen. The essential components of slinger conveyor are the continuous belting, idlers, driving unit, and pulley and take up unit to maintain the tension in the belt and supporting structure.

2. *SINGLE DECK VIBRATING SCREEN*

A robust heavy-duty frame single deck vibratory screen is placed at the start of gathering conveyor. Its job is to remove oversize aggregate before being fed to the dryer.

3. *DRYER AND MIXER UNIT*

It is a rotary shell made of heat resistance steel 10 mm thick, supported on rings and rollers. Its main function is:

I. *To remove moisture from aggregates by heating it at appropriate temperature.*
II. *To blend aggregates and bitumen in desired proportion to achieve homogenous mix with in 140^{o} to 160^{0}*

The drum is in inclined position. It includes a burner and blower fan which provides primary air for combustion of fuel and an exhaust fan to create a draft through the dryer. The drum is fitted with longitudinal trough or channels called flights. These flights lift the aggregates and drop it in veils through the burner flame and hot gases. The dwell time will depend on the slope of drum. The balance between fuel and air supply should be maintained for complete combustion and efficient dryer operation. Imbalance between draft air and blower air velocities can cause a back pressure within the drum.
Normally, dryer is designed to heat and dry the feed aggregates at 4 to 6 % moisture content for maximum efficiency. If moisture content present in aggregates increases the feeding of aggregates into dryer drum reduced, resulting in drop in hourly production capacity of plant. The temperature of aggregates controls the temperature of mix. The layer of bitumen put on each particle of aggregates during mixing achieves the aggregates temperature instantaneously. The aggregates heated at high temperature can harden the bitumen during mixing while under heated aggregates cannot get a proper coating of bitumen. Therefore, aggregates should be heated uniformly at appropriate temperature to achieve homogenous mix.

Drum Design Aspects:

Drying and mixing unit drum is divided into two zones:
Combustion Zone: The Heating and drying of aggregates take place in this Zone.
Mixing Zone: The mixing of aggregates, the filler and bitumen takes place this Zone.

4. *BURNER FOR DRYER DRUM:*

We provide fuel burner unit. It can heat the aggregate to a temperature of above 160^{0}C without unburnt fuel or carbon residue on the aggregate and reducing the moisture contents of aggregates to 0.5% by weight and capable of giving an output of 6 TPH at 6% moisture and 10 TPH at 2% moisture.

5. *DUST COLLECTION SYSTEM:*

Multi-cyclone dry dust collector:

We provide dust collector drying and mixing with multi-cyclone dust collector of adequate capacity and exhaust capacity of fan to extract hot gases. Dust collector is designed that a proper balance achieved between air flow necessary for optimum drying performance and that which will permit proper dust control. An exhaust fan we provide with chimney and with a damper. It has efficiency of 90%. Its function is to collect undesirable amount of dust coming from the exhaust. It is cyclonic in shape, in which dust is collected and removed/ (added to dry aggregates if required). It consists of cyclonic separator and works on the principle of centrifugal separation. It is fitted at the rear of dryer drum. The flue gases leaving the dryer drum pass through these separators. Single cylinder cyclone basically consists of a large diameter cylindrical shell having a conical base. Dust laden gas enters this shell tangentially, which gives it spinning motion and makes it to travel up to bottom of cylinder. After reaching the bottom, it spirals up and is sucked out (vacuum created by exhaust fan) through coaxial cylinder fitted at the top. The large size dust particles are thrown out towards the wall cylinder due to spinning motion of gas. These particles slide down and are collected in a hopper. These are removed through auger screw OR sent to mixing zone if desired. Multiples units of cone having longer length of cyclones, smoothness of inner wall are the main factors responsible for higher efficiency of cyclone. These can remove ~90 % of dust from the dryer.

6. *BITUMEN TANK UNIT AND BITUMEN PUMP (BITUMEN UNIT)*

a. ***Bitumen Tank:*** *It is an insulated tank, of adequate capacity (3000 Litres.) Provided along with the plant. It consists of a tank fitted with burner in fire tube. Dial indicator type thermometer is provided outside the tank to indicate bitumen temperature. The burner also has a thermostatic firing control for automatic control of bitumen temperature within the specified range and automation setup to regulate the firing control using a temperature probe.*

b. ***Bitumen Pump:*** *It is positive displacement pump driven by induction motor to induct bitumen in mixing zone of drum. The system ensures bitumen delivery in desired proportion to dry weight of aggregates. In case modified bitumen is being used in plant, adequate no. of agitators in bitumen tank, made for its proper circulation, mixing, and maintaining uniform temperature. It may be ensured that guidelines for use of modified bitumen is strictly followed to maintain the quality of mix.*

c. ***Bitumen Metering System***

In this include skid mounted positive displacement bitumen, jacketed gear pump with a variable speed motor drive. The motor drive is synchronized with the aggregate feed to automatically achieve a specific RPM of the motor for desired percentage of bitumen final mix. Digital ED display indicates this information in the control panel with label bitumen flow rate and units in Litres per minute.

7. *FUEL TANK*

A fuel tank of 500 Litres has been provided, this specific fuel tank is used for operating the Dryer Burner and the Bitumen Heating Burner.

8. *CONTROL PANEL AND CONTROL CABIN:*

A control panel with control cabin is provided for Automatic proportioning and cycling control work together through preset interlocking devices. Automatic dryer control regulates the temperature of aggregate discharged from dryer automatically within a preset range.

A fully automatic electronic type, computerized control panel board which offer centralized operation of whole plant unit,

The control panel operated for the following functions:

a) *Operation and control of all AC drive with load meters in the plant and operation.*
b) *Automatic time relay type of synchronization of flow of bitumen to exactly control the quantity required as per design mix.*
c) *Control for pre-set setting the moisture content of the aggregate displayed digitally.*
d) *Digital indication and automatic control of bitumen temperature mix material temperature and digital indication of exhaust temperature flow of aggregate, flow of bitumen, individually and its control.*
e) *Automatic control of all burner units for dryer burner and bitumen tank burners separately with automatic flame and nozzle control in dryer burner.*
f) *Panel also offer additional functions like fault detection at any point in plant operation and emergency tripping of unit.*

9. *DG SET*

An automatic, self-regulating Diesel Generator has been provided for the operation of the whole plant and its components. The DG is mounted on the same chassis, eliminating the hassle of carrying and setting up the DG each time the plant was displaced, The DG set is placed on the frame strategically and has more than sufficient space for operation and servicing of the DG.

10. *Plant chassis with jack system and Mobility system (wheel, axle)*

The plant has a robust frame, made using I 250 channels with adequate stiffening members, the placement of plant legs and heavy-duty frame structure for axle mountings ensures paramount safety and safe operation and transportation of the plant.

a. *JACK SYSTEM:*

For the plant to be operated, it needs to be converted from transportation mode to operations mode.

A portable jack system has been provided which can be used to lift the plant, such that foundation legs can be installed or removed.

b. *MOBILITY SYSTEM*

For easy, safe and quick transportation of the plant, four pneumatic wheels on two axles have been installed, one set of axle is towable with tilting allowed while the other set is fixed, these axles are installed on robust frame structure, which then connects to the plant frame. This ensures proper load distribution and prevents the plant from tilting in hilly areas.

TECHNICAL SPECIFICATIONS OF HMP 6-10

AGGREGATE HOPPER WITH GATHERING CONVEYOR:

S. No	***PARTICULARS***	***DESCRIPTION***	***REMARKS***
1	*Structure*	*Heavy–duty sturdy and robust frame for anti-vibration*	
2	*Aggregate hopper size*	*2200 mm x 1500 mm*	
3	*Aggregate hopper capacity*	*4.5 ton of aggregate*	
4	*Gathering conv. motor*	*2 HP*	
5	*Gathering conveyor gear box*	*D-13*	
6	*Gathering belt conveyor*	*500mm,7000mmX10mm*	

VIBRATING SCREEN

Vibrating screen is assembled at the end of gathering conveyor.

S. No	***PARTICULARS***	***DESCRIPTION***	***REMARKS***
1	*Vibrating Screen motor*	*200/3 self vibrator*	
2	*Dimensions*	*1000x640mm*	
3	*Screening area*	*.64 M^2*	

DRYING AND MIXING DRUM

production t/h @ ∇t 120 ^oC temperature, specific heat of aggregate .21 kcal/kg/^0C, specific weight of aggregate 1.6 ton/m^3, net heat value of fuel 9650 kcal/kg. Atmospheric pressure 760 mmHg.

2% Moisture ---------- 10 TPH

6% Moisture ----------6 TPH

S. No	***PARTICULARS***	***DESCRIPTION***	***REMARKS***
1	*Drum diameter*	*1250 mm*	
2	*Drum length*	*3000mm*	
4	*Steel*	*IS:2062*	
5	*Internal Balding*	*J type flight + comb flight MS IS:2062*	
6	*Chassis*	*I-Sec-250x125 mm structural steel*	
7	*Dryer Drive Motor*	*10 HP*	
6	*Dryer Drive Type*	*Pinion Gear Drive*	
9	*Dryer Gear Box*	*R.R-10:1*	
10	*Trunnion Roller*	*4 Nos.*	
11	*Drive/Supporting ring*	*Drive Ring dia. 1300 mm Supporting Ring dia. 1400 mm*	
12	*Bearing*	*Self-aligning dust proof*	
13	*Primary dust collector*	*Multi cyclone*	
14	*Exhaust Motor*	*10 HP*	

DRYER BURNER: Drum Burner is the heart of the entire system hence its efficiency, ease of serviceability etc. are most important factor. The temperature is controlled through thermostatic control device to operate the plant in desired temperature range. For additional safety dryer burner fuel pump Motor & Blower Motor can be interlocked with dryer drum Motor, hence burner cannot fire when dryer drum is not rotating. It has two stage high & Low, Capacity to reduce the moisture by up to .5% and achieve 180 Deg. Celsius for aggregate.

S. No	***PARTICULARS***	***DESCRIPTION***	***REMARKS***
1	*Starter type*	*Electrical*	
2	*Capacity (LPH)*	*70-100*	
3	*Fuel*	*LDO/Diesel*	
4	*Blower HP*	*1 HP*	
6	*Fuel Pump HP*	*1 HP*	
8	*Solenoid Valve*	*2*	
9	*Air control*	*Manual*	
10	*Fuel Filter*	*1*	
11	*Controls*	*2 stage high and low.*	
12	*Power supply*	*230 V AC/440V AC*	

BITUMEN SYSTEM: Fully insulated double walled tank is equipped with separate high-pressure burner for heating the bitumen. The positive displacement jacketed bitumen pump coupled with reduction gear box and variable speed motor is provided with hot oil circulating system

S. No	***PARTICULARS***	***DESCRIPTION***	***REMARKS***
1	*Storage Capacity*	*3000 Liters*	
2	*Bitumen pump*	*Positive Displacement*	
3	*Hot oil circulating*	*Built in Tank itself*	
4	*Tank Shape*	*U-type, vertical position*	
5	*Insulation*	*50mm glass wool and covered with GI sheet*	
6	*Burner*	*Automatic diesel fired*	
7	*Thermal duct, manhole, Lifting hook*	*Yes*	
8	*Temperature Gauge*	*Yes*	

TOTAL POWER CONSUMPTION IN HMP 6-10 TPH

S.no	Item	Rating	Quantity	Total	UNIT
1	Slinger Conveyor Motor	2 HP	1	2	HP
2	Dryer Motor	10 HP	1	10	HP
3	Dryer Burner Motor	1 HP	1	1	HP
4	Dryer Burner Pump Motor	1 HP	1	1	HP
5	Bitumen Pump Motor	3 HP	1	3	HP
6	Bitumen tank burner motor	1 HP	1	1	HP
7	Exhaust Motor	10 HP	1	10	HP
8	Bitumen Burner blower and pump	0.5 HP	1	0.5	HP
9	LDO pump	1 HP	1	1	HP
			TOTAL:	29.5	HP

Note: -Design & Drive may vary as per modifications recommended by Designer/ Customer.

OPERATION OF HOT MIX PLANT HMP 6-10

PRINCIPLES FOR OPERATION

Following principles govern the operation of modern hot mix plant:

1. The operation should be carefully planned, so that the final product is of a highly quality.
2. The operation should be run by a competent manager, who with his supporting staff, are all fully conversant with the plant, its operation and maintenance.
3. The aim should be continuity in operation, avoid break-down and intermittent working.
4. The adequate stock of ingredients must be ensured.

The guidelines point given below should also be taken care of before starting, shutting down and running the plant.

a) The sample of aggregates, bitumen and mix material should be taken at regular intervals of time and tested.
b) The stockpiles of aggregates should be checked frequently.
c) The operation of the dryer mixer should be checked regularly.
d) The vibrating screen, aggregate bin and dust collector should be checked daily for uninterrupted flow of aggregates.
e) The bitumen pump should be checked for its accuracy and got calibrated, if required.
f) Carry out visual inspection of mix, collect mix samples, do extraction test on mix and bitumen penetration daily or as required, to ensure compliance with specification.
g) The record is pertaining to quantity of aggregate, bitumen, mix being laid, and their temperatures be maintained.

PRECAUTIONS DURING OPREATION AND MAINTANENCEOF HOT MIX PLANT HMP 6-10

The following precaution should be observed during various sequence of operation of the plant to achieve better performance and optimum utilization:

1. Aggregate Bin Hopper:
   - Segregation of aggregate should be prevented, while loading aggregates into bin.
   - Moisture in aggregates should be avoided.
   - The material build up should be checked periodically to prevent rollers from turning and remove the same.
2. Drying and mixing unit:
   - Before starting the dryer ensures the feed box bottom door is opened dust removed and cleaned.
   - Before starting the plant, the nozzle and burner should be cleaned with kerosene oil.
   - Before starting the dryer drum, the aggregates should not be inside it. because a very high torque is required to start the dryer drum filled with aggregates and this will burn the motor out.
   - If furnace oil is used in burner instead of diesel, furnace oil should be pre-heated to bring down its viscosity, before passing it through burner. The Furnace oil to be preheated between 100 centigrade -110 centigrade.
   - Before starting, ensure the combustion chamber of dryer drum and bitumen boiler are completely dry.
   - Don't permit open fire around fuel oil tanks.
   - Always stand and hold torch at desired length, to prevent getting burnt in case burner puffs back when manually igniting the burner.
   - While lighting burner, never allow excessive fuel to be sprayed into combustion chamber.
   - Don't keep the burner lighted for a long time preferably more than five minutes, without aggregates inside the dryer drum, as the dryer drum may bulge. Operate the burner on low flame when it is not loaded fully.
   - Never operate the burner on high flame max setting for prolonged duration when aggregate is not present inside the drying-mixing unit as this will cause serious harm to the machinery and its hardware.

- Shape of flame is regulated by means of air swirling action. Maximum swirl will produce a short wide flame and minimum swirl a long cigar shaped flame.
- If fuel pump delivery is irregular or negligible, prime the pump and see the pump does not suck air through joints on suction side.
- Observe the exhaust smoke during operation. If it is found black, it means incomplete combustion of fuel and feeding of excess fuel. Necessary action may be taken accordingly.
- Ensure no holes are formed in the cyclone unit, which may add to excess dusty conditions at site.
- The flow of material in dryer drum should be uniform; it should not be overloaded by passing more quantity of aggregates from aggregate bin hopper to dryer drum. It should be checked by measuring hot aggregates temperature, to be maintained at about 180 centigrade and moisture content to not exceed 0.5 percent.
- The heat loss of aggregates from hot mix plant to laying site should be checked at regular intervals of time.
- At the end of the day, put off the dryer drum burner by stopping fuel oil supply and then the motor.

3. Burner:
    - The burner fitted on dryer unit should be adjusted properly to maintain uniform and desired aggregates temperature. Shorter and longer flame length will heat the aggregates and dryer ends properly.
4. Screening Unit:
    - Make sure the screen is set at proper slope for smooth flow of aggregates.
    - The screen should not have holes. The clogging of screen will not allow the aggregates to pass though. Therefore, the screen must be inspected and cleaned frequently.

5. Bitumen Unit:
    - Ensure before filling the bitumen tank, it does not contain water. Even a small amount of water will cause hot bitumen to foam up several times its normal volume, resulting in its overflow.
    - Fill up the bitumen tank to its 80 % capacity only since the volume of bitumen increase while raising the temperature. The overflow of bitumen can be a fire hazard.
    - The top lids of the bitumen tank should be kept closed, since the water, dust are the deterrents to good and clean bitumen. Clean the external sides of barrels, before charging to prevent foreign matter going into the boiler. The dust and fine particles settle down around the flue tubes, which results in poor heat transfer, local heating of flue tubes and cracks are produced in welding resulting in leakage, which can be fire hazardous.
    - In case excess fuel has been fed into flue tubes, shut off the fuel supply and allow air to blow off the fuel and again start the procedure for lighting the burner. It is always safe to start the blower first before turning of the fuel.
    - Bitumen must be maintained at specified temperature. Overheating may case cracking and it may be difficult for the pump.
    - Whenever there is a change in type of bitumen to be used, the bitumen tank should be drained and cleaned thoroughly with solvent before further use.
    - Certain solvent like diesel oil to be used for cleaning are highly inflammable and must be thoroughly drained before bitumen is circulated. If the traces of such solvent reach the mixer and meet the heated aggregates, causing a fire hazard.
    - Bitumen tank burner may be lighted, only when the level of bitumen inside the tank is higher than the heating tubes.
    - Circulate the hot oil for about fifteen minutes to melt the bitumen sticking to the walls of the bitumen line.
    - While inducting hot oil into a cold line, open the valve very slowly, to allow piping and jackets heat up gradually, Rapid induction of hot oil into cold lines will result in expansion of lines and may damage the connecting points in line.
    - The hot oil level should be checked regularly in the hot oil tank. If the level falls, check for any leakage in hot oil or jacketed bitumen pipelines.
    - Ensure that dust does not enter the meter relay box and dial head.

6. Bitumen pump:
   - It is rotary gear type of pump in which while working, suction develops on the kettle side and pressure on the delivery side of the pump.
   - The gear pump should be thoroughly drained at the end of each operating period.
   - The failure to clean the pump results in solidifying the bitumen around the rotor and may break the gear teeth or driving shaft when the power is applied. The only means of relieving the clogged rotor is by heating the pump.
   - Never pump in dry state.
   - When "weeping" becomes apparent at the bottom pump gland, tighten the gland nuts carefully, one flat at a time. If "weeping" is allowed to persist, it soon becomes a leak and gland packing is to be replaced.
   - It should be made a practice to disengage the pump drive at the end of operation. Otherwise, if the plant is stated next day, before the bitumen is sufficiently heated for circulation, the pump drive, if still engaged will place excessive strain on the driving shaft and might cause the shaft or rotors to break. The pump rotor should also be reversed for about four to five minutes, as soon as the plant is stopped, to empty the bitumen pipelines. Always observe that the pump rotors are free by applying the V-belt drives gradually. Slipping of the belt over the pump driving pulley indicates that the rotors are clogged and need heating to relieve them. Never apply the drive quickly, as it may cause damage to the pump rotors or shaft.
   - If the rate of flow of pump falls during operation, the cause may be slipping of clutch. In case it is not so, it would mean that pump rotors have worn out and need renewal.
   - When a new pump or pump with new rotor is fitted, the pump at times may fail to lift the bitumen. To overcome this, uncouple the pipe from delivery side and pour a small quantity of heated bitumen approximately ten liters and at same time reverse the pump rotor by means of hand wheel. Reconnect the pipe and start up. This difficulty would not occur once the pump has been operating satisfactory.
   - Bitumen to be used in the mix should be hearted to ensure its fluidity before the pump is started. The bitumen must be allowed to circulate for at least

     Fifteen minutes before the mixing commences, to keep the meter, spray bar warm and relieve the solidified deposits throughout the circuit. A test cock in return line, closed to the kettle is provided to ensure that bitumen has completely circulated.

SAFETY INSTRUCTIONS

- ✓ Check all the electrical connections for tightness. Do not operate if electrical connections are loose.
- ✓ Check drives assemblies. Do not operate machine if assembly is not proper.
- ✓ Check all the lubricating point. Do not operate the machine if the lubricating points are dry or has low oil.
- ✓ Check the entire plant nut and bolts for tightness regularly. Do not operate the machine if the nuts and bolts are loose.
- ✓ Operate the machine only by trained operator. Do not operate the machine if operator is not properly trained
- ✓ All the V-belts and pulley having guard covers.
- ✓ All the conveyor belts are partially covered to avoid accidents.
- ✓ Optional Emergency stop switches can be installed to stop the working of the entire plant at convenient location dryer drum, main control panel and burner control panel.
- ✓ All the motors are equipped with safety devices like overload
- ✓ Keep the equipment in good running condition.
- ✓ Never operate unsafe equipment.
- ✓ Be familiar with all controls, gauges, instruments.
- ✓ Look around before starting the plant and equipment.
- ✓ Never leave the equipment unattended when running.
- ✓ Keep operator's cabin clean and free from oil and grease.
- ✓ Never carry out servicing, adjustment, and repairs when the equipment is running.
- ✓ Never permit unauthorized persons to handle the plant.
- ✓ The operator must have maximum unrestricted view of the operating area.
- ✓ Avoid loose connections in electrical system.

- ✓ Avoid leakage and overheating of bitumen.
- ✓ Always take precautions against backfire from burner whenever working with one.
- ✓ Store fuel and lubricants away from plant.
- ✓ Keep away from hot bitumen.
- ✓ Be careful while attending to lighted burner.
- ✓ Inspect all cables of plant periodically.
- ✓ No open fire should be allowed around bitumen or fuel storage tanks.

DAILY OPERATION INSTRUCTIONS

- Oiling & greasing to all Bearing, Chains, keep oil can filled up in the Machine for ready use.
- Check the oil level in all Gear Boxes. If found below level, top it up with proper grade (S.A.E-140).
- To check all the fasteners by the Tool Before the operation/ starting of the plant.
- Clean the dust sludge & other foreign material from gears, Roller of Conveyor Belt, and the Rotary Parts.
- Adjust Slinger Belt through 2 tension screw provided at the lower end to keep it in proper tension and inline. Also check the positioning of belt guard cover.
- Check Hydraulic Power Packs Oil level in Tank and filter of Hydraulic Tank. Clean it regularly. Change the Hydraulic oil in regular interval of time.
- Check the Roller of all the Conveyers before the operation start.
- Before starting / operating the plant the Rotary parts are to be checked manually for their freeness. Jamming indicates a blockage of same they should be removed and start otherwise the diode will burnt out and motor will play foul/ will not work properly.
- Before stopping the plant after the day schedule work. The following points should be followed: - To run the dryer with at least 5 to 6 minutes with dry material so that the water or other adhesive lump may wash out and should not be locked the rotary parts.
- Slugs and waste material are to be properly handled and cleaned.
- Use vacuum cleaner daily to keep Panel Cabin dust free for smoother and trouble-free operation.

WARNING

- The DG set used must be equipped with automatic voltage and frequency regulator.
- Do not switch on the Panel Power before setting and stabilizing the DG set output (440V +-10%, 50 Hz +- 3%). In case of any failure in input power source, switch off the panel immediately.
- Use vacuum cleaner daily to keep panel cabin dust free for smoother and trouble- free operation.
- Before starting the panel make sure that AC is working and cooling properly.
- All the phases from the input power sources are present and are at proper level. See the proper earthling as per IS 3043.
- Check Oil level in Gear Boxes. Hydraulic oil tanks, Thermo fluid tank and all the lubrication points such as chains, Bearing etc.
- Oiling and greasing daily is absolutely must for smooth and trouble- free operation of the part.

NOTE: -

- *While doing general maintenance, cleaning belt, main nozzles etc., make sure that the panel power is cut switch off.*

PLANT OPERATION INSTRUCTIONS WHILE STARTING, OPERATING AND SHUTTING DOWN PLANT

CHECK THE FOLOWING BEFORE YOU START THE PLANT: -

- Check the supply voltage between two phases. It should be at 440+-10%, 50 Hz frequency.
- Switch on the A.C. and let the cables cool properly.
- Keep sufficient water in earthing system.
- Check the positioning of all conveyor belts. It should be in line with motor and gear Box with V-Belt.
- Clean the panel keyboard by a clear and soft piece of clothes with any standard make cleaning liquid.
- Carry out the daily maintenance schedule as per instructions.
- Check all oil tank and gear box all should be proper grade of oil and fuels.
- Check the tension of V–belt, flat and chains.
- Check all grease point before starting the plant.
- Check all guards and covers fitted in the plant complying the safety norms.
- Check the conveyor belts for any damage of wear.
- Check the conveyor rollers for free turning.
- Check too much fuel is not sprayed into the combustion chamber of dryer.
- Check there is no water in the bitumen tank before pouring the bitumen in the tank.

SEQUENCE OF OPERATION FOR STARTING AND SHUTTING DOWN THE PLANT

The starting and shutting down the plant should be done in chronological order for its smooth running. The sequence for starting various components of plant is as under:

→ Exhaust Fan

→ Dust Cleaning system

→ Filler feeding system

→ Vibrating screen

→ Dryer-mixer

→ Slinger conveyor

→ Loading aggregate into aggregate bin hopper

→ Burner

The Shutting down the plant, the first component to be stopped is the input of aggregate system. The material trapped inside the drum should be then flushed out from the system in the sequence shown below:

→ Depleting aggregate from aggregate bin hopper

→ Slinger conveyor

→ Burner

→ Vibrating screen

→ Dryer-mixer

→ Cleaning system and filler system

→ Exhaust fan.

THE FOLLOWING POINTS SHOULD ALSO BE CONSIDERED, WHILE SHUTTING DOWN PLANT:

- As soon as the last portion of aggregates leaves the dryer, the burner fuel supply must be cut off then the dryer motor must be turned off.
- The plant should not be stopped in case the material is in transit. The plant may be stopped if dryer, conveyor and hopper bin are empty.
- Now, put off the bitumen tank burner by stopping the fuel supply. Stop the bitumen pump and reverse its drive immediately, either by hand wheel or reversing the motor rotation. Move the lever on pressure regulator to draining position. Fix the discharge of weigh/ spray system hopper in open position. The bitumen system must be drained thoroughly to ensure its easy operation the next day. All bitumen piping should have slope downwards to the kettles to assist drainage, and a tap fitted in the delivery line just after the pump, which may be left open over night to prevent the thoroughly drained off, before re-circulating the bitumen.
- Run the bitumen pump in the reverse direction at least 10 minutes then close the bitumen valve and run the pump in flow direction by using LDO/Diesel 3 to 4 liters approx. for 5 minutes and let the LDO/Diesel go out through the 3-way valve.
- The fuel Tank should be filled.
- Defects, if any or unusual sound should be reported to the concerned engineer and got rectified.
- Check and rectify any leakage, especially in bitumen and hot oil system.
- Inspect the blower of exhaust fan for balancing and play of bearings.
- Weld the cracks in the sheets, if found.
- Clean the plant, especially dust/ aggregates collected underneath the belt/ chain conveyor and lubricate all points.
- Keep the motors and exhaust pipes covered to avoid rain or dew entering inside.
- Let the plant run alone without aggregate for 10 minutes to cool down the entire equipment.
- Disconnect the main power supply to panel Board and lock the cabin.

IF THE PLANT IS LEFT IN OPEN FOR MORE THAN SIX WEEKS, CERTAIN PRECAUTIONS SHOULD BE OBSERVED.

- Isolate the mains supply to electrically driven plant to prevent unauthorized starting.
- Warp all V- belts pulleys with a strong, self-adhesive paper and lubricate exposed chain drives.
- Grease all adjusting screw, Dryer swiveling support rollers, and motor slide rail adjusting screw Jack to prevent rusting.
- Protect the dryer burner nozzle.
- Close the window of control cabin and keep the door closed.
- Cover the top of exhaust fan to prevent ingress of water.
- Cover the inlet of the burner air blower.
- If the doors are fitted in the dryer feed end box, pin it in the closed position.

Erection and Transport

A normal civil work foundation is required for making plant stationary and so that it could bear the affecting load and sustain the occurred vibration. Material like aggregate, sand, bitumen should be of sufficient quantity; lack of material can cause reducing efficiency of the plant. Special attention should be taken where the ground soil is soft. In case of soft soil, concrete should be used to make the soil hard otherwise ground will sink. Water pipe and power cables must be used with proper safety / shielding to avoid any damage that may occur during operation. Make certain that no loose objects are placed on the mixer before starting double check make certain that no unauthorized people are close to mixing drum. Make certain that all fuses are intact and free of dirt. It is important that the fuses fit the plug-in use. Check the phases properly before start. If phases are charged, then system can move in opposite direction. Hence change the phase accordingly.

Erection site

Check to ensure accuracy and dependable operation of the proposed equipment and methods prior to the start of concreting operations and after making any changes in the location or arrangement of the plant. Plant calibration and proper erection of the plant is the responsibility of Site Engineer

Check the general layout of the plant before the equipment is erected to ensure efficient operation and adequate space for stockpiling and handling materials in compliance with specified requirements. Whenever possible, avoid the arrangement and erection of plant in congested locations which are not conducive to proper handling of materials. Small stockpiles result in segregation and non-uniformity of materials and very poor control of the mix. Once the plant is erected in such a location, it is difficult to improve conditions. Experience has demonstrated that the most uniform mix is produced when the plant is favoured by adequate space for the maintenance of large stockpiles of materials.

When draining aggregates at the plant site, provide provisions for disposal of drainage water and for clear cut separation of drained from un-drained materials. Keep materials of different sources/classes or gradations separated.

Erect the weighing bins and hoppers on firm foundations to avoid settlement, which might affect the accuracy of the equipment.

TRANSPORTATION OF MACHINE.

A registered vehicle must be used when plant is transported on the public road and the speed limit must not exceed 40km/hr.

- Dryer mixer must be empty during transport.
- Make sure that nothing sticks out before transporting the dryer mixer; make certain that all loose objects are securely fastened.
- Always drive slowly on uneven ground and pay attention when turning.
- Only use cranes/elevator and loading equipment that have sufficient carrying capacity.
- Determine a competent person to guide the lifting operation.
- Lift machine and parts properly with lifting equipment accessories.
- Use slinging point for loading equipment
- Use suitable transport vehicle having sufficient loading capacity.
- Do not unload the complete machinery all at once, please unload one by one.
- Use red signal / red flag, at rear side of trailer, while transporting during night.

Personnel requirements

Personnel moving the machine require no special training. Nevertheless, we recommend that this operation be handled by someone who regularly uses lifting equipment in full respect of the safety standards currently in force. If this requirement cannot be implemented, contact **AKONA's** Service Department.

Instructions for lifting and moving the machine

The machine can be hoisted using a bridge crane, a mobile crane, a forklift, or any other suitable means with a capacity of at least twice the weight of the machine. Anyone operating the hoisting equipment must stay a suitable distance away from the part being lifted. He must also make sure that people and property are not exposed to any possible risk if the machine should fall. Movements must be slow and constant to avoid breaking the cables, chains, etc. The machine comes with specifically designed gripping points that are indicated with hooks or slots given in the structure/frame of the machine/plant.

Important:

Ensure that the load is correctly balanced. In case of accidental collision, immediately verify the extent of any damage and contact the manufacturer if necessary

MAINTENANCE SCHEDULE OF HMP 6-10

DAILY MAINTENANCE SCHEDULE: -

1) Check the gear box oil level at least one hour after the shut down the plant, when the oil will settle down and indicate the correct level. If necessary, top them up.
2) Top up all drip feed lubricators.
3) Check the bearings and ensure that overheating does not occur.
4) Turn on all chain drive drip feed lubricators.
5) Turn the key on the filter, in the burner fuel supply pipeline periodically during the day, to remove water and sediments.
6) Open the tap of moisture separators of air receive twice daily.
7) Check the gland of bitumen pump. Tighten if weeping is evident.
8) Be alert for undue noises, which may be due to lose bolts.
9) Recheck the angle of dryer drum frame to ensure that no local shrinkage has occurred

WEEKLY MAINTENANCE SCHEDULE: -

1) Clean the filters on suctions side of the burner fuel and bitumen pump.
2) If filters are fitted on the blower, remove the element, wash it in paraffin soak lightly in fresh oil and refit.
3) Check all V-belts and chain drivers and do necessary adjustments accordingly.
4) Inspect conveyor belts for wear and tear and broken fasteners.
5) Check all belt scrapers on feed unit and in surge silo. Ensure they are in good condition and effective. If necessary, replace them.
6) Check the conveyor belts in case of holes or cuts repair them immediately by lacing or vulcanizing.
7) Clean the cyclone of dust collection unit.
8) Periodic inspection of flue tube is essential to prevent a fire accident resulting out of punctured tube.

MONTHLY MAINTENANCE SCHEDULE: -

1) Clean the burner nozzles as per instructions.
2) Check all electrical wiring and cables for loss of insulation or corrosion and replace, if required.
3) Check the screen meshes and repair/ replace, if required.

QUARTERLY MAINTENANCE SCHEDULE: -

1) Drain the oil of gear boxes, flush them and refill to correct level with recommended gear oil.
2) Inspect the dryer chain ring for worn out or broken pins. Remove the affected segments of the ring/ pins and replace them.
3) Check the oil level in exhaust fan bearing and top up, if required.
4) Inspect the liner plates in dryer feed ring, discharge chute replaces if required.
5) Check the burner combustion chamber refractory for carbonization, clean it and repair, if required.
6) Clean electric contact and relays in control panel.

MAINTENANCE OF ELECTRICAL MOTORS: -

1) Isolate the mains supply to prevent unauthorized starting
2) Cover all the exposed motor starter panels and controls, with tarpaulin of plastic sheet to prevent their damage during rains.
3) Always place the proper size of fuse, while replacing it. Never put a substitute of different size.
4) Do earthing of entire electric supply line properly.
5) Keep the motors and contacts always clean, by blowing away the dust.
6) Test check no volt's coils and overload protection devices for their proper function.
7) All the wiring should be placed under insulated cabling and properly covered trench

GENERAL MAINTANENCE

DRYER AND MIXING UNIT: - Check running of mixing unit whether it is in line or not. If it is running in centerline, adjust it center by adjusting the guide roller and main rollers.

SLINGER CONVEYOR BELT: - Adjust it through 2 tension screw provided at the lower end to make it in proper tension and inline. Also check the positioning of belt guard cover.

FUEL TANK: - Always check for level and at bottom tank. If dust is collected there, clean if before filling it.

BITUMEN TANK: - Do not fire the burner when gas tubes are open in the air. If the plant required stopping for 15 to 20 minutes run the bitumen pump by LDO and run for 5 to 10 minutes.

BITUMEN PIPELINE: - After the completion of work, make all the pipes empty by reverse running bitumen pump for 5-10 minutes and clean the pipeline by LDO or diesel.

BITUMEN BURNER: - Keep oil pressure up to 110 PSI to 120 PSI. If oil not spraying out check the nozzle and clean it. Check filter and pump for air blockage. Clean the filter and remove air bubbles from pump by losing the suction line.

i. If igniter does not start check and clean electrode by benzene oil and keep electrode gap as mentioned in dryer burner. Check transformer and input supply.
ii. If burner stops after few second of starting, check photocell, clean it and check and input supply.

DRYER BURNER: - Always maintain proper cleaning of spray nozzles, burner, diffuser plate, and electrode, photocell, and suction lines. Maintain the distance of 4 locking and its cleaning. Always check for the distance between proximity switch and damper rod

Detailed Maintenance and Repair

DRYER-MIXER DRUM

Cleanout

We recommend cleaning of drum mixers by rinsing with water or running a mix of water and rock to clean light build up. Done weekly, this usually takes about 10 minutes. In mixers with blades, remove excessive build up with chipping hammers or needle scalars.

Maintenance

Check for worn or cracked blades on daily basis. Operator should ensure appropriate greasing for mixer ring and pinion together. Regularly greasing the gears and pulleys of your drum mixer will prevent damage caused by friction. This will extend the lifespan of the mixer and keep it performing at an optimum level.

Loose particles can wreck destruction on the motor, causing damage that is costly to repair. By keeping your motor clean, you can ensure that it performs optimally, while also preventing the need for expensive repairs.

BEARINGS

The way a bearing is maintained and handled has a huge impact on its performance. Proper maintenance and handling lead to longer bearing life, minimized downtime, and greater productivity, which ultimately leads to cost savings and lower cost of ownership for your business.

Checklist & Maintenance

Here is a simple 8-point checklist for ensuring your bearing is always handled in the correct way and thus, optimizing performance.

Handle Bearings with Care

Bearings are precision components. As such, they should be handled and stored in a proper manner to avoid the entry of contaminants. Bearings should be stored horizontally in a clean and dry environment with their packaging intact. Care should be taken to avoid exposing bearings to airborne contaminants, as just a tiny speck of dirt in a raceway can cause premature bearing failure. Do not hammer, pound, or apply direct force on a bearing or its outer ring. This can cause the rolling elements to be damaged and misaligned. Bearings should also not be installed if they have been dropped or mishandled, as little cracks and scratches can result in poor performance, and subsequently, premature bearing failure.

1. Inspect the Bearing Housing and Shaft

Before mounting a bearing, inspect the housing and shaft for physical condition or damage. Use a soft cloth to wipe the surfaces clean, and ensure any nicks and burrs are removed.

2. Apply the Correct Mounting Method

When mounting bearings, the correct method to use depends on the type of bearing and type of fit. Bearings with cylindrical bores are normally mounted through press fit method (mounting by pressing the bearing on the shafts) or shrink fit (heating the bearing to expand its diameter). Bearings with tapered bores can be mounted directly on tapered or cylindrical shafts with the help of tapered sleeves. Take note that pressure should only be applied with a press fit. Applying pressure without a press fit to the ring will damage the raceways.

3. Prevent Direct Heating or Overheating

The maximum permitted temperature of bearings depends on the heat treatment of the material. Temperatures above the heat limit can permanently deform or soften the bearing steel, thus reducing load carrying capacity and leading to eventual failure. Never heat a bearing using an open flame. Bearings should ideally be heated with induction heaters.

4. Use Proper Tools

Always use the appropriate equipment whenever handling bearings or during the mounting and dismounting process. Some of the specialized tools available for mounting and dismounting are bearing pullers, bearing fitting tool kits, oil injector kits, hydraulic nuts, or induction heaters. These tools are customized to ensure a smooth mounting and dismounting process and minimize risk of bearing damage. Avoid using general purpose tools for handling bearings. These are not specialized for bearings and may cause unwanted damage and incur unnecessary repair costs.

5. Prevent Corrosion

If bearings are exposed to the presence of water over time, rust and corrosion may occur. This will cause premature bearing fatigue and over time, affect your machine performance and productivity, increasing operating costs. When handling bearings, make sure you wear gloves, as perspiration on your hands, water, or other contaminants can cause corrosion. You may also use a water-resistant grease as your lubricant, which will then act as a protective barrier in damp environments. For extremely corrosive environments, you might want to consider using bearings with different materials, such as ceramic bearings.

6. Proper Lubrication is Essential

Proper lubrication is extremely important if you want your bearings to have a prolonged life Lubricants can be either oil or grease, and the right lubricant depends on a series of factors such as environmental conditions, temperature, speed, and load. Follow your bearing manufacturer’s recommendations for the most suitable grade and type of lubricant. Failure to use the right lubricant can result in machine failure or voiding of warranty. Do check lubrication levels frequently and be sure to change lubricants at least yearly.

7. Observe And Check for Danger Signs

The final step is to make sure you observe and be alert to any signs of abnormal or poor bearing performance. Examples include excessive noise, increased temperature, or abnormal vibration. If your bearings display any of these signs, they should be monitored more closely, and if needed, remove before any further damage occurs to your equipment or machinery. Vibration analysis can help you to track and detect any bearing danger signs early. Vibration analysis is part of condition monitoring, which can include technologies such as thermographs, vibration analysis and oil analysis, tools which can help compare current bearing states with historical data and thus provide an accurate assessment of the remaining life of the bearing. Tools like vibration pens can also provide a quick, compact, and easy option to check the Condition of your rotating equipment. This can provide you with an early warning about potential machine problems before a costly breakdown or failure.

GEAR BOX

Maintenance and replacement work must be done by expert maintenance technicians trained in the observance of applicable laws on health and safety at work and the special ambient problems attendant on the installation.
Before doing any work on the unit, the operator must first switch off power to the gear unit and ensure that it is out of service, as well as taking all necessary precautions against it being accidentally switched on again or its parts moving without warning (due to suspended loads or similar external factors).
Furthermore, all additional environmental safety precautions must be taken (e.g., elimination of residual gas or dust, etc.).

- *Before doing any maintenance work, activate all safety equipment and, if necessary, inform persons working in the vicinity. Mark off the area around the unit and prevent access to any equipment which, if activated, might be the cause of unexpected health and safety hazards.*
- *Replace worn components with original spare parts only.*
- *Use the lubricants (oil and grease) recommended by the Manufacturer.*
- *When working on the gear unit always replaces gaskets and seals with new original ones.*
- *If a bearing requires replacement, it is good practice to also replace the other bearing supporting the same shaft.*
- *We recommend replacing the lubricating oil after all maintenance work.*

The above instructions are aimed at ensuring efficient and safe operation of the gear unit.
The Manufacturer declines all liability for injury and damage to components due to the use of non-original spare parts and non-routine work which modifies the safety requirements without the express prior authorization of the Manufacturer.

Routine Maintenance

Frequency	***Component***	***Type of work***	***Operation***
1000 h	*External seals and gaskets*	*Check oil level* *Check for leaks by eye*	*Maintain or replace* *components as required*
3000 h	*For gear units with torque* *arm: polymer bushings*	*Check for cracks/ageing*	*Replace if no longer fully* *effective*
5000 h	*Gear unit seals and gaskets*	*Inspect Carefully of Wear And* *Aging of external seals.*	*Replace if aged/worn*

Trouble shooting

PROBLEM	***CAUSE***	***SOLUTION***
Bearing temperature too high	*Oil level too low*	*Top up oil level*
	Oil too old	*Replace oil*
	Defective bearings	*Contact authorized workshop*
Operating temperature too high	*Oil level too high*	*Check oil level*
	Oil too old	*Replace oil*
	Impurities in oil	*Replace oil*
Abnormal running noise	*Gears damaged*	*Contact authorized workshop*
	Bearing axial backlash too high	*Contact authorized workshop*
	Bearings defective or worn	*Contact authorized workshop*
	Service load too high	*Correct service load to nominal values given in Sales Catalogue*
	Impurities in oil	*Replace oil*
Abnormal noise at gear unit Mounting	*Mounting bolts loose*	*Tighten down to specified torque*
	Mounting bolts worn	*Replace bolts*
Oil leaks	*Oil level too high*	*Check oil level*
	Casing/coupling seals inadequate	*Contact authorized workshop*
	Gaskets worn	*Contact authorized workshop*
Gear unit does not run or runs with difficulty	*Oil viscosity too high*	*Replace oil (see table of recommended lubricants)*
	Oil level too high	*Check oil level*
	Service load too high	*Redesign drive for actual service load*
Output shaft does not turn with motor running	*Gears damaged*	*Contact authorized workshop*

CALIBRATION PROCEDURE OF CONTROL PANEL

BITUMAN CALIBRATION:

1 set plant load to 50% and Bitumen pot to 3%
2 Make some arrangement to collect the discharge of bitumen pump in a drum or other vessel. Note weight of empty drum/vessel
3 Run the bitumen pump for 30 seconds.
4 Weight the drum with the help of weigh scale and find out weight of bitumen.
5 The weight should be approximately 1.625Kg for HMP 35 Plant, 7.5 Kg for HMP 8-10 Plant, 11.25Kg for HMP PLANT.

6 If weight is less, then increase the speed of pump with the help of Amplifier card pot if weigh is more. Then decrease the speed of pump with the help of electronic card Pot
7 Repeat the above process again and try to get reading closet to the above weights.

NOTE: - CALIBRATION IN (+/-) 3% VARIATION.

2

WORKSHOP MANUAL FOR BOTH ENGINE/ GENERATOR AND PLANT
OF
AKONA MAKE HOT MIX PLANT
MODEL: HMP 6-10
CAPACITY: 6-10 TPH

AKONA ENGINEERING PVT LTD.

AN ISO 9001:2008 CERTIFIED COMPANY

MFG. UNIT: -PLOT NO.: -200 RAIPUR INDRUSTRIAL AREA, ROORKEE, HARIDWAR (U.K)

HEAD OFFICE: - HYCON-HOUSE, A-455, HINDON VIHAR, DELHI MEERUT RAOD, GHAZIABAD-201001 (U.P)

MAIL: - info@akonaindia.com

WEBSITE: -www.akonaindia.com

Toll free No-1800-121-457-457

BIN HOPPER

SLENGER CONVEYOR

DRYER-MIXER UNIT

3

ILLUSTRATED PARTS CATALOUGE FOR BOTH ENGINE/ GENERATOR AND PLANT MODEL: HMP-30 CAPACITY: 6-10 TPH

AKONA ENGINEERING PVT LTD.

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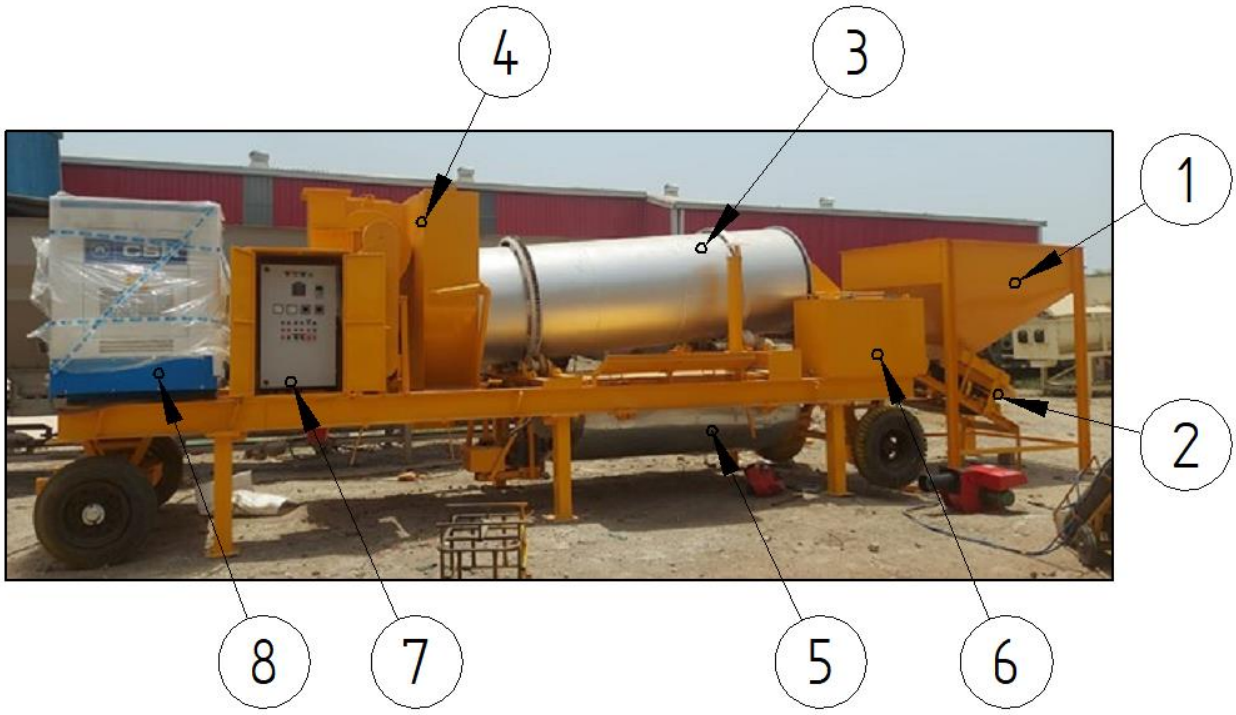


S. No.	SUB-ASSEMBLY.	SUB-ASSEMBLY NO.	REMARKS
1	AGGREGATE BIN HOPPER	AKN-R2F-02/01	
2	SLINGER	AKN-R2F-02/02	
3	DRYING MIXING UNIT	AKN-R2F-02/03	
4	POLLUTION CONTROL UNIT	AKN-R2F-02/04	
5	BITUMEN SYSTEM	AKN-R2F-02/05	
6	LDO/DIESEL TANK	AKN-R2F-02/06	
7	CONTROL PANEL	AKN-R2F-02/07	
8	40 KVA DG SET	AKN-R2F-02/08	BOUGHT OUT ITEM (Spares parts manual supplied with plant manual)

1. AGGREGATE BIN HOPPER

S. no	ILL. No.	Spare Part ID	Item	QTY
-	-	**AKN-R2F-02/01**	**HOPPER**	01 NO
1	1	AKN-R2F-02/01-01	HOPPER GATE BEARING	02 NO

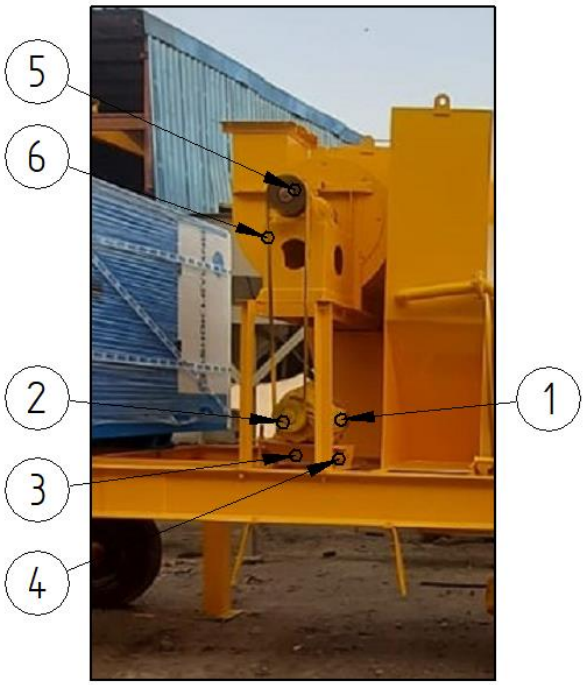
2. SLINGER CONVEYOR

S. no	ILL. No.	Spare Part ID	Item	QTY
-	-	**AKN-R2F-02/02**	**SLENGER CONVEYOR**	01 NO
1	1	AKN-R2F-02/02-01	SLENGER CONVEYOR ADJESTING ROLLAR	01 NO
2	2	AKN-R2F-02/02-02	SLENGER CONVEYOR ADJESTING ROLLAR BEARING	02 NO
3	3	AKN-R2F-02/02-03	SLENGER CONVEYOR BELT GUIDE ROLLAR	02 NO
4	4	AKN-R2F-02/02-04	SLENGER CONVEYOR BELT ROLLAR STAND	3 NO
5	5	AKN-R2F-02/02-05	SLENGER CONVEYOR BELT STAND ROLLAR	09 NO
6	6	AKN-R2F-02/02-06	SLENGER CONVEYOR BELT SUPPORTING ROLLAR	01 NO
7	7	AKN-R2F-02/02-07	SLENGER CONVEYOR GEAR BOX	01 NO
8	8	AKN-R2F-02/02-08	SLENGER CONVEYOR GEAR BOX PULLY	01 NO
9	9	AKN-R2F-02/02-09	SLENGER CONVEYOR INLETE HOPPER	01 NO
10	10	AKN-R2F-02/02-10	SLENGER CONVEYOR INLETE HOPPER SIDE PATTA	COMPLETE
11	11	AKN-R2F-02/02-11	SLENGER CONVEYOR MAIN ROLLAR	01 NO
12	12	AKN-R2F-02/02-12	SLENGER CONVEYOR MAIN ROLLAR BEARING	02 NO
13	13	AKN-R2F-02/02-13	SLENGER CONVEYOR MOTOR	01 NO
14	14	AKN-R2F-02/02-14	SLENGER CONVEYOR MOTOR TO GEAR BOX V BELT	02 NO
15	15	AKN-R2F-02/02-15	SLENGER CONVEYOR RUBBER BELT	01 NO
16	16	AKN-R2F-02/02-16	SLENGER CONVEYOR SCREEN	01 NO

3. DRYING MIXING UNIT

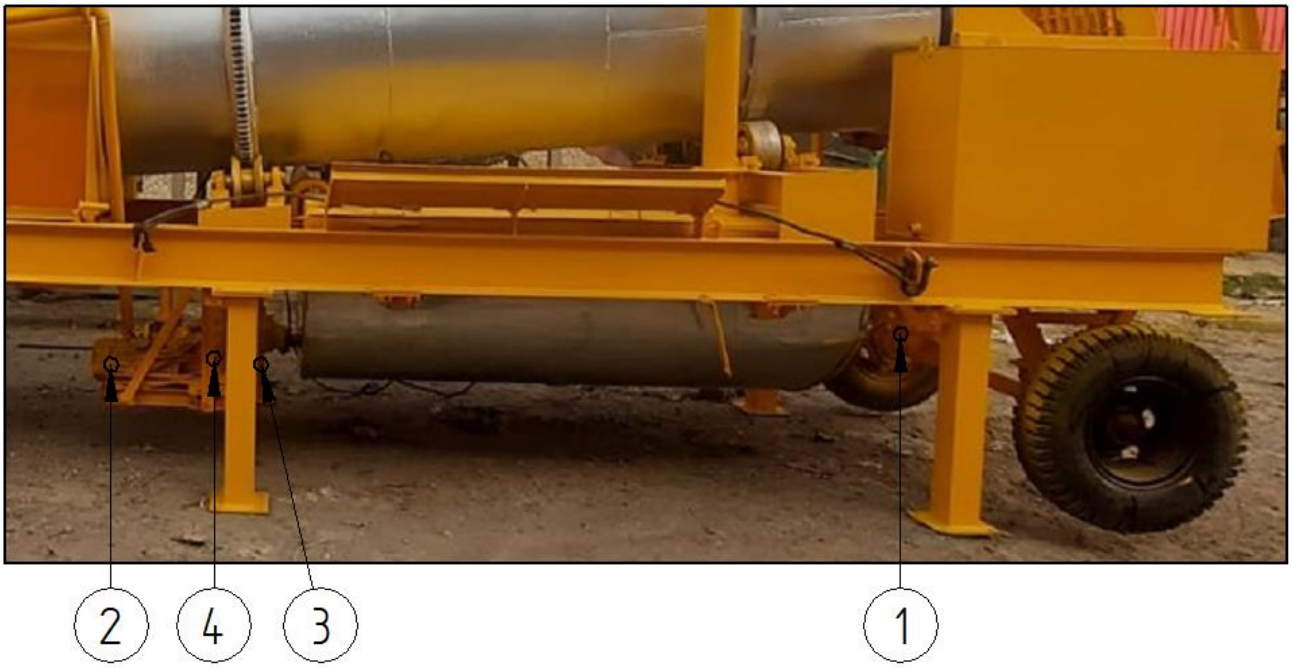
S. no	ILL. No.	Spare Part ID	Item	QTY
-	-	**AKN-R2F-02/03**	**DRYER**	01 NO
1	1	AKN-R2F-02/03-01	DRYER BUNER BI	01 NO
2	2	AKN-R2F-02/03-02	DRYER SUPPORT RING	01 NO
3	3	AKN-R2F-02/03-03	DRYER CHAIN SPOCKET	01 SET
4	4	AKN-R2F-02/03-04	DRYER GEAR BOX MOTOR	01 NO
5	5	AKN-R2F-02/03-05	DRYER GEAR BOX	01 NO
6	6	AKN-R2F-02/03-06	DRAYER PINION SHAFT BEARING	02 NO
7	7	AKN-R2F-02/03-07	DRAYER PLANE RING ROLLAR	02 NO
8	8	AKN-R2F-02/03-08	DRAYER DRIVE RING	01 NO
9	9	AKN-R2F-02/03-09	DRAYER RING PINION	01 NO
10	10	AKN-R2F-02/03-10	DRAYER SUPPORT RING ROLLAR BEARING	04 NO
11	11	AKN-R2F-02/03-11	DRAYER DRIVE RING ROLLAR BEARING	04 NO
12	12	AKN-R2F-02/03-12	DRAYER RING ROLLAR TEPPER	02 NO
13	13	AKN-R2F-02/03-13	TYRE WITH HUB AND RIM COMPLET	04 NO
14	14	AKN-R2F-02/03-14	FOUNDATION LEGS	04 NO

4. POLLUTION CONTROL UNIT



S. no	ILL. No.	Spare Part ID	Item	QTY
-	-	**AKN-R2F-02/04**	**POLLUTION UNIT**	01 NO
1		AKN-R2F-02/04-01	POLLUTION UNIT CHIMNI	01 NO
2	1	AKN-R2F-02/04-02	POLLUTION UNIT MOTOR	01 NO
3	2	AKN-R2F-02/04-03	POLLUTION UNIT MOTOR PULLY	01 NO
4	3	AKN-R2F-02/04-04	POLLUTION UNIT PADISTAL	01 NO
5	4	AKN-R2F-02/04-05	POLLUTION UNIT PADISTAL STOOL BEARING	02 NO
6	5	AKN-R2F-02/04-06	POLLUTION UNIT PADISTAL STOOL PULLY	01 NO
7	6	AKN-R2F-02/04-07	POLLUTION UNIT V BELT	02 NO

5. BITUMEN SYSTEM



S. no	ILL. No.	Spare Part ID	Item	QTY
-	-	**AKN-R2F-02/05**	**BITUMEN TANK**	01 NO
1	1	AKN-R2F-02/05-01	BITUMEN TANK BITUMEN BURNER	01 NO
2		AKN-R2F-02/05-02	BITUMEN TANK 2 WAY VALVE	01 NO
3		AKN-R2F-02/05-03	BITUMEN TANK 3 WAY VALVE	01 NO
4	2	AKN-R2F-02/05-04	BITUMEN TANK BITUME MOTOR	01 NO
5	3	AKN-R2F-02/05-05	BITUMEN TANK BITUMEN PUMP	01 NO
6	4	AKN-R2F-02/05-06	BITUMEN TANK GEAR BOX	01 NO
7		AKN-R2F-02/05-07	BITUMEN TANK GEAR BOX PUMP CHAIN SPOCKET	01 SET
8		AKN-R2F-02/05-08	BITUMEN TANK MOTOR TO GEAR BOX CHAIN SPOCKET	01 SET
9		AKN-R2F-02/05-09	BITUMEN TANK TEMPRETURE MACHANICAL	01 NO
10		AKN-R2F-02/05-10	HOT OIL STEEL FLAXIBLE PIPE	02 NO

6. LDO/DIESEL TANK

S. no	ILL. No.	Spare Part ID	Item	QTY
-	-	**AKN-R2F-02/06**	**LDO TANK**	01 NO
1	1	AKN-R2F-02/06-01	LDO TANK SOCKET	01 NO
2		AKN-R2F-02/06-02	LDO PUMP WITH MOTOR WITH PIPE	01 NO

7. CONTROL PANEL

S. no	ILL. No.	Spare Part ID	Item	QTY
-	-	**AKN-R2F-02/07**	**CONTROL PANEL**	
1	1	AKN-R2F-02/07-01	CONTROL PANEL	01 NO
2	2	AKN-R2F-02/07-02	Control Panel CABINET	01 NO
3		AKN-R2F-02/07-03	TOOL BOX SET (PLAIR, TEASTER, WIRE CUTTER, GREASE GUN, PRESSURE OIL CAN, PANA, KEY)	01 SET
4		AKN-R2F-02/07-04	FIRE CYLINDER	02 NO

4

ILLUSTRATED LIST OF SPECIAL MAINTENANCE TOOLS

MODEL: HMP 6-10

CAPACITY: 6-10 TPH

AKONA ENGINEERING PVT LTD.

AN ISO 9001:2008 CERTIFIED COMPANY

MFG. UNIT: -PLOT NO.: -200 RAIPUR INDRUSTRIAL AREA, ROORKEE, HARIDWAR (U.K)

HEAD OFFICE: - HYCON-HOUSE, A-455, HINDON VIHAR, DELHI MEERUT RAOD, GHAZIABAD-201001 (U.P)

MAIL: - info@akonaindia.com

WEBSITE: -www.akonaindia.com

Toll free No-1800-121-457-457

LIST OF SPECIAL MAINTENANCE TOOLS

S. No.	Description	Qty.
1	Spanner Set	01
2	Allen Key Set	01
3	Continuity Electric Tester	01
4	Hand Grease Gun	01
5	Oil Crane Lubricating	01
6	CSD 8”	01
7	Plier	01

RECOMMENDED LUBRICATION

1. Hydraulic Oil: -No.-68
2. Gear Box Oil: -No.-320 &220
3. Engine Oil 20W40
4. Grease: shell

5

LUBRICATION CHART OF COMPLETE PLANT
MODEL: HMP 6-10
CAPACITY: 6-10 TPH

AKONA ENGINEERING PVT LTD.

AN ISO 9001:2008 CERTIFIED COMPANY

MFG. UNIT: -PLOT NO.: -200 RAIPUR INDRUSTRIAL AREA, ROORKEE, HARIDWAR (U.K)

HEAD OFFICE: - HYCON-HOUSE, A-455, HINDON VIHAR, DELHI MEERUT RAOD, GHAZIABAD-201001 (U.P)

MAIL: - info@akonaindia.com

WEBSITE: -www.akonaindia.com

TOLL FREE NO-1800-121-457-457

AKONA MAKE: HOT MIX PLANT 6-10 TPH
LUBRICATION CHART

S. NO.	PARTICULAR	DAILY	WEEKLY 50 HRS.	MONTHLY 200 HRS.	QUARTERLY 500 HRS.
1	Gear Oil (Check)	Visually			
2	Gear Oil (filling)			✓	
3	Gear oil (Change)				✓
4	Engine Check	Visually			
5	Engine Oil filling			✓	
6	Engine Oil (Change)				✓
7	Greasing (Drum Unit)		✓		
8	Greasing Bearing		✓		

Please use only recommended oil and lubricants as mentioned

RECOMMENDED LUBRICATION

1. Hydraulic Oil: -No.-68
2. Gear Box Oil: -No.-320 &220
3. Engine Oil 20W40
4. Grease: shell

AKONA MAKE: HOT MIX PLANT 6-10 TPH
PERIODIC MAINTENANCE CHART

S. NO.	MAINTENANCE POINT	DAILY	WEEKLY OR 50 HRS.	EVERY 3 MONTHS OR 500 HRS.
1	Fasteners checking	✓		
2	Electrical connection for all motors		✓	
3	Earthing			✓
4	Drum discharge chute	✓		
5	Belt alignment		✓	
6	V-belt replacement			✓
7	Vibrating screen spring check			✓
8	Drum flight check			✓
9	Water Pump cleaning			✓
10	Electrical supply check 3-phase 415V x 50Hz	✓		
11	Belt Roller check		✓	

RECOMMENDED LUBRICATION

1. Hydraulic Oil: -No.-68
2. Gear Box Oil: -No.-320 &220
3. Engine Oil 20W40
4. Grease: shell

AKONA MAKE: HOT MIX PLANT 6-10 TPH
INSTRUCTIONS SHEET

1. Check visually complete plant before starting for any unwanted external object.
2. Check Electric supply 3 phase x 415 V x 50 Hz properly.
3. Check all electrical connections periodically.
4. The DG Set should idle run for 2 minutes before starting production and stop after 3 minutes of idle running.
5. Check fuel before starting DG Set.
6. Check dryer flights periodically.
7. Always clean the discharge chute before stopping the plant.
8. Apply ample of grease at all greasing points before start.
9. Do not insert bar/ rod/ hand during the operation of plant.
10. Check gear oil visually in all gear boxes.
11. Replace all belt pairs together.
12. Do not allow outside persons inside the control room.
13. Operate the plant by trained operator only. Do not operate the plant if operator is not there.
14. Keep plant on level surface. Do not operate plant in overload conditions.

ASHOK LEYLAND

Aapki Jeet. Hamari Jeet.

AL2CTIDG1/1

Parts Catalogue - April 2018

HINDUJA GROUP

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FOREWORD

This Spare Parts Catalogue is applicable to **AL2CTIDG1/1**

The following information regarding mode of supply is given in the Catalogue:

A) When the components are supplied in the form of a sub-assembly or a set, or kit, specific mention is made.

B) All standard fasteners are not serviced.

While ordering the parts, due note of the above information should be taken.

Since the process of development is continuous with design c hanges, part numbers are likely to c hange. The information given in this publica tion is current at the time of release. The possibility exists that the information may need to be upda ted as a result of modification adopted by the manufacturer at any time for reason of a technical or commercial nature. Relevant changes would be updated through our Service Circulars / Bulletins, if found necessary.

While all the care has been taken to illustrate the components as they look, due to constraints of standardizing the illustrations, variation will be there.

Though every care has been taken in preparing the Parts Catalogue, no liability is under taken for any error which may arise.

We welcome your suggestions and feedback for better service. Should you need any further information pl write to:

Ashok Leyland Limited,
Power Solutions Business,
No. 1, Sardar Patel Road,
Guindy, Chennai – 600 032

ASHOK LEYLAND

INDEX - AL2CTIDG1/1_A

ASHOK LEYLAND

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3	ALECH49_#3	CYLINDER HEAD	8
4	HAEMB6_#	MAIN BEARINGS	10
5	HAEPR46_#1	PISTONS & RINGS	12
6	HAECN11_#1	CONNECTING ROD	14
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8	HAECM13_#1	CAMSHAFT	18
9	ALEFW47_#1	FLYWHEEL	20
10	ALEFH26_#	FLYWHEEL HOUSING	22
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20	HAEOC19_#2	OIL COOLER AND FILTER	42
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22	ALEBH300_C	BREATHER HOSE	46
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INDEX - AL2CTIDG1/1_A

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INDEX - AL2CTIDG1/1 (V:A)			
SL.NO	**SPEC NO**	**DESCRIPTION**	**PAGE NO**

| | | | |

ENGINE ASSEMBLY - AL2CTIDG1/1_A

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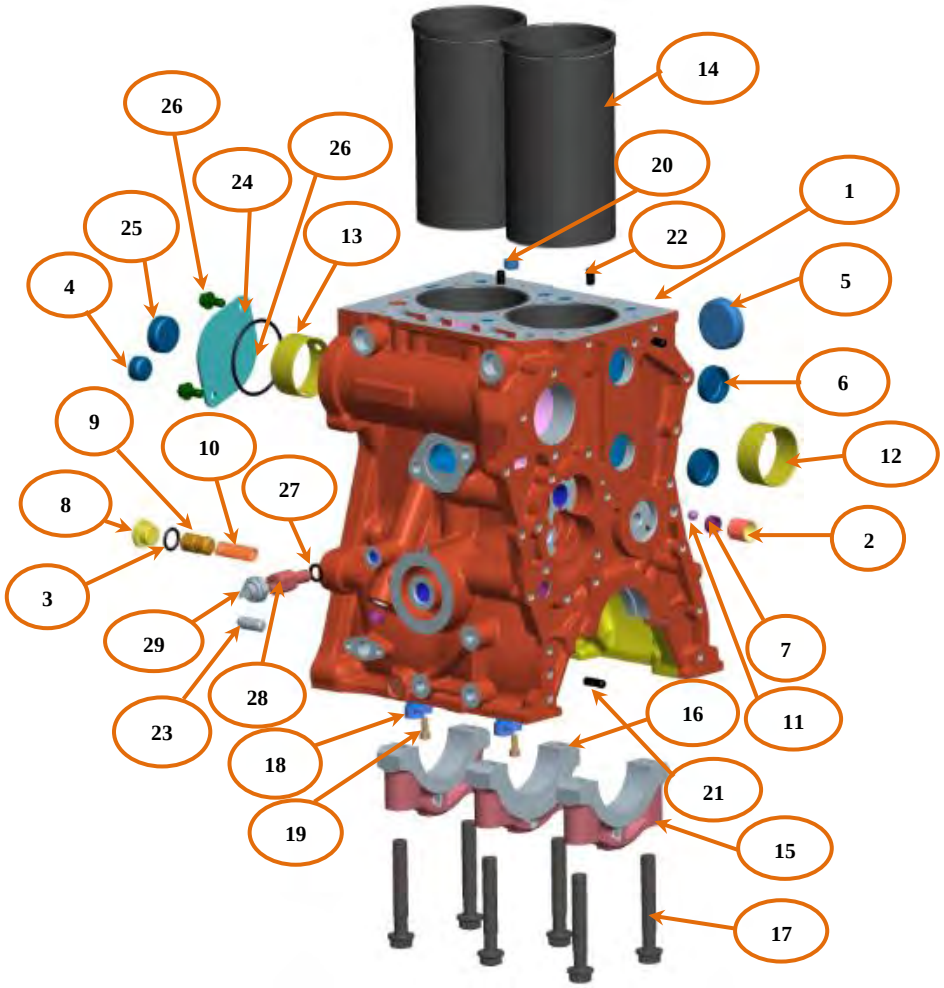
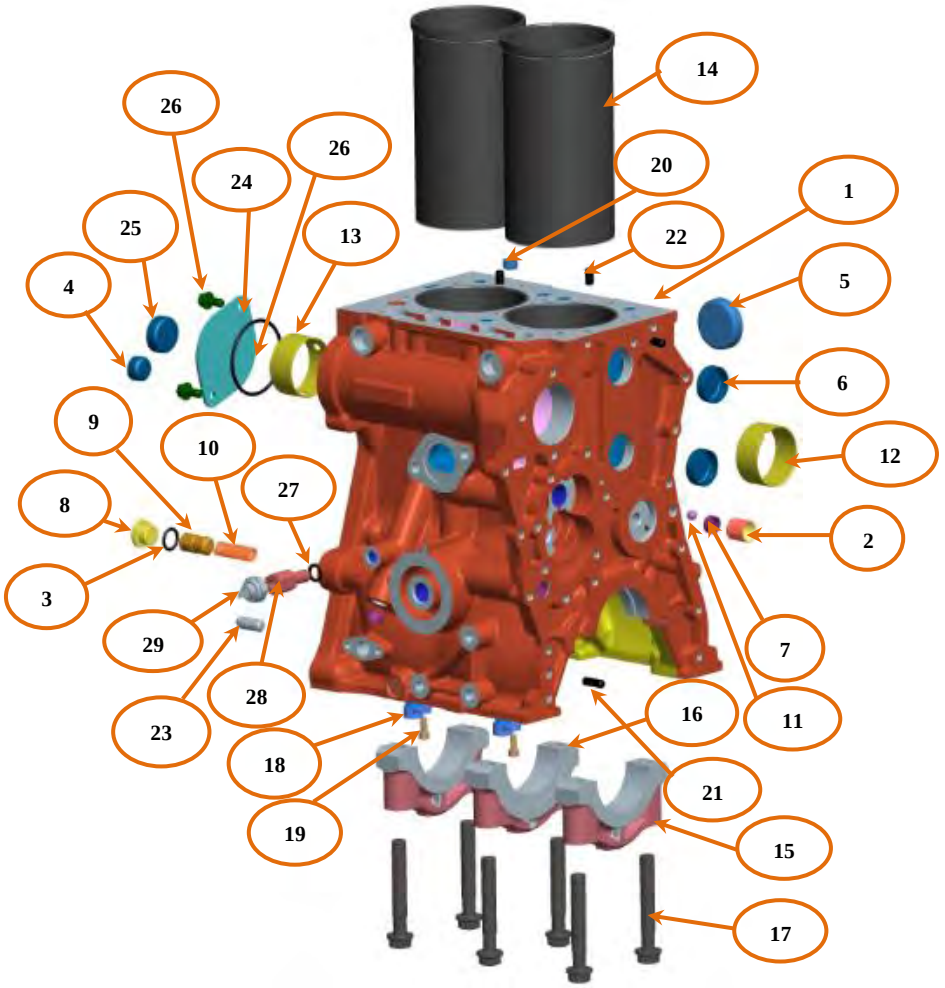
ENGINE ASSEMBLY - AL2CTIDG1/1_A					
SL.NO	**ILL.NO**	**PART NO**	**DESCRIPTION**	**QTY**	**REMARK**
1		10009857	ENGINE WITH UPFIT KIT AND RADIATOR AND AIR INTAKE SYSTEM	1	
2		A9N02300	ENGINE WITHOUT UPFIT KIT AND RADIATOR AND AIR INTAKE SYSTEM	1	

ASSEMBLY OF ENGINE BLOCK – HAECB21_#2



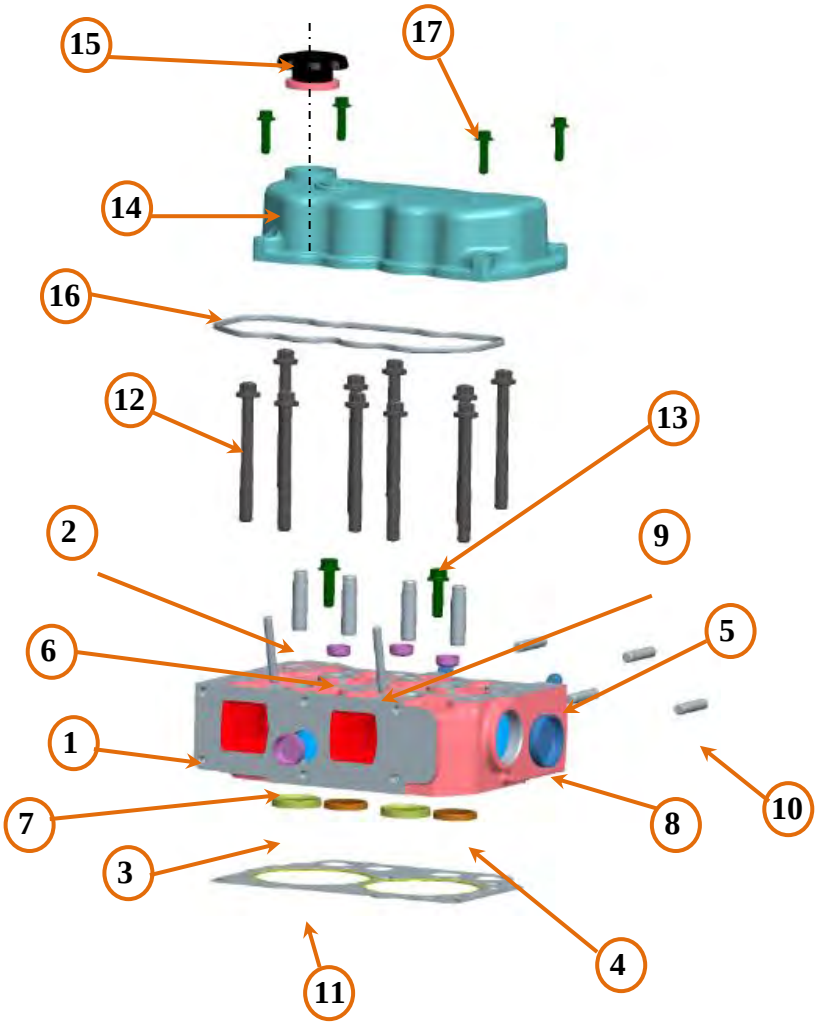
S/A OF CYLINDER BLOCK, H2 CYLINDER - HAECB21_#2					
SL.NO	**ILL.NO**	**PART NO**	**DESCRIPTION**	**QTY**	**REMARK**
1		B3B05401	S/A OF CYLINDER BLOCK (consists of items marked with #)	1	
2	1	B3B05403 #	S/A OF CYLINDER BLOCK (consists of items marked with $)	1	
3		FCA00622 $	CRANKCASE-H2 ENGINE	1	
4	2	F0536230 $	BUSHING BODY O/PUMP	1	
5	3	F2749700 $	O Ring 17.6 x 2.6	1	
6	4	F3145015 $	PLUG EXPANSION	1	
7	5	F3145415 $	PLUG EXPANSION	1	
8	6	F0954615 $	PIN STRAIGHT (5X10)	1	
9	7	F3145715 $	PLUG EXPANSION	4	
10	8	FS500611 $	PLUG	1	
11	9	F4231711 $	VALVE FILTER SAFETY	1	
12	10	F3639410 $	SPRING OIL VALVE	1	
13	11	F4832610 $	BALL STEEL	2	
14			CAM BUSH KIT (Consists of illustation no 12 &13)	1	Part No will be upadated later
15	12	F9Y00300 $	BEARING-CAMSHAFT NO.1 (Alternare Part No - F9Y00500)	1	
16	13	F9Y00400 $	BEARING-CAMSHAFT N0.3 (Alternate P/No - F9Y00700)	1	
17	14	F9K00122 $	INTERFERENCE FIT LINER - W	AR	
18	14	F9K00222 $	INTERFERENCE FIT LINER - X	AR	
19	14	F9K00322 $	INTERFERENCE FIT LINER - Y	AR	
20	14	F9K00422 $	INTERFERENCE FIT LINER - Z	AR	
21	15	X1102722 $	MAIN BEARING CAP	2	
22	16	X1102822 $	MAIN BEARING CAP-CENTRE	1	
23	17	X3511115 $	BOLT, MAIN BEARING CAP	6	
24	18	B8758803 #	COOLING, JET BODY	2	
25	19	FE702710 #	Special Screw - Hex Socket Cap - M6 X 1CP X 21mm LONG X GR 12.9	2	

ASSEMBLY OF ENGINE BLOCK – HAECB21_#2



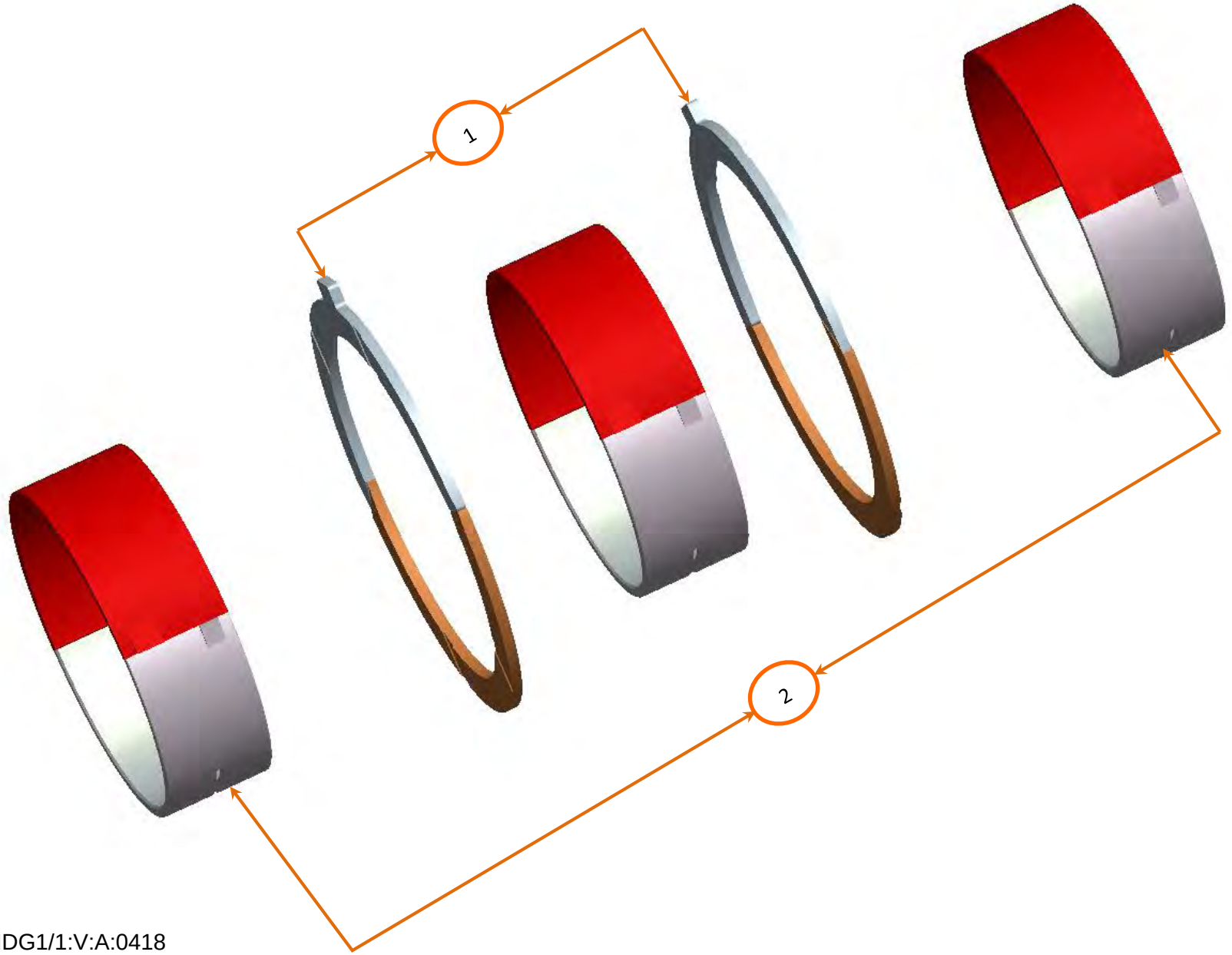
S/A OF CYLINDER BLOCK, H2 CYLINDER - HAECB21_#2					
SL.NO	**ILL.NO**	**PART NO**	**DESCRIPTION**	**QTY**	**REMARK**
26	20	F3145615 $	PLUG EXPANSION	4	
27	21	F0954415	PIN STRAIGHT	2	
28	22	F0954515	PIN STRAIGHT (8X16)	2	
29	23	F0954715	PIN REAR	2	
30	24	F2702150	O RING CAM AND SEAL	1	
31	25	F7647314	SEAL, PLATE	1	
32	26	L9010818	FLANGED SCREW - Hex - M8 X 1.25 CP X 18mm LONG	2	
33	27	X4901530	SPECIAL WASHER	1	
34	28	FL300315	ADAAPTER - PRESSURE SEDNSOR	1	
35	29	X7809300	LOW LUB OIL PRESSURE SWITCH	1	
36		F1Z01314	LIFTING EYE	1	
37			CAM BUSH KIT	1	

ASSEMBLY OF CYLINDER HEAD – ALECH49_#3



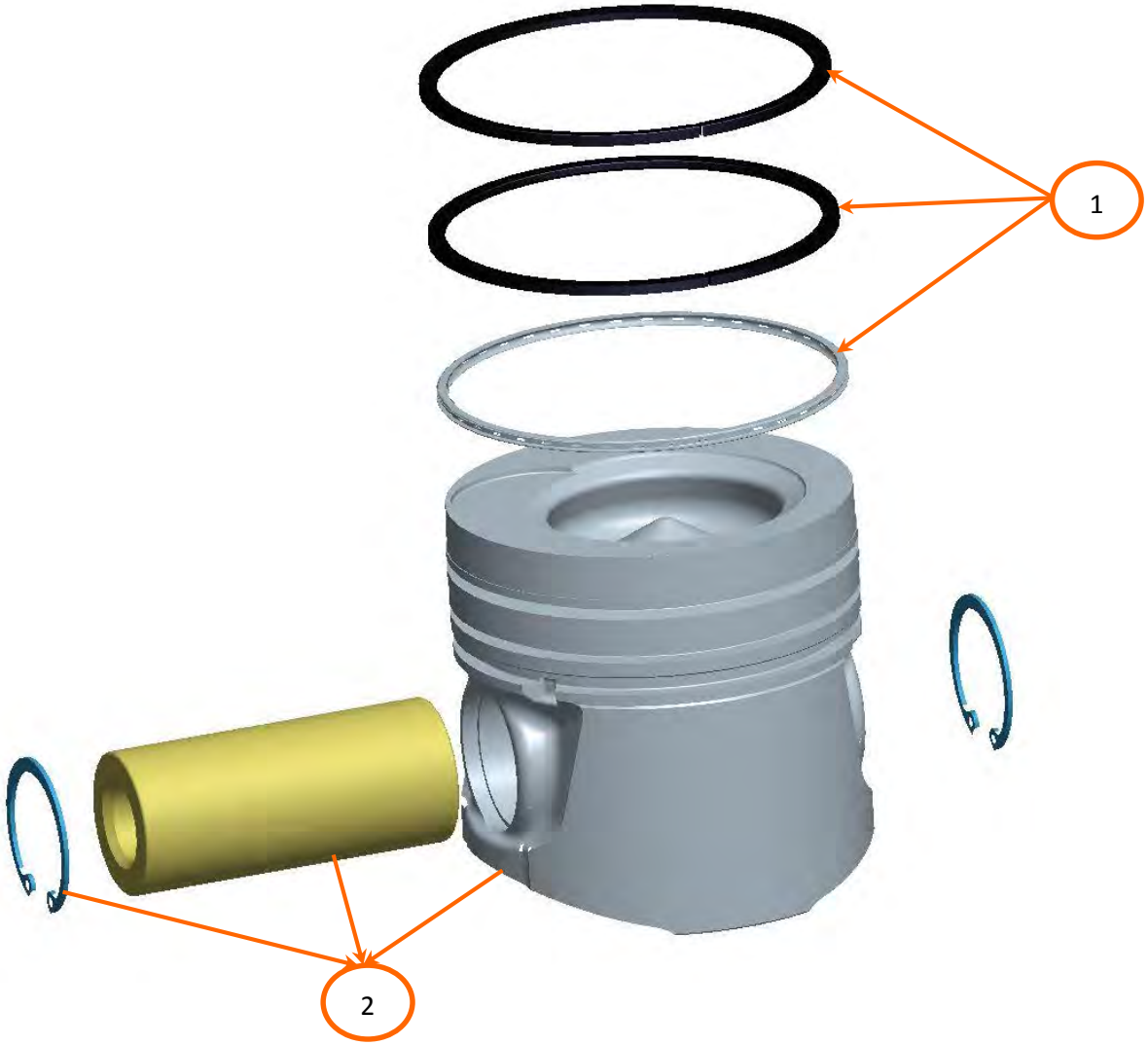
ASSY OF CYLINDER HEAD - ALECH49 - #3					
SL.NO	**ILL.NO**	**PART NO**	**DESCRIPTION**	**QTY**	**REMARK**
1	1	B3C08501	S/A OF CYLINDER HEAD (Consists of items marked wit $)	1	
2		B3C08502 $	S/A OF CYLINDER HEAD	1	
3	2	F0531522 $	BUSHING, VALVE GUIDE INTAKE	4	
4		FCN00822 $	CYLINDER HEAD (H2 DIESEL)	1	
5	3	X0900312 $	SEAT, VALVE INTAKE (Alternate X0900216)	1	
6	4	F0900312 $	EXHAUST VALVE SEAT INSERT - H-Series	2	
7	5	F3144915 $	PLUG EXPANSION	2	
8	6	F3145815 $	PLUG EXPANSION	3	
9	7	F3145315 $	PLUG EXPANSION 30DIA	1	
10	8	F3145415 $	PLUG EXPANSION	1	
11	9	F3777815 $	INJECTOR MOUNTING STUD	4	
12	10	F3769315 $	STUD M10X1.5/1.25	4	
13	11	FCT00300	GASKET-CYLINDER HEAD-H2 ENGINE	1	
14	12	FYJ00711	SPECIAL FLANGED BOLT - BI-HEX - 12 X 1.5 CP X 118.0MM LONG X GR 10.9	10	
15	13	L9011035	Standard Flanged Screw - Hex - M10 X 1.5 CP X 35mm LONG X GR 8.8	2	
16	14	FCR00542	COVER-CYLINDER HEAD - PDC	1	
17	15	F1100160	OIL FILLER CAP	1	
18	16	FCS00258	GASKET-CYLINDER HEAD COVER-H2 ENGINE	1	
19	17	L9010835	Standard Flanged Screw - Hex - M8 X 1.25 CP X 35mm LONG X GR 8.8	4	
20		F4832510 $	BALL STEEL	2	

ASSEMBLY OF MAIN BEARING – HAEMB6_#



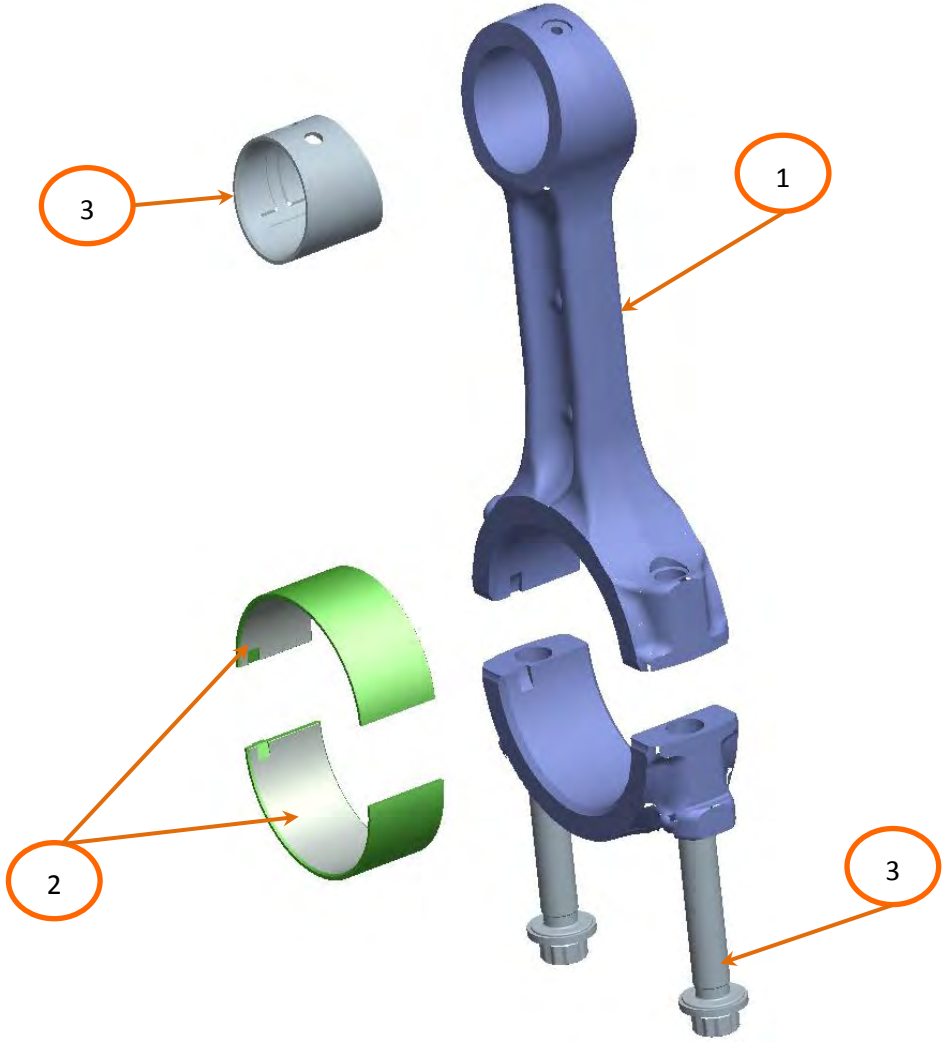
ASSY OF MAIN BEARING - HAEMB6_#					
SL.NO	**ILL.NO**	**PART NO**	**DESCRIPTION**	**QTY**	**REMARK**
1	1		THRUST WASHER KIT (STD)	1	PART NO WIILL ADDED ON RECIPT OF SAME FROM SPD
2	2		MAIN BEARING SET - STD	1	

ASSEMBLY OF PISTON AND RINGS – HAEPR46_#1



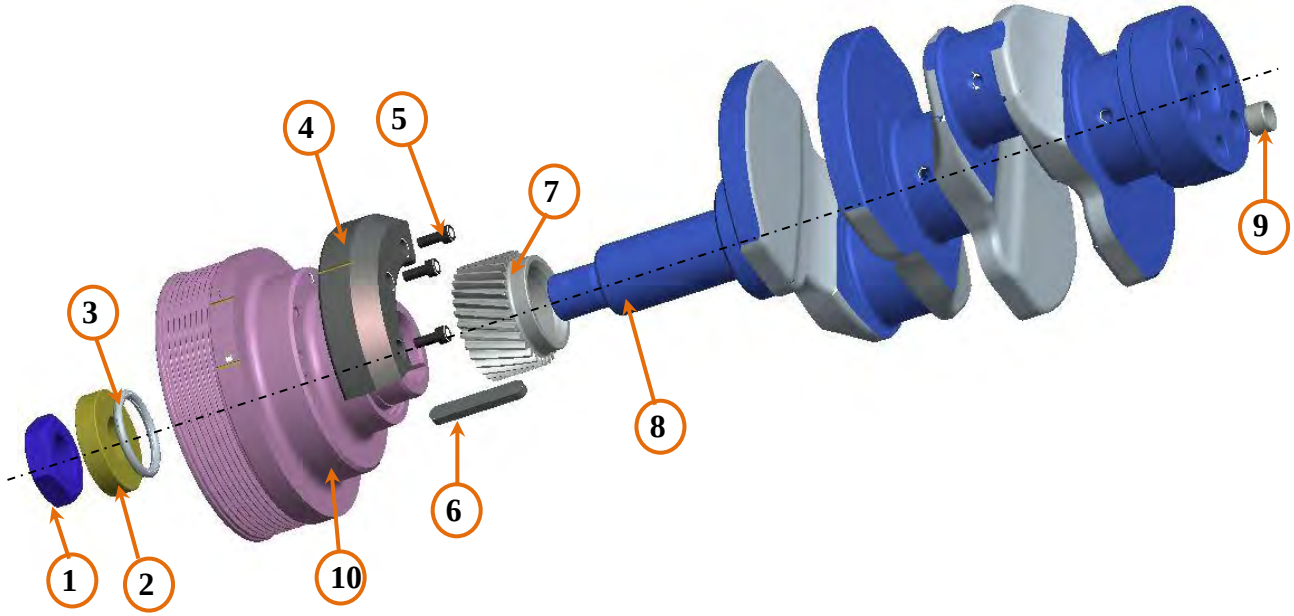
ASSY OF PISTON AND RINGS - HAEPR46_#1					
SL.NO	**ILL.NO**	**PART NO**	**DESCRIPTION**	**QTY**	**REMARK**
1	1		RIN SET	1	Part No will be added once relesed by SPD
2	2		PISTON SET	1	
3			ENGINE SET (Consists of Piston set & Ring set)	1	

CONNECTING ROD ASSEMBLY – HAECN11_#1



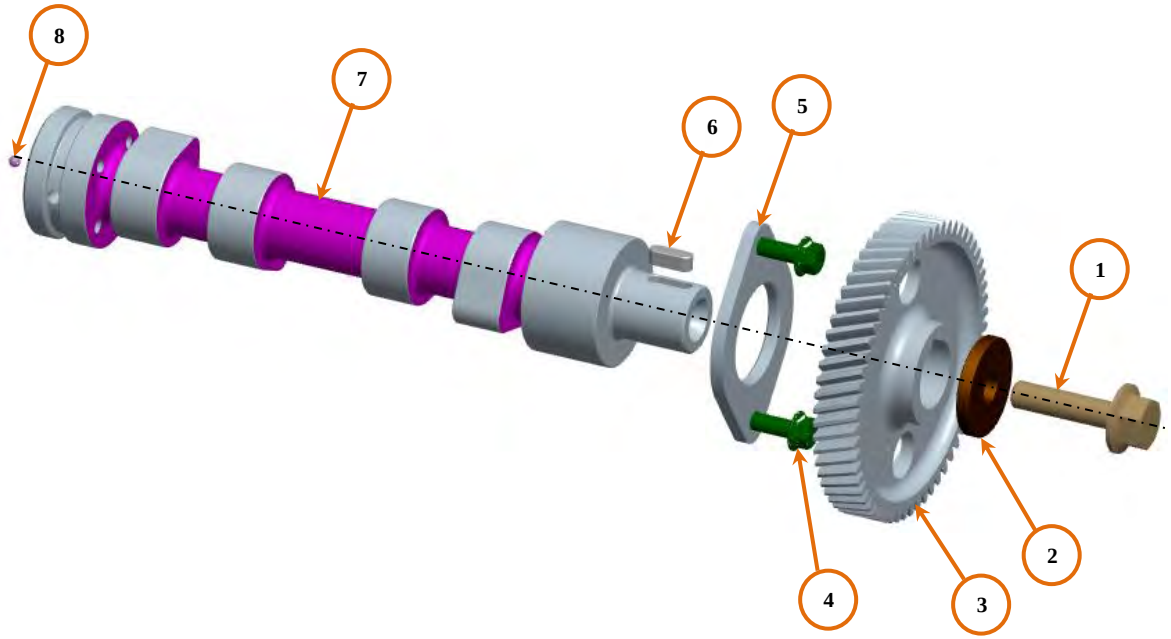
CONNECTINGROD ASSY - HAECN11_#1					
SL.NO	**ILL.NO**	**PART NO**	**DESCRIPTION**	**QTY**	**REMARK**
1	1	B2X00301	CONECTING ROD (contains item marked with $)	2	
2	2		CONECTING ROD BEARING - STD	1	Part No will be updated
3	3	X3505311 $	FLANGED SCREW - Bi-Hex - M12 X 1.5 FP X 60mm LONG	4	
4	4	X0501030 $	BUSHING CON ROD	2	

ASSEMBLY OF CRANKSHAFT – HAECS29_#2



ASSY OF CRANK SHAFT_HAECS29_#2					
SL.NO	**ILL.NO**	**PART NO**	**DESCRIPTION**	**QTY**	**REMARK**
1	1	F3568715	SPECIAL NUT - HEX - M27 X 1.5FP X 15MM LONG X GR	1	
2	2	F1200210	SPACER	1	
3	3	F2702650	O RING 41.4 X 5.54	1	
4	4	F4D00611	BOSS - ECCENTRIC MASS	1	
5	5	FE702711	SPECIAL SCREW - HEX SOCKET CAP - M6 X 1CP X 15MM LONG X GR 10.9	3	
6		B3A07601	S/A OF CRANK SHAFT (Consists of items marked with 4)	1	
7	6	F0954915 $	KEY FOR CRANKSHAFT	1	
8	7	X1607511 $	GEAR,CRANKSHAFT	1	
9	8	FCB00611 $	CRANKSHAFT, H2	1	
10	9	F3438615 $	COLLAR	1	
11	10	X7J00122	POLY V PULLEY WITHOUT RUBBER DAMPER AND WITH PROVISION FOR 2V FITMENT	1	

ASSEMBLY OF CAMSHAFT – HAECM13_#1



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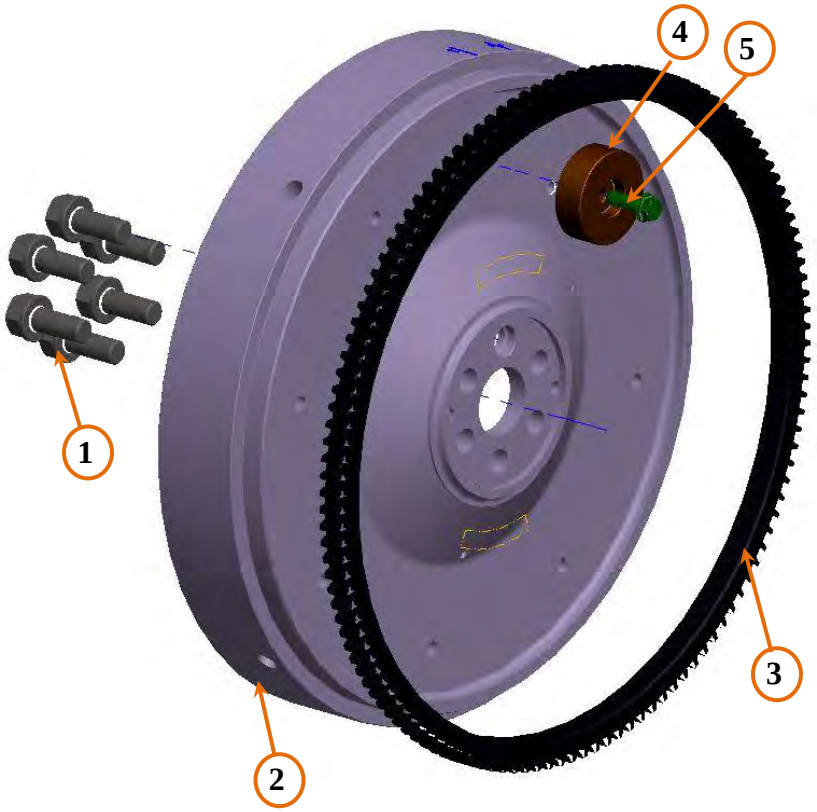
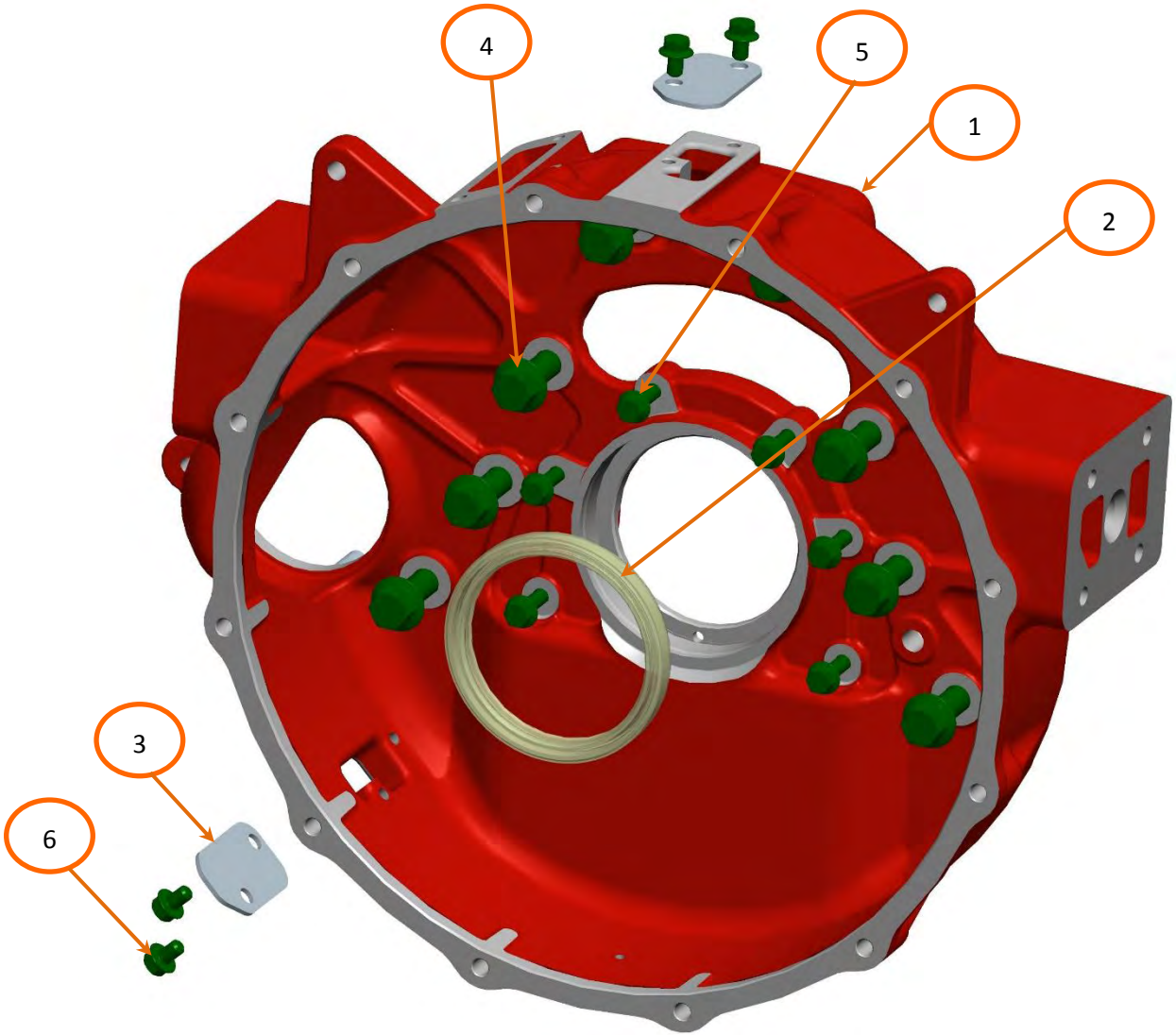
ENGINE CAMSHAFT ASSEMBLY - HAECM13_#1					
SL.NO	**ILL.NO**	**PART NO**	**DESCRIPTION**	**QTY**	**REMARK**
1	1	X3511915	SPECIAL FLANGED BOLT - HEX - M14 X 1.5 FP X 40MM LONG X GR 10.9	1	
2	2	F4945310	SPECIAL WASHER - MM - PLAIN - 15MM ID X 44MM OD X 6MM T	1	
3	3	F1655711	GEAR,CAMSHAFT	1	
4	3	F1661211	GEAR, CAMSHAFT (REF:	1	
5	4	L9010822	STANDARD FLANGED SCREW - HEX - M8 X 1.25 CP X 22MM LONG X GR 8.8	2	
6	5	F7661614	PLATE CAMSHAFT	1	
7	6	F0955115	KEY FOR CAMSHAFT	1	
8		B2S01402	S/A OF CAM SHAFT (Consists of items markedwith $)	1	
9	7	F9X00611 $	CAMSHAFT	1	
10	8	F4832710 $	BALL STEEL	1	

ASSEMBLY OF FLYWHEEL – ALEFW47_#1



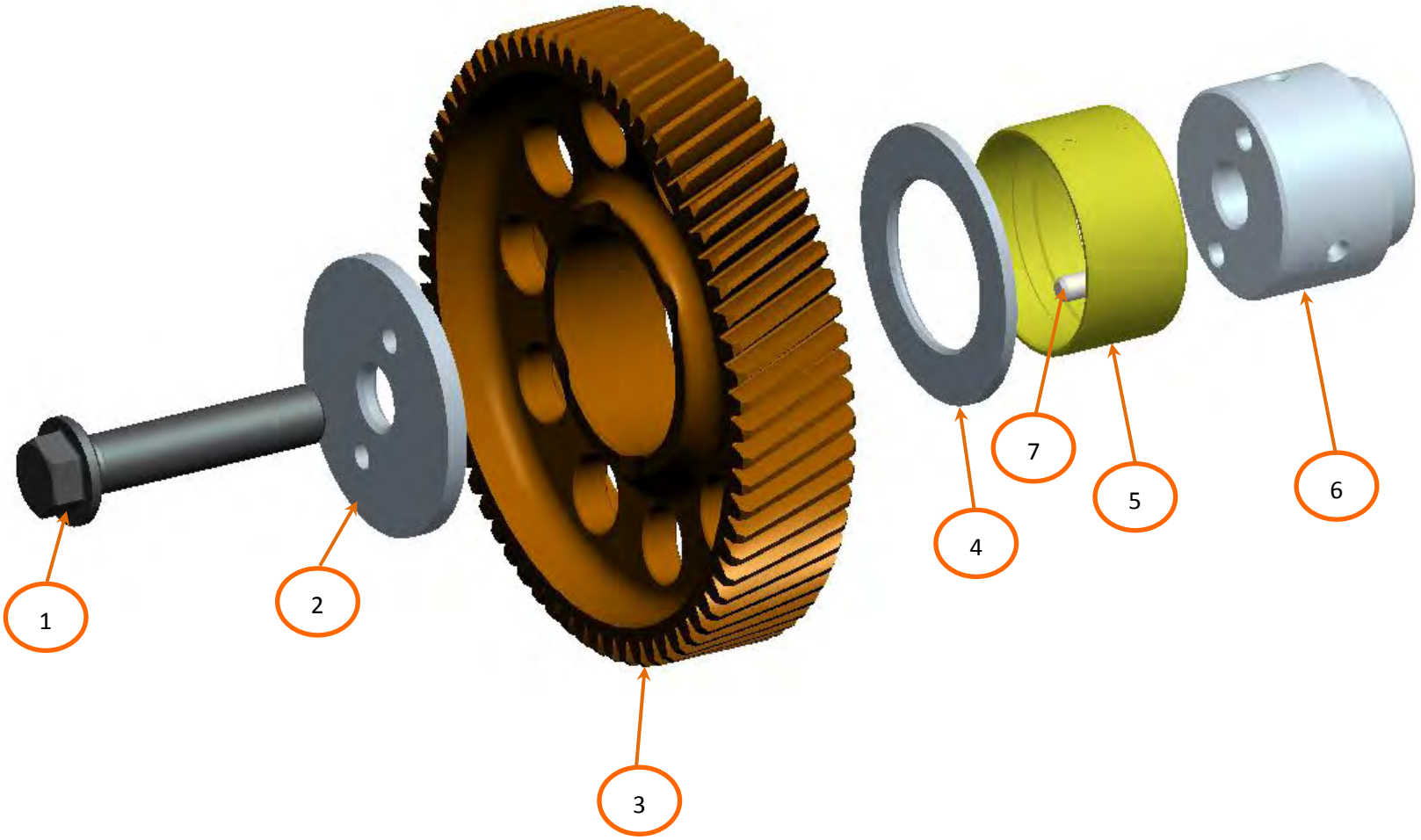
ASSY OF FLYWHEEL - ALEFW47_#1					
SL.NO	**ILL.NO**	**PART NO**	**DESCRIPTION**	**QTY**	**REMARK**
1	1	X3511015	BOLT, FLYWHEEL	6	
2		B8761001	S/A of SAE 10 FLYWHEEL WITH 12 deg Inj Timing (consists of items marked with $)	1	
3	2	F1625022 $	SAE 10 Flywheel	1	
4	3	F0741822 $	STARTER RING	1	
5	4	F4D00411	BOSS ECCENTRIC MASS FOR FLYWHEEL	1	
6	5	L9011025	Standard Flanged Screw - Hex - M10 X 1.5 CP X 25mm LONG	1	

ASSEMBLY OF ENGINE FLYWHEEL HOUSING – ALEFH26_#



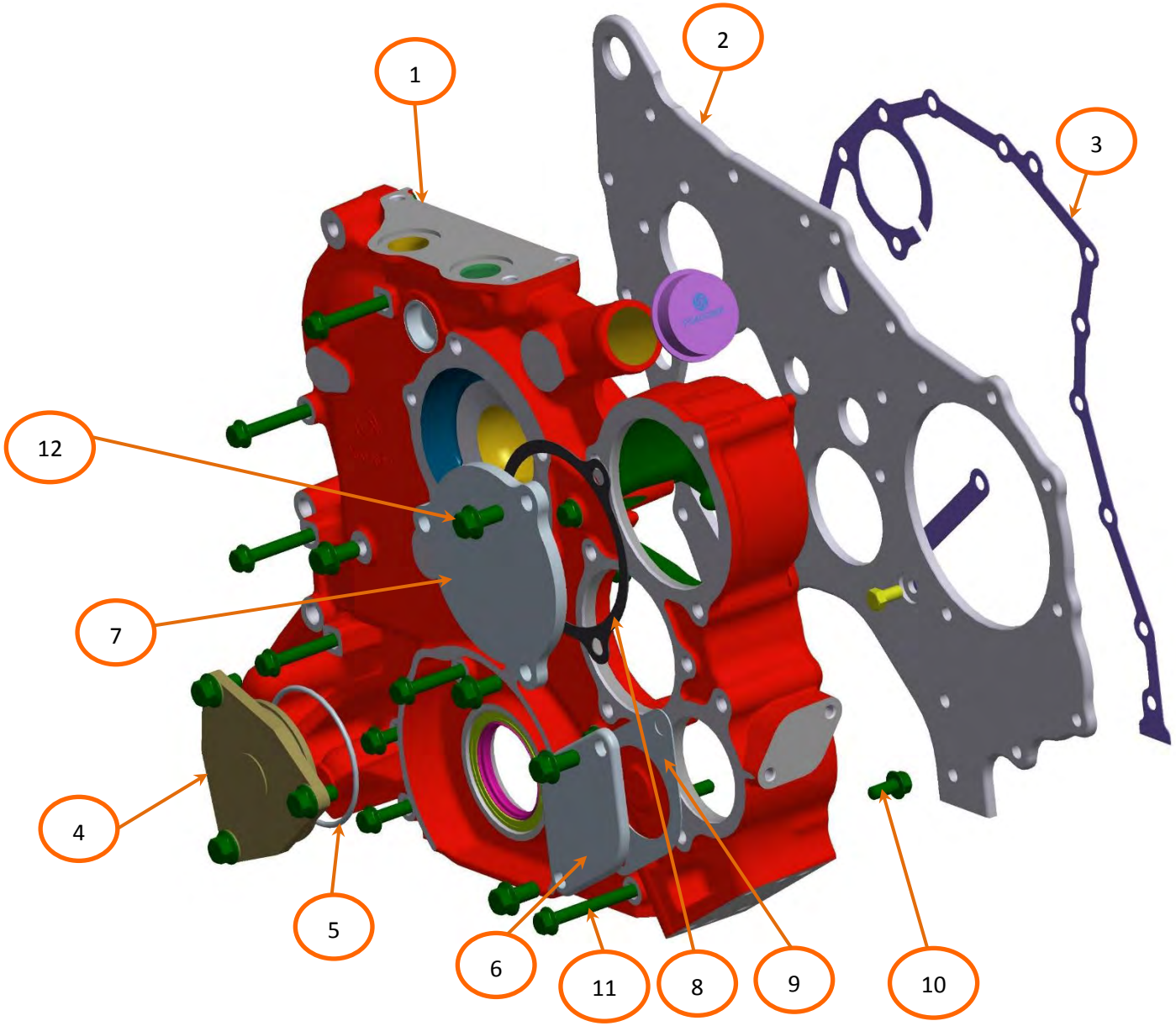
ASSY OF ENGINE FLYWHEEL HOUSING - ALEFH26_#					
SL.NO	**ILL.NO**	**PART NO**	**DESCRIPTION**	**QTY**	**REMARK**
1	1	X1815822	FLYWHEEL HOUSING	1	
2	2	X2711000	SEAL, OIL REAR	1	
3	2	X2705200	C/S REAR END PTFE OIL SEAL	1	
4	2	F2749000	OIL SEAL(982800109)	1	
5	2	X2705100	H-SERIES C/S REAR END PTFE OILSEAL	1	
6	3	X1102513	F/H, DUST COVER	2	
7	4	L9011440	STANDARD FLANGED SCREW - HEX - M14 X 2 CP X 40MM LONG X GR 8.8	8	
8	5	L9010832	STANDARD FLANGED SCREW - HEX - M8 X 1.25 CP X 32MM LONG X GR 8.8	6	
9	6	L9010812	STANDARD FLANGED SCREW - HEX - M8 X 1.25 CP X 12MM LONG X GR 8.8	4	
10		F3769515	STUD - COVER TIMER ,STARTER MOTOR MOUNTING M10	3	

ASSEMBLY OF ENGINE TIMING GEARS – HAETG1/1_A



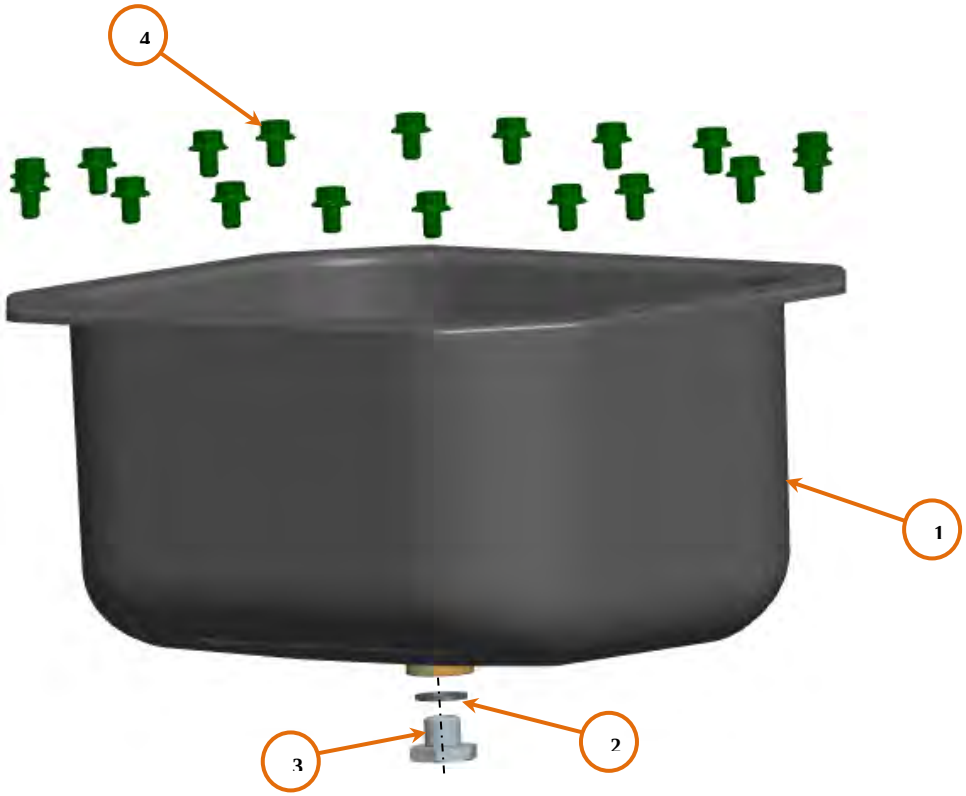
ASSY OF ENGINE TIMING GEARS - HAETG1/1_A					
SL.NO	**ILL.NO**	**PART NO**	**DESCRIPTION**	**QTY**	**REMARK**
1	1	F3585715	SPECIAL FLANGED BOLT - HEX - M14 X 1.5 FP X 63MM LONG X GR 10.9	1	
2	2	F7661814	PLATE IDLE, GEAR THRUST	1	
3		B8783801	S/A OF GEAR, IDLER (CONSISTS OT ITEMS MARKED WITH $)	1	
4	3	X1607611 $	GEAR,IDLER	1	
5	4	F0536530 $	BUSHING	1	
6	5	F7661714	PLATE IDLE, GEAR THRUST	1	
7		B7014502	S/A SHAFT.IDLER GEAR (CONSISTS OF ITEMS MARKED WITH #)	1	
8	6	F3347211 #	IDLER GEAR SHAFT	1	
9	7	F0955015 #	PIN STRAIGHT (6X10)	2	

ASSEMBLY OF TIMING GEAR CASE – HAETG6_A



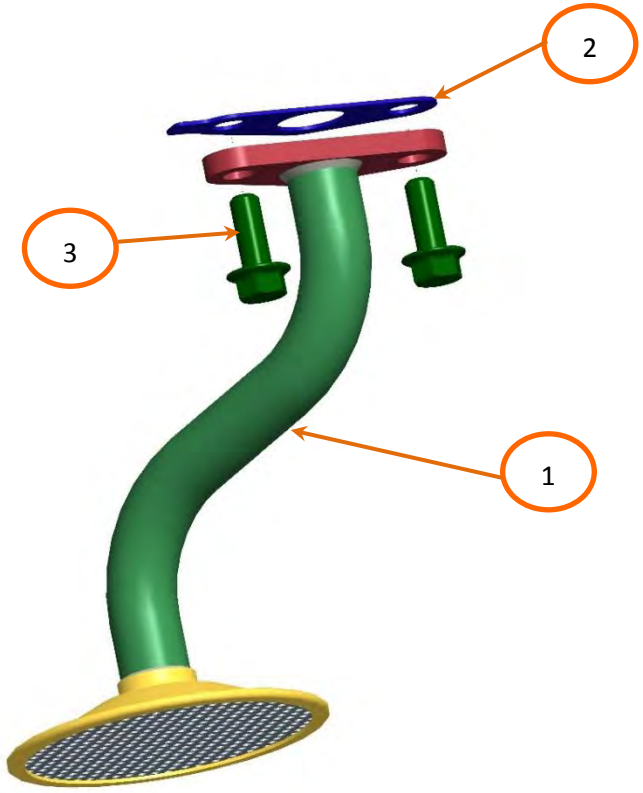
ASSY OF TIMING GEAR CASE - HAETG6_A					
SL.NO	**ILL.NO**	**PART NO**	**DESCRIPTION**	**QTY**	**REMARK**
1	1	B8760901	S/A OF TIMING GEAR CASE WITH WELCH PLUGS(FOR PROCUREMENT PURPOS	1	
2		X1104022	COVER, TIMING GEAR CASE TO SUIT 230 CC AIR COOLED COMPESSOR	1	
3		F3145915	PLUG EXPANSION 32DIA	1	
4	2	X7200113	TIMING BACK PLATE	1	
5	3	F1761500	GASKET FRT END PLATE	1	
6	4	X1102622	FRONT COVER	1	
7	5	F2749200	O RING 81.2 X 3.3	1	
8	6	F7647414	SEAL PLATE	1	
9	7	F7909414	SEAL PLATE	1	
10	8	F7Y03300	GASKET - COMPRESSOR DUMMY PLATE GASKET	1	
11	9	F1721600	JOINT-POWERSTEERINGPUMP DUMMY PLATE	1	
12	10	L9010818	STANDARD FLANGED SCREW - HEX - M8 X 1.25 CP X 18MM LONG X GR 8.8	7	
13	11	L9510813	STANDARD FLANGED BOLT - HEX - M8 X 1.25 CP X 65MM LONG X GR 8.8	5	
14	12	L9011020	STANDARD FLANGED SCREW - HEX - M10 X 1.5 CP X 20MM LONG X GR 8.8	8	
15	13	L9510817	STANDARD FLANGED BOLT - HEX - M8 X 1.25 CP X 85MM LONG X GR 8.8	3	
16		L9510815	STANDARD FLANGED BOLT - HEX - M8 X 1.25 CP X 75MM LONG X GR 8.8	1	
17		L9510819	STANDARD FLANGED BOLT - HEX - M8 X 1.25 CP X 95MM LONG X GR 8.8	2	
18		X2706700	OIL SEAL, FRONT (PTFE)	1	
19		X2710900	SEAL, OIL FRONT	1	
20		F3502400	BOLT	1	

ASSEMBLY OF OIL SUMP – HAES15_#1



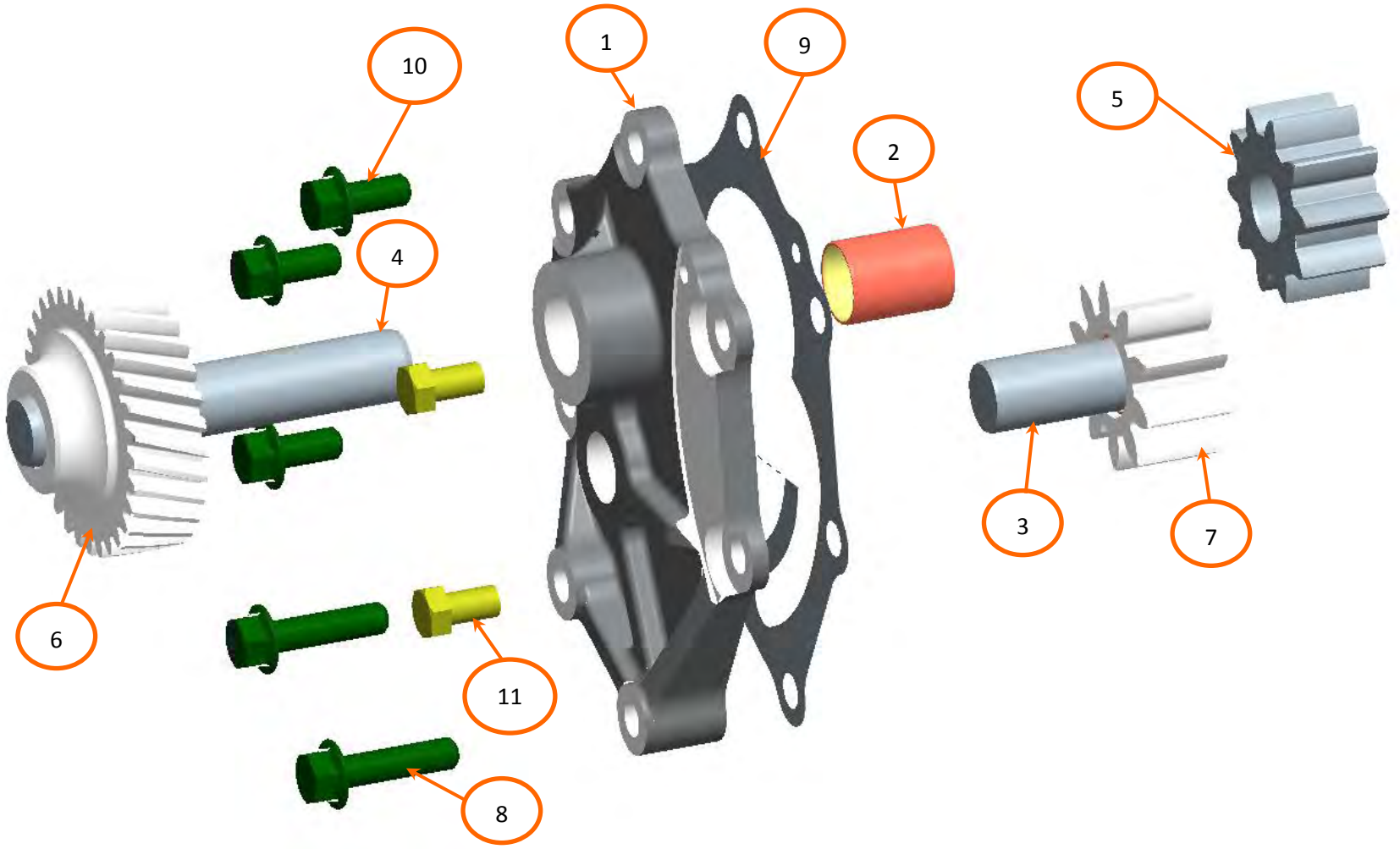
ASSY OF SUMP H2 ENGINE - HAES15_#1					
SL.NO	**ILL.NO**	**PART NO**	**DESCRIPTION**	**QTY**	**REMARK**
1	1	B4H03201	SUMP - H2 Engine	1	
2	2	FL800231	SPECIAL WASHER - MM - Plain - 16.2mm ID X 23mm OD X 2mm T	1	
3	3	F3114515	DRAIN PLUG MAGNETIC	1	
4	4	L9010812	FLANGED SCREW - Hex - M8 X 1.25 CP X 12mm LONG X GR 8.8	18	

OIL STRAINER ASSEMBLY – HAEOS13_#1



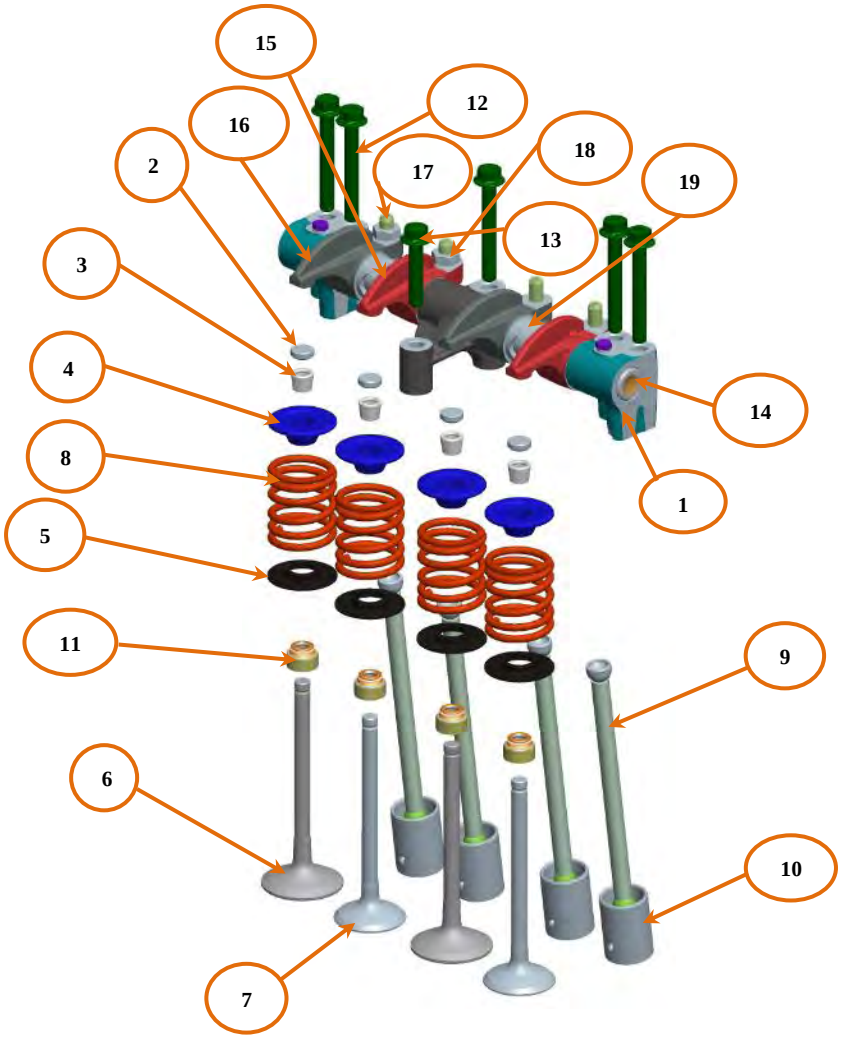
ASSEMBLY OF ENGINE OIL STRAINER - HAEOS13_#1					
SL.NO	**ILL.NO**	**PART NO**	**DESCRIPTION**	**QTY**	**REMARK**
1	1	B4C01501	STRAINER ASSY. H2 ENGINE	1	
2	2	L9010822	FLANGED SCREW - Hex - M8 X 1.25 CP X 22mm LONG X GR 8.8	2	
3	3	FJ607500	GASKET OIL STRAINER	1	

ASSEMBLY OF ENGINE LUB OIL PUMP – ALEOP350_B



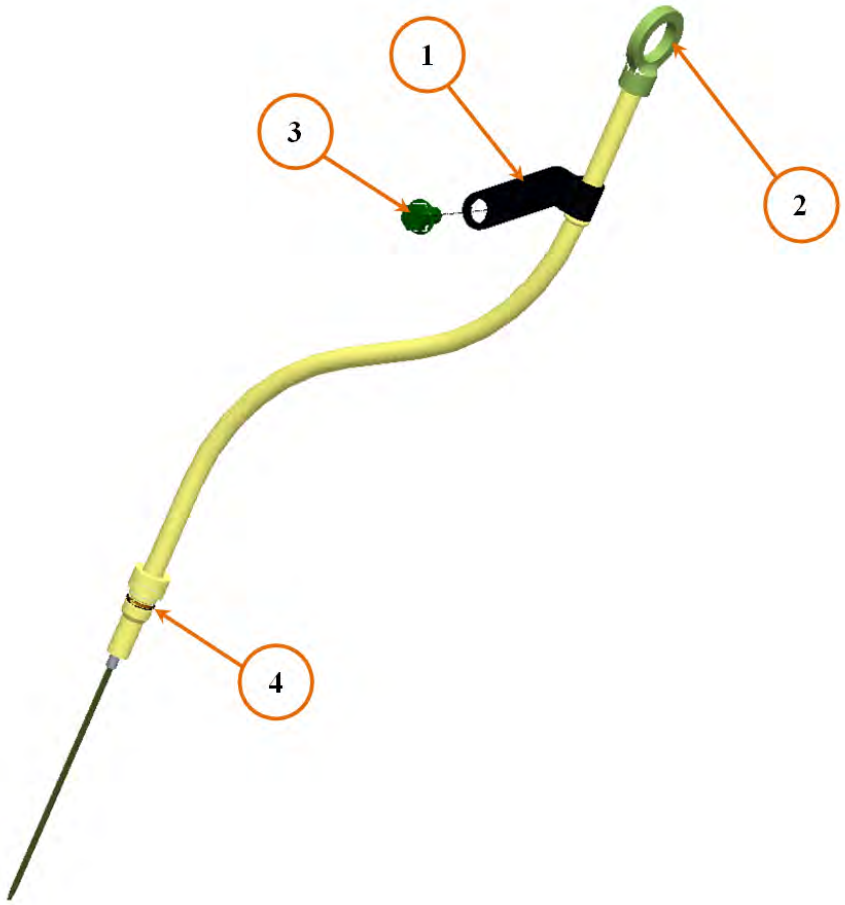
ASSY OF ENGINE OIL PUMP - ALEOP350_B					
SL.NO	**ILL.NO**	**PART NO**	**DESCRIPTION**	**QTY**	**REMARK**
1		B8729901	S/A OIL PUMP-4CTI-E2	1	
2		B8255003	S/A OIL PUMP COVER (Consists of items marked with #)	1	
3	1	X1101122 #	COVER,OIL PUMP	1	
4	2	F0536430 #	BUSHING,BODY OIL PUM	1	
5	3	F3356315	SHAFT OIL PUMP DRIVEN	1	
6	4	F3356215	SHAFT OIL PUMP DRIVE	1	
7		B8729902	S/A OIL PUMP COVER-4CTI-E2	1	
8	5	F1600326	OIL PUMP GEAR	1	
9	6	F1661311	GEAR, OIL PUMP DRIVE	1	
10		B7018703	S/A OF GEAR OIL PUMP (Consists of items marked with $)	1	
11		F0536230 $	BUSHING BODY O/PUMP	1	
12	7	F1600426 $	OIL PUMP GEAR	1	
13	8	L9010832	FLANGED SCREW - Hex - M8 X 1.25 CP X 32mm LONG X GR 8.8	2	
14	9	F1761200	GASKET O P COVER	1	

ASSEMBLY OF ENGINE VALVES – HAEVL16_#2



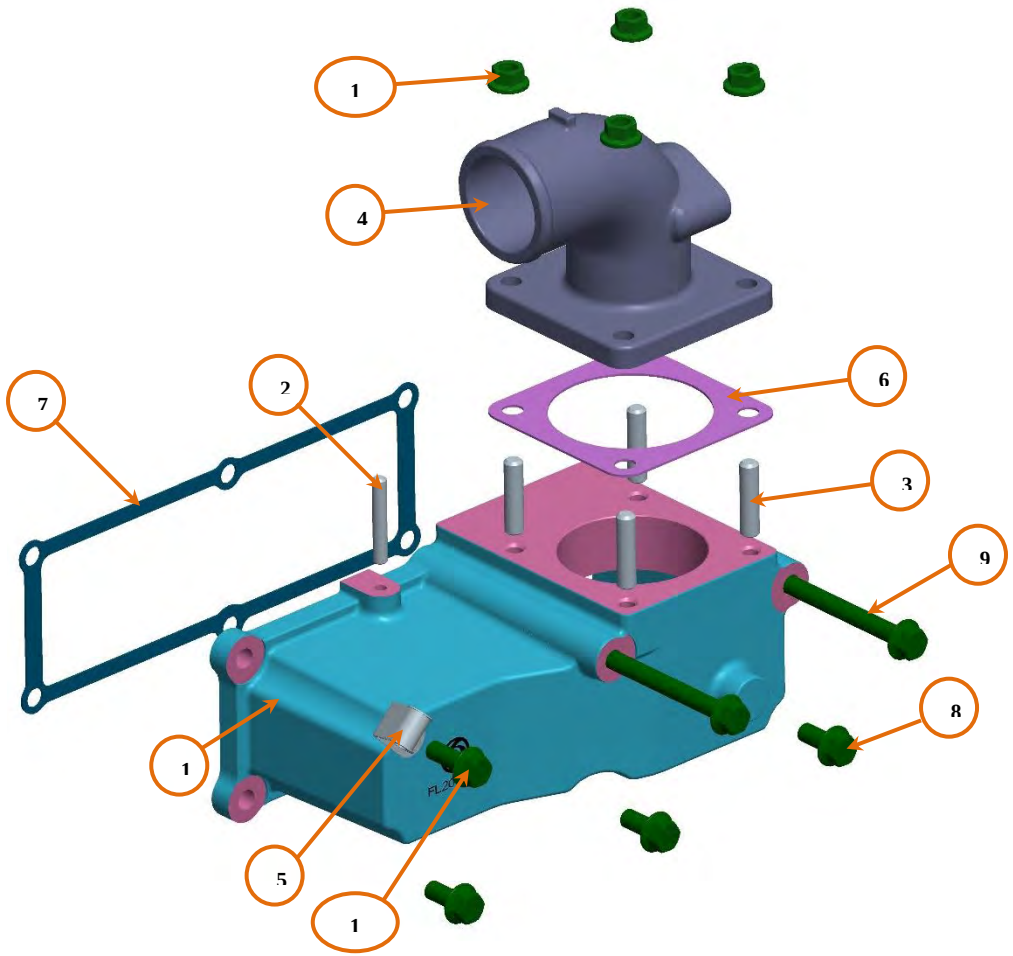
ENGINE VALVE SYSTEM - HAEVL16_#2					
SL.NO	**ILL.NO**	**PART NO**	**DESCRIPTION**	**QTY**	**REMARK**
1	1	B4P01701	S/A OF ROCKER ARM ASSY	1	
2	2	X1100615	VALVE CAP	4	
3	3	F3438515	LOCK, VALVE SPRING RETAINER	8	
4	4	X0900911	SEAT,VALVESPRING-UPPER	4	
5	5	X0901011	SEAT-VALVE SPRING LOWER	4	
6	6	X4202011	ENGINE INTAKE VALVE (Altermat P/No - FL600101)	2	
7	7	FFH00101	ENGINE EXHAUST VALVE (Alternate P/No F4231911)	2	
8	8	X4M00210	SPRING-VALVE SPRING, OUTER	4	
9	9	B7015004	S/A VALVE PUSH ROD	4	
10	10	F4330722	LIFTER, VALVE	4	
11	11	FE802800	VALVE STEM SEAL, SKF (Alternate P/No X2706400, X271110)	4	
12	12	L9510812	FLANGED BOLT - Hex - M8 X 1.25 CP X 60mm LONG X GR 8.8	5	
13	13	L9510808	FLANGED BOLT - Hex - M8 X 1.25 CP X 40mm LONG X GR 8.8	1	
14	14	B4P01703	S/A OF ROCKER SHAFT	1	
15	15	F3210422	ROCKER ARM.EXH.	2	
16	16	F3210322	ROCKER ARM.INLET	2	
17	17	X3507615	SCREW,VALVE ADJUSTING	4	
18	18	X3514015	FLANGED NUT - Hex - M8 X 1FP X 6mm LONG X GR	4	
19	19	F3438415	COLLAR	2	
20		FVY00122	ROCKER ARM-BRACKET	1	
21		FVY00322	ROCKER ARM BRACKET	1	
22		FVY00222	ROCKER BRACKET	1	
23		F3576711	SCREW - Hex - M5 X 0.8CP X 8mm LONG X GR	2	
24		F4945910	WASHER- Single coil - 5.1mm ID X 9.2mm OD X 2.6mm T	2	

ASSEMBLY OF OIL DIPSTICK – ALOLG11_#



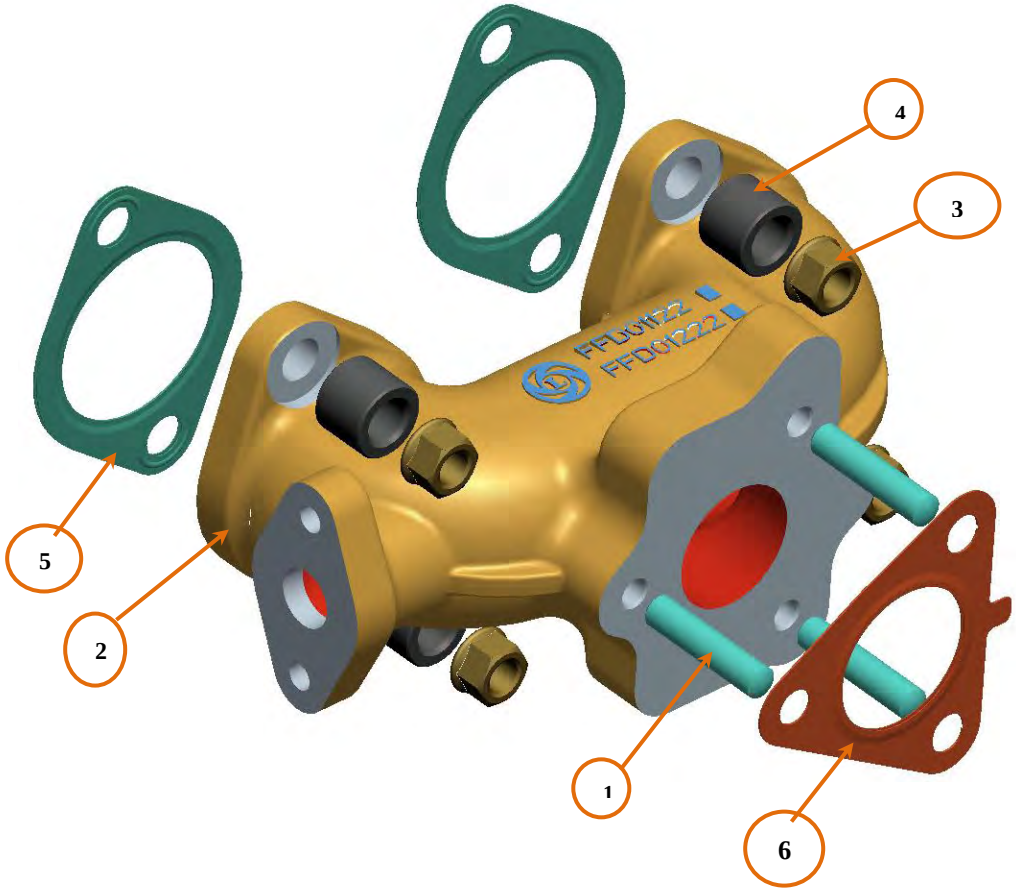
ASSEMBLY OF ENGINE OIL LEVEL GAUGE FOR H2 ENGINE - ALOLG11_#					
SL.NO	**ILL.NO**	**PART NO**	**DESCRIPTION**	**QTY**	**REMARK**
1	1	B6E04602	S/A OF DIPSTICK GUIDE	1	
2	2	B6E04603	S/A OF TOP ACCESS DIP STICK FOR H2 ENGINE	1	
3	3	L9010812	STANDARD FALNGED SCREW - Hex - M8 X 1.25 CP X 12mm LONG	1	
4	4	F2702050	O RING HOLDER SEAL 9.8X2.4	1	

ASSEMBLY OF INTAKE MANIFOLD – HAEIM39_#2



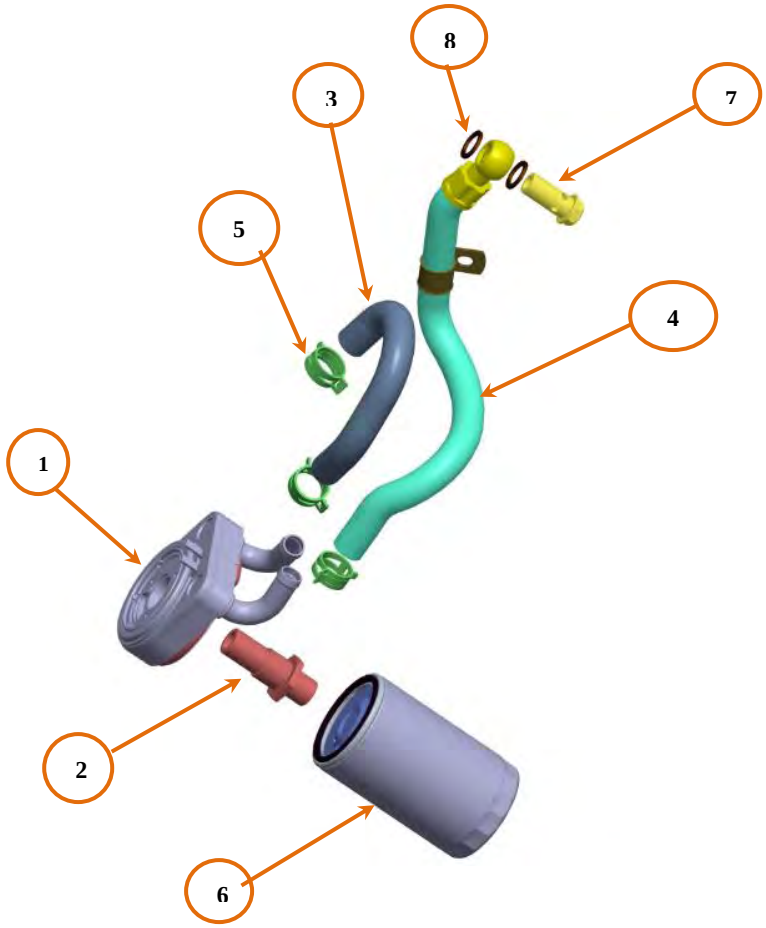
ASSY OF INTAKE MANIFOLD - HAEIM39_#2					
SL.NO	**ILL.NO**	**PART NO**	**DESCRIPTION**	**QTY**	**REMARK**
1		B3P08601	S/A OF INTAKE MANIFOLD ASSEMBLY (Consists of items marked with $)	1	
2	1	FL200192 $	INTAKE MANIFOLD-ENGINE AIR INTAKE ASSEMBLY	1	
3	2	F3769615 $	STUD M6X1	1	
4	3	X3715115 $	STUD (M8X1.25) FOR AIR INTAKE PIPE MTG	4	
5	4	FL400322	PIPE-ENGINE AIR INTAKE WITH EGR	1	
6	5	B8249509	S/A OF CLIP	1	
7	6	X1706500	GASKET, AIR INTAKE PIPE	1	
8	7	FL300600	GASKET-ENGINE AIR INTAKE MANIFOLD FOR H2 ENGINE	1	
9	8	L9010818	STANDARD FLANGED SCREW - HEX - M8 X 1.25 CP X 18MM LONG X GR 8.8	3	
10	9	L9510825	STANDARD FLANGED BOLT - HEX - M8 X 1.25 CP X 125MM LONG X GR 8.8	2	
11	10	L9010822	STANDARD FLANGED SCREW - HEX - M8 X 1.25 CP X 22MM LONG X GR 8.8	1	
12	11	L9110818	STANDARD FLANGED NUT - HEX - M8 X 1.25 CP X 8MM LONG X GR 8	4	

ASSEMBLY OF EXHAUST MANIFOLD – ALEEM20_#1



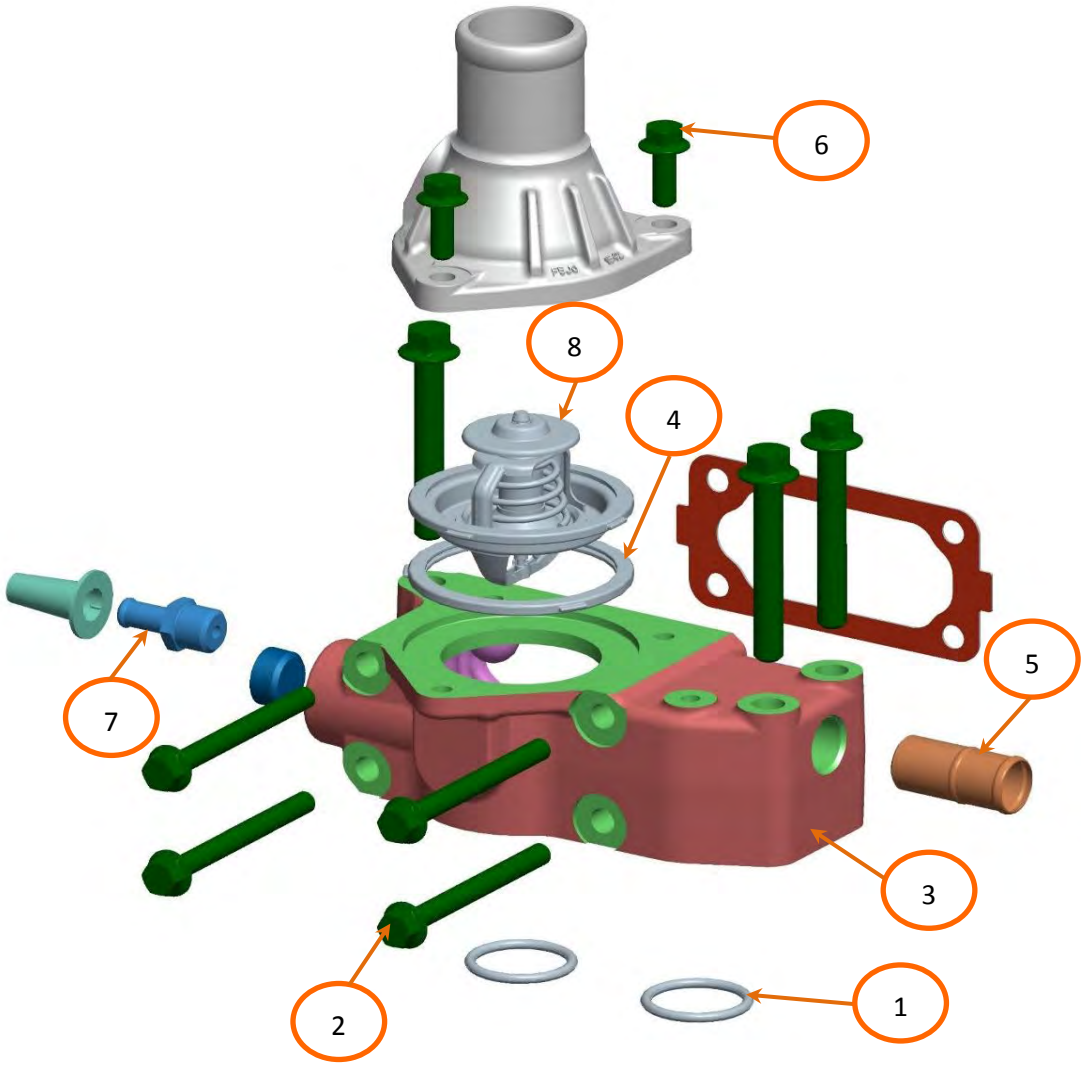
ENGINE EXHAUST MANIFOLD ASSEMBLY - ALEEM30_#1					
SL.NO	**ILL.NO**	**PART NO**	**DESCRIPTION**	**QTY**	**REMARK**
1	1	F3782115	STUD-TC MTG ON EMF	3	
2	2	FFD01122	EXHAUST MANIFOLD ASSEMBLY	1	
3	3	F7F00115	FLANGED NUT - HEX - M10 X 1.25 FP X 9.6mm LONG X GR	4	
4	4	FG500310	SPACER for Turbo Mounting	4	
5	5	FFF00213	GASKET	2	
6	6	FJ600510	GASKET TURBOCHARGER INLET	1	

ASSEMBLY OF OIL COOLER AND FILTER – HAEOC19_#2



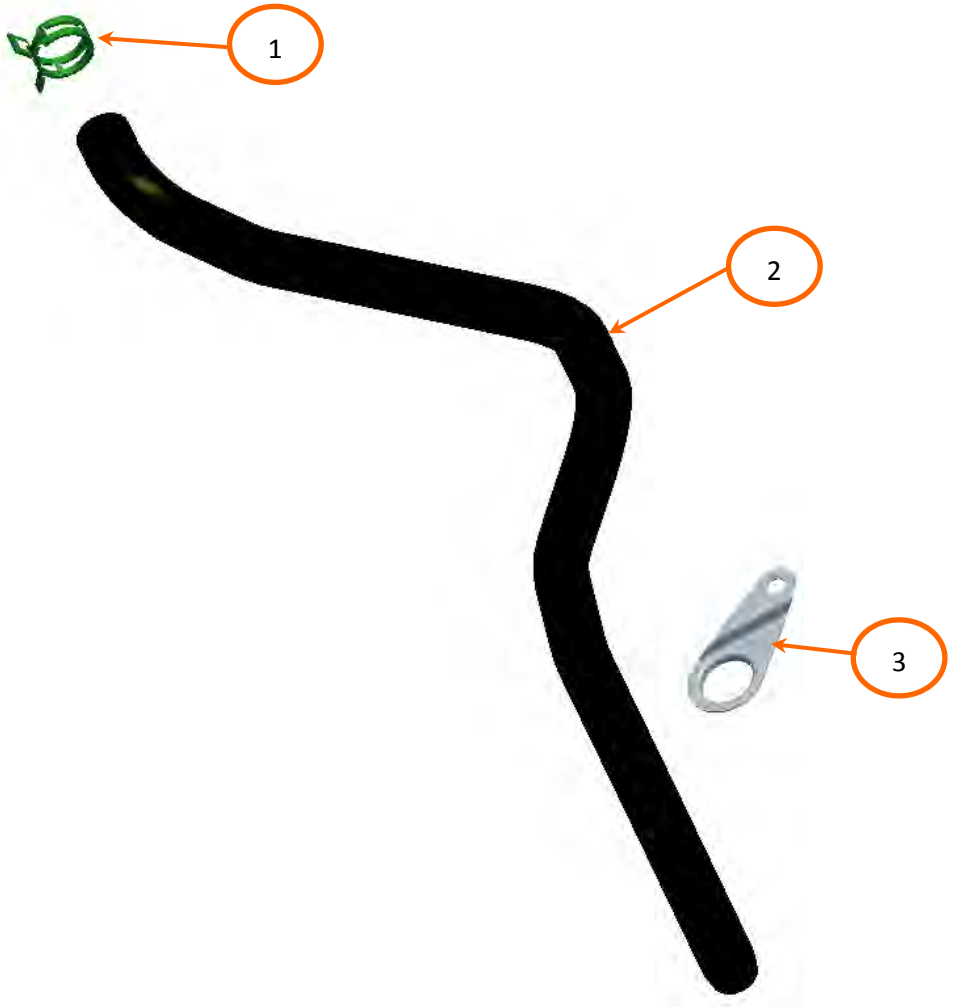
ASSY OF OIL COOLER - HAEOC19_#2					
SL.NO	**ILL.NO**	**PART NO**	**DESCRIPTION**	**QTY**	**REMARK**
1	1	FP404000	OIL COOLER	1	
2	2	F0T08611	ADAPTOR -OIL FILTER	1	
3	3	B3Z04501	COOLANT HOSE -INLET	1	
4	4	B3Z04502	COOLANT HOSE OUTLET	1	
5	5	FP000103	CLIP COOLING SYSTEM	3	
6	6	FPA00600	OIL FILTER	1	
7	7	X3105115	BANJO BOLT-04864084W	1	
8	8	X4901240	Special Washer - MM - Plain - 16mm ID X 22mm OD X 1.5mm T	2	

ENGINE THERMOSTAT ASSEMBLY – ALETH18_B



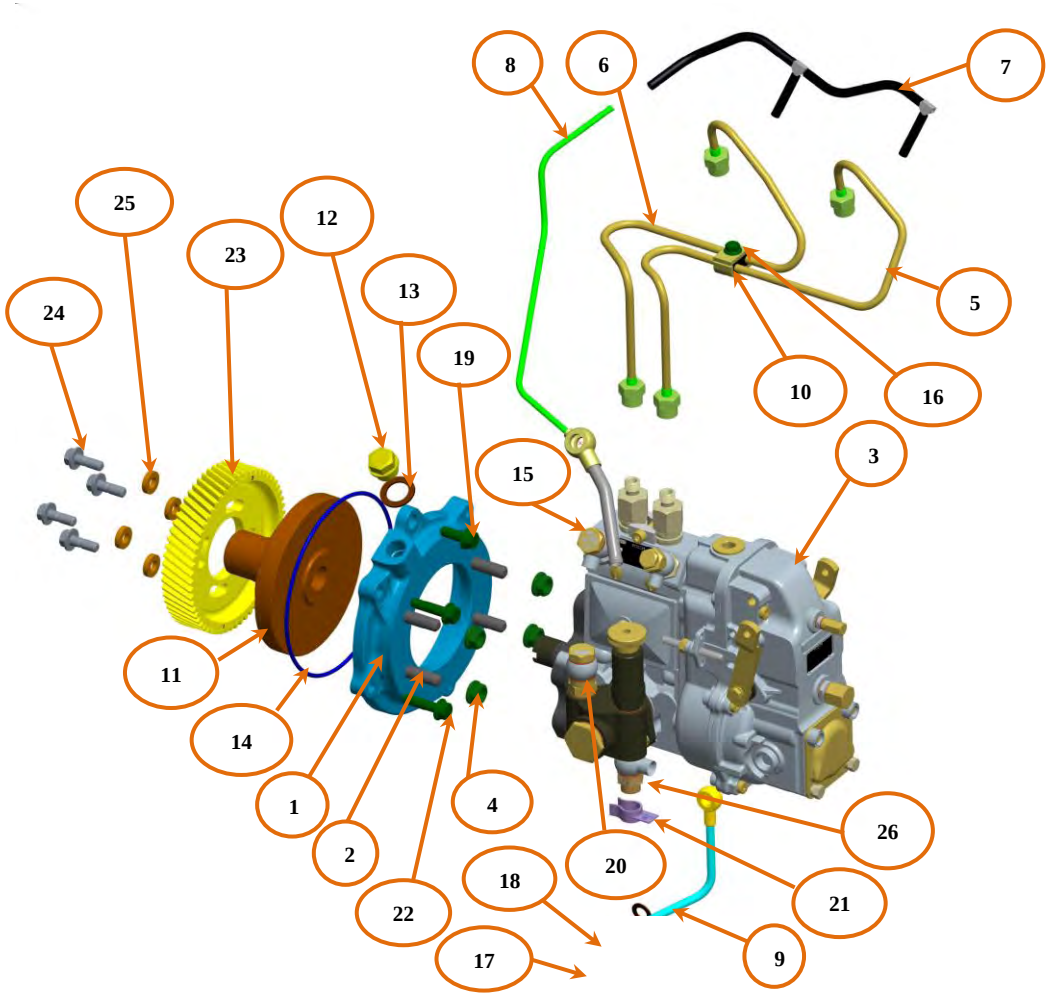
ENGINE THERMOSTAT ASSEMBLY - ALETH18_B					
SL.NO	**ILL.NO**	**PART NO**	**DESCRIPTION**	**QTY**	**REMARK**
1	1	F2701550	O RING 31.2 X 3.5	2	
2	2	L9510817	STANDARD FLANGED BOLT - HEX - M8 X 1.25 CP X 85MM LONG X GR 8.8	4	
3	3	F1825022	CASE THERMOSTAT, A-PLATFORM	1	
4	4	F1761400	GASKET THERMOSTAT	1	
5	5	F1985515	PIPE VENT	1	
6	6	L9010822	STANDARD FLANGED SCREW - HEX - M8 X 1.25 CP X 22MM LONG X G	3	
7	7	X0148515	ADAPTOR	1	
8	8	X1W00500	THERMOSTAT-MAGALTECH- H SERIES DIESEL	1	
9	8	X1W00300	THERMOSTAT-WESTERN THOMSON- H SERIES DIESEL	1	
10		F5J01942	COVER,THERMOSTAT CASE	1	
11		L9511014	STANDARD FLANGED BOLT - HEX - M10 X 1.5 CP X 70MM LONG X GR 8.8	3	
12		FJ600393	GASKET GASKET THERMOSTAT HOUSING GASKET RTUG	1	
13		X3108815	PLUG	1	

ENGINE BREATHER ASSEMBLY – ALEBH300_C



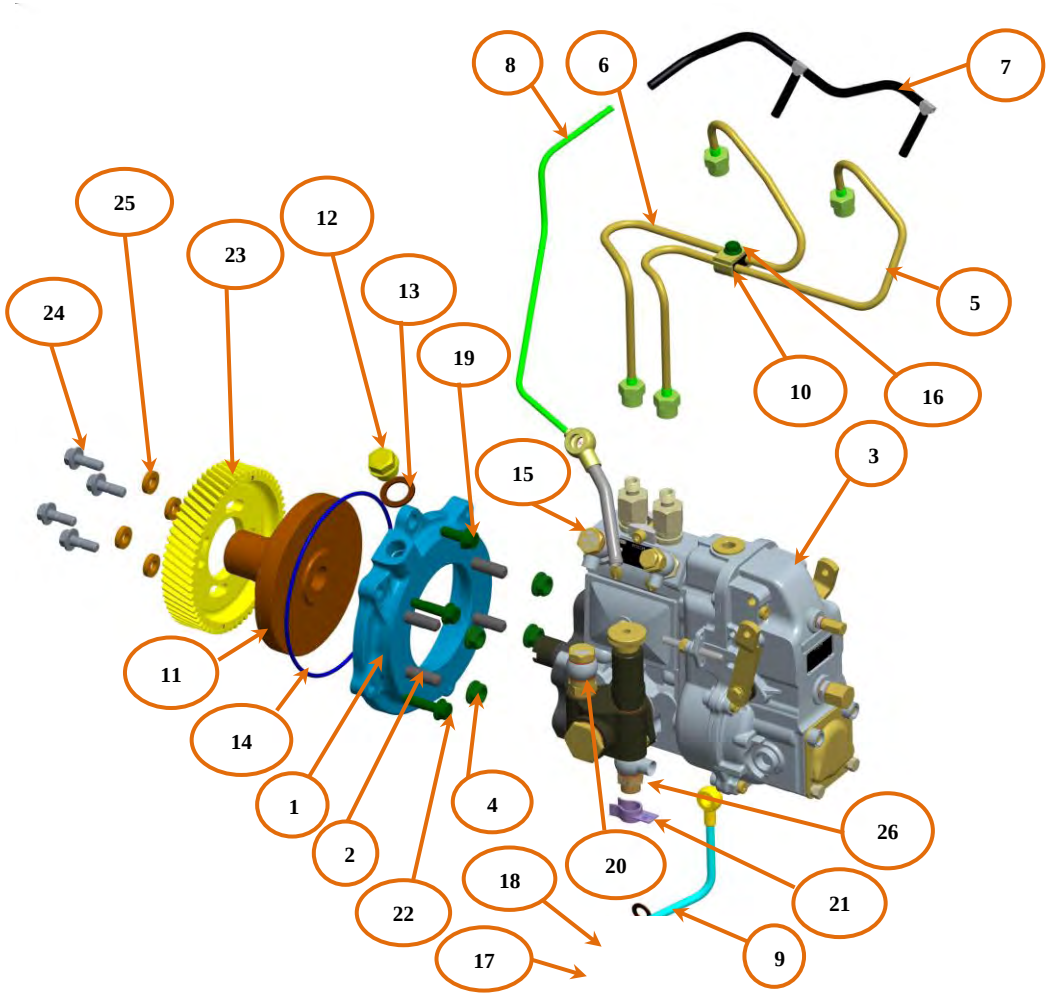
ASSY OF ENGINE BREATHER - ALEBH300_C					
SL.NO	**ILL.NO**	**PART NO**	**DESCRIPTION**	**QTY**	**REMARK**
1	1	X0807610	CLIP, SPRING BAND (25X12X1)	1	
2	2	B7015701	BREATHER HOSE WITH INNER SPRING	1	
3	3	F0837710	CLAMP - BREATHER - 4D PP	1	
4		X1407414	BRACKET BREATHING SYSTEM Oil Separator H-series	1	

ASSEMBLY OF FUEL INJECTION PUMP AND PIPES – HAFIE49_#3



ASSY OF FUEL INJECTION PUMP - HAFIE49_#3					
SL.NO	**ILL.NO**	**PART NO**	**DESCRIPTION**	**QTY**	**REMARK**
1	1	FC400422	COVER TIMER	1	
2	2	X1D00911	STUD MOUNTING	4	
3		B5H09801	S/A OF FUEL INJECTION PUMP	1	
4	3	FHL04000	FUEL INJECTION PUMP	1	
5		FJ606500	GASKET FIP	1	
6	4	L9121018	STANDARD FLANGED NUT - HEX - M10 X 1.25 FP X 10MM LONG X GR 8	4	
7		B5H09802	S/A FUEL IN PIPES	1	
8	5	B5H09803	S/A OF PIPE, INJECTOR - NO.1	1	
9	6	B5H09804	S/A OF PIPE, INJECTOR - NO.2	1	
10	7	B5H09809	S/A OF FUEL RETURN LINE	1	
11	8	B5H09812	LEAK-OFF PIPE	1	
12	9	B5H09807	S/A OIL INLET TO FUEL PUMP	1	
13	10	B7015810	S/A OF CLIP	2	
14	11	FGF00422	FLANGE FOR H2-GENSET ENGINE	1	
15	12	F3148415	PLUG	1	
16	13	F4935030	SPECIAL WASHER - MM - PLAIN - 18MM ID X 27.5MM OD X 1.5MM T	1	
17	14	F2702450	O RING 142.5 X 3	1	
18	15	F3131415	BANJO CONNECTION	2	
19	16	L9110618	STANDARD FLANGED NUT - HEX - M6 X 1 CP X 6MM LONG X GR 8	1	
20	17	F3147415	BANJO BOLT	2	
21	18	X7435600	SPECIAL WASHER - MM - PLAIN - 10MM ID X 17MM OD X 1MM T	4	
22	20	F4930430	SPECIAL WASHER - MM - PLAIN - 14MM ID X 18.9MM OD X 1.5MM T	6	
23	22	L9010832	STANDARD FLANGED SCREW - HEX - M8 X 1.25 CP X 32MM LONG X G	2	
24	23	X1608211	GEAR, INJ. PUMP DRIVE	1	
25	24	X3509410	SPECIAL FLANGED BOLT - HEX - M8 X 1.25 CP X 21.05MM LONG	4	

ASSEMBLY OF FUEL INJECTION PUMP AND PIPES – HAFIE49_#3

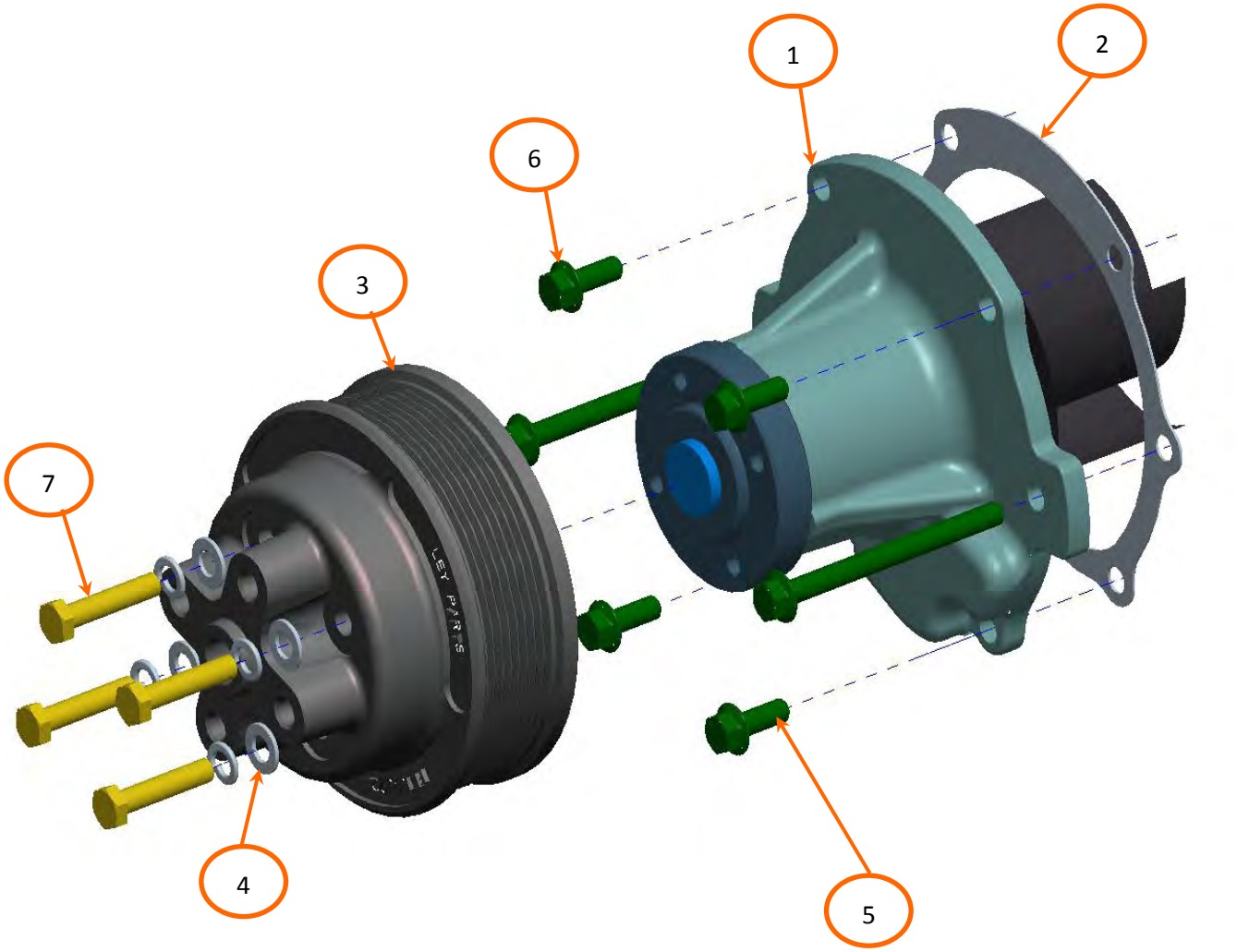


ASSY OF FUEL INJECTION PUMP - HAFIE49_#3					
SL.NO	**ILL.NO**	**PART NO**	**DESCRIPTION**	**QTY**	**REMARK**
26	25	X4904410	SPECIAL WASHER - MM - SPHERICAL - 9MM ID X 18MM OD X 4MM T	4	
27	26	X3965600	STRAINER ASSY.	1	
28		L9010822	STANDARD FLANGED SCREW - HEX - M8 X 1.25 CP X 22MM LONG	1	

ASSEMBLY OF NOZZLE HOLDER – HAENH40_#1

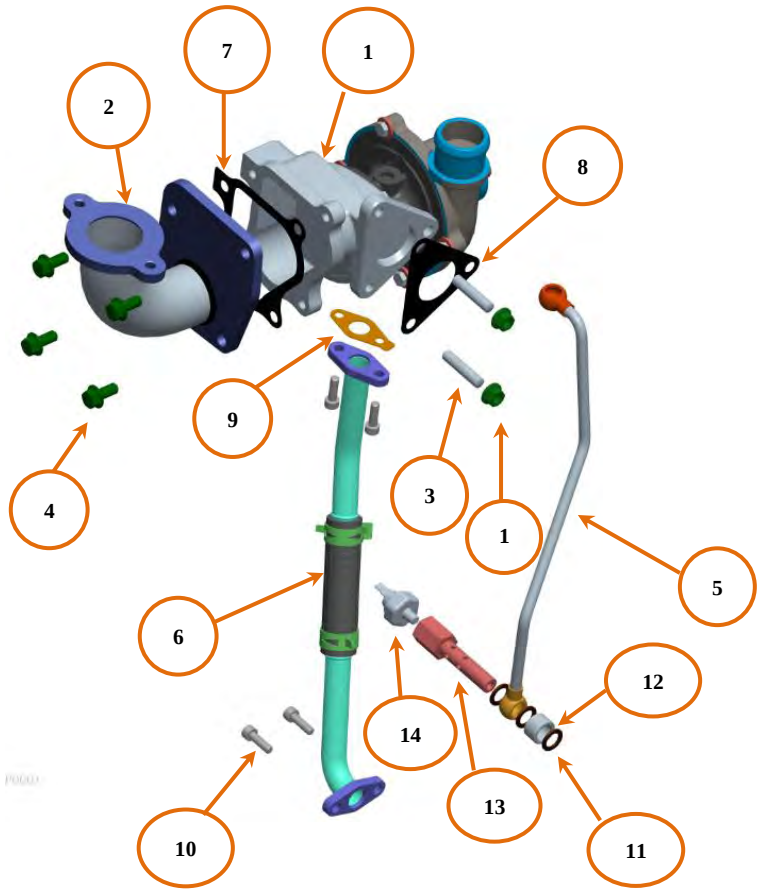
ASSY OF NOZZLE HOLDER - HAENH40_#1					
SL.NO	**ILL.NO**	**PART NO**	**DESCRIPTION**	**QTY**	**REMARK**
1	1	FKS04400	INJECTOR	2	
2	2	FKT00121	INJECTOR HOLDER	2	
3	3	X4905510	WASHER, INJECTOR CLAMP REF: IVECO DRAWING 771326	2	
4	4	L9110818	FLANGED NUT - Hex - M8 X 1.25 CP X 8mm LONG X GR 8	2	

WATER PUMP ASSEMBLY – ALEWP274_#3



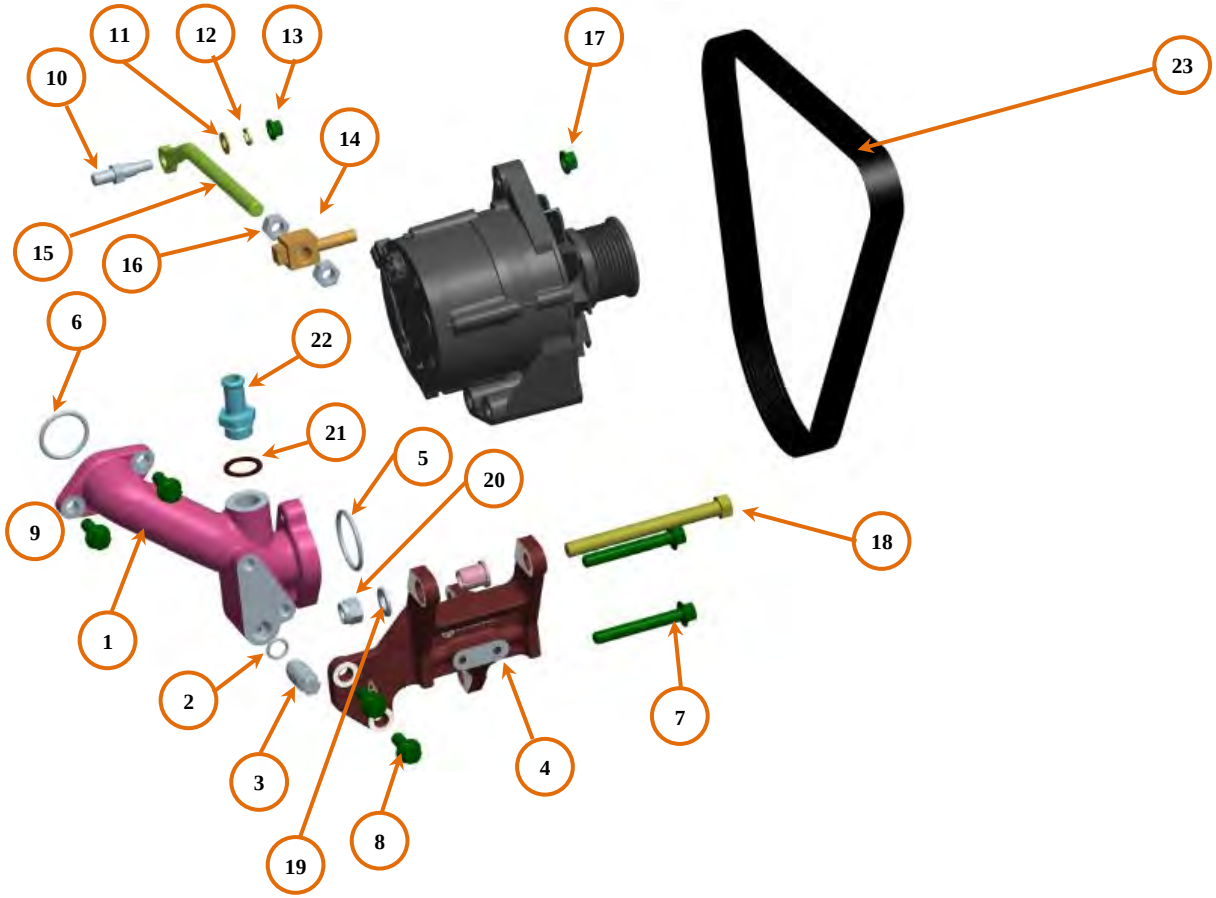
ENGINE WATER PUMP ASSEMBLY - ALEWP274_#3					
SL.NO	**ILL.NO**	**PART NO**	**DESCRIPTION**	**QTY**	**REMARK**
1	1	B7016008	WATER PUMP	1	
2	2	FJ600703	GASKET GASKET RTUG	1	
3	3	FBT00222	PULLEY-COOLANT PUMP .	1	
4	4	L4010800	STANDARD WASHER - PLAIN - M8	4	
5	5	L9510819	STANDARD FLANGED BOLT - HEX - M8 X 1.25 CP X 95MM LONG X GR 8.8	2	
6	6	L9010822	STANDARD FLANGED SCREW - HEX - M8 X 1.25 CP X 22MM LONG X G	4	
7	7	L1010808	STANDARD BOLT - HEX - M8 X 1.25CP X 40MM LONG X GR 8.8	4	
8		L4110800	STANDARD WASHER - SINGLE COIL - M8	4	

ASSEMBLY OF TURBO CHARGER – HAESC55_A



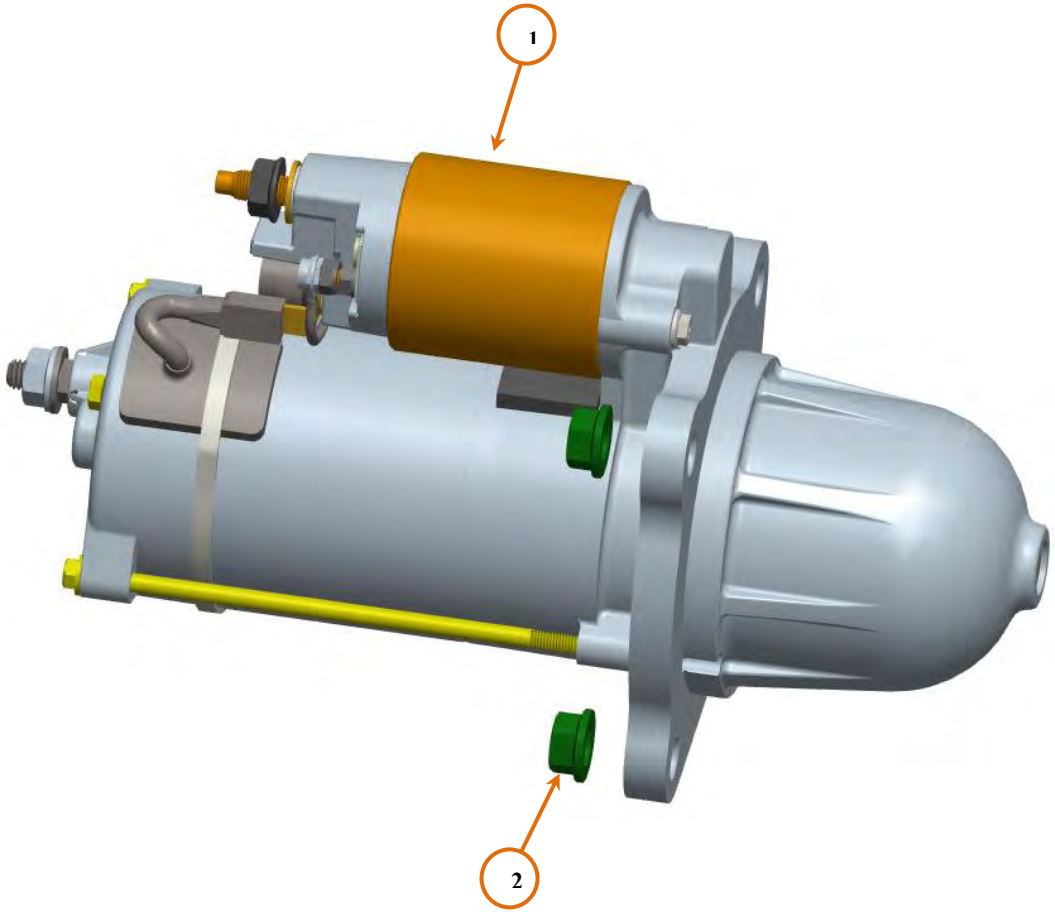
ASSY OF TURBOCHARGER - HAESC55_A					
SL.NO	**ILL.NO**	**PART NO**	**DESCRIPTION**	**QTY**	**REMARK**
1	1	X3M02900	TURBOCHARGER, H2 ENGINE	1	
2	2	FF301822	PIPE-ENGINE EXHAUST	1	
3	3	F3782115	STUD-TC MTG ON EMF	4	
4	4	L9010618	STANDARD FLANGED SCREW - HEX - M6 X 1 CP X 18MM LONG X GR 8.8	4	
5	5	B4K14401	S/A OF TC OIL INLET PIPE	1	
6	6	B4K14402	S/A OF TC DRAIN PIPE	1	
7	7	F7Y00310	GASKET- TC OUTLET	1	
8	8	FG500310	SPACER FOR TURBO MOUNTING	1	
9	9	F1772700	GASKET - TC OIL DRAIN FLANGE	2	
10	10,11	X4904810	SPECIAL WASHER - MM - PLAIN - 9MM ID X 17MM OD X 2.3MM T	7	
11	12	F1296815	FERRULE - DISTANCE PIECE	1	
12	13	FL300215	ADAPTOR, PRESSURE SENSOR	1	
13	14	X7809300	PRESSURE SENDER	1	
14	15	X3504011	SPECIAL NUT - HEX - M8 X 1.25CP X 6.8MM LONG X GR	7	
15		X7435600	SPECIAL WASHER - MM - PLAIN - 10MM ID X 17MM OD X 1MM T	2	
16		X4901530	SPECIAL WASHER - MM - PLAIN - 12MM ID X 18MM OD X 1.5MM T	2	

ASSEMBLY OF ALTERNATOR – ALDD154_#3



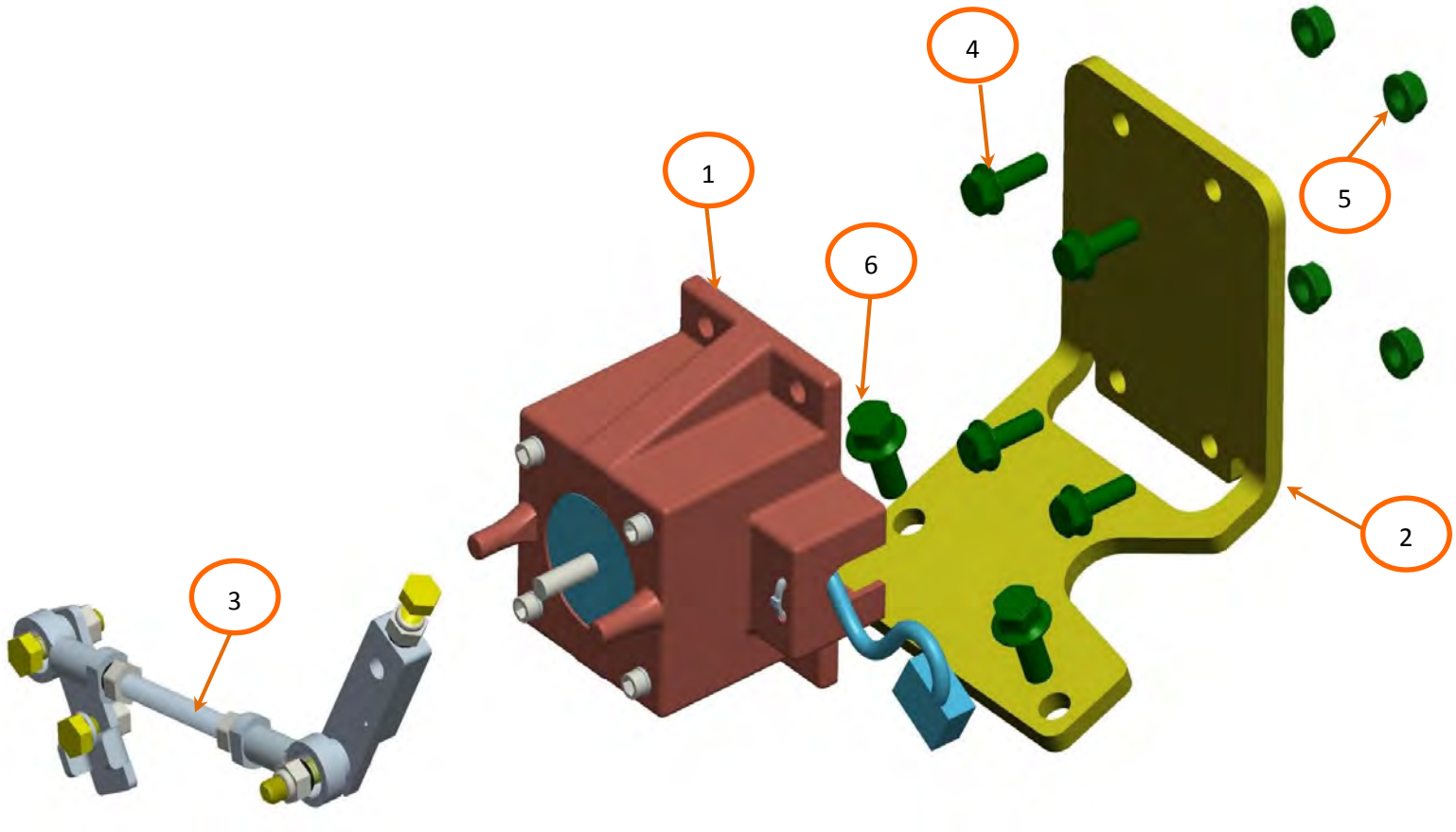
ASSY OF DYNOMO DRIVE, H2 ENGINE - ALDD154_#3					
SL.NO	**ILL.NO**	**PART NO**	**DESCRIPTION**	**QTY**	**REMARK**
1	1	FBR00322	COOLANT PIPE	1	
2	2	F2701850	O RING 13.8 X 2.4	1	
3	3	X4202111	VALVE (COOLANT ELBOW)	1	
4	4	B9716201	SUB ASSY OF ALTERNATOR BRACKET X7103422 WITH BUSH F0535915	1	
5	5	F2701650	O RING 43.7 X 3.5	2	
6	6	FA401358	O RING	1	
7	7	L9511015	STANDARD FLANGED BOLT - HEX - M10 X 1.5 CP X 75MM LONG X GR 8.8	2	
8	8	L9011025	STANDARD FLANGED SCREW - HEX - M10 X 1.5 CP X 25MM LONG X G	4	
9	9	F0C00400	ALTERNATOR 12 V 35	1	
10	10	F3583015	SPECIAL SCREW	1	
11	11	F4923000	WASHER,PLAIN REF.S	1	
12	12	F4922600	SPRING WASHER FOR ABOVE	1	
13	13	L9110818	STANDARD FLANGED NUT - HEX - M8 X 1.25 CP X 8MM LONG X GR 8	1	
14	14	F0130711	ADAPTOR	1	
15	15	F3570911	SPECIAL BOLT - L-BEND LINK - M12 X 1.75 CP X 230MM LONG X GR	1	
16	16	L3011218	STANDARD NUT - HEX - M12 X 1.75 CP X 10.8MM LONG X GR 8	2	
17	17	L9111018	STANDARD FLANGED NUT	1	
18	18	F3572711	SPECIAL BOLT - HEX - M12 X 1.75 CP X 130MM LONG X GR	1	
19	19	L4011200	STANDARD WASHER - PLAIN - M12	1	
20	20	L3611218	STANDARD NUT - NYLOC - M12 X 1.75 CP X 14.9MM LONG X GR 8	1	
21	21	F4911800	SPECIAL WASHER - MM - PLAIN - 22.86MM ID X 30.48MM OD X 1.588MM T	1	
22	22	F0130815	NIPPLE	1	
23	23	X0301650	BELT, 8PK 1250 (FENNER)	1	

ASSEMBLY OF STARTER MOTOR – ALSM46_#



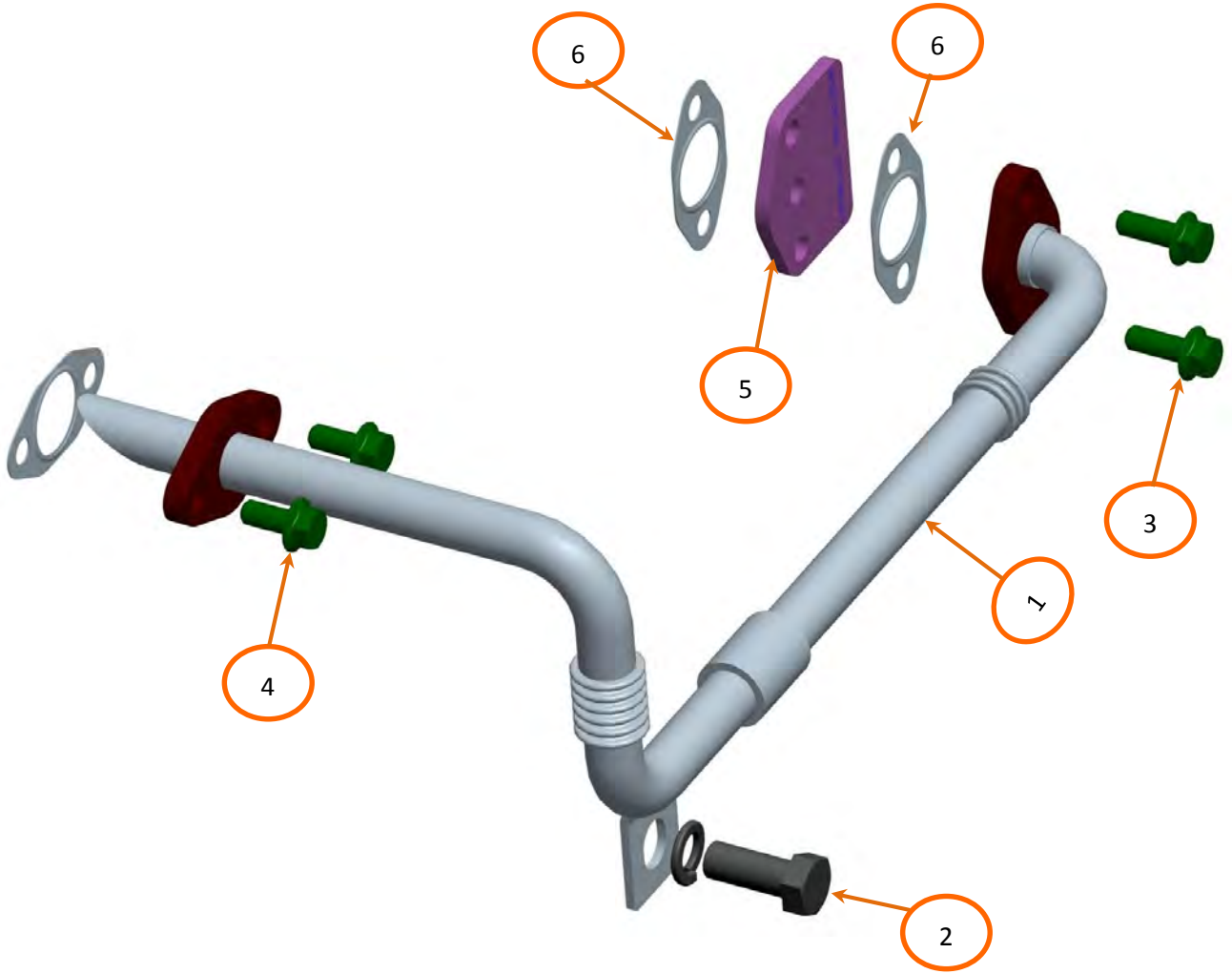
ASSY OF STARTER MOTOR - ALSM46_#					
SL.NO	**ILL.NO**	**PART NO**	**DESCRIPTION**	**QTY**	**REMARK**
1	1	FH000190	12V 2.5kW GEAR REDUCTION STARTER MOTOR with TCO	1	
2	2	L9121018	FLANGED NUT - Hex - M10 X 1.25 FP X 10mm LONG X GR 8	3	

FUEL PUMP CONTROL UNIT WITH SEDEMAC – ALECP17_#



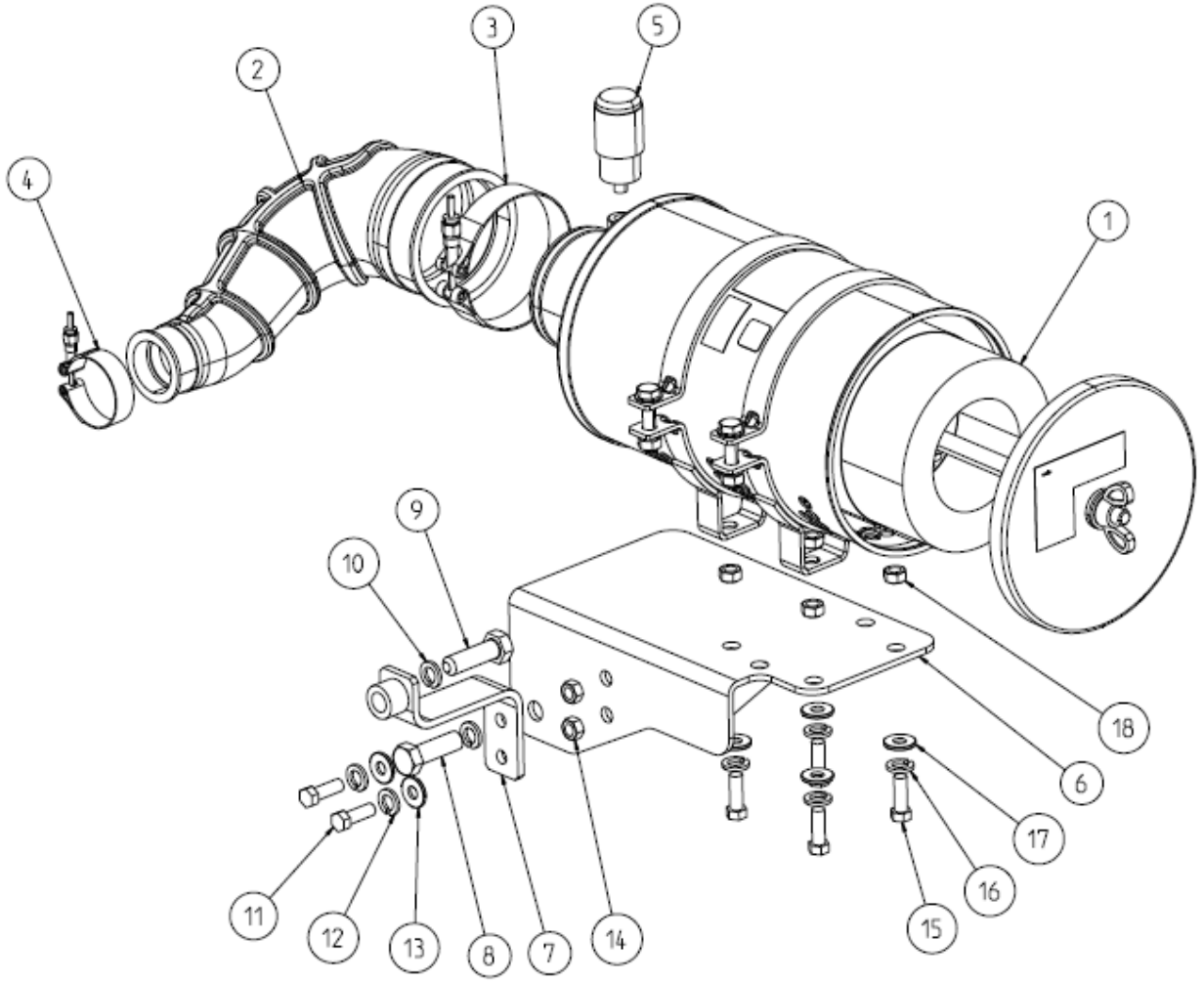
PUMP CONTROL UNIT WITH SEDEMAC CONTROLLER FOR 15KVA ENGINE_ALEPC17_#					
SL.NO	**ILL.NO**	**PART NO**	**DESCRIPTION**	**QTY**	**REMARK**
1	1	F0A02300	ACTUATOR (SEDEMAC MAKE)	1	
2	2	F5M00214	BRACKET-ECU ACTUATOR	1	
3	3	B4E01001	ACTUATOR LINKAGE	1	
4	4	L9010620	STANDARD FLANGED SCREW - HEX - M6 X 1 CP X 20MM LONG X GR 8.8	4	
5	5	L9110618	STANDARD FLANGED NUT - HEX - M6 X 1 CP X 6MM LONG X GR 8	4	
6	6	L9010820	STANDARD FLANGED SCREW - HEX - M8 X 1.25 CP X 20MM LONG X GR 8.8	2	

EXTERNAL EGR SYSTEM – HAEGR7_#1



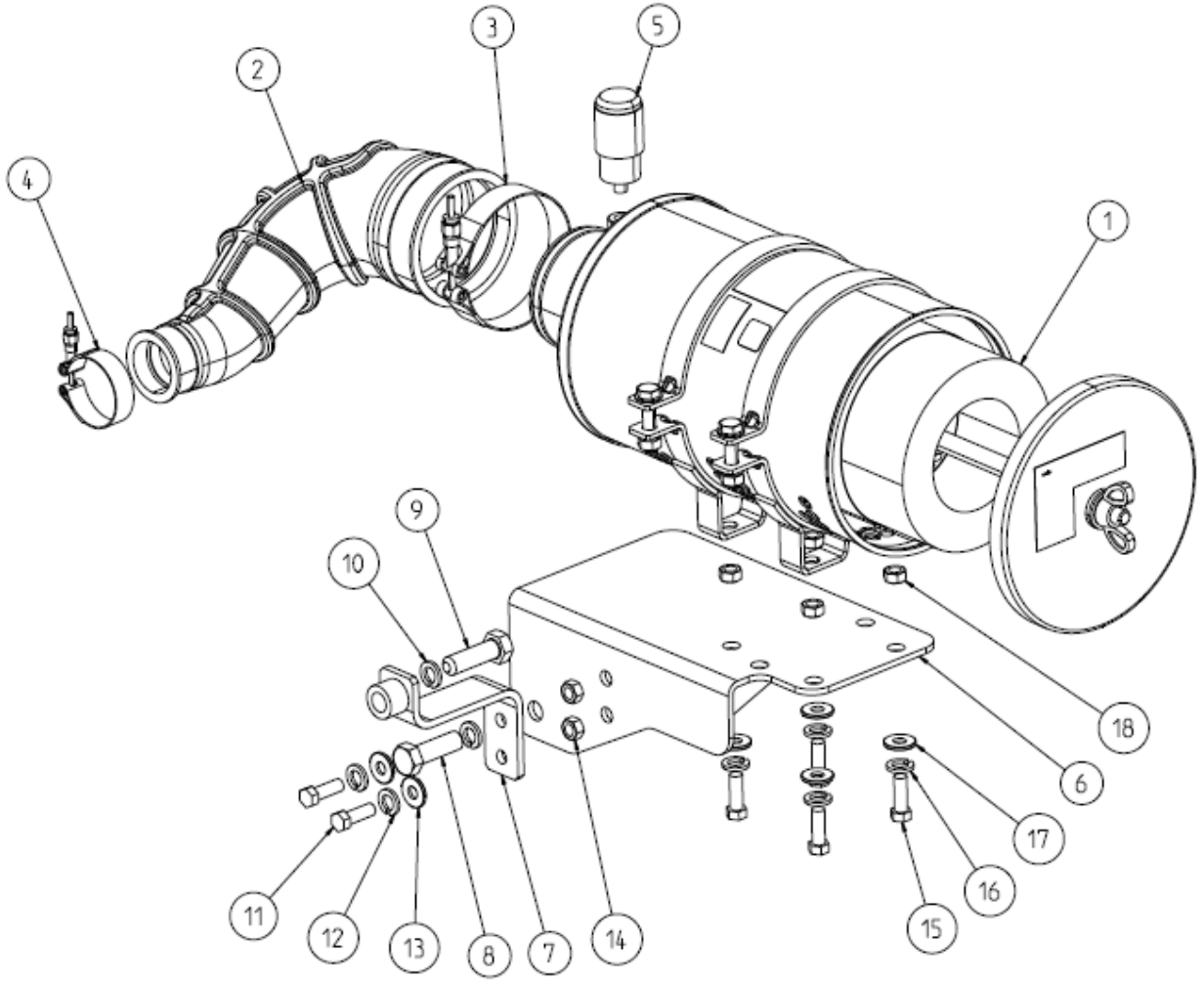
EXTERNAL EGR SYSTEM FOR H2-25 AND 30 KVA ENGINE - HAEGR7_#1					
SL.NO	**ILL.NO**	**PART NO**	**DESCRIPTION**	**QTY**	**REMARK**
1	1	B2G03101	EXTERNAL EGR FOR H2 GENSET ENGINE	1	
2	2	L2011230	STANDARD SCREW - HEX - M12 X 1.75 CP X 30MM LONG X GR 8.8	1	
3	3	L9010822	STANDARD FLANGED SCREW - HEX - M8 X 1.25 CP X 22MM LONG X GR 8.8	2	
4	4	L9010818	STANDARD FLANGED SCREW - HEX - M8 X 1.25 CP X 18MM LONG X GR 8.8	2	
5	5	FS415314	PLATE ORIFICE	1	
6	6	FJ605800	GASKET - EGR VALVE INLET	3	
7	7	L4111200	STANDARD WASHER - SINGLE COIL - M12	1	

H2-30/25/20kVA AL2CTIDG1/AL2CTIDG2/AL2CTDG1 ENGINE AIS KIT ASSLY



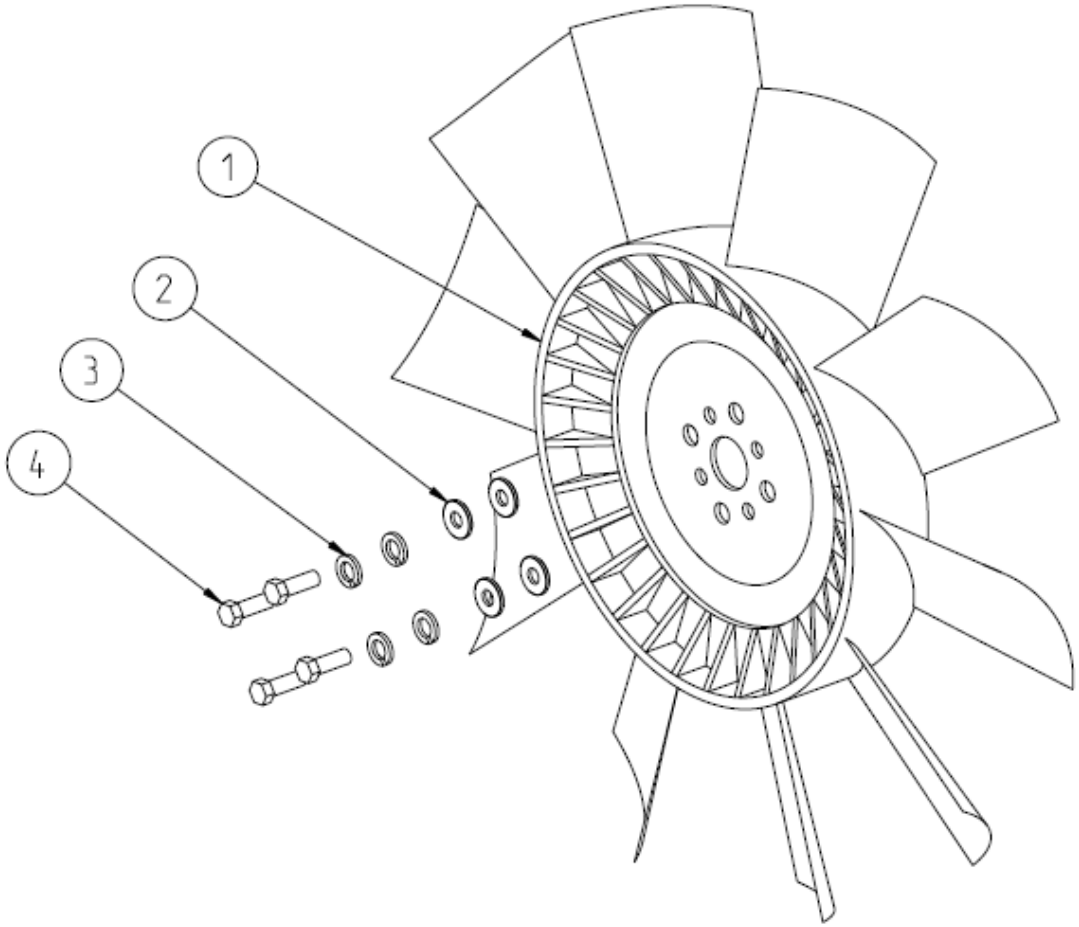
AIR INTAKE SYSTEM ASSEMBLY - 10009092					
SL.NO	**ILL.NO**	**PART NO**	**DESCRIPTION**	**QTY**	**REMARK**
1		10009092	AIR INTAKE SYSTEM	1	
2		10005529	AIR CLEANER ASSY - H2 - 15KVA	1	
3	1	P7B00017	PRIMARY AIR FILTER ELEMENT	1	
4	2	10009855	Hose Reducer Degree	1	
5	3	X3901010	Hose Clamp, T Bolt	1	
6	4	10009856	Hose Clamp, T Bolt	1	
7	5	F8W00300	Restriction Indicator	1	
8	6	10009535	Bracket Air Cleaner Mounting	1	
9	7	F1E01414	BRACKET - AIR FILTER MOUNTING	1	
10	8	L2011225	SCREW M12 X 25 X 1.75 CP PLATED	1	
11	9	L2011235	SCREW M12 X 35 X 1.75 CP PLATED	1	
12	10	L4111200	SC WASHER 12 DIA PLATED	2	
13	11	L2010825	SCREW M8 X 25 X 1.25 CP PLATED	2	
14	12	L4110800	SC WASHER 8 DIA PLATED	2	
15	13	L4010800	PLAIN WASHER 8MM	2	
16	14	L3010818	NUT M8 X PC 8 X 1.25 CP PLATED	2	
17	15	L2011025	SCREW M10 X 25 X 1.5 CP PLATED	4	
18	16	L4111000	SC WASHER 10 DIA PLATED	4	
19	17	L4011000	PLAIN WASHER 10MM	4	
20	18	L3011018	PLAIN NUT M10X1.5	4	

H2-30/25/20kVA AL2CTIDG1/AL2CTIDG2/AL2CTDG1 ENGINE AIS KIT ASSLY



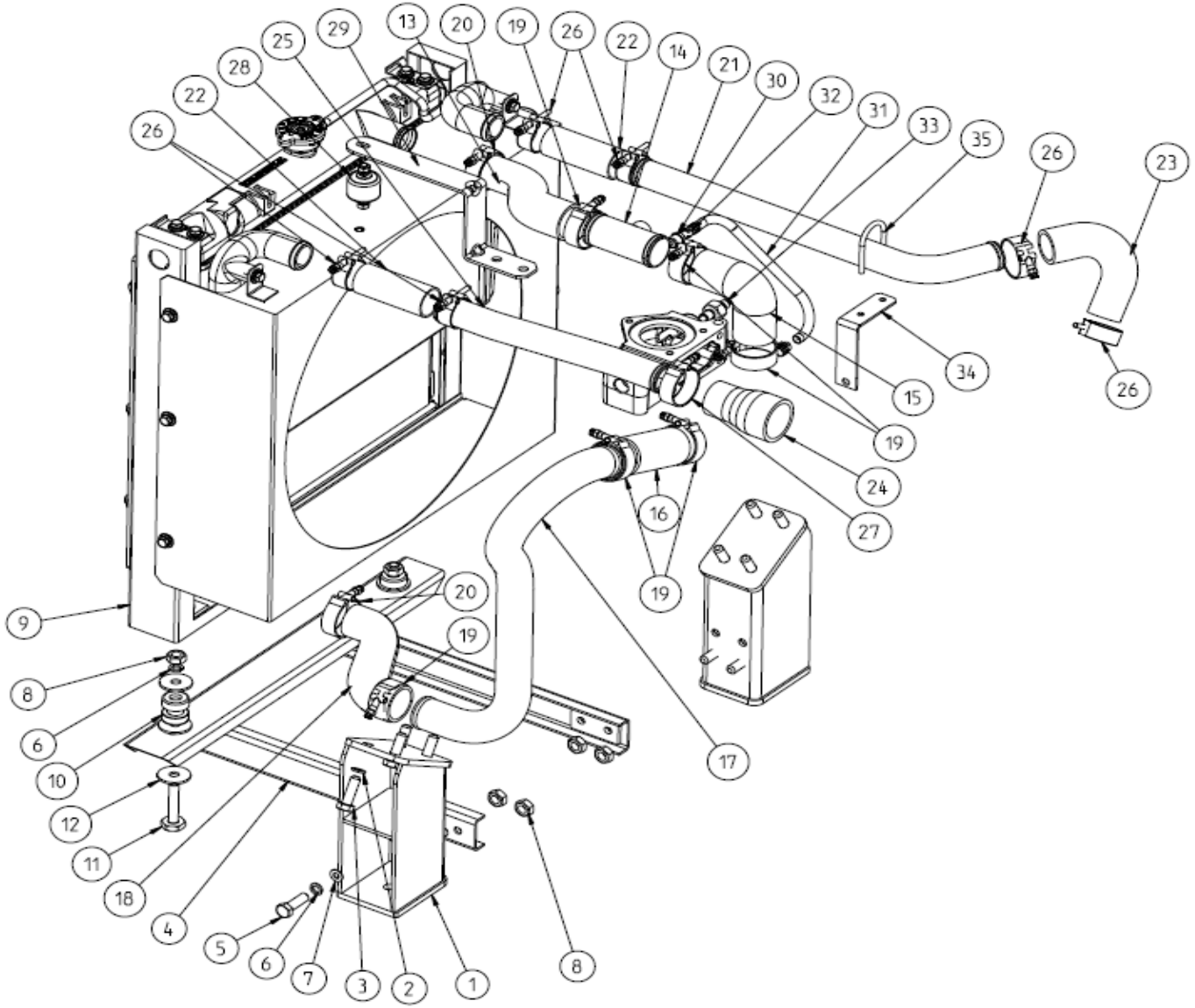
FUEL FILTER ASSEMBLY - 10009395					
SL.NO	**ILL.NO**	**PART NO**	**DESCRIPTION**	**QTY**	**REMARK**
1	1	10009531	FUEL FILTER MOUNTING BRACKET	1	
2	2	L2010825	SCREW - M8 X 25 X 1.25 CP PLATED	2	
3	3	L4110800	SC WASHER 8 DIA PLATED	2	
4	4	L4010800	PLAIN WASHER 8MM	2	
5	5	10009395	FUEL FILTER CUM WATER SEPARATOR ASSY	1	
6	6	10009873	SPIN ON FUEL FILTER	1	
7	7	L2011035	SET SCREW - M10 X 1.5 X 35	2	
8	8	L4111000	SC WASHER 10 DIA PLATED	2	
9	9	L4011000	PLAIN WASHER 10MM	2	
10	10	B3J00501	HOSE FUEL FEED PUMP TO FILTER AND FILTER TO FIP	2	
11	11	F3590715	BANJO BOLT - M12	2	
12	12	04858607W	WASHER 18 OD X 12.2 ID X 1.5 T	4	
13		F8824500	FUEL STRAINER	1	
14		10001378	AL 485 FSKL-HOSE (TANK TO STRAINER) (800mm)	1	
15		10001379	AL 485 FSKL-HOSE Strainer to FEED PUMP	1	
16		B3J00503	HOSE FUEL RETURN	1	
17		F8200110	JUPITER HOSE CLAMP	3	
18		F8474714	STRAINER BRACKET	1	
19		F0804814	C - CLAMP	1	
20		L2010615	SET SCREW - M6 X 1 X 15	2	
21		L3010618	NUT M6 X PC 8 X 1 CP PLATED	2	
22		L4110600	SC WASHER 6 DIA PLATED	2	
23		L4110600	SC WASHER 6 DIA PLATED	2	

H2-30/25 AL2CTIDG1/AL2CTIDG2 FAN ASSLY



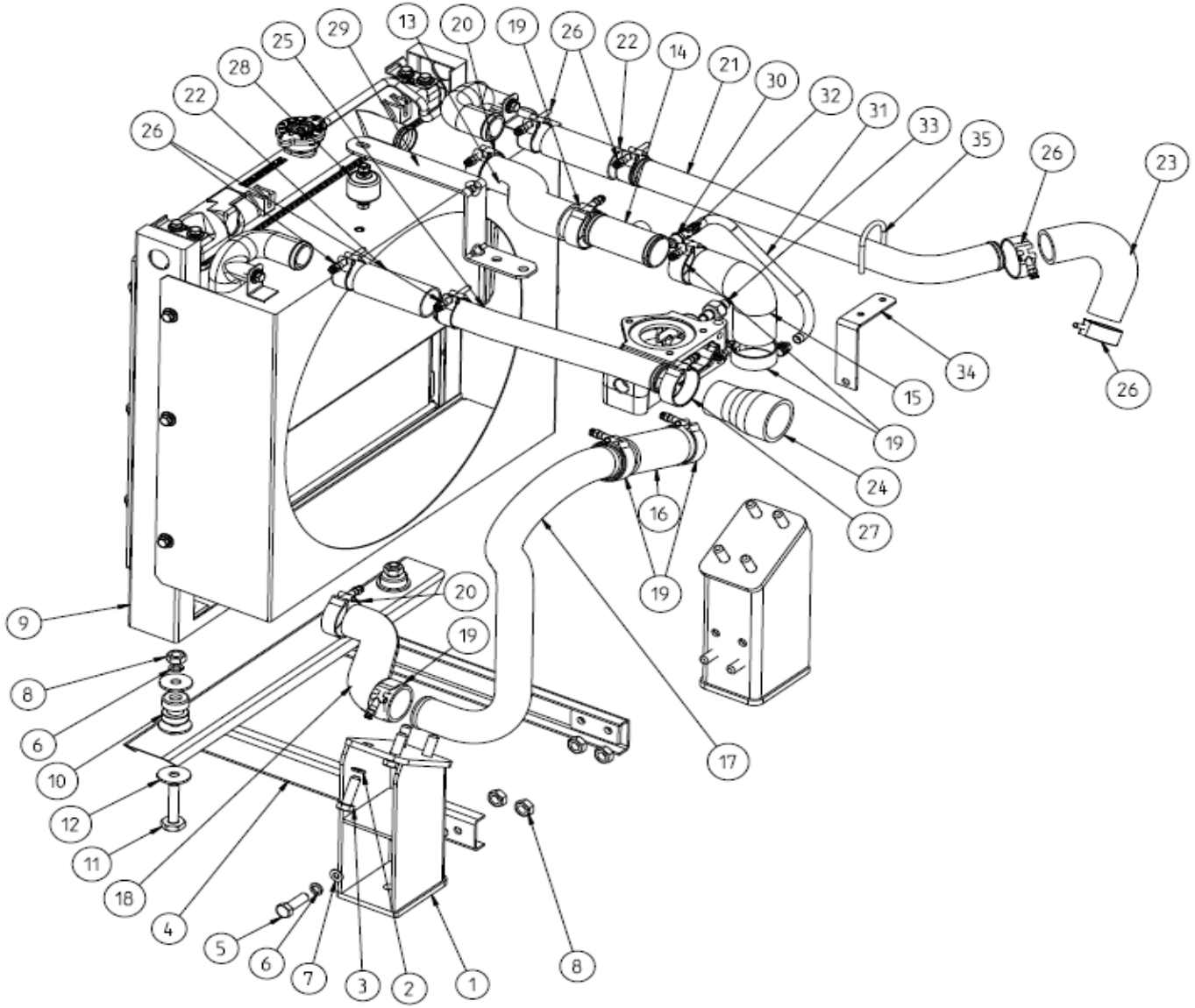
FAN ASSEMBLY_10003405					
SL.NO	**ILL.NO**	**PART NO**	**DESCRIPTION**	**QTY**	**REMARK**
1	1	10003405	18.5" 10 BLADED PUSHER PLASTIC FAN	1	
2	2	L4011000	PLAIN WASHER - 10MM	4	
3	3	L4111000	SC WASHER 10 DIA PLATED	4	
4	4	L2021025	SET SCREW M10 X 1.25 X 25	4	

H2-30kVA AL2CTIDG1 RADIATOR AND ACCESSORIES



RADIATOR ASSEMBLY - 10009336					
SL.NO	**ILL.NO**	**PART NO**	**DESCRIPTION**	**QTY**	**REMARK**
1	1	10009338	ENGINE MOUNTING BRACKET	2	
2	2	L4111200	SC WASHER 12 DIA PLATED	8	
3	3	L2011230	SCREW M12 X 30 X 1.75 CP PLATED	8	
4	4	10009533	RADIATOR MOUNTING BRACKET	1	
5	5	L2011035	SETSCREW M10X1.5X35	4	
6	6	L4111000	SC WASHER 10 DIA PLATED	6	
7	7	L4011000	PLAIN WASHER 10MM	4	
8	8	L3011018	PLAIN NUT M10X1.5	6	
9	9	10009336	RADIATOR CUM CAC	1	
10	10	10000223	AVM-RADIATOR -CORI RUBBER	2	
11	11	L1011012	BOLT - M10X1.5X60	2	
12	12	10000251	ENGINE RADIATOR AVM WASHER 10M	6	
13	13	F8P06750	HOSE S - BEND WATER OUTLET PIPE TO RAD INLET	1	
14	14	10009340	PIPE EMGOME WATER OUTLET	1	
15	15	F8P10058	L - HOSE RADIATOR PIPING	1	
16	16	F8P13558	STRAIGHT HOSE RADIATOR PIPING	1	
17	17	F8638610	PIPE RADIATOR OUT TO ENGINE INLET	1	
18	18	F8P06650	HOSE S - BEND RADITOR OUT TO PIPE	1	
19	19	F0803400	WORM DRIVE CLIP	6	
20	20	10000713	HOSE CLAMP	2	
21	21	10009343	PIPE CAC IN	1	
22	22	10001487	STRAIGHT SILICON HOSE	2	
23	23	10009344	BEND HOSE - TURBO OUT	1	
24	24	10009534	HOSE REDUCER - CAC	1	
25	25	10009342	PIPE CAC OUT	1	

H2-30kVA AL2CTIDG1 RADIATOR AND ACCESSORIES



RADIATOR ASSEMBLY - 10009336					
SL.NO	**ILL.NO**	**PART NO**	**DESCRIPTION**	**QTY**	**REMARK**
26	26	10000713	HOSE CLAMP	7	
27	27	F0803400	WORM DRIVE CLIP	1	
28	28	F2602158	RADIATOR BUFFER WITH NUTS	1	
29	29	10007760	RADIATOR STAY BRACKET	1	
30	30	X0148515	ADAPTOR VENT	1	
31	31	F1927650	VENT HOSE	1	
32	32	F8200110	JUPITOR HOSE CLAMP	2	
33	33	10007350	TEMPERATURE SENSOR CUM SWITCH	1	
34	34	10010234	L -BRACKET CAC PIPE SUPPORT	1	
35	35	10000182	U-CLAMP	1	
36		L4110800	SC WASHER - 8 DIA PLATED	2	
37		L3010818	NUT - M8 x 1.25 CP PLATED	2	

PSB SUNDRIES ITEMS

PSB SUNDRIES ITEMS					
SL.NO	**ILL.NO**	**PART NO**	**DESCRIPTION**	**QTY**	**REMARK**
1		10009491	WIRING HARNESS - 30 KVA	1	
2		10009463	GENSET CONTROLLER - GC 902	3	
3		F8P04550	EXTENDED BREATHER HOSE	1	
4		FB506400	CONNECTOR PIPE	1	
5		F0831310	ZERO CLIP	2	
6		10009722	EXPANSION BELLOW	1	

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