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Distribution list Jenbach, Subsidiaries, Service Providers		
Service Technician Instruction	ST-178	23 March 2017

Engine type **J612-F, J616-F, J620-F**

Subject **Crankcase ventilation**
Conversion from Generation 2 to Generation 3

The purpose of Service Technician Instruction ST-178 is to explain the modification to the crankcase ventilation consisting of new filter housings with replaceable filter elements.

PURPOSE OF THIS BULLETIN / NEED FOR ACTION

No need for proactive action, i.e. if the filter elements are to be modified on one of the above engines, ST-178 can be used as an aid for organising and carrying out the work.

AFFECTED ENGINES / SCOPE OF THIS BULLETIN

Type J612-F, J616-F and J620-F engines equipped with 'the new crankcase ventilation but still fitted with the old version of the filter housing. Figure 1 shows the design of the new and old blow-by filter housings to illustrate the differences. The green components remain unchanged as part of the modification.

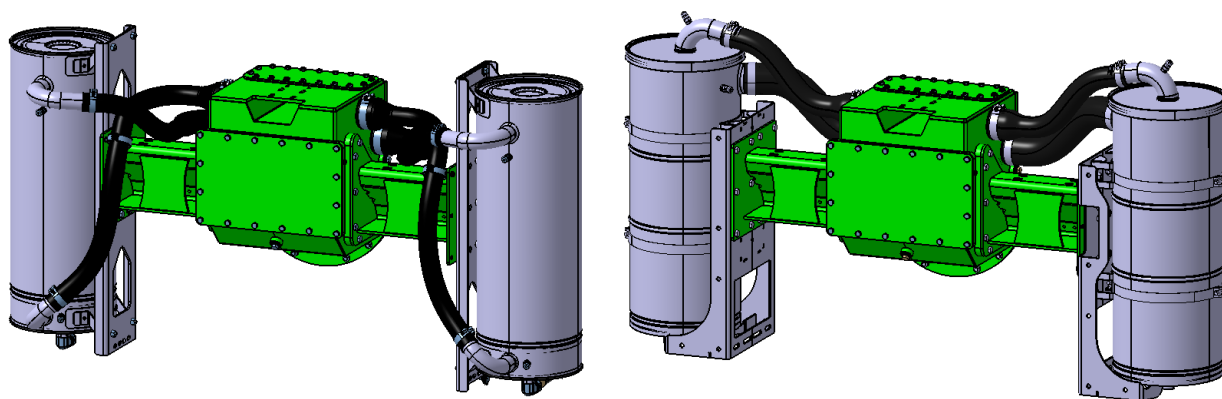


Figure 1: Comparison of the old and new blow-by filter housings

In Figure 1 left, the crankcase ventilation of Generation 2 is pictured. This version uses so-called "interchangeable" filters as it is known (filter housing with filter element bonded inside). In Figure 1, right the crankcase ventilation of Generation 3 is pictured. This version uses replaceable filter elements, which allow the filter elements to be replaced without having to remove or replace the filter housings.

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Contents

1	OVERVIEW OF THE CRANKCASE VENTILATION SYSTEMS.....	3
1.1	Generation 1.....	3
1.2	Generation 2.....	3
1.3	Generation 3.....	4
1.4	Generation 3 Light.....	4
2	DESCRIPTION OF THE CONTENT	5
3	REPLACEMENT PROCEDURE.....	8
3.1	Removing the old hoses	8
3.2	Removing the old filter housings.....	10
3.3	Removing the old filter brackets	11
3.4	Fitting the rubber buffers.....	12
3.5	Fitting the new filter brackets	13
3.6	Fitting the hoses (Ø60 and Ø90)	14
3.7	Fitting the new filter housings.....	15
3.8	Fitting the heavy-duty hose clamps to secure the filter housings	16
3.9	Installing the filter elements	17
3.10	Fitting the cover	18
3.11	Fitting the oil return line	20
3.12	Fitting the measuring connections.....	20
3.13	Cutting the insulation to fit	21
3.14	Fitting the insulation	22
4	PARTS LIST 9016169 FOR THE upgrade kit	23
4.1	General view of the items in the upgrade kit, part no. 9016169	25
5	MISCELLANEOUS	26
5.1	Required time.....	26
5.2	Relevant documents.....	26
5.3	Revision history	26
6	LIST OF FIGURES	27



1 OVERVIEW OF THE CRANKCASE VENTILATION SYSTEMS

In order to make them more easily identifiable, different versions of the crankcase ventilation for our Type 6 engines have with immediate effect been given specific generation names (numbering), starting with the Generation 1 shown in Figure 2.

1.1 Generation 1

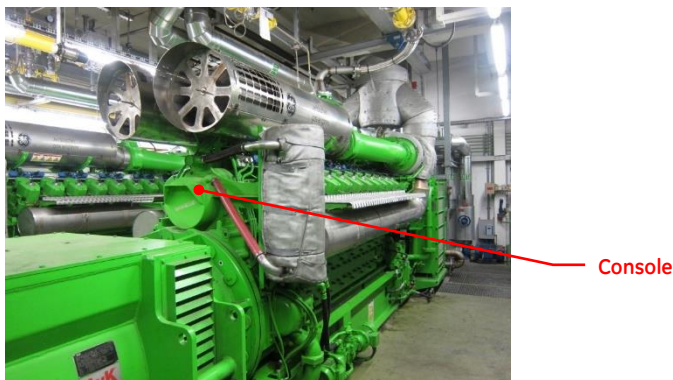


Figure 2: Generation 1

The crankcase ventilation shown in Figure 2 represents Generation 1 of the Type 6 engine crankcase ventilation. It only has a single blow-by filter, regardless of the number of cylinders (J612, J616, J620). When the filter has reached the end of its service life, the "interchangeable" filter as it is known (filter housing with filter element bonded inside), must be replaced. Moreover, Generation 1 does not have a preliminary separator, only a simple console.

1.2 Generation 2



Figure 3: Generation 2

The crankcase ventilation shown in Figure 3 represents Generation 2 of the Type 6 engine crankcase ventilation. This is fitted with two blow-by filters. When the filter has reached the end of its service life, the "interchangeable" filter as it is known (filter housing with filter element bonded inside), must be replaced. Generation 2 is fitted with a preliminary separator which also acts as mounting for the filters.



1.3 Generation 3

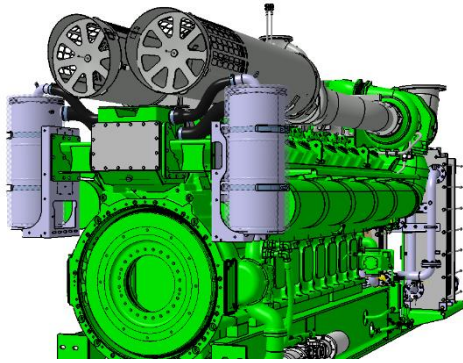


Figure 4: Generation 3

The crankcase ventilation shown in Figure 4 represents Generation 3 of the Type 6 engine crankcase ventilation. Compared with Generation 2 crankcase ventilation, it is fitted with a preliminary separator and filter housings with replaceable filter elements, which allow the filter elements to be replaced without having to remove or replace the filter housings.

1.4 Generation 3 Light

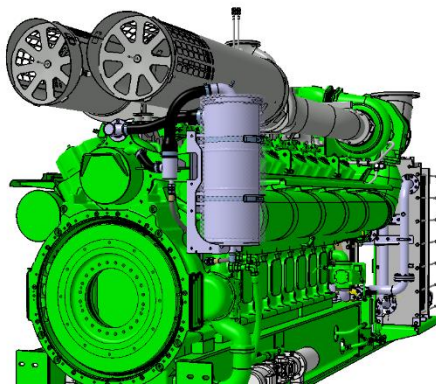


Figure 5: Generation 3 Light

The crankcase ventilation shown in Figure 5 represents Generation 3 Light of the Type 6 engine crankcase ventilation. This is a retrofit solution or modification for Generation 1 crankcase ventilation, in which the Generation 1 interchangeable filter has been replaced by a Generation 3 filter housing. This then subsequently allows the filter element to be replaced without having to remove or replace the filter housing. No preliminary separator is retrofitted, and the number of blow-by filters (1) remains unchanged. This solution is never used in new plants.



2 DESCRIPTION OF THE CONTENT

As part of the continuous development of our products, new plants featuring Type 6 engines have recently begun to be fitted with an improved version of the blow-by filter housing. Before the introduction of the new blow-by filter housing with a detachable cover for replacing the filter element, the entire blow-by filter housing including the bonded filter element had to be replaced.

The new design with the detachable cover allows the filter element to be quickly and efficiently replaced when necessary.

Your attention is drawn to the following changes:

- **Detachable cover**
For replacing the filter element, in other words it is no longer necessary to replace the entire filter housing (the old filter element was bonded into the filter housing). This measure allows the filter housing to be re-used. Dismantling the filter housing is not necessary.
- **New brackets for filter housing**
Suitable filter brackets have been designed for the new filter housing.
- **New blow-by hoses**
The blow-by hoses had to be modified due to the different positions of the connections on the filter housing.
- **New insulation**
The insulation had to be modified due to the different positions of the blow-by hose connections.

Remarks:

The rest of the crankcase ventilation design (preliminary separator housing, consoles) remains unchanged (see Table 1).



MAIN DIFFERENCES BETWEEN GENERATION 2 AND GENERATION 3

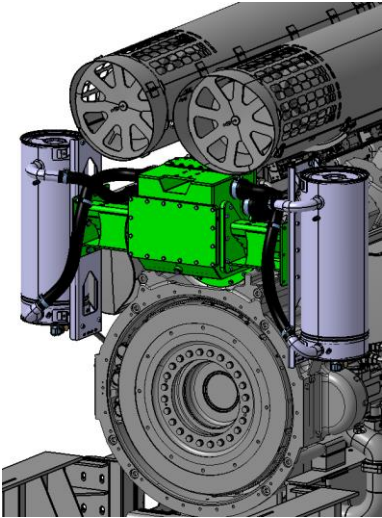



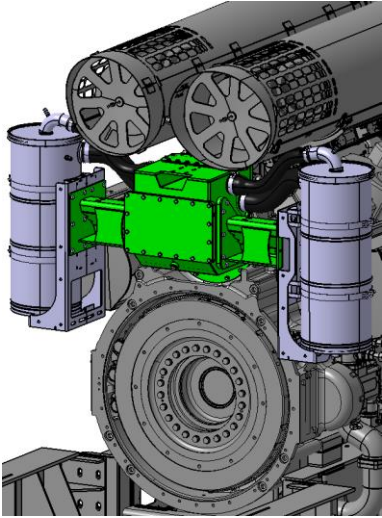
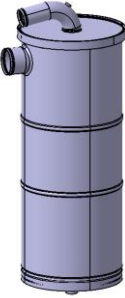

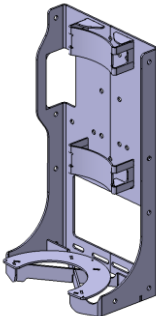

GENERATION 2 (Installation on the engine)	Parts, which have to be removed while dismounting the change filter			
	Blow-by filter housing including glued filterelement („interchangeable filter“)	Hoses	Holder for interchangeable filter	-
				-
GENERATION 3 (Installation on the engine)	Parts which have to be used for the installation of the filter housings with replaceable filter elements			
	Blow-by filter housing („filter housing for exchangable filter elements“)	Hoses	Holder for filterhousing	Filterelement
				

Table 1: Comparison of the interchangeable filters and the filter housings with exchangeable filter elements



NECESSARY PARTS FOR THE MODIFICATION TO NEW BLOW-BY FILTER HOUSINGS

All the parts for the upgrade modification to replaceable filter elements are grouped together in an upgrade kit with the part number 9016169. The drawing shown below (Figure 6) shows the assembly set with part no. 9015252 for new plants. **This drawing is only for information purposes as an aid for installation**, as there is no drawing for the upgrade kit (part no. 9016169). The parts list for the upgrade kit is shown in section 3. The item numbers in the upgrade kit (part no. 9016169) are identical with those for the assembly set (part no. 9015252).

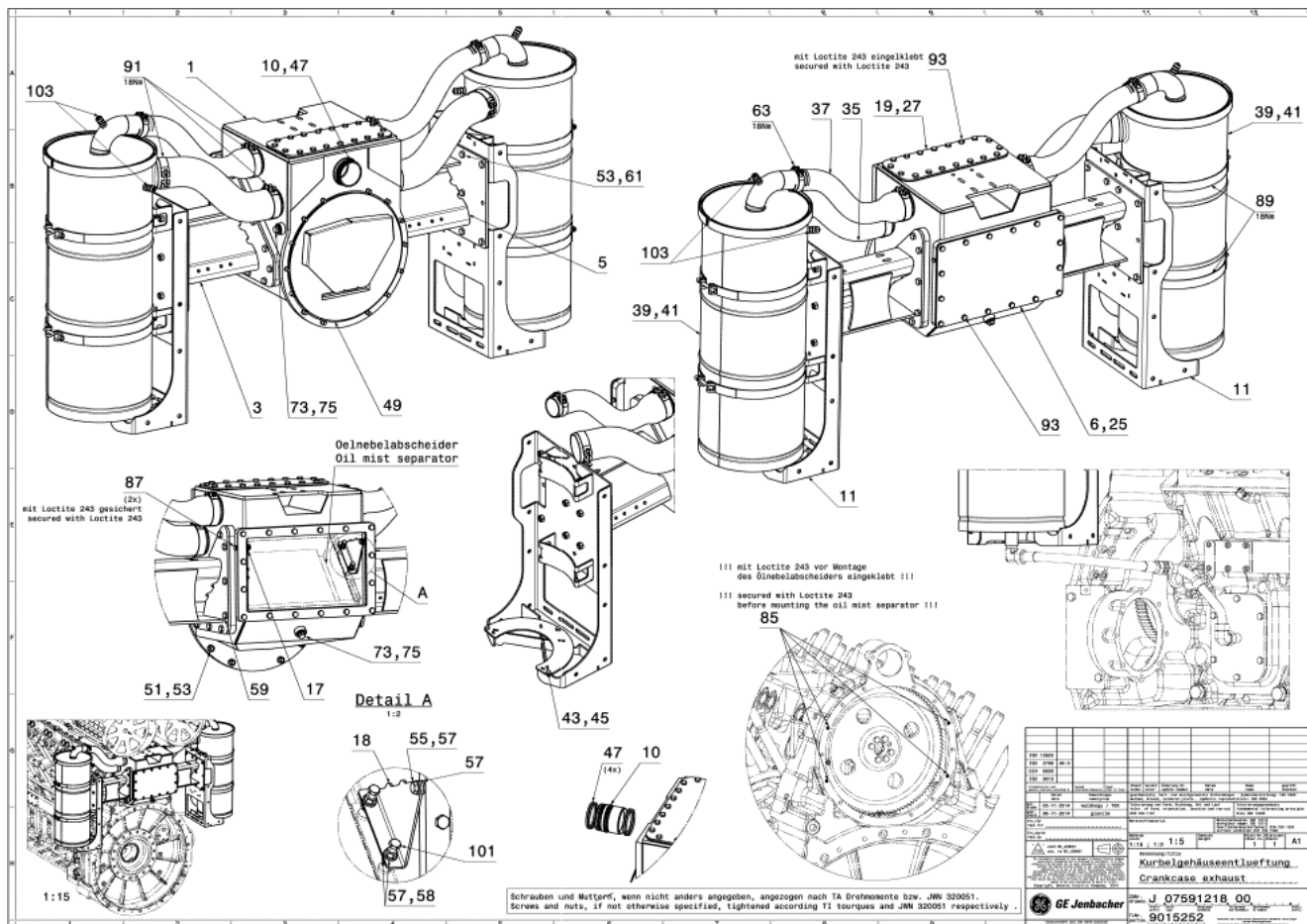


Figure 6: New plant crankcase ventilation assembly set, part no. 9015252



3 REPLACEMENT PROCEDURE

The modification procedure for the new solution for the blow-by filter housing is described below in detail.



Shut down the engine in accordance with Technical Instruction no. 1100-0105 and secure it against unauthorised restarting in accordance with Technical Instruction no. 2300-0010.

Observe the safety and hazard advice in the safety instructions (TA2300-0005) and wear the appropriate personal protective equipment.

Caution:



When removing the hoses and filter housings, remember that they may still contain quantities of residual oil.

3.1 Removing the old hoses

In the first step, remove all the hose clips and heavy-duty clamps securing the hoses to the preliminary separator housing and the filter housings. A total of five hose clips and heavy-duty clamps must be removed for each filter housing. After removing these, remove the hoses.

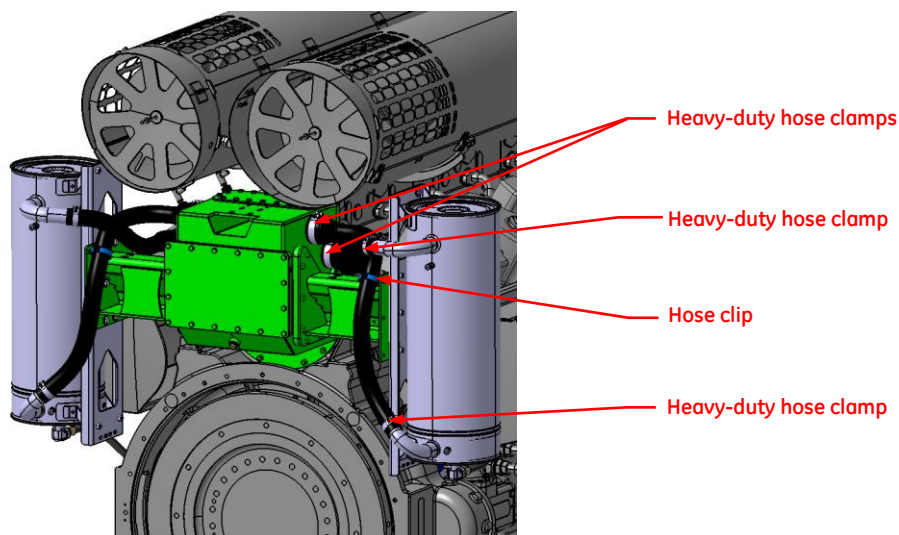


Figure 7: Position BEFORE removing the hoses

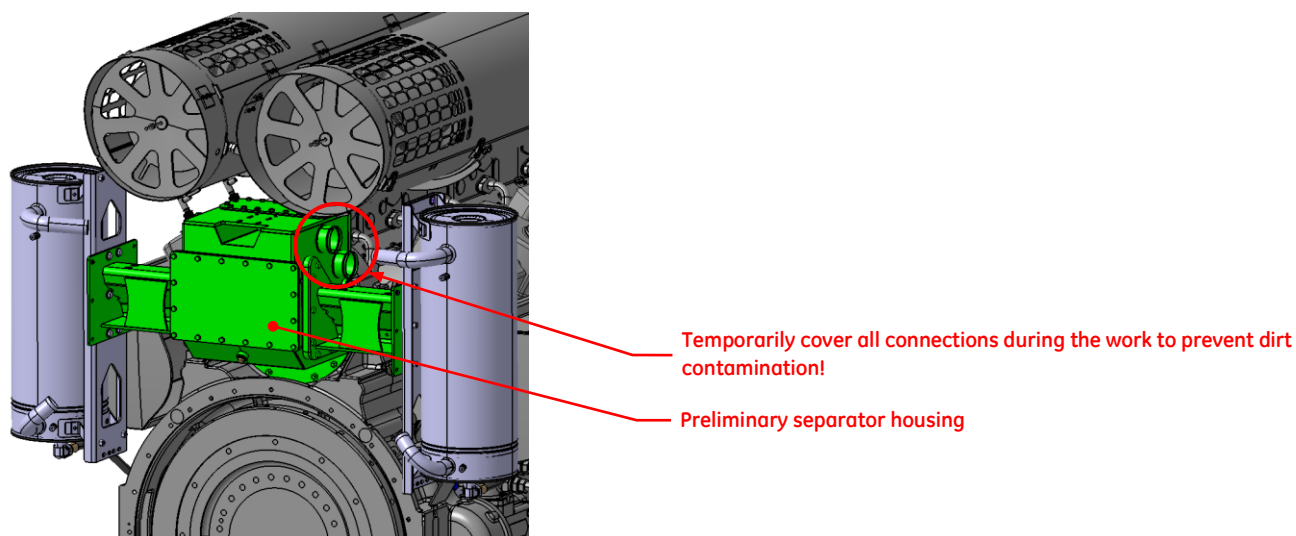


Figure 8: Position AFTER removing the hoses

ATTENTION:



Seal off or temporarily cover every connection point in the crankcase ventilation system and preliminary separator housing as soon as possible after opening in order to prevent the ingress of foreign bodies or dirt contamination into the engine interior.



Remove the elbow unions connected to the oil return lines as well, so that the filter housings can be disconnected from all the connected lines and hoses. These can be re-used after the new filter housings have been fitted. The oil return line can remain fitted on the crankcase cover during the modification work.

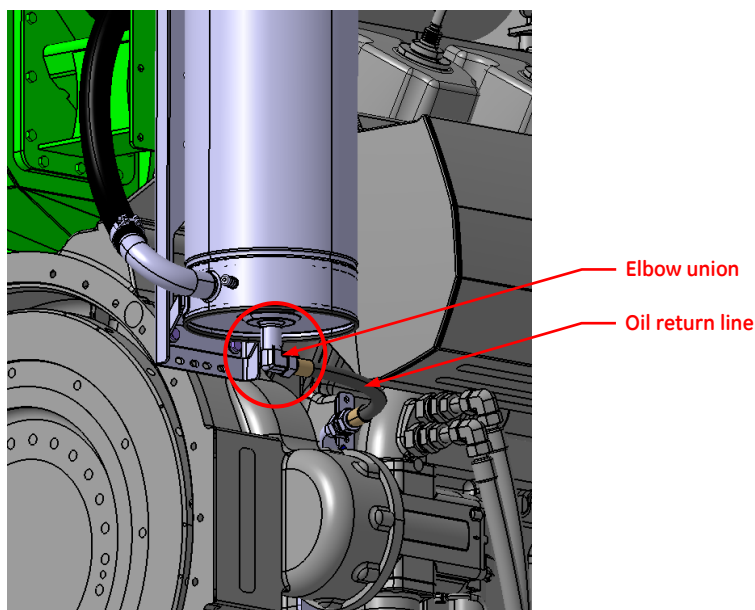


Figure 9: Removing the elbow union for the oil return line

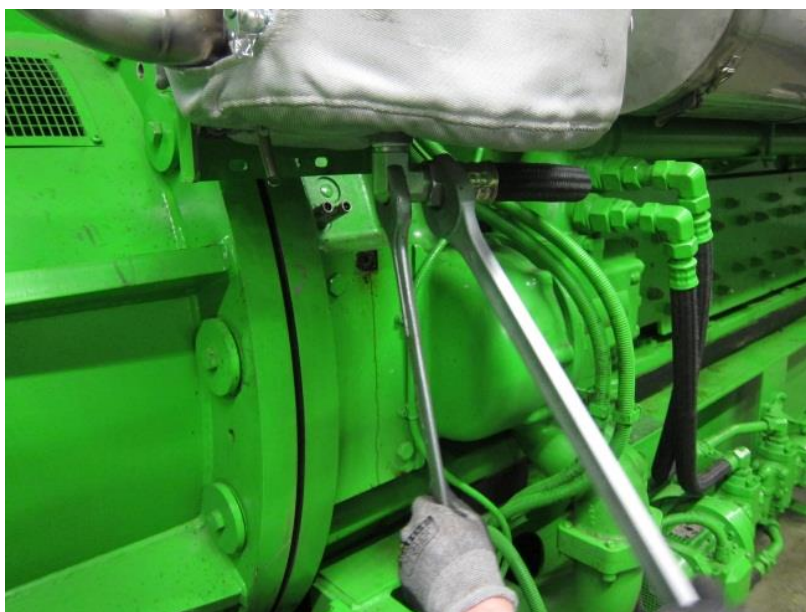


Figure 10: Holding the elbow union secure while disconnecting the hose

Note:

When disconnecting the hose from the elbow union, hold the union securely with a second open-ended wrench.



3.2 Removing the old filter housings

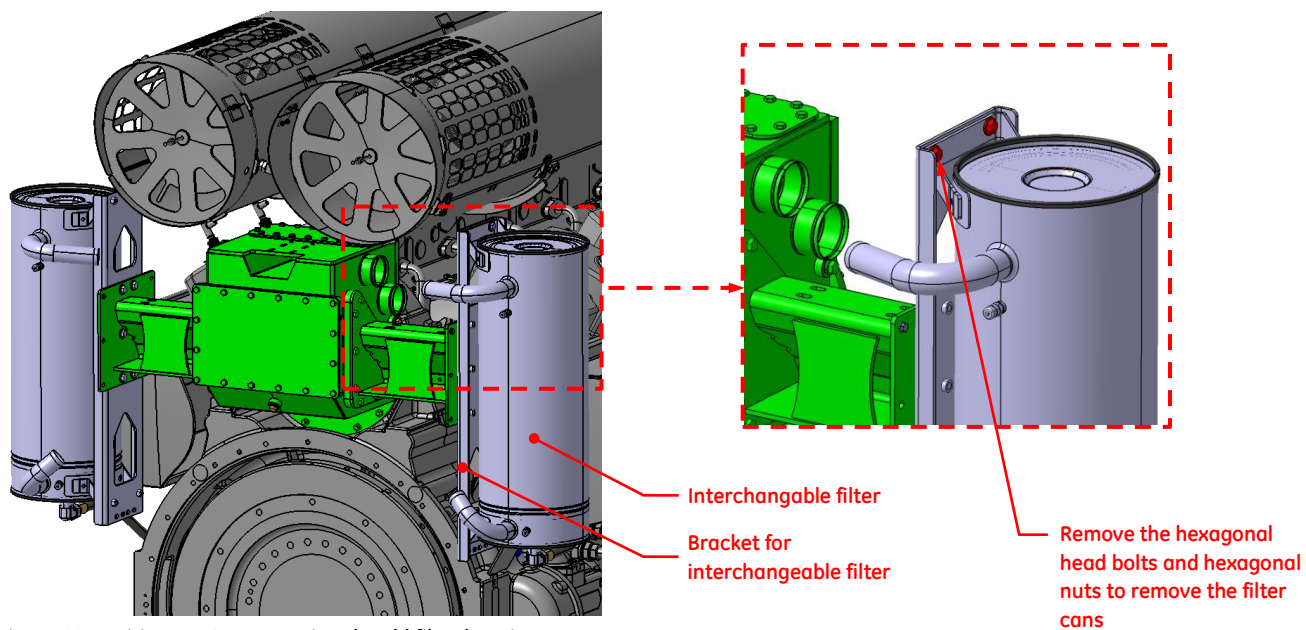


Figure 11: Position BEFORE removing the old filter housings

The oil filter housings are mounted on the top and bottom of the filter brackets. To remove the filter housing, undo and remove the 4 hexagonal head bolts and hexagonal nuts including the washers on each filter housing. Figure 11 on the right shows the bolted joint at the top of the filter housing.

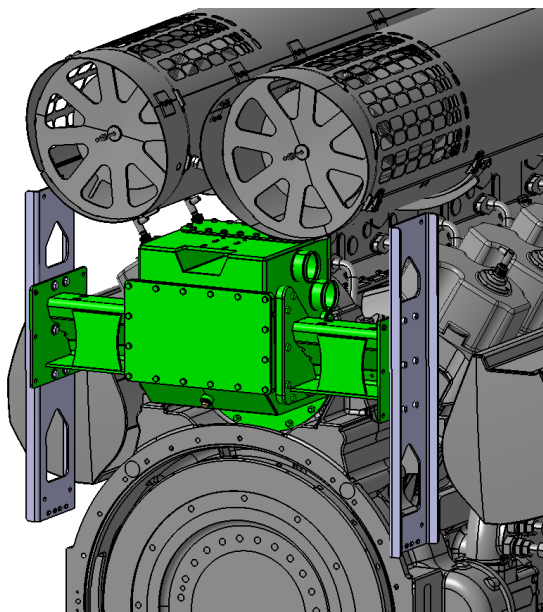


Figure 12: Position AFTER removing the old filter housings

In the next step, undo the bolts and nuts on the two old filter brackets and remove them.



3.3 Removing the old filter brackets

Figure 13 shows the old filter brackets fastened to the filter bracket consoles by six M12 hexagonal head bolts and washers. Undo these and remove the filter brackets as the next step.

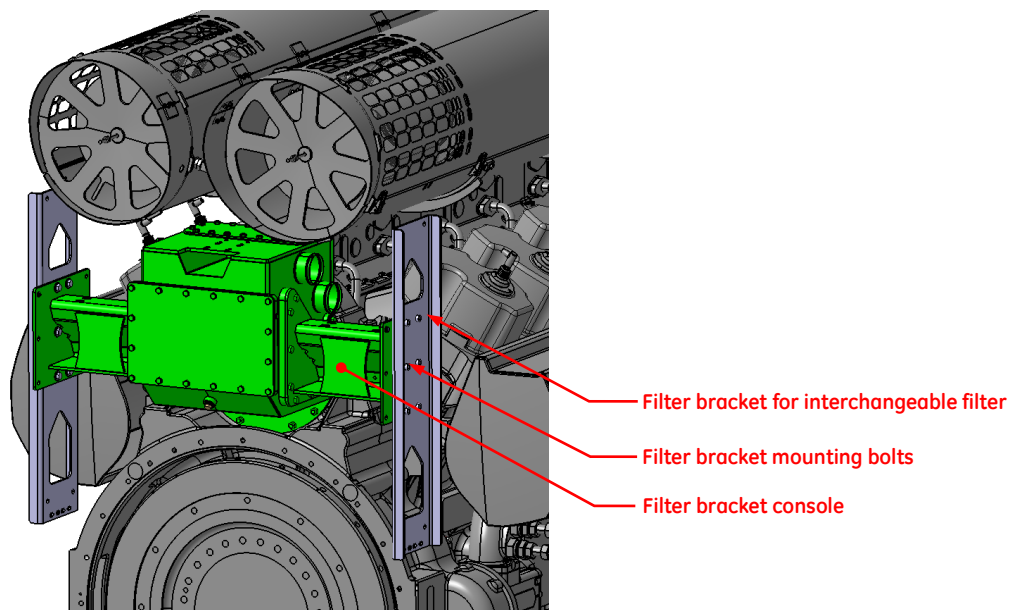


Figure 13: Old filter brackets BEFORE removal

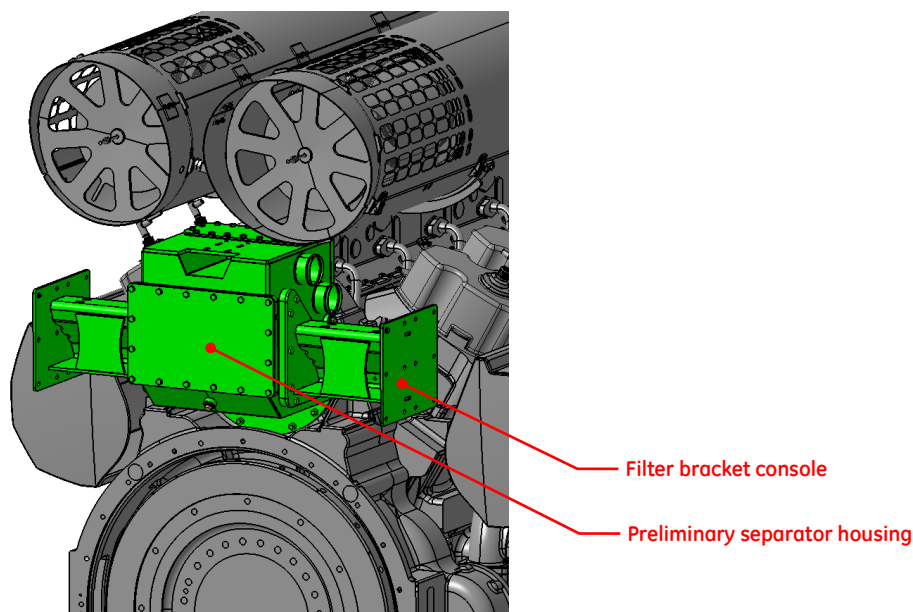


Figure 14: Position AFTER removing the old filter brackets

After removing the old filter brackets, the preliminary separator housing with the consoles for the filter brackets is left. The new solution is mounted on this component.

Note:

Removal and cleaning of the preliminary separator (filter cloth in the preliminary separator housing) is not normally necessary (see IW 0513 M6).



3.4 Fitting the rubber buffers

Before the new filter brackets can be mounted on the filter consoles, the rubber buffers must be fitted. Fasten each of these rubber buffers with one hexagonal nut (Pos. 45), as shown in Figure 15.

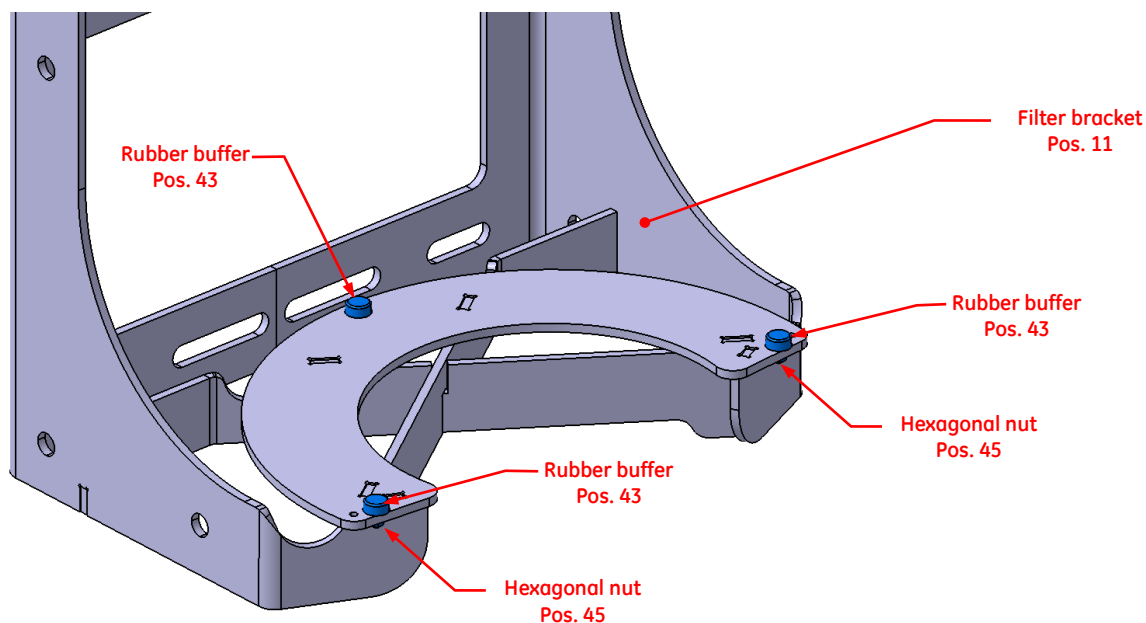


Figure 15: Fitting the rubber buffers



3.5 Fitting the new filter brackets

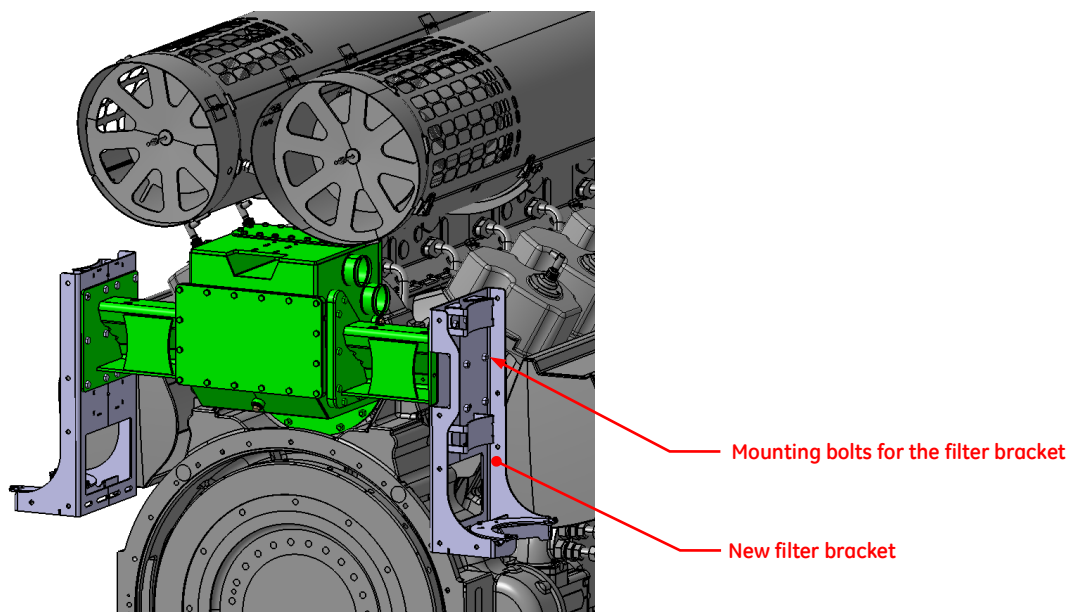


Figure 16: Position AFTER fitting the new filter bracket

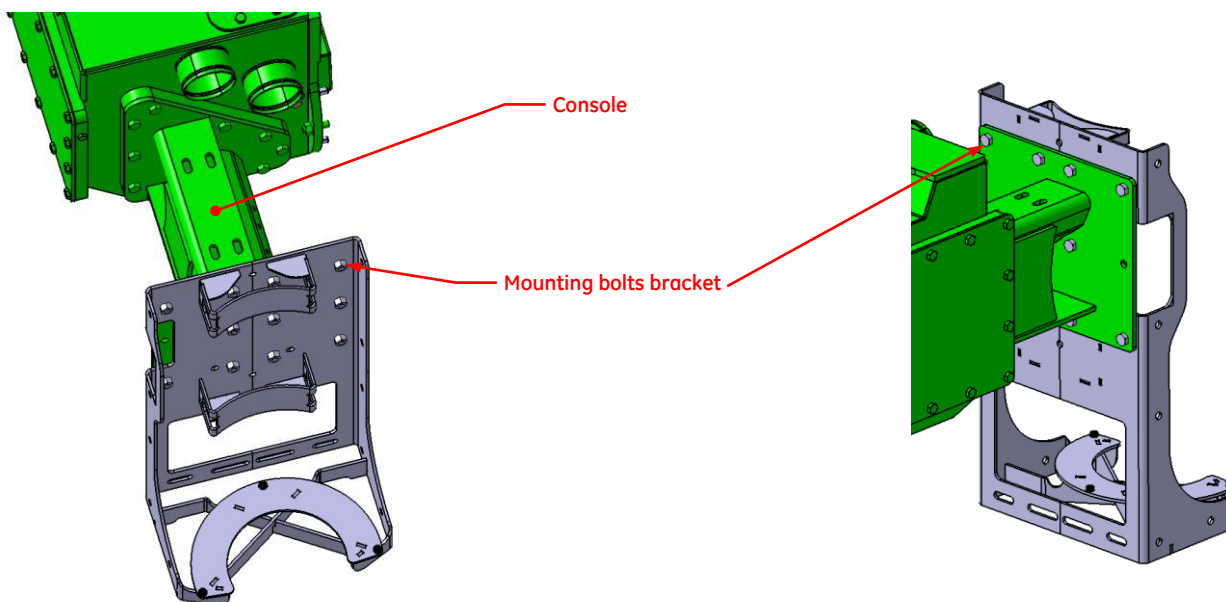


Figure 17: Mounting bolts for the new filter bracket

Figure 16, Figure 17 and Figure 18 show the mounting bolts for the new filter bracket. Fasten each filter bracket with 11 hexagonal head bolts (Pos. 61) and hexagonal nuts (Pos. 53).



Figure 18: Fitting the filter bracket



3.6 Fitting the hoses (Ø60 and Ø90)

Push the Ø60 hose (the thinner of the two hoses) on to the connection of the preliminary separator housing (see Figure 19). Fasten the hose to the preliminary separator housing with a heavy-duty hose clamp (91). Tighten the heavy-duty hose clamps with a screwdriver and finally retighten it to a torque of 18 Nm (after fitting the filter housing and the cover).

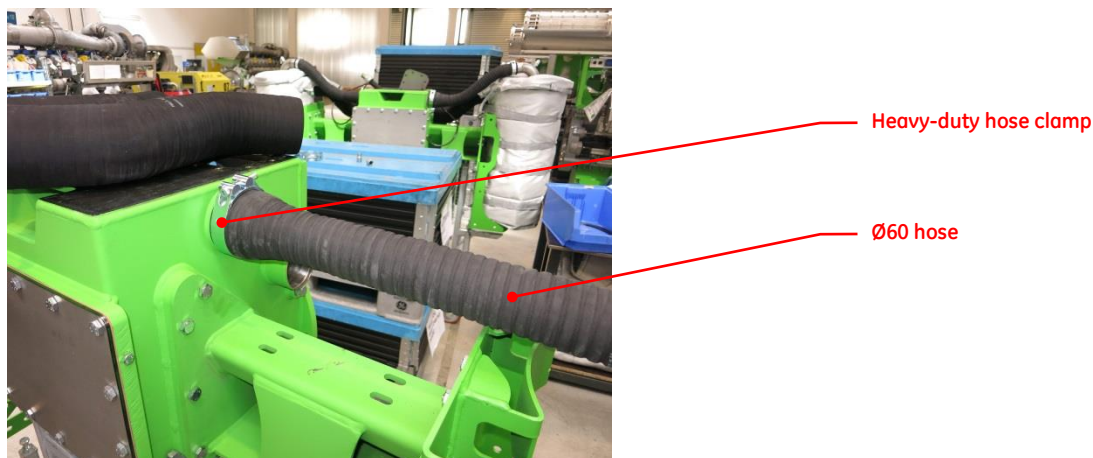


Figure 19: Fitting the Ø60 hose

Preassemble the second hose with Ø90 (the thicker of the two hoses) as the next step, shown in Figure 20. The hose positions should be exactly as shown in Figure 20 to make the rest of the installation work easier.

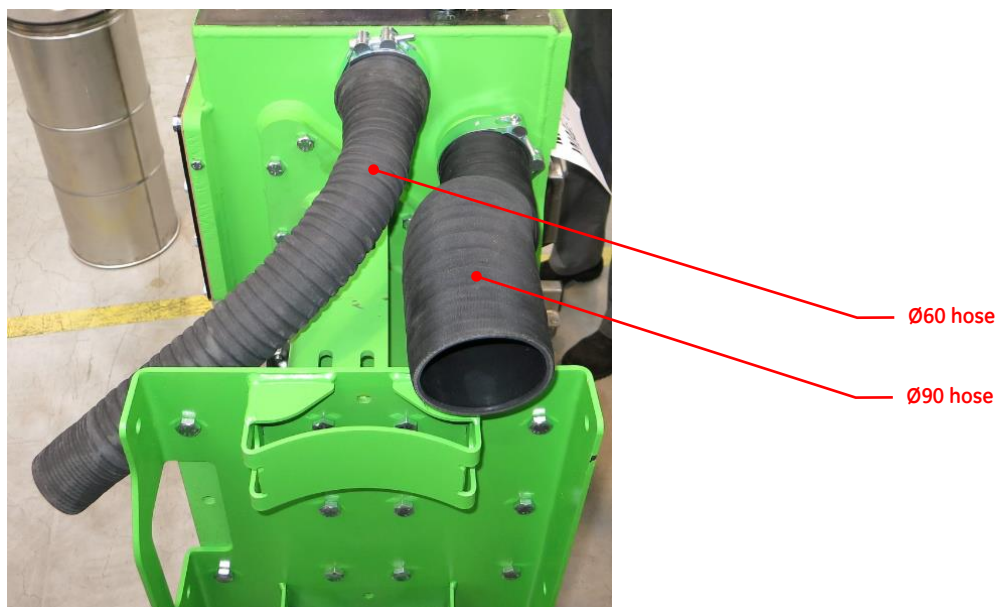


Figure 20: Fitting the Ø90 hose



3.7 Fitting the new filter housings



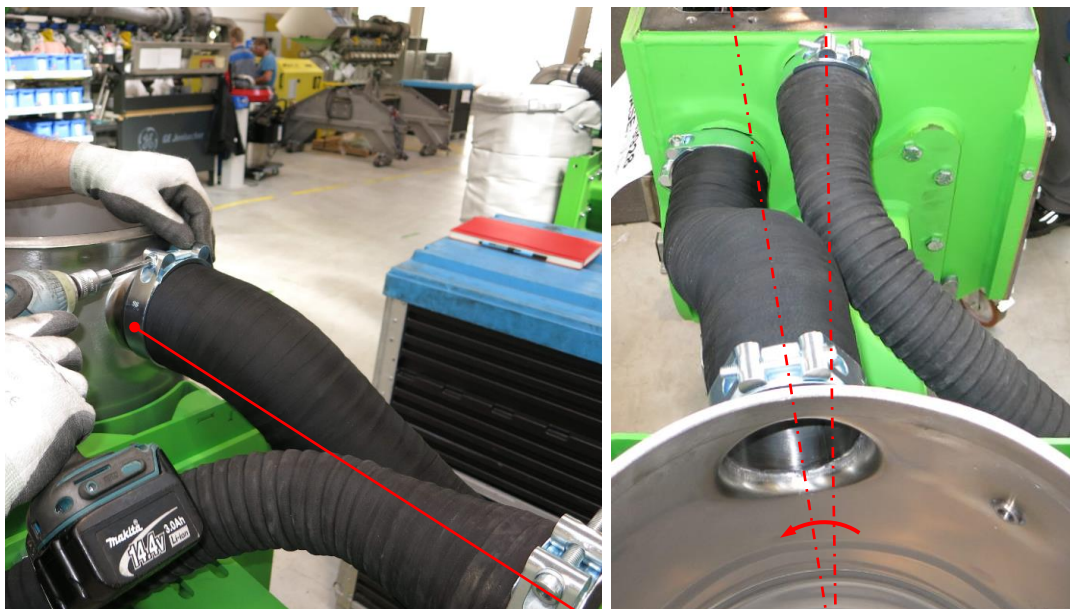
NEW filter housing

Figure 21: Fitting the new filter housings

Place the filter housings on the filter console as shown in Figure 21. Then slide the heavy-duty hose clamps on to the Ø90 hose. Push this hose on to the connection on the filter housing as the next step. Position the heavy-duty hose clamp as shown in Figure 22 and tighten it with a screwdriver.

Note:

The hoses must not be kinked after fitting and should not touch each other. To achieve this position, the filter housing must be turned slightly (see Figure 22, right).



Heavy-duty hose clamps

Figure 22: Fitting the heavy-duty hose clamps



3.8 Fitting the heavy-duty hose clamps to secure the filter housings



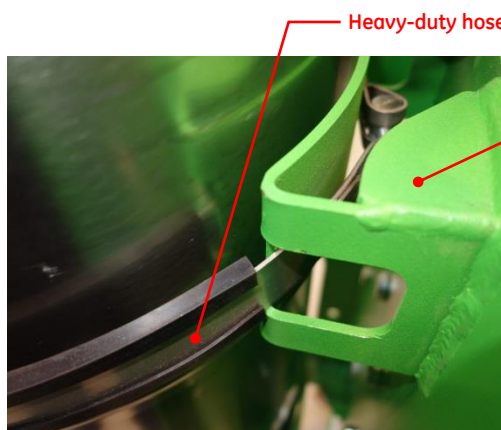
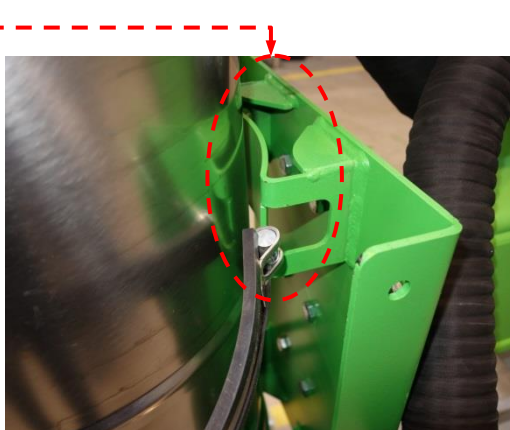
Figure 23: Heavy-duty hose clamp



Distance

→ The rubber elements on the heavy-duty hose clamp straps must be positioned as shown in Figure 23, right, as the rubber elements as shown in Figure 24 only reaches up to the bracket and should not extend beyond (around) it.

Preassemble the heavy-duty hose clamp (89) is as shown in Figure 23. Then pass one of the free ends around the filter housing (as in Figure 24), threading it through the slit (opening) in the filter bracket, and close it at the front of the filter housing. Then position the bolted joint in the centre (as in Figure 25) and tighten it.



Heavy-duty hose clamp

Mounting bracket

Figure 24: Fastening the new filter housing to the filter bracket



Heavy-duty hose clamp

Heavy-duty hose clamp

Figure 25: Bolted joint of the heavy-duty hose clamp

Figure 25 shows the bolted joints of the heavy-duty hose clamps after tightening (front of the filter).



3.9 Installing the filter elements

The filter element installation is described in **IW 0513 M6 - Crankcase ventilation**.



3.10 Fitting the cover

Before fitting the filter housing cover, lubricate the inside of the connection socket on the filter element (with engine oil).

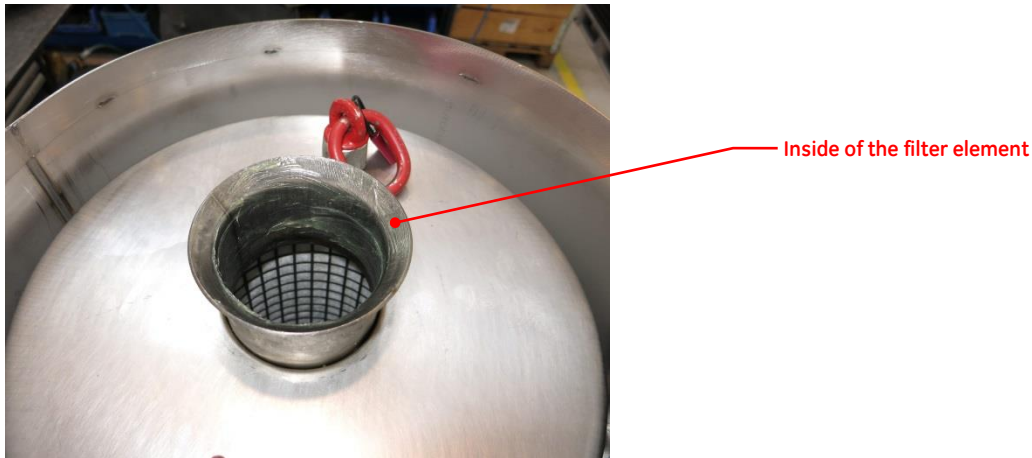


Figure 26: Lubricating the connection socket on the filter element

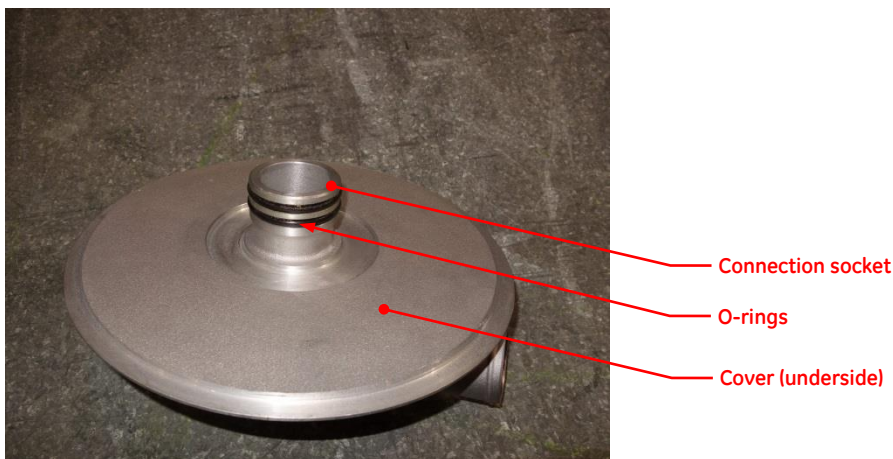


Figure 27: Underside of the cover



Figure 28: Fitting the cover

Figure 28 shows the procedure for fitting the cover. This step requires a certain amount of strength and skill. We advise connecting the cover to the hose first as shown in Figure 28 and then placing the cover, with the hose connected, on the filter housing so that the connecting spigot on the underside of the cover is guided into the connecting socket on the filter element. The pre-assembly of the cover (fitting the O-rings etc.) is described in detail in **IW 0513 M6**.



Figure 29: Fitting the cover on the filter housing



In the next step, position the cover as shown in Figure 29 and tighten it with a V-clamp using an open-ended wrench.



Figure 30: V-clamp



Figure 31: Alignment of the blow-by hoses, mounted on the engine.



ATTENTION:



Figure 31 shows the alignment of the blow-by hoses. These must not touch each other! The blow-by hoses must not touch the in-line air filter either, as this can lead to chafing of the hoses due to vibrations in operation and ultimately result in failure of the hoses!



ATTENTION:



After tightening the heavy-duty hose clamps for fitting the filter housing and after fitting the cover, loosen the heavy-duty hose clamps for securing the hoses once again, as the filter housing can be slightly stressed as a result of fitting the heavy-duty hose clamps. After this step, fully tighten all the heavy-duty hose clamps and hose clips.

Positioning and fastening parts

Route the blow-by hoses so that the bends are as rounded as possible (no kinks). They must not press against/touch each other or any other parts (exception: connections and additional brackets), so as to avoid chafing during operation and any possible transmission of vibrations.

The hoses can only be routed like this if the cover of the filter housing and the blow-by filter housings are rotated into the appropriate position as necessary and the system is then tightened (see Figure 23).

Observe the following points when doing this:

- ✓ The blow-by hoses must not touch the ROLF in-line air filter.
- ✓ Align the heavy-duty hose clamps 63, 89 and 91 in accordance with our **Inspection and Maintenance Instruction M6 IW 0511 M6** so that the bolt heads are as accessible as possible once the system is installed.
- ✓ Tighten all the heavy-duty hose clamps (63, 89 and 91) to a **torque of 18 Nm** after fastening.
- ✓ Blow-by hoses (35 and 37): tighten all heavy-duty hose clamps (63, 18 Nm).
- ✓ Blow-by filter housing (39): tighten the heavy-duty hose clamp (89, 18 Nm).

3.11 Fitting the oil return line

The oil return line is fitted to the filter housing in the same way as it is removed (see page 9 and Figure 10).

ATTENTION:



Make sure when fitting the elbow union that it is held securely with a second open-ended wrench, as otherwise the filter housing can be damaged.

3.12 Fitting the measuring connections

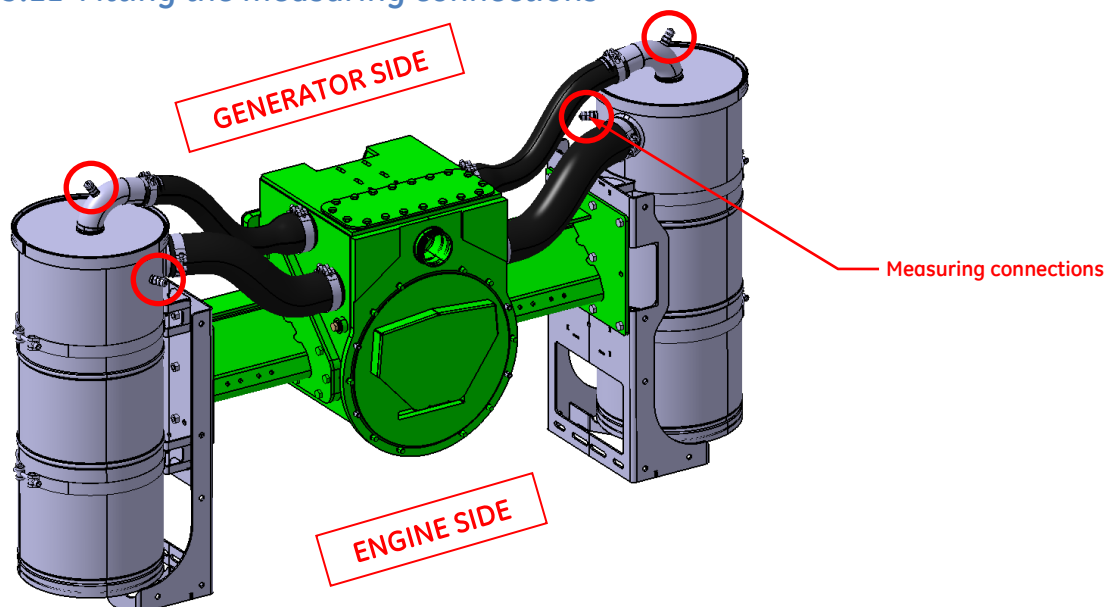


Figure 32: Fitting the measuring connections

Figure 32 shows the positions of the measuring connections for the differential pressure measurement. The condition of the filter can be ascertained from the differential pressure measurement (pressure drop across the filter).



3.13 Cutting the insulation to fit

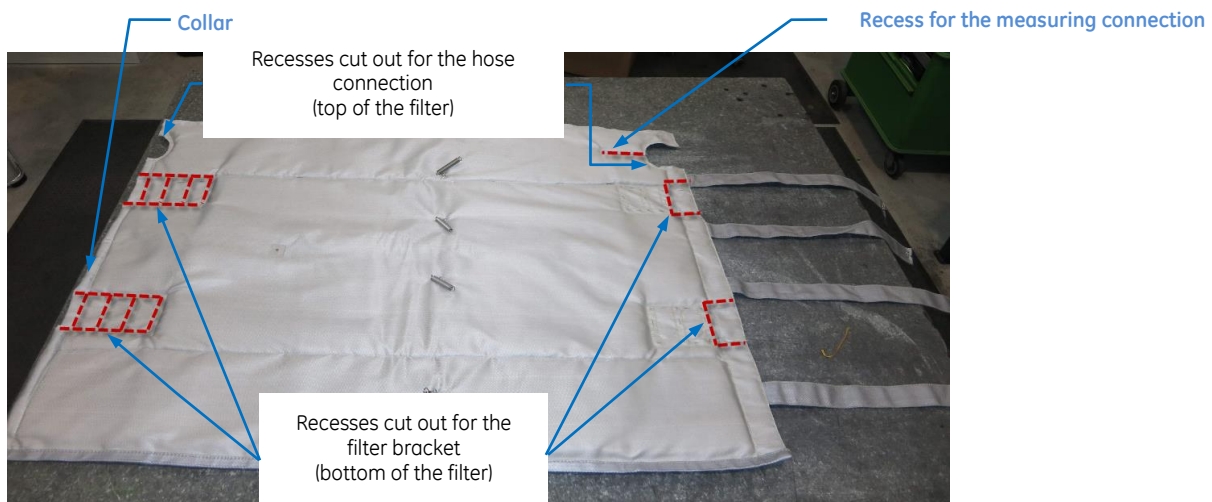


Figure 33: Insulation for the filter housing at cylinder bank A

Figure 33 shows the insulation before it is fitted to the filter housing. The same insulation is used for both filter housings, although the insulation for both filters is cut differently. Cut out the quilted marks as shown in Figure 33 and Figure 34 (for the hose connection and filter bracket).

Cutting to fit cylinder bank A:

These recesses are necessary to fit round the bracket (upon which the filter housing is mounted) and the hose connection (the recesses for the hose connection do not need to be cut out – they are already present). Cut out one of the three quilted rectangles at the right, and three rectangles and the collar at the left of the insulation, as shown in Figure 33. Due to the slightly rotated alignment of the filter housing in relation to the filter bracket (for routing the hose), this rectangle must be cut out depending on the filter (filter housing for cylinder bank A or B) in order to ensure that the filter housing bracket does not cause any problems when fitting the insulation.

Cutting to fit cylinder bank B:

As the other filter housing (filter housing for cylinder bank B) is fitted as a mirror image of the filter housing for cylinder bank A, the marked rectangles must be cut out somewhat differently here, i.e. all three rectangles on the right are cut out, and one of the three quilted rectangles and the collar on the left (see Figure 34).

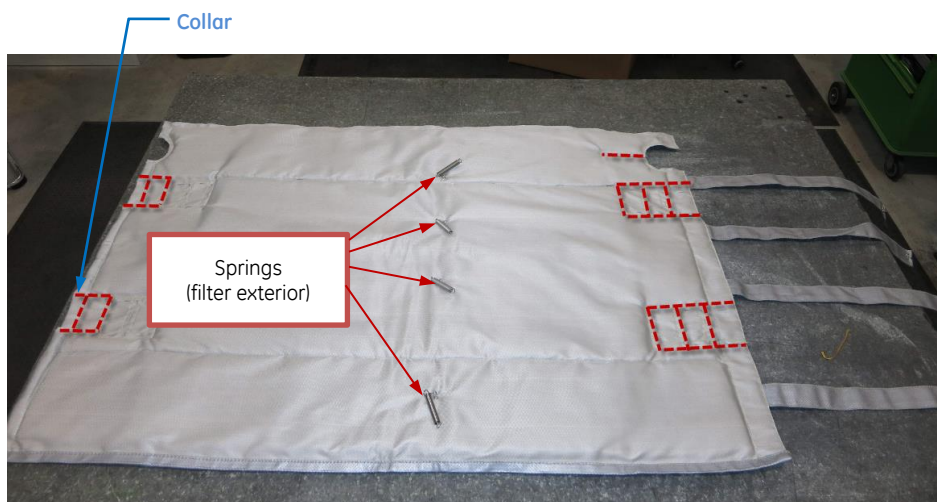


Figure 34: Insulation for the filter housing for cylinder bank B



3.14 Fitting the insulation

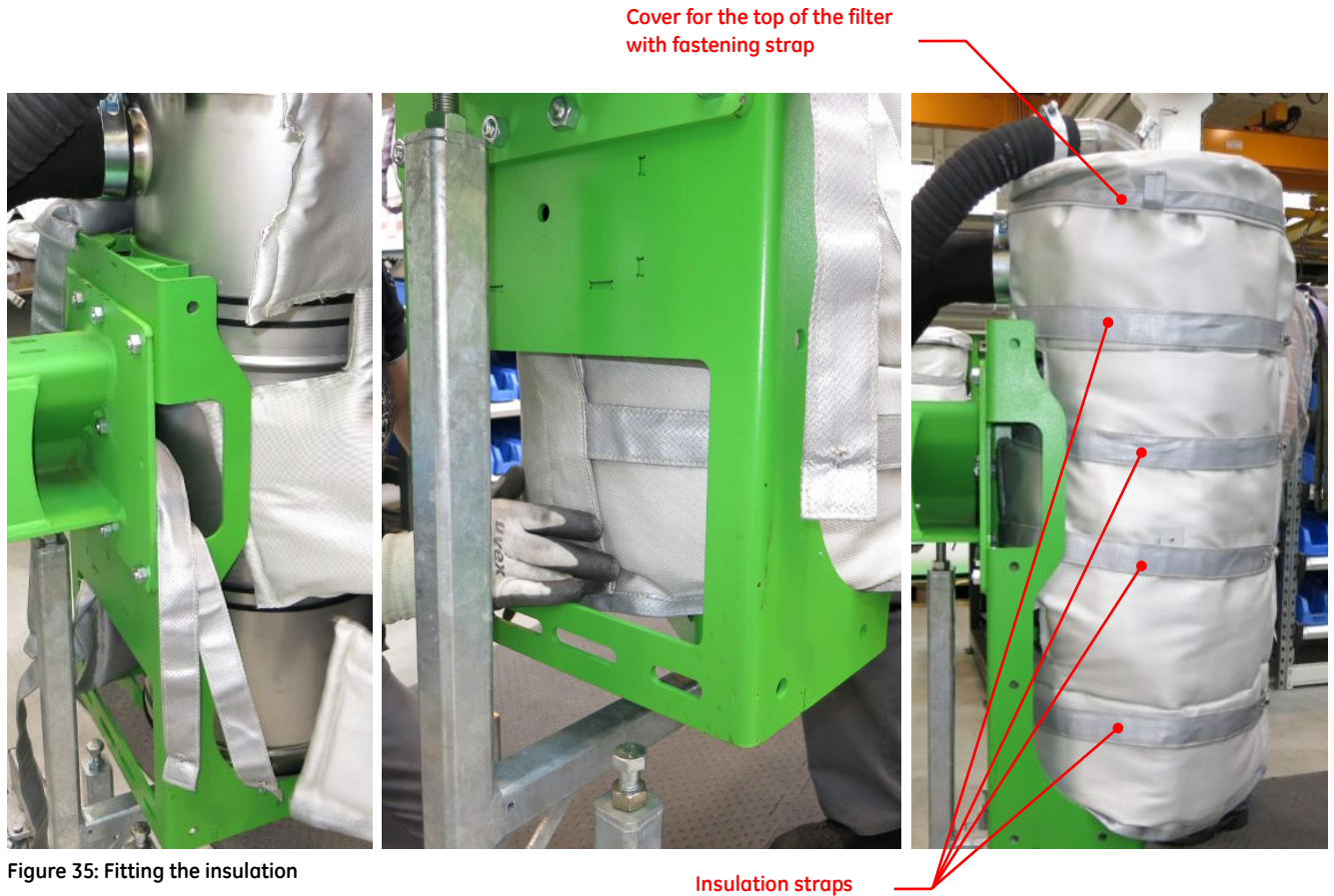


Figure 35: Fitting the insulation

Pass the insulation straps around the filter housing and position them so that the springs (see Figure 35) are at the front of the filter. Then wrap the insulating jacket around the filter housing. The straps are fitted with eyelets at the ends, which are then joined by the springs (Figure 36). Finally, place the cover for the filter top on the filter housing and secure it with the fastening straps.



Figure 36: Securing the straps with springs



4 PARTS LIST 9016169 FOR THE upgrade kit

The following parts list includes all the parts needed for modifying the crankcase ventilation system to the solution with replaceable filter elements as described in this Service Technician Instruction. It applies to Type J612, J616 and J620 engines where the crankcase ventilation system is fitted with a preliminary separator and two filter housings (without replaceable filter elements).

Pos. No.	Part No.	Qty.	Description
11	9016170	2	Mounting bracket
35	9016148	2	Ø90 hose
37	9016149	2	Ø60 hose
39	9015651 Remark: is an assembly set See Table 3	2	Oil mist lubricator
41	1228792	2	Insulation
43	9013864	6	Rubber buffer
45	101805	6	M4 hexagonal nut
53	101823	22	M12 hexagonal nut
61	100466	22	M12 x 25 hexagonal head bolt
63	9016154	2	DIN 3017-3 C1 1 68 x 20 heavy-duty hose clamp
89	9016157	4	DIN 3017-3 C2 1 340 x 25 heavy-duty hose clamp
91	9013152	6	DIN 3017 - C1 - 1 - 98 x 25 heavy-duty hose
103	460138	4	R1/8" measuring connection

Table 2: Parts list for the upgrade kit, part no. 9016169

This parts list consists of 13 items.



Pos. No.	Part No.	Qty.	Description
1	9015673	1	Oil mist separator
2	9023168	1	Filter
3	9015828	1	Cover lid
5	9015643	1	Bracket / clamp
9	9015965	1	O-ring
11	9015964	2	Sealing ring

Table 3: Bill of material of the oil mist separator, part no. 9015651

This bill of material consists of 6 items.

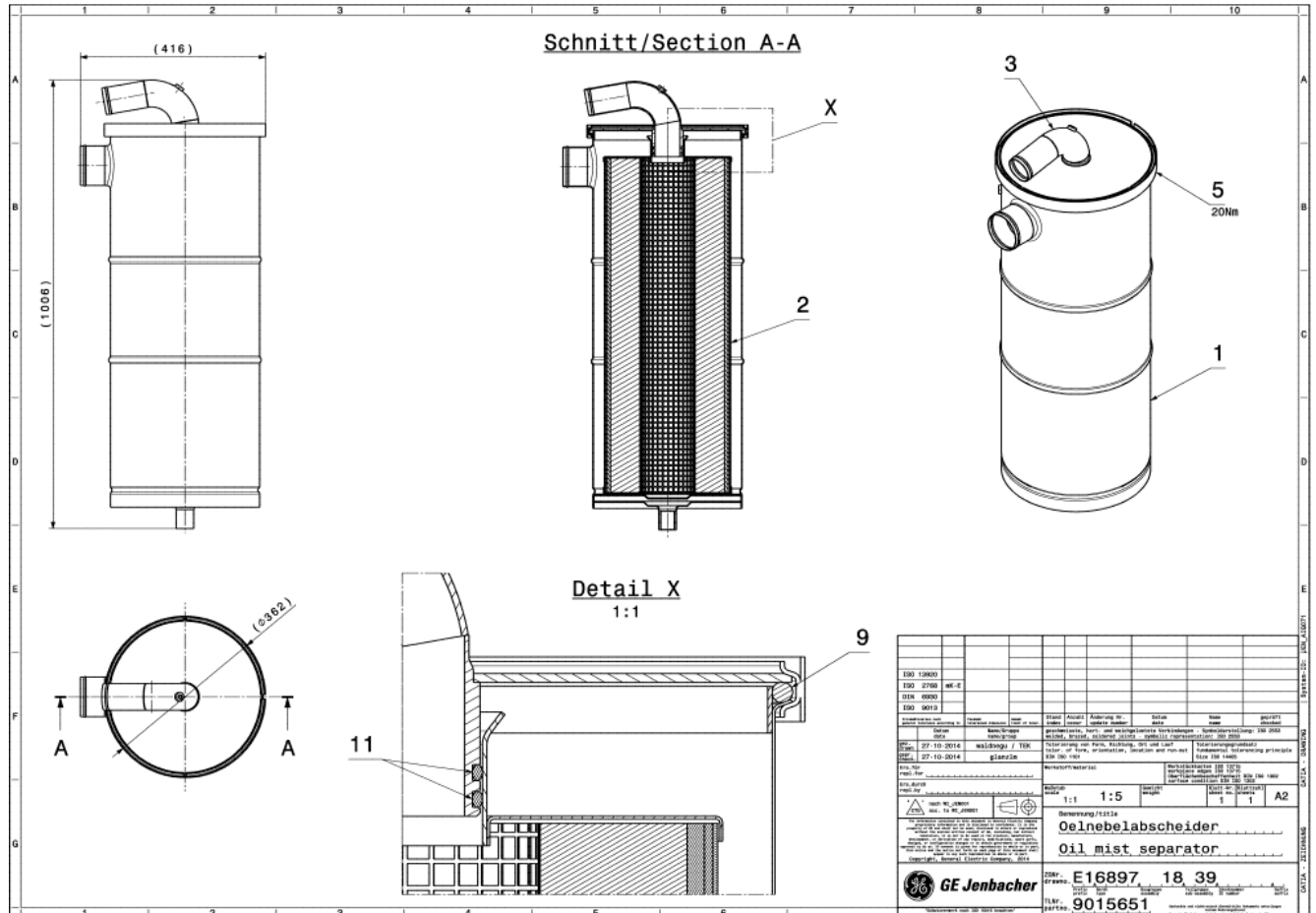


Figure 37: Drawing – oil mist separator – part no. 9015651



4.1 General view of the items in the upgrade kit, part no. 9016169

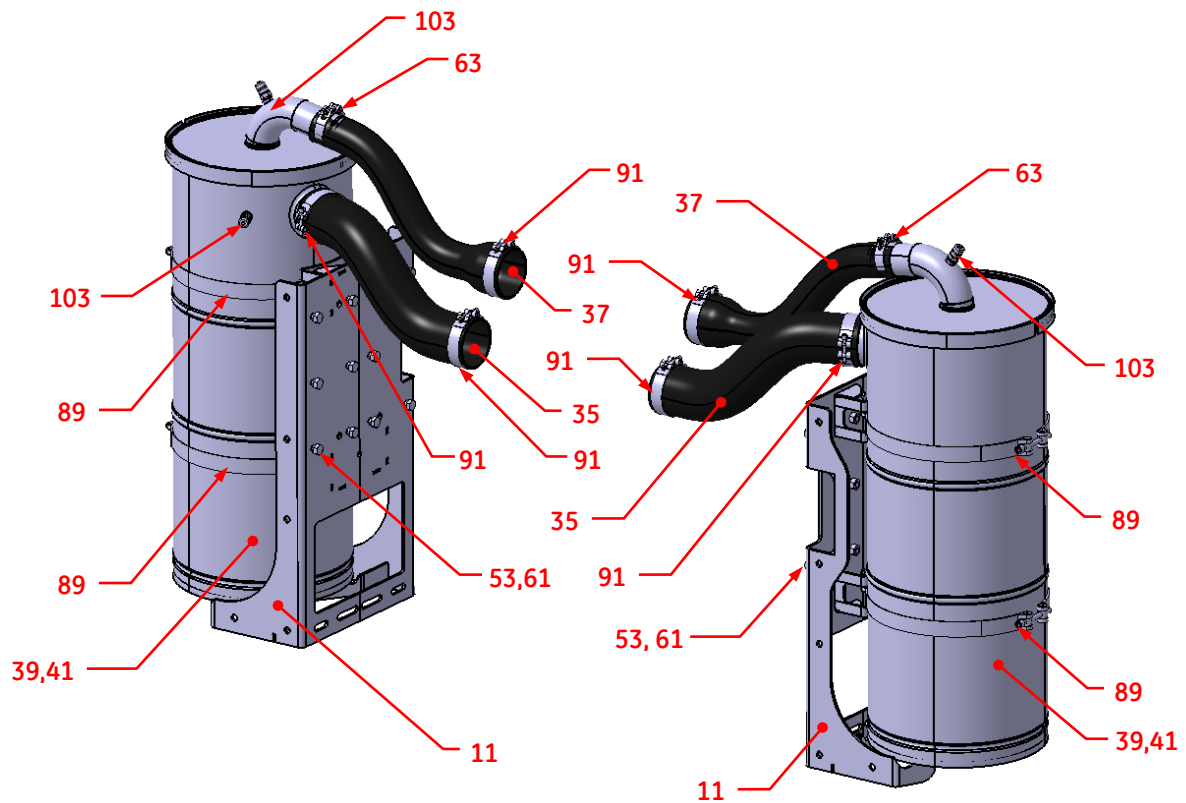


Figure 38: General view of items in the upgrade kit, part no. 9016169 – item 1

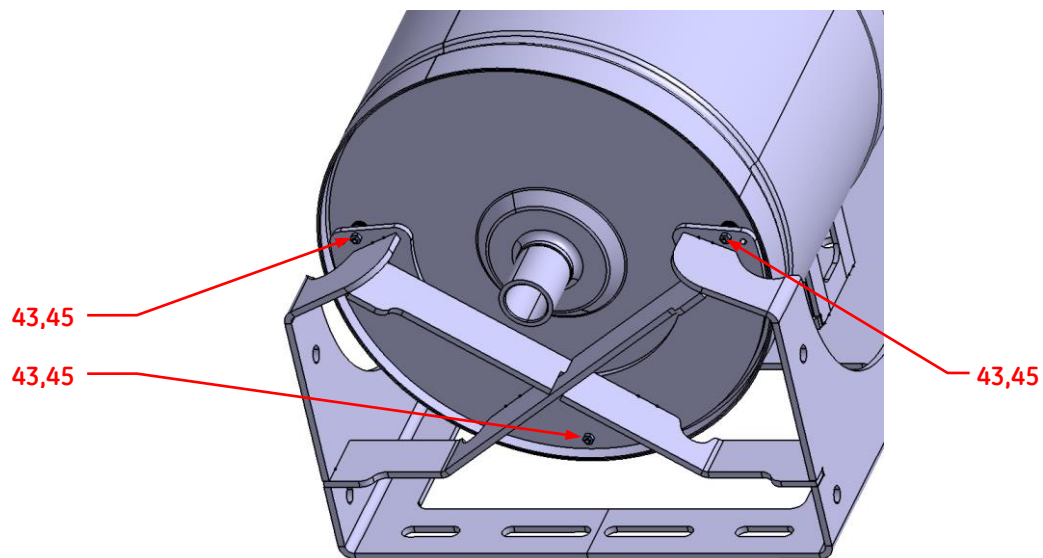


Figure 39: General view of items in the upgrade kit, part no. 9016169 – item 2



5 MISCELLANEOUS

5.1 Required time

The following table shows how much time should be allowed for the crankcase ventilation modification for each J6xx-F engine.

ACTIVITY	ENGINE	REQUIRED TIME
Modifying 1 engine to the solution with replacement filter elements	J612-F J616-F J620-F	Approx. 1 day for 2 technicians

Table 4: Required time

5.2 Relevant documents

When working on GE Jenbacher modules, all applicable local regulations must of course be observed in addition to our documentation. We would particularly like to emphasise observation of the following documents in connection with this Service Technician Instruction:

- Technical drawing J 0759 1218 00: Crankcase ventilation, part no. 901252 (used as aid for assembly)
- Crankcase ventilation parts list, part no. 9016169 (no technical drawing available, as this is an upgrade kit)
- Technical Instruction TA 1100-0105: Engine shutdown
- Technical Instruction TA 1100-0111: General conditions – Operation and maintenance
- Technical Instruction TA 2300-0010: Guidelines for using the LOTO kit
- Technical Instruction TA 2300-0005: Safety regulations
- Inspection and Maintenance Instruction IW 0511 M6: Crankcase ventilation

5.3 Revision history

INDEX	DATE	DESCRIPTION / REVISION SUMMARY
03	23/03/2017	Change of PN of filter element to new version 9023168
02	01/12/2016	Implementation of generation description of the crankcase ventilation systems
01	17/08/2015	First version of this document

Table 5: Revision history



6 LIST OF FIGURES

Figure 1: Comparison of the old and new blow-by filter housings	1
Figure 2: Generation 1	3
Figure 3: Generation 2	3
Figure 4: Generation 3	4
Figure 5: Generation 3 Light.....	4
Figure 6: New plant crankcase ventilation assembly set, part no. 9015252	7
Figure 7: Position BEFORE removing the hoses.....	8
Figure 8: Position AFTER removing the hoses	8
Figure 9: Removing the elbow union for the oil return line.....	9
Figure 10: Holding the elbow union secure while disconnecting the hose	9
Figure 11: Position BEFORE removing the old filter housings.....	10
Figure 12: Position AFTER removing the old filter housings	10
Figure 13: Old filter brackets BEFORE removal	11
Figure 14: Position AFTER removing the old filter brackets	11
Figure 15: Fitting the rubber buffers.....	12
Figure 16: Position AFTER fitting the new filter bracket.....	13
Figure 17: Mounting bolts for the new filter bracket.....	13
Figure 18: Fitting the filter bracket.....	13
Figure 19: Fitting the Ø60 hose	14
Figure 20: Fitting the Ø90 hose	14
Figure 21: Fitting the new filter housings	15
Figure 22: Fitting the heavy-duty hose clamps	15
Figure 23: Heavy-duty hose clamp.....	16
Figure 24: Fastening the new filter housing to the filter bracket.....	16
Figure 25: Bolted joint of the heavy-duty hose clamp	16
Figure 26: Lubricating the connection socket on the filter element.....	18
Figure 27: Underside of the cover.....	18
Figure 28: Fitting the cover.....	18
Figure 29: Fitting the cover on the filter housing.....	19
Figure 30: V-clamp	19
Figure 31: Alignment of the blow-by hoses, mounted on the engine.	19
Figure 32: Fitting the measuring connections	20
Figure 33: Insulation for the filter housing at cylinder bank A	21
Figure 34: Insulation for the filter housing for cylinder bank B.....	21
Figure 35: Fitting the insulation.....	22
Figure 36: Securing the straps with springs.....	22
Figure 37: Drawing – oil mist separator – part no. 9015651.....	24
Figure 38: General view of items in the upgrade kit, part no. 9016169 – item 1	25
Figure 39: General view of items in the upgrade kit, part no. 9016169 – item 2	25