



NOTE! Read the *Installation Manual D4/D6 Aquamatic DPH/DPR, Volvo Penta IPS, Inboard* before the installation work of hull insert, engine foundation, IPS propulsion unit and engine is started.

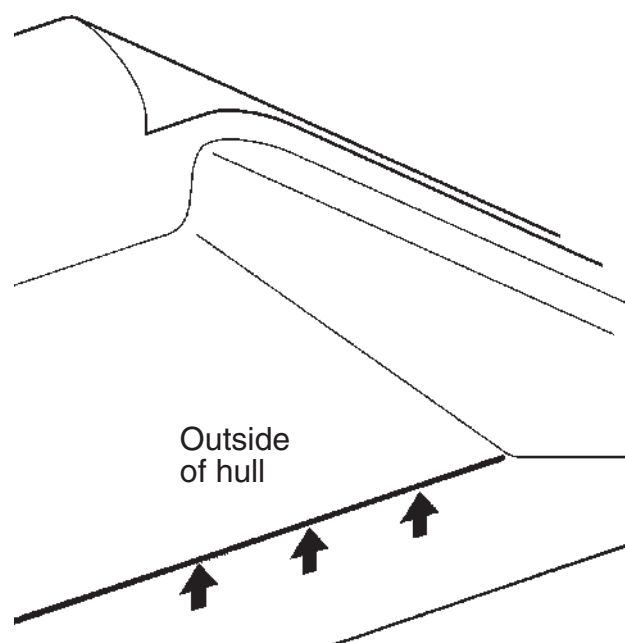
Installation Reference, Volvo Penta IPS Hull Insert and Engine Foundation



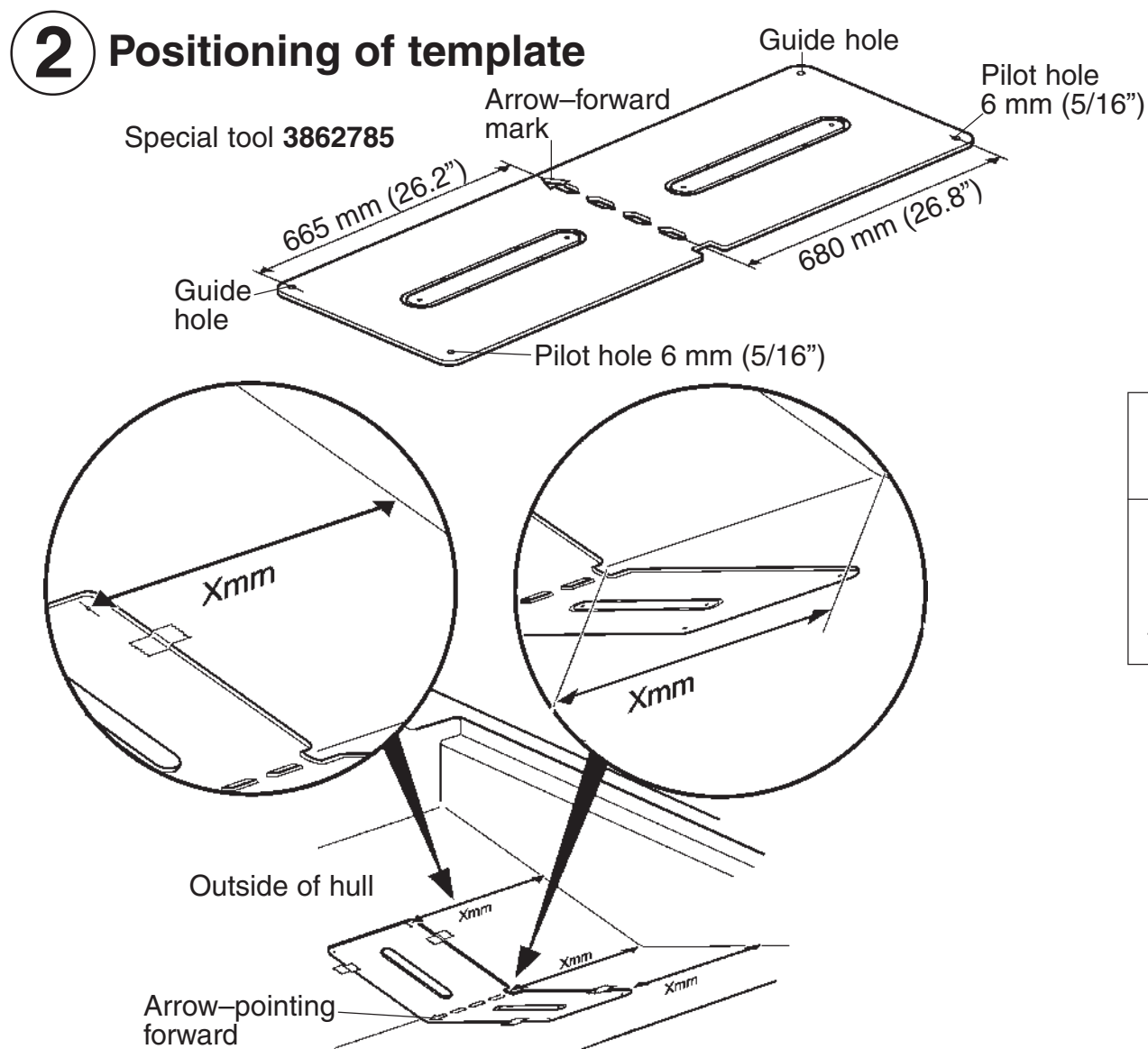
WARNING! Make sure all safety precautions are made prior to working procedures, to avoid personal injuries and damage on equipment.

Positioning and fitting of hull insert

1 Marking of "keel line"



2 Positioning of template

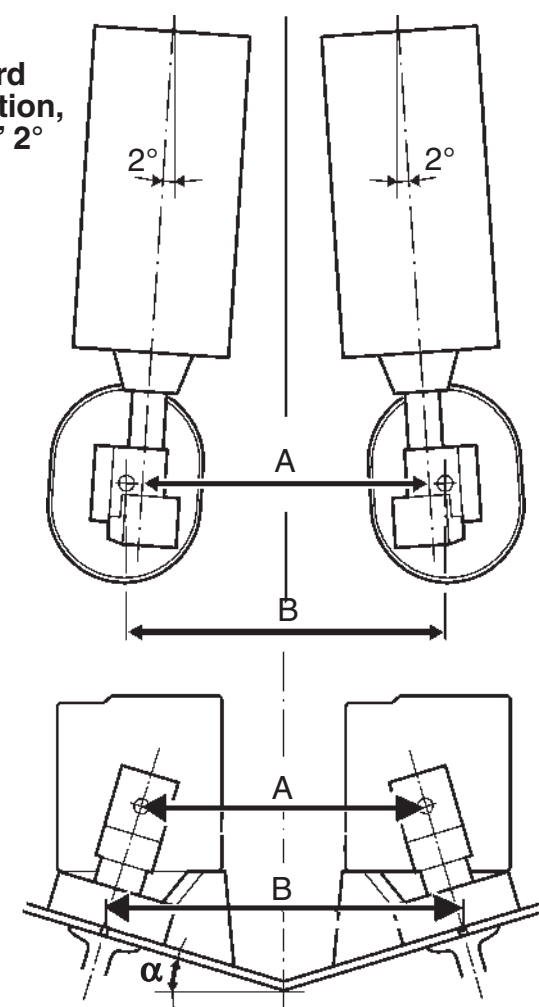


Template position (X) at different transom angles (β)	
Angle (β)	Position (X) mm (")
0–5°	620 (24.4)
6–10°	580 (22.8)
11–15°	550 (21.7)

Distance (A) between crank shaft/propulsion unit center lines at different deadrise angles, when using the template.
Distance (B) between center of hull inserts at different deadrise angles.

Deadrise (α)	Distance (A) mm (")	Distance (B) mm (")
5°	1295 (51.0)	1355 (53.3)
6°	1285 (50.6)	1355 (53.3)
7°	1270 (50.0)	1350 (53.1)
8°	1255 (49.4)	1350 (53.1)
9°	1240 (48.8)	1345 (53.0)
10°	1225 (48.2)	1340 (52.8)
11°	1205 (47.4)	1335 (52.6)
12°	1190 (46.9)	1330 (52.4)
13°	1175 (46.3)	1325 (52.2)
14°	1155 (45.5)	1320 (52.0)
15°	1140 (44.9)	1315 (51.8)
16°	1120 (44.1)	1310 (51.6)
17°	1100 (43.3)	1300 (51.2)
18°	1085 (42.7)	1295 (51.0)
19°	1065 (41.9)	1290 (50.8)
20°	1045 (41.1)	1280 (50.4)

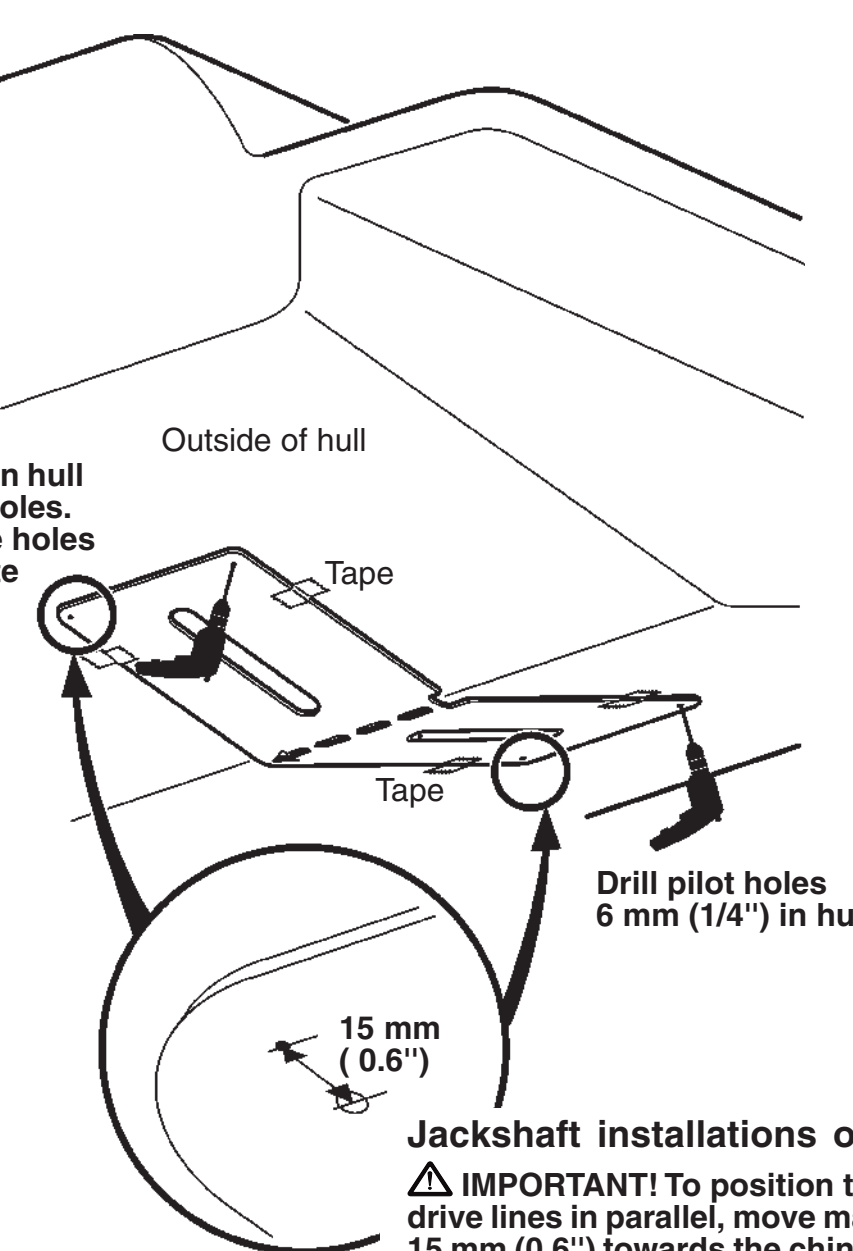
Standard installation, "toe-in" 2°



NOTE! Min. center distance (A) IPS 400/500/600: 1045 mm (41.1") IPS 350: 1030 mm (40.5")
If higher angles are needed do not use template. Measure according to minimum B-distance.

3

Mark off on hull and drill holes. Use guide holes in template



Jackshaft installations only:
⚠ **IMPORTANT!** To position the drive lines in parallel, move mark 15 mm (0.6") towards the chine.

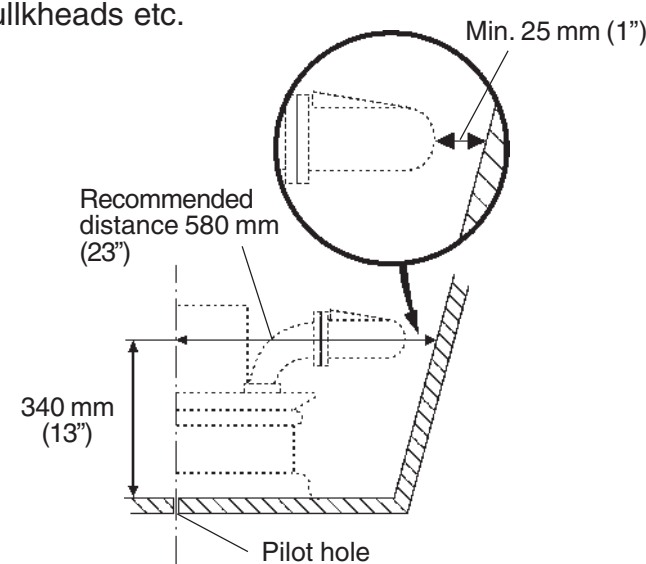
4 Check:

Distance from pilot holes (port and starboard) to transom.

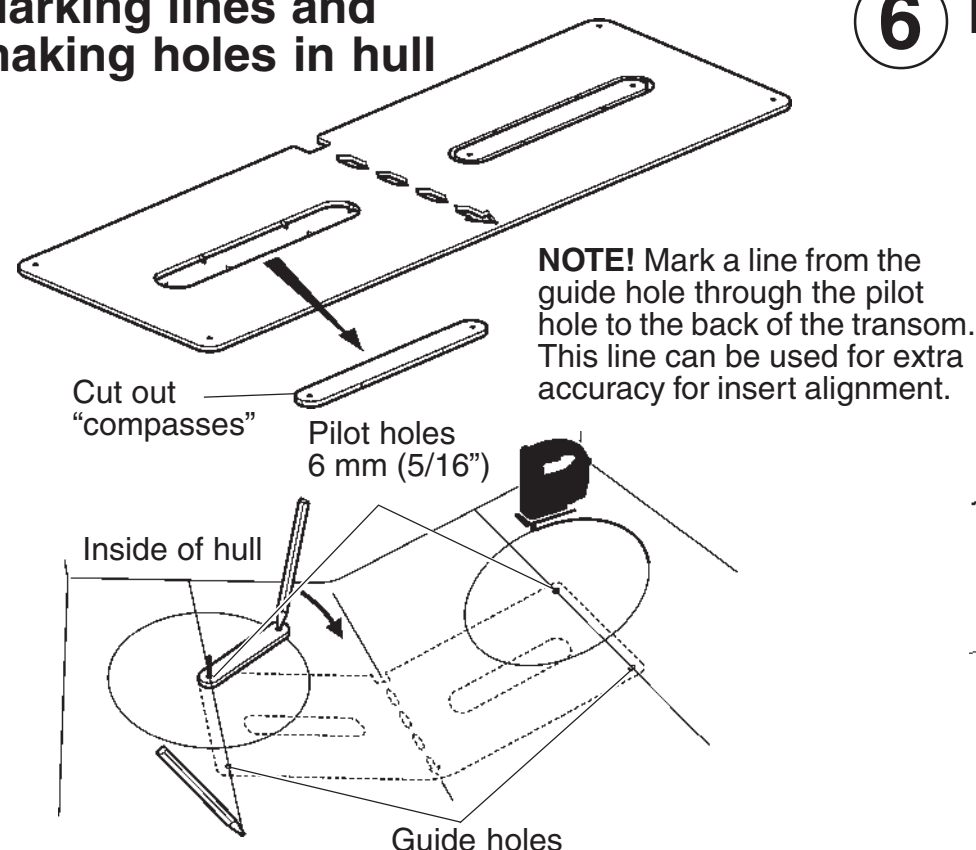
NOTE! Measure at height 340 mm (13").

If distance is less than 580 mm (23") it is recommended that the pilot holes and guide hole marks are moved.

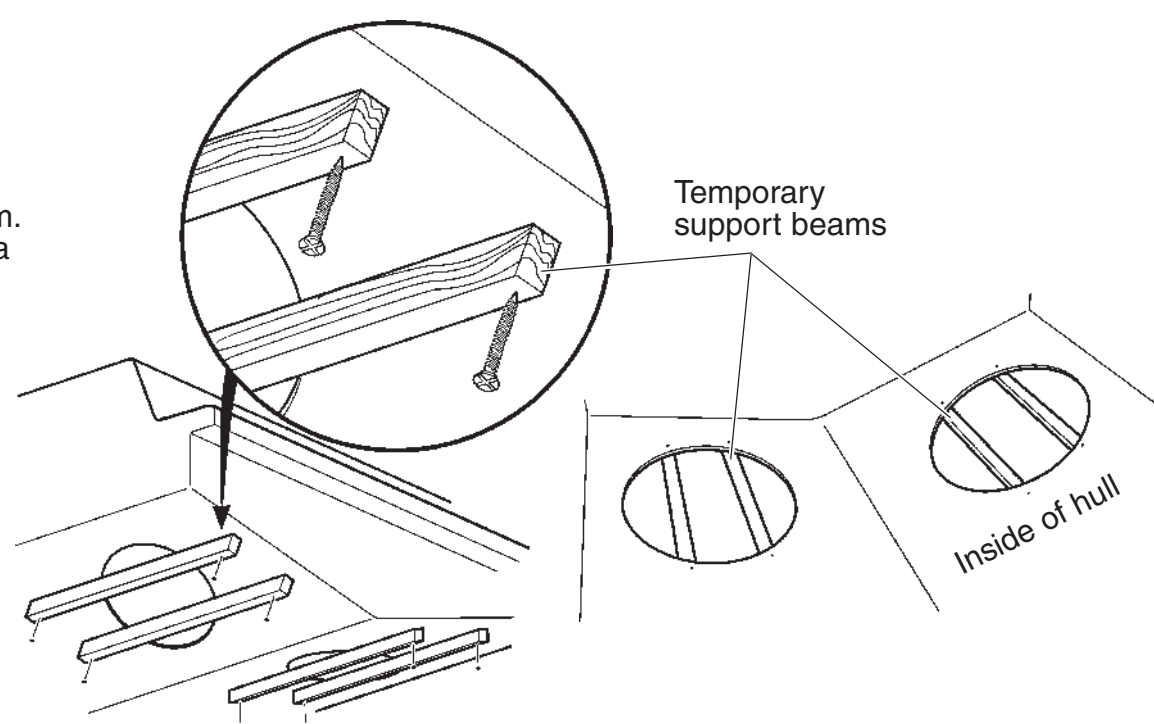
NOTE! Pay attention to reinforcements, bulkheads etc.



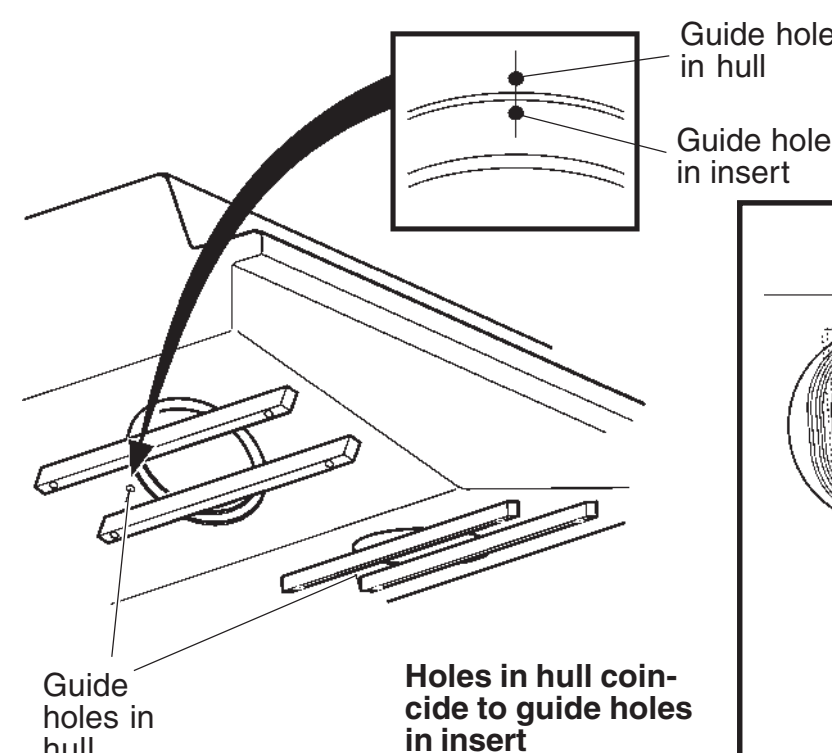
5 Marking lines and making holes in hull



6 Fitting of temporary support beams

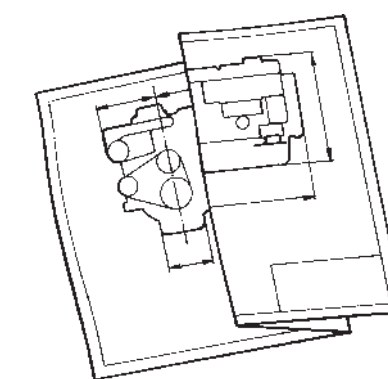


7 Aligning of inserts to hull



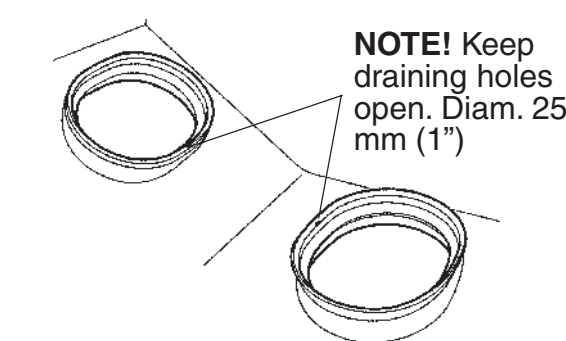
8 Fiberglass and layer specifications

Please refer to the latest version of installation drawings regarding lamination and reinforcement for Volvo Penta IPS.

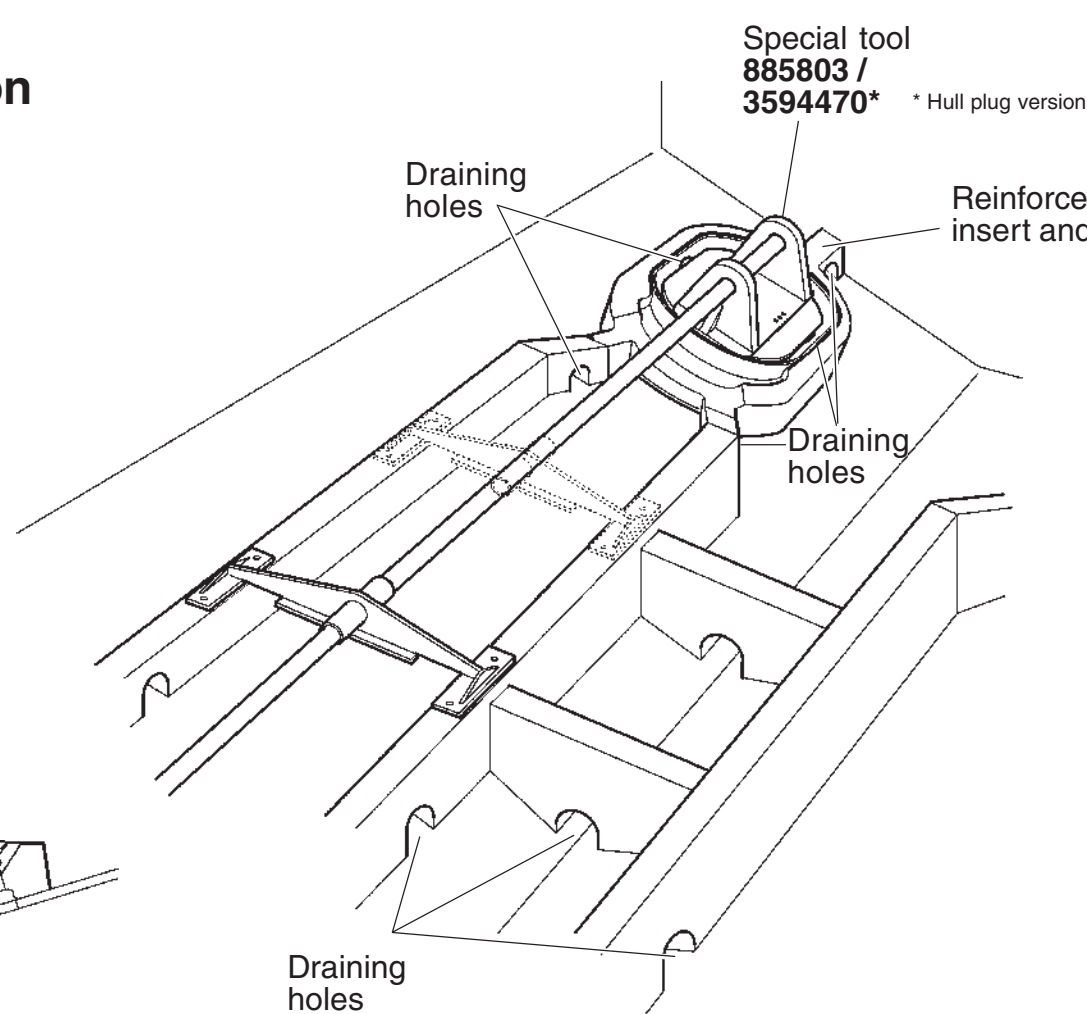
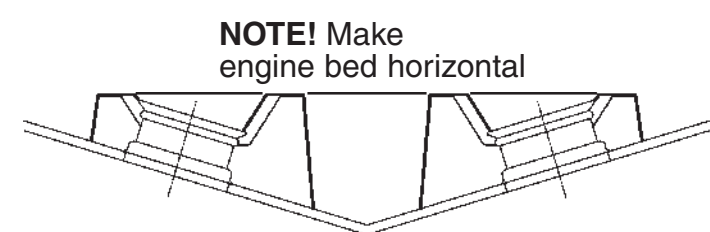


Building the engine bed

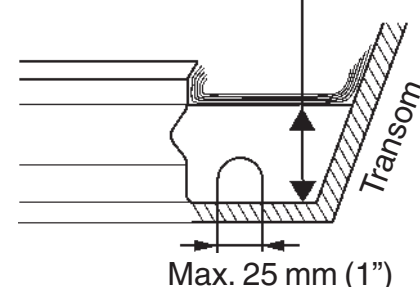
9 Engine bed position



NOTE! Make engine bed horizontal

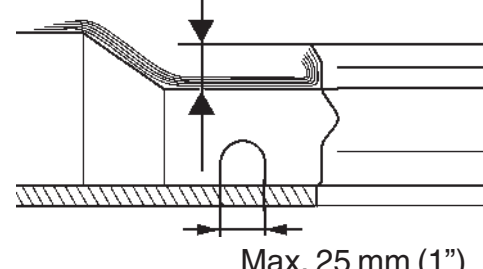


Reinforcement between insert and transom

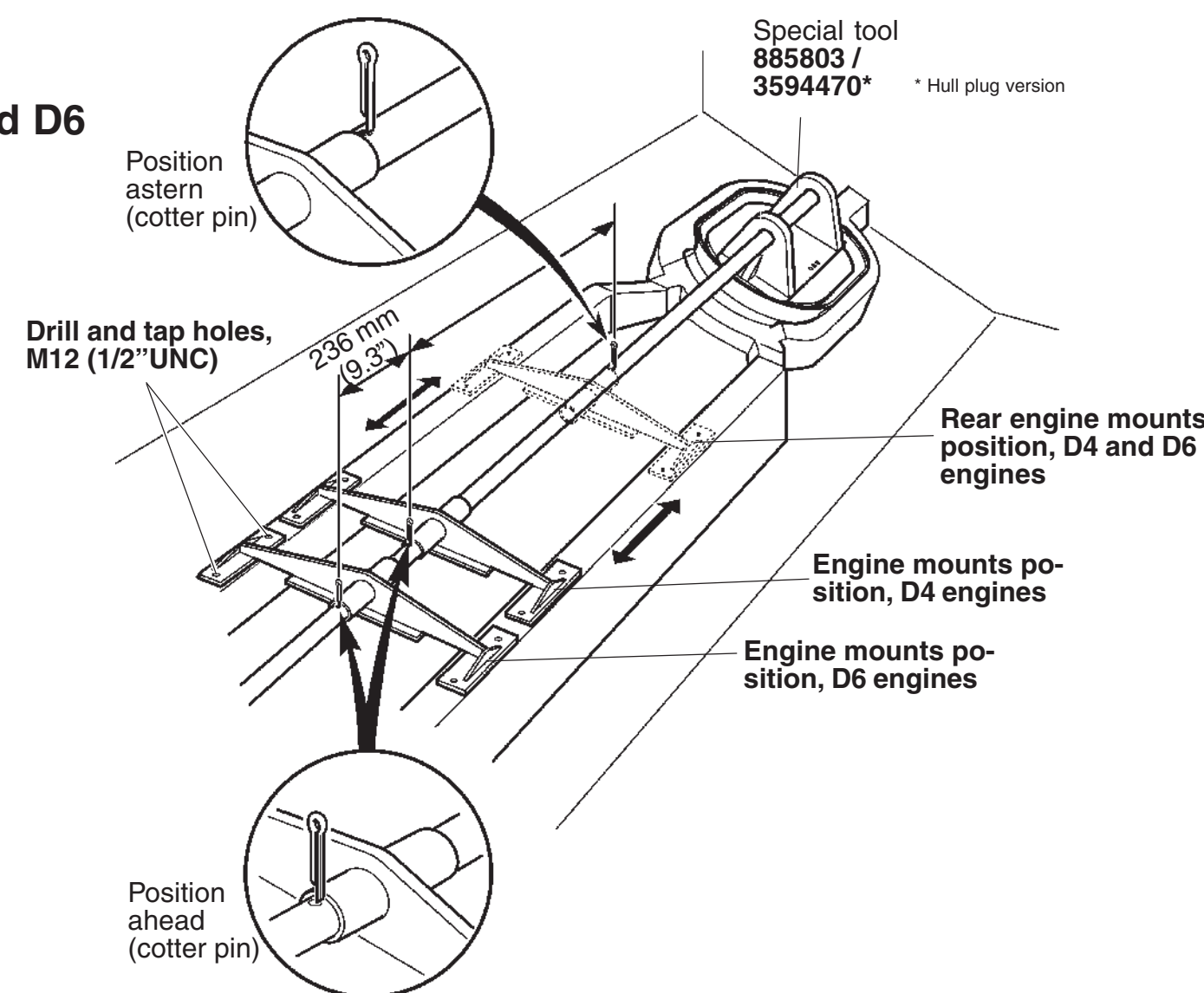


NOTE! Please refer to the latest version of installation drawings regarding lamination and reinforcement for Volvo Penta IPS.

Stringers between engine bed and insert



10 Engine mounts position, D4 and D6



11 Jack shaft installations

This poster describes a standard installation of Volvo Penta IPS units (drive shaft length 385 mm/15").

Standard installations have a "toe-in" of 2°. In jack shaft installations the drive lines are set in parallel to the keel line. Jack shaft installations please refer to *Installation Reference*, publ. no. 7746926.

**VOLVO
PENTA**



NOTE! Read the *Installation Manual D4/D6 Aquamatic DPH/DPR, Volvo Penta IPS, Inboard* before the installation work of hull plug, engine foundation, IPS propulsion unit and engine is started.

Installation Reference, Volvo Penta IPS Hull Plug and Engine Foundation



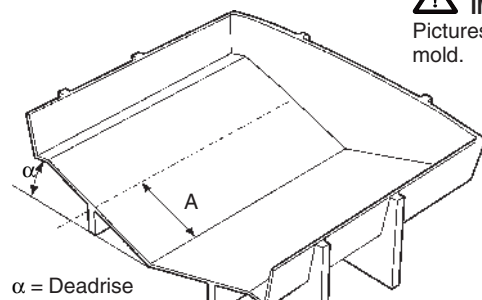
WARNING! Make sure all safety precautions are made prior to working procedures, to avoid personal injuries and damage on equipment.

Positioning and fitting of hull plug, Twin

1 Marking of "plug center line" measured from keel line

Mark a straight line parallel to the keel line at distance A depending on the deadrise of the hull.

IMPORTANT!
Pictures shows a hull mold.



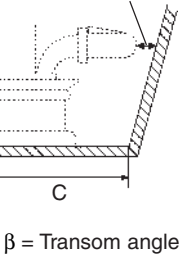
α	A	α	A
24°	755 mm (29.7")	14°	655 mm (25.8")
23°	745 mm (29.3")	13°	645 mm (25.4")
22°	730 mm (28.7")	12°	635 mm (25.0")
21°	720 mm (28.3")	11°	630 mm (24.8")
20°	710 mm (28.0")	10°	620 mm (24.4")
19°	700 mm (27.6")	9°	610 mm (24.0")
18°	690 mm (27.2")	8°	605 mm (23.8")
17°	680 mm (26.8")	7°	600 mm (23.6")
16°	670 mm (26.4")	6°	590 mm (23.2")
15°	660 mm (26.0")	5°	585 mm (23.0")

2 Marking of "plug center line" measured from transom

Mark a straight line parallel to the transom at distance C depending on the transom angle.

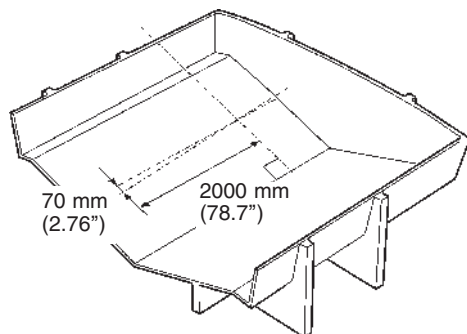
NOTE! Pay attention to reinforcements, bulkheads etc. If necessary, the distance C may need to be increased to clear the exhaust bend.

Min. 25 mm (1")



3 Marking of "toe-in" line

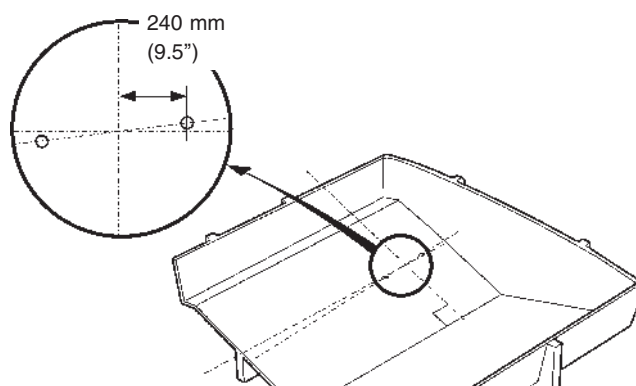
Mark a line, at a slight angle, in comparison to the straight line. At a distance of 2000 mm (78.7") the end points should be 70 mm (2.8") apart to create the desired 2° angle.



IMPORTANT! If the installation is a jack shaft type no "toe-in" line should be made. The IPS propulsion units should be installed parallel to the keel line.

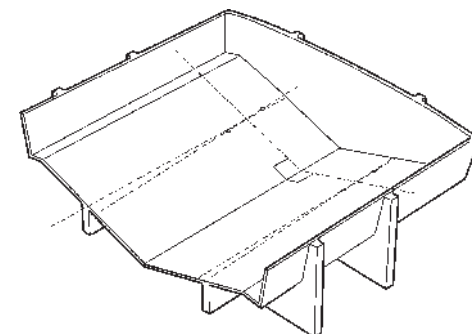
4 Drill hole on "toe-in" line

Drill bolt holes on the "toe-in" line at 240 mm (9.5") from the center intersection.



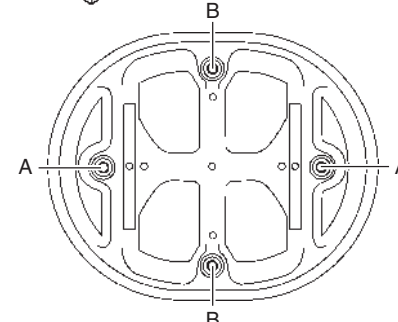
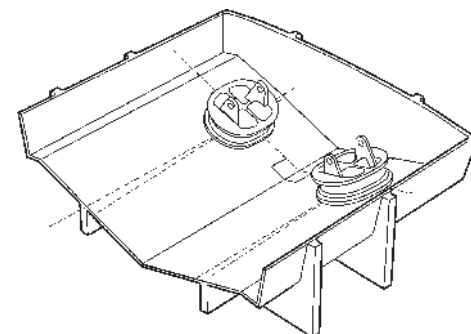
5 Mirror the procedure

Mirror the procedure for the port side of the hull mold.

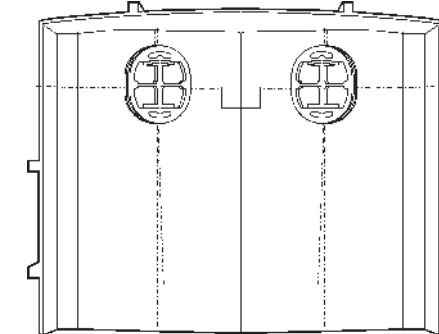


6 Place IPS plugs and drill additional holes

Place the IPS plugs according to the drilled holes (A) and bolt the plugs to the hull mold. Mark, drill and bolt additional two holes (B) for each plug.



7 Final result, hull mold

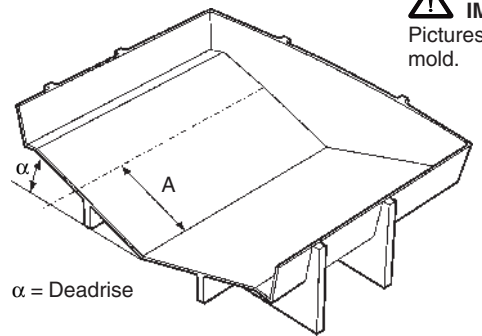


Positioning and fitting of hull plug, Triple

1 Marking of "plug center line" measured from keel line

Mark a straight line parallel to the keel line at distance A depending on the deadrise of the hull.

IMPORTANT!
Pictures shows a hull mold.



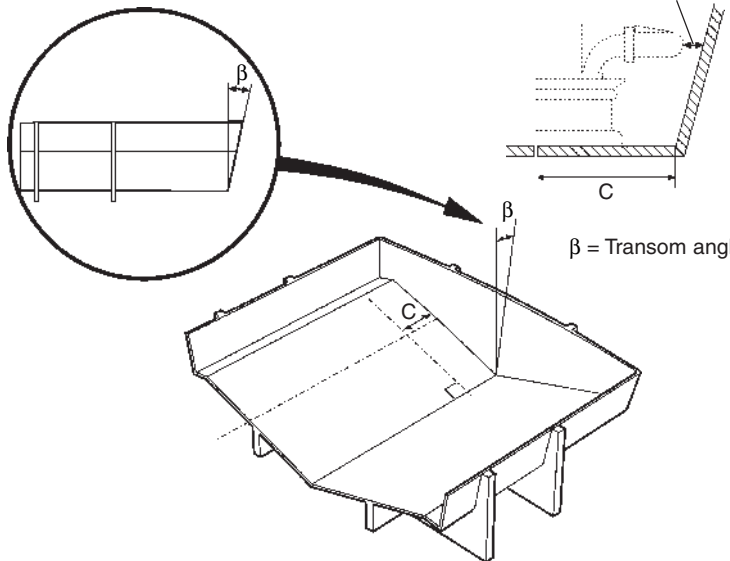
α	A	α	A
20°	1190 mm (46.9")	12°	1095 mm (43.1")
19°	1175 mm (46.3")	11°	1085 mm (42.7")
18°	1165 mm (45.9")	10°	1080 mm (42.5")
17°	1150 mm (45.3")	9°	1070 mm (42.1")
16°	1140 mm (44.9")	8°	1060 mm (41.7")
15°	1130 mm (44.5")	7°	1050 mm (41.3")
14°	1120 mm (44.1")	6°	1045 mm (41.1")
13°	1105 mm (43.5")	5°	1035 mm (40.7")

2 Marking of "plug center line" measured from transom

Mark a straight line parallel to the transom at distance C depending on the transom angle.

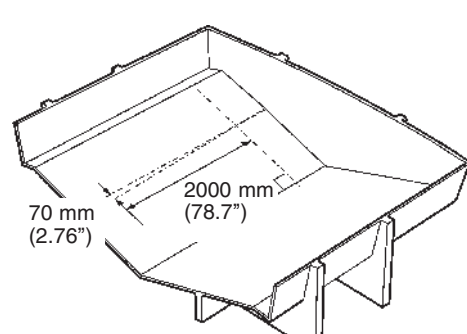
NOTE! Pay attention to reinforcements, bulkheads etc. If necessary, the distance C may need to be increased to clear the exhaust bend.

Min. 25 mm (1")



3 Marking of "toe-in" line

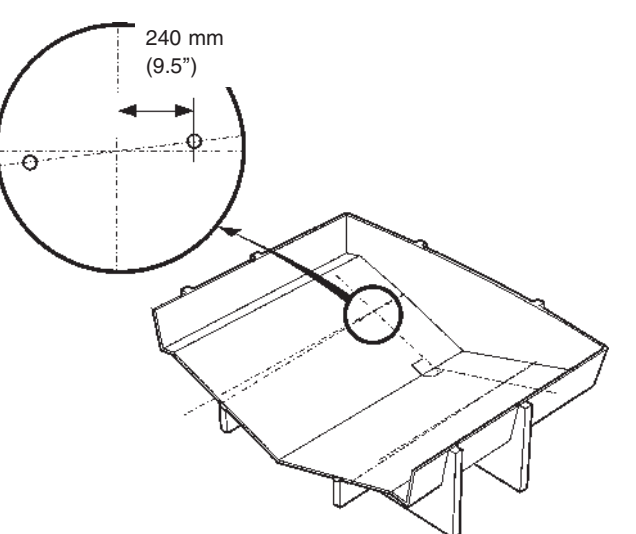
Mark a line, at a slight angle, in comparison to the straight line. At a distance of 2000 mm (78.7") the end points should be 70 mm (2.8") apart to create the desired 2° angle.



IMPORTANT! If the installation is a jack shaft type no "toe-in" line should be made. The IPS propulsion units should be installed parallel to the keel line.

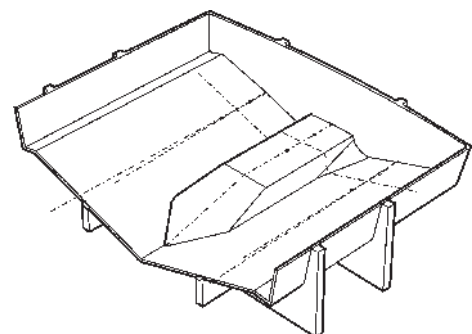
4 Drill holes on "toe-in" line and mirror the procedure

Drill bolt holes on the "toe-in" line at 240 mm (9.5") from the center intersection. Mirror the procedure for the port side of the hull mold.



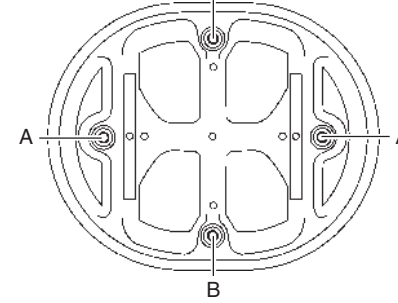
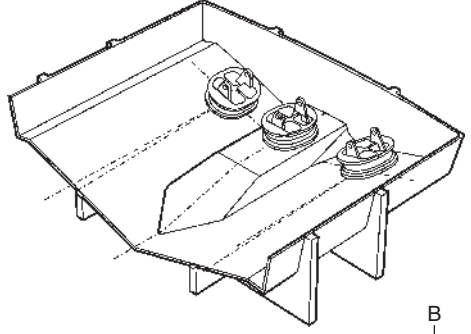
5 Build and place a hull tunnel plug. Mark "plug center line" and drill holes

Build a hull tunnel plug according to installation drawings. Mark a plug center line. Drill bolt holes on the line at 240 mm (9.5") from the center intersection.

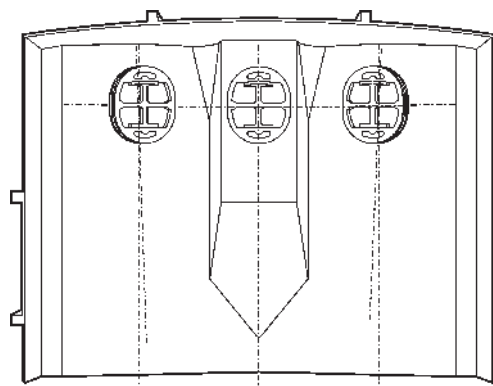


6 Place IPS plugs and drill additional holes

Place the IPS plugs according to the drilled holes (A) and bolt the plugs to the hull mold. Mark, drill and bolt additional two holes (B) for each plug.



7 Final result, hull mold

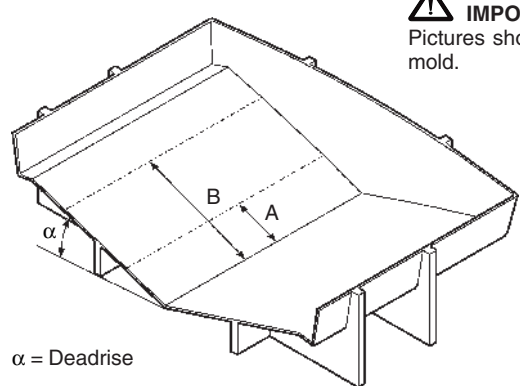


Positioning and fitting of hull plug, Quadruple

1 Marking of "plug center lines" measured from keel line

Mark two straight lines parallel to the keel line at distance A and B depending on the deadrise of the hull.

IMPORTANT!
Pictures shows a hull mold.



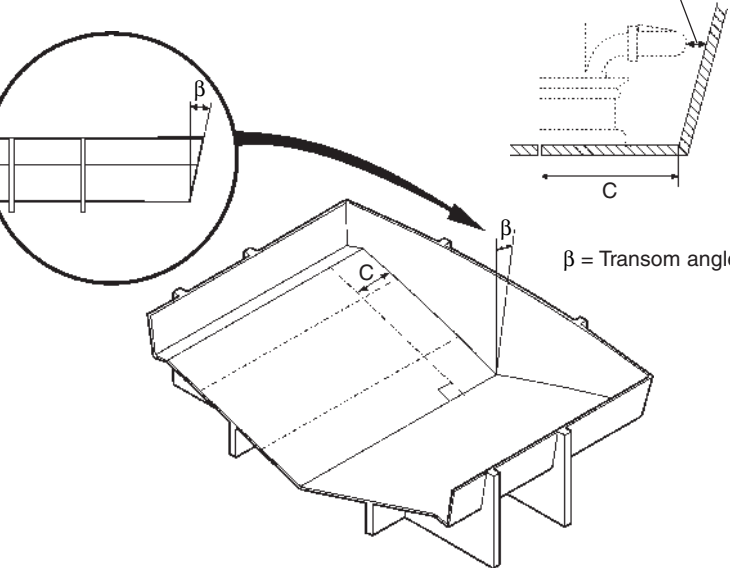
α	A	B
18°	640 mm (25.2")	1640 mm (64.6")
17°	630 mm (24.8")	1625 mm (64.0")
16°	620 mm (24.4")	1610 mm (63.4")
15°	610 mm (24.0")	1595 mm (62.8")
14°	605 mm (23.8")	1580 mm (62.2")
13°	595 mm (23.4")	1570 mm (61.8")
12°	585 mm (23.0")	1555 mm (61.2")
11°	580 mm (22.8")	1545 mm (60.8")
10°	570 mm (22.4")	1535 mm (60.4")
9°	565 mm (22.2")	1525 mm (60.0")
8°	555 mm (21.9")	1515 mm (59.6")
7°	550 mm (21.7")	1505 mm (59.3")
6°	540 mm (21.3")	1495 mm (58.9")
5°	535 mm (21.1")	1490 mm (58.7")

2 Marking of "plug center lines" measured from transom

Mark a straight line parallel to the transom at distance C depending on the transom angle.

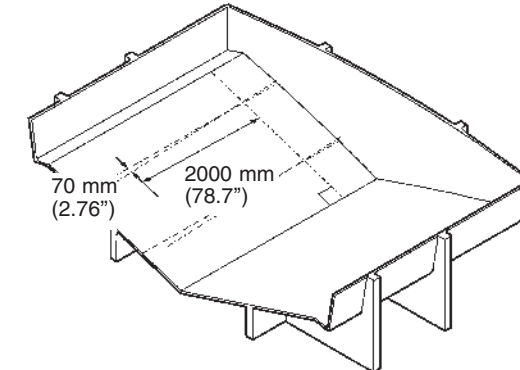
NOTE! Pay attention to reinforcements, bulkheads etc. If necessary, the distance C may need to be increased to clear the exhaust bend.

Min. 25 mm (1")



3 Marking of "toe-in" lines

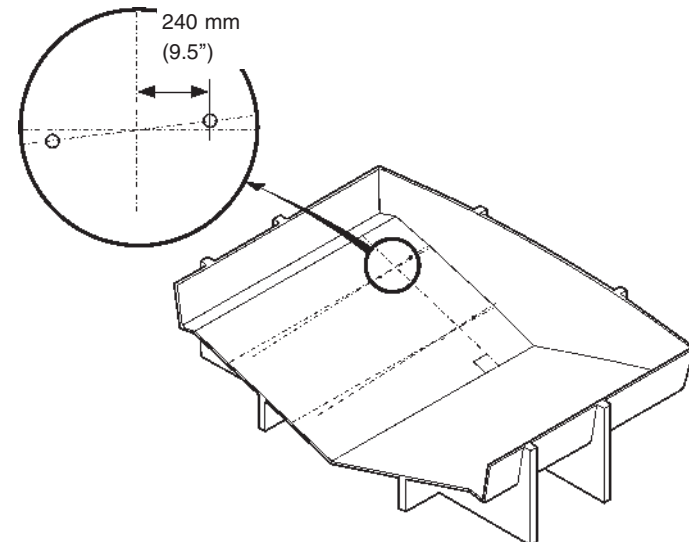
Mark two lines, at a slight angle, in comparison to the straight lines. At a distance of 2000 mm (78.7") the end points should be 70 mm (2.8") apart to create the desired 2° angle.



IMPORTANT! If the installation is a jack shaft type no "toe-in" line should be made. The IPS propulsion units should be installed parallel to the keel line.

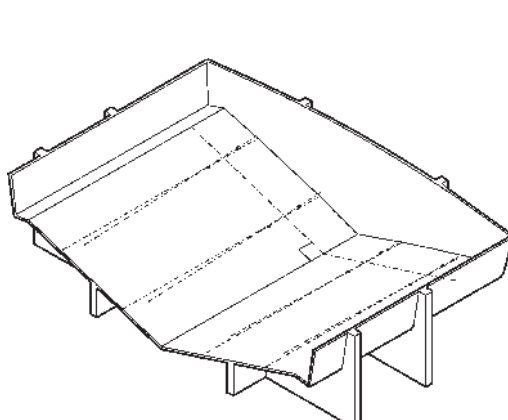
4 Drill holes on "toe-in" lines

Drill bolt holes on the "toe-in" lines at 240 mm (9.5") from the center intersection.



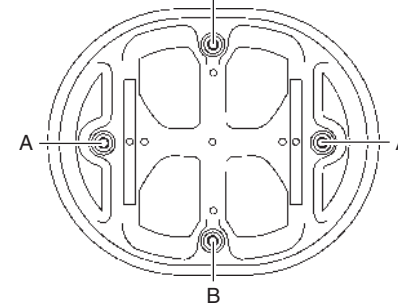
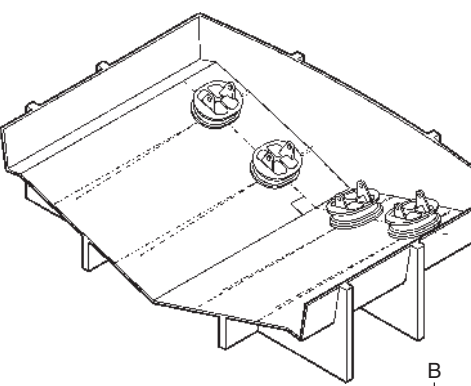
5 Mirror procedure

Mirror the procedure for the port side of the hull mold.

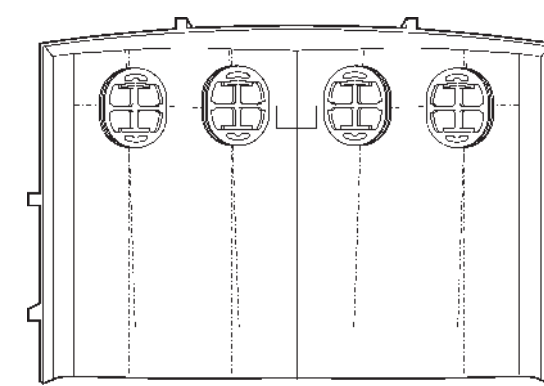


6 Place IPS plugs and drill additional holes

Place the IPS plugs according to the drilled holes (A) and bolt the plugs to the hull mold. Mark, drill and bolt additional two holes (B) for each plug.



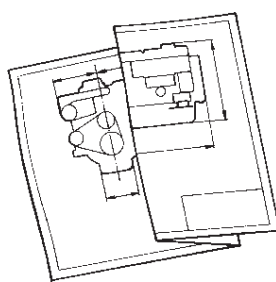
7 Final result, hull mold



Lamination

8 Fiberglass and layer specifications

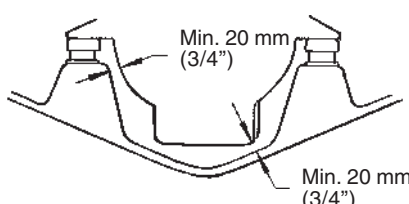
Please refer to the latest version of installation drawings regarding lamination and reinforcement for Volvo Penta IPS.



Building the engine bed

9 Design and build engine beds

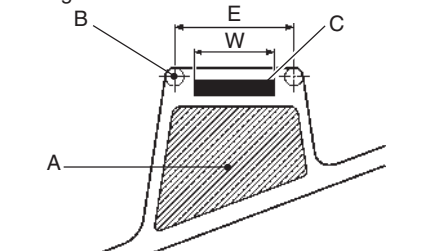
When the engine beds are designed, make sure that the space for the flywheel housing, the bottom and sides of the sump, etc. have a recommended clearance of at least 20 mm (3/4").



NOTE! Make engine beds horizontal

To reduce noise and vibration, the engine bed should be filled. Make sure the material does not absorb water. Generally high density material (A) is better for noise and vibration reduction.

Build up the engine bed with spacer material (A) so that the underside of the engine mountings / engine rubber mountings almost rest against the bed. There must be room for flat bars and fiberglass.



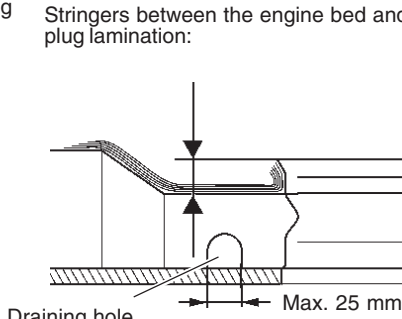
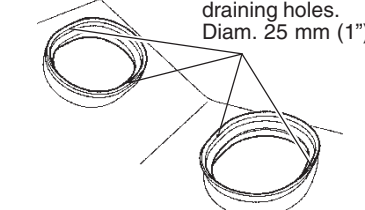
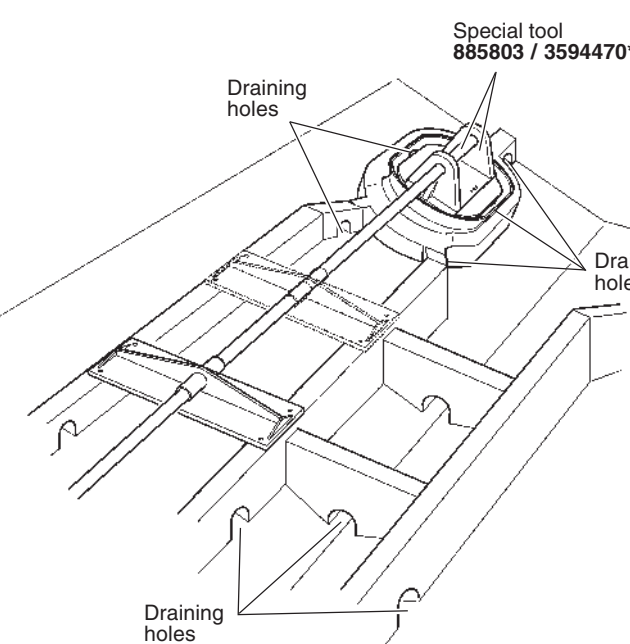
A = Spacer material
B = Fiberglass, approx. 10–15 mm (0.4–0.6")
C = Flat bar, galvanized, approx. 10 mm (0.4"), min. width: 60 mm (3")
W = Flat bar width
E = Engine bed min. width: 112 mm (4.4")

10 Lamination and reinforcement

Use special tool 885803 / 3594470* to measure up the engine beds. The beds must be horizontal. Reinforcements must be made between the engine beds and hull plug lamination and from hull plug lamination to the transom. The beds shall end up against the hull plug lamination by building stringers.

Draining holes shall be made according to figure, diameter approx. 25 mm (1")

* Hull plug version



11 Engine mounting positions

Use special tool 885803 / 3594470* with the engine bed drill jig. Place the drill jig against the clevis pins for ahead and astern positions engine beds.

Mark the bed with holes 6 mm (1/4") by drilling through the drill bushings. Then remove the special tool. Drill and tap the holes. Dimension: M12 (1/2" UNC) or equivalent.

* Hull plug version

