

Beekeeping with Polystyrene Hives

Introduction

Plastic beehives have been used in Europe for at least 30 years, where they have proved both durable and effective, so much so that today in Denmark virtually 99% of all new hives sold are made of plastic, either expanded polystyrene or polyurethane. The position is similar in many other Northern European countries, particularly Germany and the other Scandinavian countries. In total there are over half a million plastic hives in use in Europe today, which is testament to their effectiveness and durability. The plastic hives we sell are made from food grade, high density expanded polystyrene. Although this is chemically identical to the polystyrene foam used in packaging, it has a much harder surface and is substantially stronger.

Our Langstroth hive has a number of unique features, including the hard plastic edges which double as frame runners and provide protection against the hive tool. The hive bodies also interlock with a raised portion on the top of each hive body engaging with a corresponding “socket” on the underside of the upper hive body. This design is coupled with another unique feature – these hives are neither top or bottom bees space, they are a bit of both. This feature is linked to the hive body design and shows up when the bodies are replaced after an inspection. With a conventional hive it is usually recommended to replace the hive body at a large angle to the one below and then rotate it round into correct alignment. With our hives the upper body or super should be replaced at a *slight* angle only. Smoke is then applied around the joint to chase away any bees and then the body is rotated round the last few degrees when it will drop down into place, with the beekeeping taking some of the weight to minimize any jarring, which will excite the bees. This means the final movement between the bodies is *vertical* not horizontal and why the idea of top or bottom bee space does not apply. The bee space is *between* the frames, with the upper frame dropping downwards onto the lower one.

Assembling the Hive

The mesh varroa floor is secured with 4 screws placed in the corners, close to the edge. Tighten them very gently – the bees will soon stick everything down with propolis. Be very careful of the edges of the mesh screen before fitting, it is extremely sharp.

The hive bodies must be fitted with hard plastic edges along the short sides. These edges will be supplied loose and are easily recognized – they are brown plastic and about 38 cm long. There are two different types and you will see each type matches the profile of the upper and lower edges of the short sides. To fit the edges engage the strip by hand and then push it along as far as it will go with gentle pressure by hand. The amount of force required varies, some strips can be completely fitted by hand but many require a bit more effort. To fit the stubborn strips you can push them almost home by holding the short side piece itself and pushing down against a soft surface like a carpet. You will find it much easier to push the expanded polystyrene hive body side by hand downwards than to try and apply force to the end of the plastic strip. To push the strip finally home you can use a mallet and a small block of wood, striking the end of the strip while the hive body side is supported on carpet. Ensure the end of the side body is not damaged by the block of wood as the strip reaches its final position.

The four parts of the full depth and shallow supers are easily assembled. This is best done on a smooth, flat surface. Carpet is ideal as it will reduce the risk of damage if you drop one of the components. Select two ends (with the hard plastic edges) and two longer sides and ensure the words "Bee Box" all face the same way. Push the ends one at a time into a long side, ensuring the tenons slide evenly into the mortises. If you make a

mistake and need to remove an end, stand on the long side and pull the end piece while gently rocking it from side to side.

Adhesive is not essential but it makes the hive body much stronger and can be used to seal any gaps which will aid sterilization and cleaning. Use a waterproof PVA glue such as the Evostick one in a blue bottle. The glue should be sparingly applied to the tenons only and the mating faces. Do not put any in the mortise holes as it can form a hydraulic lock and prevent the joint being closed. After two short ends have been fitted to a long side check everything is facing the right way and then with the long side flat on the floor and the ends sticking upwards push the second long side downwards. No great force is required. If you find you need to exert excessive force check you are assembling the items correctly. A final push can be achieved by *gently* sitting on the *corner*. Do not apply your full weight to the middle of a side. To help sealing, run a bead of glue down the inside corner. Any excess glue can be removed with a damp cloth.

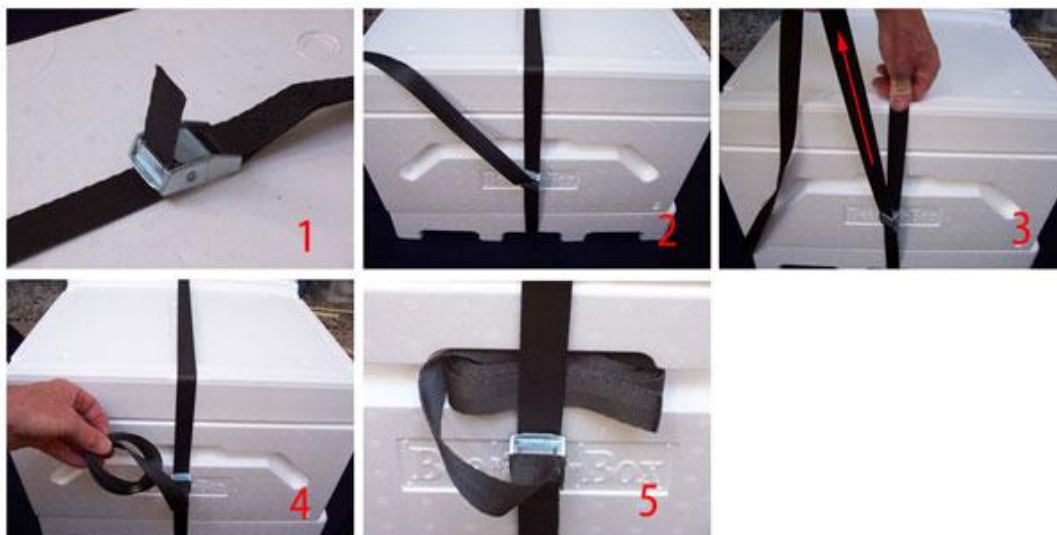
Painting the Hive

Before being taken into use it is essential the hive components are painted. Painting prevents the growth of algae on the outside of the hive, deterioration by UV and in the case of the feeder is required for sealing and ease of cleaning. We recommend the floor and roof are fully painted on all surfaces but the brood chamber and supers need only be painted on the outside although painting the inside helps cleaning and sterilisation. Ideally, two coats of paint should be applied, though one will suffice. The feeder requires additional painting on the inside, where the syrup sits. At least 4 coats are required otherwise the syrup will soak into the feeder and mould etc., will continue to grow even after you have washed it out. The interior "walk-way" the bees climb up through does not need painting but the surface the bees walk down to reach the syrup benefits from a light roughening with fine sandpaper to help the bees grip. If you have strong fingers the hard plastic edges can be slid off prior to painting for a neater finish. Water based exterior smooth masonry paint is recommended for all surfaces other than the inside of the feeder. This is quick drying and easily applied with a 4" wide fleece roller and a ½" brush for the fiddly bits. We have found Dulux Weathershield Smooth Masonry paint is an excellent choice. This paint contains an acrylic resin and gives excellent coverage and wear characteristics. Woodland Pearl No 1 in the Tailor Made range of this paint is an excellent matt green that suits the hives well. We used to recommend Cuprinol Garden Shades but it is not very hard wearing and we feel the extra durability and better coverage of the Dulux paint is worth the extra cost. One litre will be sufficient for two hives with supers although you will find you probably have to buy 2.5 litres. There is a school of thought that supports painting the hive components different colours so the bees can recognize their own hive better, but unless you have a large number of hives in the apiary this would not be economic. For the interior of the feeder we recommend four coats of interior gloss white paint. Roughen the surface down which the bees climb to reach the syrup with fine sanding paper after the last coat. Alternatively, apply an extra coat to this surface only and sprinkle dry sand on it. You do not need to paint the interior surface the bees ascend - it would be pretty hard to reach in any case.

You can spray the hives but unless you have a very powerful spray gun you will probably need to add a great deal of thinners and several coats will be required. The masonry paints can only be applied with industrial grade airless spray guns. Domestic airless guns are unsuitable as the paint is too thick.

Using the Strap

You can just put a stone or brick on the roof but it will damage the paint and a strap is neater. The strap can also be used to pick up the hive - but only when it is empty. Do not use it when it is full of bees! When full the hive should only be picked up from the bottom. Start by threading the end through the buckle, as shown in picture number 1. Then loop the strap around the hive as shown in picture 2. Note the end of the strap with the buckle comes under the floor so the buckle is pointing upwards. To pull the strap tight press down on the strap where it goes over the edge of the roof and pull the free end tight, as shown by the arrow in picture 3. It is not necessary to use a lot of force. Loop the end as in 4 and tuck it behind the strap 5.



Introducing Bees on BS National Frames - 40010, 40012 & 40030 Full Depth Frames

If you obtain your bees as a nucleus they may arrive on BS National frames. This is not a problem as it is very easy to convert BS National frames to fit into a Langstroth. Our conversion kit consists of 5 Langstroth Top Bars, 10 Side Fillers and some Nylon Ties to hold everything together. Leave the nucleus on the site chosen for the hive for 24 hours then move it to one side and replace with your new hive. Start by carefully lifting an outer National frame (ideally without the queen) from the nucleus and lay the Langstroth top bar on top of it, ensuring it is placed centrally with an equal overhang at each edge. There are marks on the top bar to guide you but adjustment is easy up until the tie is fully tightened. Place side filler on the end of the National frame and fix it to the Langstroth top bar with a tie. Ensure the hole is nearest the frame sidebar otherwise the filler will not press correctly against the National side bar. Pull the tie fairly tight and do the same at the other end. Check everything is central and tighten the tie further with pliers and then cut off the surplus. For SUBSEQUENT frames it helps if you shake off most of the bees into the new hive before conversion. More detailed instructions come with the conversion kit. The kit also works with Smith frames but the gap that would have been filled with the longer lug of a National frame should be filled with a suitable piece of scrap wood.

Introducing Bees to the 4004 Medium Bodied Hive and Subsequent Management

By far the simplest way to introduce bees to a medium bodied hive is through a shook swarm. This can be carried out between late March and until about the end of June and is our recommended method at this time of year when transferring an established colony. Feed the bees with 1:1 sugar syrup afterwards. The colony will grow strongly and will usually out-strip a colony that has not been shook swarmed, especially if the operation is carried out early in the year.

Alternatively, if you already have Langstroth hives (wooden or poly) then simply remove any supers to another hive if possible and put two medium bodies onto the hive filled with frames and foundation topped off with the new polystyrene roof. If there were supers on the original hive and no other hive to move them to, place them above a queen excluder between the medium bodies and the roof. Once the bees have drawn out the foundation in the medium bodies the queen should start laying in the medium bodies. Insert a queen excluder above the old hive body and under the new medium bodies and once the brood in the old hive has emerged transfer the new medium bodies with queen and new brood to the polystyrene floor.

If you are starting from scratch the bees may come on Langstroth full depth or National frames in a nucleus. A nucleus is not really strong enough for a shook swarm so carry out the procedure as described in the Full Depth section above if the National frames need converting and then proceed as follows.

Half fill the lowest medium depth hive body with frames of foundation and then do the same to the next level. Push the frames to the same side, leaving a 5 frame gap down the opposite side. This is the gap into which the full depth frames, or converted National frames are gently lowered. Add the roof (and ideally our full width rapid feeder) and leave the bees to get used to their new home. There will be a large gap under the full depth frames but this does not matter.

When the time comes for the first inspection gently lift off the roof and place it inverted by the side of the hive. Onto the roof place the 2 additional empty medium bodies which came with the hive (this is why we supply 4 bodies for this hive - the two extra are required for the first inspections). Start the inspection by lifting the outermost full depth frame which after checking should be lowered into the 2 empty medium bodies on the roof. Continue until all the full depth frames are in the spare hive bodies on the roof then continue the inspection of the medium depth frames in the upper of the two hive bodies on the floor. It is helpful to avoid chilling the brood if the 5 full depth frames are covered by a cloth or spare roof whilst the medium frames are being inspected. When the upper brood body has been inspected pick it up and place it on the two bodies with the full depth frames and complete the inspection of the lowest tier of the hive. To reassemble the hive reverse the procedure, replace the second tier hive body and then replace the full depth frames one at a time. At all times ensure the frames stay in the same order.

After a few weeks the bees should have drawn out much of the foundation in the medium frames, especially if they have been fed as we strongly recommend. During this period if the queen is found on a medium frame with brood, stop inspecting and prepare to rearrange the hive for the final step before the full depth frames are removed. Place the two lower hive bodies to one side, either on a spare roof or a sheet. It does not matter if their order is reversed, i.e. put the top one down first and then put the lowest one on top of it. It is essential while doing this to ensure the queen remains on her frame in one of these hive bodies.

Onto the floor, which now has no hive bodies on it place the two spare hive bodies containing the full depth frames and then add the queen excluder. Then replace the two medium bodies with the queen, filling the gaps left by the full depth frames with new medium frames with foundation. As a variation, especially if the queen has only just started to lay in the medium frames, the frames from both bodies can be combined into one hive body and either the roof replaced directly, giving a three tier hive, or the fourth hive body is filled with frames of foundation and placed on top. The aim is to have the full depth frames on their own in two otherwise empty hive bodies below the queen excluder. Above the queen excluder is the queen in either one or two medium hive bodies with drawn foundation and brood.

Whichever method is used, after about 3 weeks the brood on the full depth frames will have emerged and the frames can be disposed of and the hive returned to 2 medium bodies. Before this happens you can bruise any sealed honey cappings on the full depth frames and the bees should take it up into the hive. You will not

need full depth frames again. As the colony expands, add the second brood chamber if not already in place. Later, add the queen excluder and the first super and watch the bees bring in your first honey crop!

Running the colony on two medium bodies gives you the opportunity to try reversing them as a swarm prevention measure. In about April or early May as the weather warms and the oil seed rape comes into flower, swap the two lower hive bodies around making sure if there is an arch of honey, particularly on the upper body the cappings are bruised with the hive tool to encourage the bees to remove it and create more laying space for the queen. Avoid having a large arch of honey between the two brood chambers.

There is nothing to stop you adding more medium bodies below the queen excluder or even dispensing with the queen excluder altogether and simply letting the queen lay up as many hive bodies as she requires. This is a Danish beekeeping trick.

Apart from less lifting the big advantage of having the same size frames in all hive bodies is you should always, after your first honey crop, have a supply of drawn comb suitable for making increase, relieving congestion in the brood chamber or simply to replace older comb to reduce the risk of disease.

Using Your Plastic Hive

In use, leave out the varroa tray all year round, except for short periods of monitoring mite levels. This recommendation has been proven in Scotland where several hundred polystyrene hives suffered negligible winter losses following this regime. Bees are not killed by cold (they will cluster to keep warm) but confined, damp conditions are ideal breeding grounds for disease. In summer leaving out the tray allows improved ventilation to the hive which should reduce swarming induced by over-heating. If housing a swarm replace the varroa tray for the first few days to ensure the hive is as dark as possible to help the bees settle down. Then remove it to aid ventilation. In cold areas the varroa tray can also be replaced in the early spring to aid build-up.

Always use "J" type hive tool for lifting the frames, particularly the first one. This tool presses down on another frame in order to lift out a frame, thus avoiding any danger of damaging the hive.

The plastic queen excluders are best reversed after each inspection i.e. turned upside down. This will prevent them developing a set due to the warmth of the hive softening the plastic.

The bees will tend to stick down the roof with propolis. To avoid this, although this is not essential, put a sheet of plastic under the roof - this will make the roof much easier to remove. More or less any sort of plastic will work: for example builders' merchants can supply a flexible sheet used as a waterproof membrane under concrete. We also sell a purpose made inner cover which fits under the roof which doubles as a glass quilt – allowing the bees to be observed without disturbing them too much.

The hives are best cleaned with a solution of washing soda, made up as directed on the packet. This will dissolve propolis and clean off any dirt etc. Be careful trying to remove propolis and wax with the hive tool. We recommend purchasing one of the large plastic double handled buckets obtainable from Builders' Merchants and some DIY stores as domestic sinks are too small for the hive components. This will also allow you to do the cleaning outside. A Plasterer's Bucket is even better as it is much larger but these take up more storage space and are more expensive.

Sterilisation of the hive can be carried out with a solution of household bleach, again made up as directed on the bottle. A 5% solution of caustic soda can also be used but great care must be taken and we do not recommend this method. Wear suitable protective equipment, including eye protection. You can obtain elbow length rubber gloves from Farm Suppliers which are an excellent way of protecting your arms. We

advise against using a brush due to the danger of flicking the bleach towards your face. A disposable washing up cloth is best. Thoroughly wash the hive after cleaning or sterilisation with cold water and preferably with a hose fitted with a spray or sprinkler - not a jet. Do not use a power washer as it will damage the surface of the plastic, although a power washer can be used to clean the plastic queen excluder.

The Poly Hive Year

Polystyrene hives keep the bees warm and dry during the winter so expect your bees to come out of this period in a healthy state, providing they went into winter with a low varroa level and were fed early enough the previous year to allow them to raise plenty of over wintering bees. The end of August is not too early to start your winter feed. We advise against relying just on the ivy. Let the bees use the ivy pollen for additional brood rearing but ivy nectar is renowned for setting solid very quickly in the comb. The bees can then only use these stores if they can fly out and gather water – which in the depths of winter may be difficult for them. If this happens the bees can starve to death even though they are close to an ample food source. A bit like Robert Scott's doomed party in Antarctica in 1912.

The other main cause of winter losses is varroa. Resistance to the synthetic pyrethroids is now very widespread in England and well into Scotland. We recommend a late summer treatment with Apiguard followed by a dribble of Oxalic Acid in late December. Other treatments such as formic acid can also be effective but their use carries other dangers and so we cannot formally recommend them.

We strongly advise that you leave the varroa tray out throughout the winter. Left in it will simply become a breeding ground for wax moths. Left out the bees will get plenty of ventilation and this helps to keep the humidity levels down. Bees are not killed by the cold but damp is certainly an enemy.

In colder countries such as Finland it is recommended to replace the varroa tray in early spring and leave it until the weather warms up. We have not done this here in Devon for the last 5 years and have not noticed any problems. We have also spoken with bee farmers in Scotland who leave the trays out all year round which leads us to advise that wherever you live in the UK leave out the tray except for short periods of monitoring for varroa and when carrying out varroa treatments that require the hive to be closed up. However, if you do decide to replace the tray in Spring check it weekly and remove any debris, otherwise the wax moths will take up residence and they can chew into the plastic, especially when they decide to pupate.

Our preferred spring management regime includes an early shook swarm. This both knocks down the varroa levels and gives the bees an opportunity to recover from any other diseases. There is detailed advice in our FAQs page on the website on how to carry out a shook swarm, but essentially the technique is to shake all the bees onto a new floor and brood chamber which is filled with 10 new frames with foundation. The bees are fed and within a few weeks the colony will be rapidly growing. We have had a colony given a shook swarm in late March which was on two brood boxes and had 15 frames of brood by mid May – some 7 or 8 weeks later. As the colony expands always ensure the queen has somewhere to lay. If a shook swarm is not carried out check for combs which are clogged with ivy honey or pollen and replace them with foundation. You can expect the queen to lay up all 10 frames in the brood chamber as unlike thin-walled wooden hives a poly hive is warm throughout the brood chamber and brood will often be found on the outer faces of the end combs. Remember this when removing these frames as the queen may be on the first frame!

Prolific bees may need a second brood chamber. Even with two full size brood chambers the queen may lay in the first super if a queen excluder is not used, especially during the sort of rapid colony expansion typically found when the bees are working oil seed rape.

We have conducted a few experiments with bees in colonies without queen excluders. Early results are promising but the main lesson learned so far is the colony must be on the same sized frame throughout. Commercial bee farmers will often use full sized frames but these require a larger and more expensive extractor and of course the boxes are very heavy. For the amateur beekeeper the answer is to use 3/4 or Medium Langstroth frames throughout the hive, as offered by our 4004 model. These frames are not as small as might be envisaged being roughly the same area as a BS National full depth frame and in the case of our plastic frames they are actually about 10% larger than a BS National. We have spoken with a beekeeper in Sweden who has 400 colonies on Medium frames so the method works and the advantages which stem from having the same sized frames far outweigh any perceived extra work which may stem from having more frames to inspect.

Always ensure the bees have plenty of room. Overcrowding is the surest way of encouraging swarming. Although it means more work we recommend "bottom supering". This means when it is time to add a further super add it *below* the one already there. This gives the bees more space and also prevents marking of the cappings by the feet of the bees as they walk over the sealed combs to reach the ones above they are still filling. When it comes to remove the supers a normal wooden framed clearer board as available for other suppliers can be used. We advise against Porter bee escapes. The Canadian style clearer boards are very effective but should only be placed on the hive for about 12 hours, i.e. overnight. The alternative, and very effective for a few colonies, is simply to shake and brush the bees off the combs. To do this, place an empty super on the inverted roof next to the hive. After gentle use of smoke and ideally none at all, lift each super frame out one at a time. Shake the bees into the hive and then gently brush off any remaining bees with a soft brush. Purpose made bee brushes are available but you can also use something like a frond of bracken. The traditional tool was a feather from the wing of a goose. As each frame is cleared of bee place it in the empty super covering it with either our inner plastic over or a cloth to discourage the bees from settling on it again.

When all the frames are clear continue on to any other supers on the hive and then remove the cleared supers away from the hive. You will probably have to go through the supers again before bringing them indoors for extraction. The quickest way to clear supers is with a bee blower. A petrol driven leave sweeper works fine but always ensure it is clean inside; otherwise you will cover the comb with bits of dried leaf. You will need to dismantle the blower to clean it internally unless you keep one just for the bees. When using the blower stand each super in turn on something like a portable folding workbench next to the hive. The frames should run vertically as it makes it much easier then to look between the frames to check all the bees are out. It will be necessary to blow from both sides but start from the underside of the super first. Ensure there is plenty of room behind the super so the bees are either blown out onto the grass or can take to the wing. Do not blow the bees against a tree or wall! The bees will try to return to the hive so ensure there is nothing in the way which means blow the bees to one side, not directly away from the hive, otherwise they will have to fly past you and the blower to reach the hive. This does not make for happy bees or a happy beekeeper.

Migratory Beekeeping

To move the hives with bees in it is essential they are given plenty of ventilation, otherwise they will quickly overheat. Remove the roof and place a propolis grid on the upper most super. Then replace the roof but *inverted* so there is a tunnel above the propolis grid. Leave open the varroa floor (no tray) and with the entrance blocked off with a bit of sponge strap up the hive securely and it is ready to be taken to wherever it is required. Always load the hive in the vehicle so the frames run fore and aft, i.e. the hive entrance faces either the front or rear of the vehicle.