

P-SPREADER INNER END – MANUAL DRILL JIG

- General
- Reading tables 1-4
- Angle compensation
- Tables 1-4
- Drill jig operating instructions

General

This instruction describes how to use manual drill jigs V-538 for P-spreaders P70, P95, P117 and P140.

Reading tables 1-4

To determine the correct way to cut and drill a P-spreader's inboard end one needs to know:

1. The type of spreader extrusion to be used.
2. The mast type it is to be put on.
3. The specified sweep angle.

Knowing these three parameters, the correct cutting angle and jig setting data (drill bit diameter, hole positions A and B, and drill angle) can be read from tables 1-4.

Angle compensation

For P-spreaders to be mounted on NMP furling masts the cut and drill angles are compensated, as the spreader brackets used for these were not originally designed to use with NMP masts. The angle compensations for these cases can be read in the "REMARK" columns in tables 1-4. **These compensated angles are to be used for cutting and when reading the position B in tables 1-4.**

Example 1:

A 15 degree P117 on an F212 is to be made. From table 3 can then be read that:

- The drill bit diameter is to be 14.5 mms.
- The jig setting A should be set to 23 mms.
- The specified angle should be compensated by -3 degrees to $15-3=12$ degrees (cutting and drilling angle).
- The setting B for 12 degrees ($10^{\circ}-14^{\circ}$) is 1 mm.

Example 2:

A square ($=0^{\circ}$ =no sweep) spreader P140 is to be made for an F286 mast:

- The drill bit diameter is to be 16.5 mms.
- The jig setting A should be set to 25 mms
- The specified angle should be compensated by 1.5 degrees (compensation for P140 on F286) plus another 1.5 degrees (according to the "° at no sweep" column) to $0+1.5+1.5=3$ degrees (cutting and drilling angle).
- The setting B for 3 degrees ($0^{\circ}-4^{\circ}$) is in this case 0 mm.

In the jigs V-538 there is a drill angle compensation of 1.5 degrees aft built in. This does not have to be dealt with when using the jig. This compensation should automatically get built into all spreaders, in addition to the above.

P70				B							Remark
Mast sect	Drill ø	A	° at no sweep p	0°-4°	5°-9°	10°-14°	15°-19°	20°-24°	25°-29°	30°	
122/85	10,2	15	1	0	1	2	4	5	7		
130/93		15	1	0	1	2	4	5	7	9	
121/92		15	1	0	1	2	4	5	7		

Table 1

P95				B							Remark	
Mast sect	Drill ø	A	° at no sweep p	0°-4°	5°-9°	10°-14°	15°-19°	20°-24°	25°-29°	30°	33°	For NMP, cut and drill altered as below.
138/95	12,2	19	1	0	1	1	2	5	8	11		
155/104		19	1	0	1	1	2	5	8	12		
170/115		19	1	0	1	1	3	5	9	13	12	
137/113		15	1	2	2	2	3	6	10			
160/132		15	1	2	2	2	4	2	2			
190/94		19	1	0	1	1	6	5	8	8		
213/104		19	1	0	1	1	5	5	8	8	11	
F176		19	-1.5	0	1	1	5	5	8	8		Spec. -4° (522-164/165)
F194		19	-0.5	0	1	1	5	5	8	8		Spec. -1.5° (522-164/165)

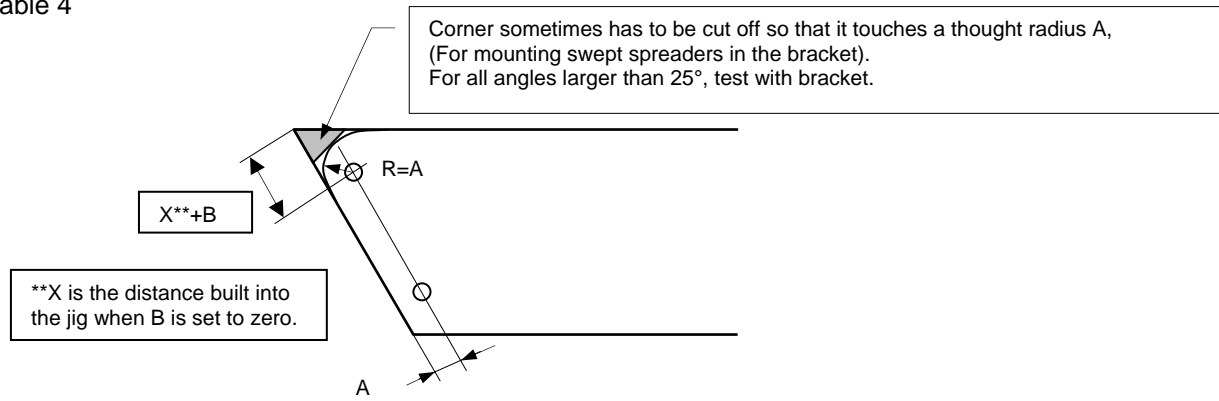
Table 2

P117				B							Remark
Mast sect	Drill ø	A	° at no sweep p	0°-4°	5°-9°	10°-14°	15°-19°	20°-24°	25°-29°	30°	For NMP, cut and drill using altered angles as below.
177/124	14,5	23	1	0	1	1	4	6	9	10	
189/132		23	1	0	1	1	4	6	9		
206/139		23	1	0	1	1	4	6	9	10	
235/116		23	1	0	1	1	4	6	6?	9	
232/126		23	1	0	1	1	4	6	12	14	
260/136		23	0	0	1	1	4	6	13		
F212		23	-1.5	0	1	1	4	6	12	14	Spec. angle -3° (522-065/066)
F228		23	-1	0	1	1	4	6	12	14	Spec. angle -2° (522-065/066)
F246		23	1	0	1	1	4	6	12	14	Spec. angle +1° (522-065/066)
F265		23	1	0	1	1	4	6	12		Spec. angle +1° (522-160/161)

Table 3

P140				B							Remark
Mast sect	Drill ø	A	° at no sweep p	0°-4°	5°-9°	10°-14°	15°-19°	20°-24°	25°-29°	30°	For NMP, cut and drill using altered angles as below.
224/150	16,5	25	1	0	1	2	6	8	10		
237/162		25	1	0	1	2	6	8	10		
274/185		25	1	0	1	2	6	8	10		
290/150		25	1	0	1	2	6	8	10		
F286		25	1.5	0	1	2	6	8	10		Spec. angle +1.5° 522-162/163
F305		25	3	0	1	2	6	8	10		Spec. angle +3° 522-162/163

Table 4



Drill jig operating instructions

Installation, mounting and connections

In the pallet the jig is partly dismounted. The pneumatic vertical AMF-spanner is to be reattached on the socket using the four M10 screws.

When the drill jig is to be used the large 12 mm steel plate screws on to the Arboga drill table using the four M12x30 screws and T-nuts provided.

To be able to slide the base plate and jig on and of the drill machine table (because they are mighty heavy) a separate rolling table with approximately the same height as the normal working height for drilling, could be used. (This is not provided.)

The filter/water condenser should be mounted vertically, for example on a nearby wall. It increases the life and function of the pneumatic parts fed through it.

Pneumatics

The horizontally mounted pneumatic cylinder (flat) should touch the spreader “wing” before the pneumatic vertical fastening device touches and puts force on the spreader.

The spring-loaded valve on the left-hand side of the jig is a safety device that should always be connected. Always push the spring loaded valve before switching the twin-position valve. (This prevents sudden quick moves of the AMF-clamp.)

Not until this spring-loaded valve has been open for a few seconds (the lever pressed down) the cylinder and the vertical device develop full force. So it is important to press the lever until the P-spreader extrusion is fully secured in place before drilling. Otherwise the drill (especially the larger diameters) may lift the extrusion and make the drilled holes look bad.

When the two position valve handle is put into its withdrawal position the safety valve lever has to be pressed down again in order to let some air into the lifting chamber of the vertical device cylinder. In this case though, a certain force is not required so a quick press down should be sufficient.

On the horizontal cylinder a one way strangler valve is fitted in each end. These are used to adjust the speed of the cylinder movement in both directions. Regulating the area through which the air is let out from the non-pressurised (exhausting) side of the cylinder does this.

A similar solution is used on the vertical device cylinder. In this case though the regulating valves strangle airflow in both directions. In this way both the building up of pressure on one side as well as letting out of pressure on the other is speed regulated.

WARNING! If the strangling valves are set too open, extremely fast and scary, if not dangerous, cylinder movements may occur. (This especially after depressurised periods.)

Settings for the different P-spreader extrusions

The vertical fixing device has a plastic piece attached to it. It attaches through a bolt (axle) and the plastic device is free to rotate on the bolt within a certain angle span. The main rule is that the plastic piece touches the P-spreader extrusion in two places when in fixed position. One touching surface somewhere on top of the extrusion’s arch and one on the very edge of the wing (closest to the operator).

To obtain the above; the plastic piece and bolt can be attached in four different ways on the vertical spanner. All the required bolt positions are marked next to the corresponding holes.

On the jig there are two sliding “stairs” that are there to keep the different extrusions flat, give them support and give them the right elevation so that their top surface is close to the under sides of the drill bushings. These stairs are marked P95, P117 and P140 and those markings refer to where the wing of the profile shall be positioned.

For the P70 there is a 300x68x25 mm steel piece to support it. This piece is to be put with the higher end towards the operator and with the “take-out” so that the piece driven by the horizontal cylinder fits in it when in its outer position.

There are four different drill-bushing templates for the four different extrusions. These are slid in from the operator’s side with the arrow pointing away and the positioning mark on the left (towards the scale “B”). They are locked in the right position suggested by the drilling table sheet. This is done with the 8-mm screw on the right hand side.

There are also four different locating holes on the right hand side of the drilling area. These are marked “A” and a number (25, 23, 19, and 15). The number corresponds to the perpendicular distance in millimetres between the holes to be drilled and the cut edge of the extrusion. **WARNING!** The distance is not always the same for the same extrusion. There is a 50 mm pin that fits in the locating holes and when the distance is set right the black lever screw is tightened.

The angle is set according to the drilling table sheet. The jig has a built in exaggerated angle by 1.4 degrees and this is to compensate for variations in mast extrusions and castings. This means that a 30-degree aft swept angle spreader is actually drilled 31.4 degrees. However, the jig should always be set on the specified angle according to table.

Drilling for reinforcements

Drilling the holes for reinforcements can also be done in this jig. The hole positions are then measured and marked by hand before drilling straight through the profile with the reinforcement plates already inside it. The drill bushings are in these cases not used but the holes are drilled on the left- hand side of the drill-bushing/angle-setting plate. **SPECIAL CARE** has to be taken to that the holes (i.e. the extrusion) is not positioned so that holes can be drilled into the sliding “stairs” and thereby destroying these. Preferably the base of the jig should not be drilled into either, this might though be inevitable when drilling through P117 and P140 extrusions which are positioned directly on the base.