American Leistritz 27mm Co-Rotating Twin-Screw Extruder (Model ZSE27)
Screw Elements at MTU as of 4/6/2015, 40 L/D

1) GLC2-8-5X3.5-0.5-120R-30
   Nitralloy Nitrided
   Combing Distributive Mixer 30mm= length
   Have 0 = 0 pair

2) GLC2-8-5X3.5-0.5-120F-30
   Nitralloy
   Combing Distributive Mixer 30mm= length
   Have 4 = 2 pair

3) GLC2-6-3X6-0.2-60R-30
   Combing Distributive Mixer 30mm= length
   Have 2 = 1 pair

4) GLC2-6-3X6-0.2-60F-30
   Combing Distributive Mixer 30mm= length
   Have 4 = 2 pair
5) KS1-2-10-A
Kneading Disk Initial Disk 10mm=length
(hash marks on smooth side)
Have 6 = 3 pair

6) KS1-2-10-M
Kneading Disk Middle Disk 10mm= length
(steps on both sides)
Have 40 = 20 pair

7) KS1-2-10-E
Kneading Disk End Disk 10mm=length
(hash marks on raised/step side)
Have 6 = 3 pair

8) KS6-2-10/60-90N-M
60 mm long total so 10mm long for each element, so 6 of 10mm makes 1 KS6-2-10/60-90N-M
Have 12 = 1 pair
9) GFA2-30-60
Co-rotating conveying screw 60mm= length
Have 6 = 3 pair

10) GFA2-40-90
Co-rotating conveying screw 90mm=length
Have 10 = 5 pair

11) GFA2-30-90
Co-rotating conveying screw 90mm=length
Have 4 = 2 pair

12) GFA2-30-30
Co-rotating conveying screw 30mm=length
Have 8 = 4 pair
13) GFA2-20-30
Co-rotating conveying screw 30mm=length
Have 8 = 4 pair

14) GFA2-20-60
Co-rotating conveying screw 60mm=length
Have 8 = 4 pair

15) KB5-2-30-90
Kneading Block 30mm=length
Have 8 = 4 pair

16) KB5-2-30-60
Kneading Block 30mm=length
Have 8 = 4 pair

17) KB5-2-30-30
Kneading Block 30mm=length
Have: 6 = 3 pair
18) ZD5
Spacer 5mm=length
Have: 6 = 3 pair

19) Die tip
11.0 UNDERSTANDING THE LEISTRITZ SCREW NOMENCLATURE

The Leistritz screw terminology and designations are logical and fairly well organized. The attached sheets from the 27mm extruder manual make a good example that applies to all the extruders.

Please keep in mind that these sheets only list the common element types. There are many other special elements we've made over the years which have unique designations that are too numerous to mention here.

| GFA-2-15-30 | XXX-X-XX-XX |
| GFA-2-15-90 | length of screw element |
| GFA-2-20-30 | pitch |
| GFA-2-20-60 | number of threads |
| GFA-2-20-90 | A= free-meshing |
| GFA-2-30-30 | F= freely cut |
| GFA-2-30-60 | F= conveying |
| GFA-2-30-90 | G= co-rotating |
| GFA-2-40-30 | |
| GFA-2-40-60 | |
| GFA-2-40-90 | |
| GFF-2-40-90 | |

| KS1-2-10-A | XXX-X-XX-X |
| KS1-2-10-M | length of kneading disc |
| KS1-2-10-E | number of threads |
| &nbsp; | kneading disc |
| A= initial disc |
| M= middle disc |
| E= end disc |

| KB5-2-30-30°-RE | XXX-X-XX-XX-XX |
| KB5-2-30-60°-RE | length of kneading block |
| KB5-2-30-90° | number of kneading segments |
| KB5-2-30-30°-LI | number of threads |
| KB5-2-30-60°-LI | kneading block |
| RE= conveying |
| LI= back conveying |
| twisting angle of |
| the individual |
| kneading segments |

| FD-1-20-30 | XXX-X-XX-XX |
| FD-1-20-90 | length of screw element |
| FD-1-30-30 | pitch |
| FD-1-30-90 | number of threads |
| FD-2-30-30 | D= close meshing |
| FD-2-30-90 | F= freely cut |
| FD-3-45-30 | D= close meshing |
| FD-3-45-90 | F= conveying element |
| FF-1-30-30 | K= compression element |
| KFD-1-30/20-90 | |
| KDD-1-30/20-90 | |
only co-rotating

GPA - 2 - 20 - 90
co-rotating 2-pitch increase 20 mm length
conveying element

KB4 - 2 - 20 - 30 RE
4-fold kneading block 2-pitch length 30° clockwise rotation sense

length
Micro 27 GL

Function of screw elements with different helix angles

<table>
<thead>
<tr>
<th>Helix angle</th>
<th>Enclosed volume of screw channel</th>
<th>Self-cleaning property</th>
<th>Dwelling time</th>
<th>Effect of conveying</th>
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<tr>
<td>GFA-2-15</td>
<td><img src="image1" alt="Diagram" /></td>
<td><img src="image2" alt="Diagram" /></td>
<td><img src="image3" alt="Diagram" /></td>
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<td>GFA-2-30</td>
<td><img src="image9" alt="Diagram" /></td>
<td><img src="image10" alt="Diagram" /></td>
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<td><img src="image14" alt="Diagram" /></td>
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<tr>
<td>GFF-2-40</td>
<td><img src="image17" alt="Diagram" /></td>
<td><img src="image18" alt="Diagram" /></td>
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<td><img src="image21" alt="Diagram" /></td>
<td><img src="image22" alt="Diagram" /></td>
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</tbody>
</table>

little, medium, high
Function of screw elements and combinations of kneading disks with different twisting angles

Kombination of kneading discs 30° conveying

KB5-2-30-30°RE

Kombination of kneading discs 60° conveying

KB5-2-30-60°RE

Kombination of kneading discs 90°

KB5-2-30-90°

Kombination of kneading discs 60° back-conveying

KB5-2-30-30°LI

GFA-2-20R

GFA-2-20L

Mixing Shearing Effect of conveying

little medium high
Only counter-rotating system

FD - 1 - 15 - 90
conveying element 1-pitch increase 15 mm length
tight cut

FF - 1 - 25 - 30
conveying element 1-pitch increase 25 mm length
clear cut

KFD - 1 - 25/15 - 90
compression element 1-pitch initial increase 25 mm length
end increase 15 mm

Stgg. 15 Extrusion Stgg. 25
5.4.0 Screw description

**ZD** - 11.8 - 5
- distance element \( \phi 11.8 \text{ mm} \) - length

**ZSS** - 17.5 - 15
- slotted reductor exterior-\( \phi \) - length

Pinion
Zahnwelle W18x1.25x30x13x8f

**ZS** - 16 - 15
- shearing element exterior-\( \phi \) - length
**Helical Lobal Dispersive Elements**

Lobal mixing elements are designed for dispersive mixing, with the slotted version being less dispersive than the solid version. They provide “elongational acceleration” and superior mixing. These elements can be placed on the shafts so as to convey material forward or in reverse to prolong residence time in a mixing zone.

Bilobal versions run in both Co and Counterrotation (GL & GG).

Hexalobal elements run only in Counterrotation (GG).

Helical lobal elements are available for all GG Leistritz machines 18 through 135mm.

**Combing Distributive Mixers**

Combing mixers are designed for high rates of distributive mixing at low energy. They are excellent for dispersing liquids and powdered solids in a polymer melt. When put near the die, they aid in producing a homogeneous melt temperature while ensuring a good distributive mix. Like the hexalobal elements, combing mixers divide the melt many more times in one revolution than traditional bi-lobal elements. However, these distributive mixers are essentially a-lobal.

Combing mixers are available in both Co and Counterrotation. (GLC and GGC, respectively)

They are available either pitched 120° forward or reversed, as well as in 0° neutral pattern.

Combing mixers are available for all Leistritz machines 18 through 135mm.
**Dynamic Seal**

The dynamic seal is designed to insure a good melt seal to zone off an area of high pressure gas injection, countercurrent backwash, etc.

Dynamic seals will run in both Co and Counterrotation. (GL and GG)

Dynamic seals are available for all Leishitz machines 27 through 135 mm.

\[ ZS-4-d_4/d_3/d_2/d_1-L \]

where:
- \( d_4 \) - Diameter of ring #4 (last ring) (mm)
- \( d_3 \) - Diameter of ring #3 (mm)
- \( d_2 \) - Diameter of ring #2 (mm)
- \( d_1 \) - Diameter of Ring #1 (first ring)
- \( L \) = length of element (mm)

**Cavlock Elements**

Cavlock elements were developed to aid in feeding lightweight materials such as in the case of powders. These elements provide much more free volume than in traditional flighted elements. They therefore aid in reactive extrusion as well as foaming processes. They impart very low shear to the material while gently conveying the material forward.

Cavlock elements are only available in Counterrotation (GG).

These elements are available for all Leishitz machines, 27 through 135 mm.

\[ GGCL1-1-S-L \]

where:
- \( S \) = flight advance (mm)
- \( L \) = length of element (mm)