LK Pex tubing key benefits

LK Pex tubing is crosslinked using peroxide crosslinking, a so called PEX-a process. By means of heat, a peroxide mixed into the PE raw material is split into radicals. These radicals react with the PE polymer chain and absorb hydrogen atoms to become inert. The polymer chains now becomes radicals. They, in turn, become inert by joining together - forming crosslinks.

As mentioned, the peroxide is split by means of heat. That means that the tubing material needs to be quite hot for the reaction described above to take place. It must be well over the crystalline melting point temperature of around 270°F. The material must also be correctly shaped (must have its tubing form) while the crosslinking takes place inside the polymer melt. After crosslinking has taken place, the material is cooled down and the crystals are formed around the crosslinking points, reinforcing these areas. These principles are valid for all PEX-a processes.

For other crosslinking methods like radiation crosslinking (PEX-c) and Silane crosslinking (PEX-b) the crosslinking takes place at temperatures well below the crystalline melting point. For these methods, when tubing is heated over the melting point, there will be a loss of crystals when the material is cooled down again. The crosslinks will partially disturb the formation of previously existing crystals. So there will be a loss of strength after this reheating - which is not the case for PEX-a tubing.

PEX-a is crosslinked while melted, and as described above, this will result in a lowered crystallinity. Typically, a lower crystallinity means a lower strength. Therefore, the raw material utilized in traditional PEX-a processes need to have a quite high density (which is practically the same as high crystallinity). Typical raw material density is at least 0.950 kg/m3, and this results in density of around 0.939 kg/m3 after crosslinking. This is approximately the minimum density required in order to meet the ASTM F 876/877 strength requirements.

Radiation and Silane crosslinked tubing have densities that are approximately the same as the raw material they are produced of - around 0.940 to 0.941 kg/m3. This is approximately the required minimum for them to meet the ASTM PEX standards. Since density is directly related to stiffness (or flexibility) we note that Radiation and Silane tubing are slightly stiffer than traditional PEX-a processes (their density os approximately 0.002 kg/m3 higher - and this makes up a clearly noticeable difference. The LK Pex Tubing process starts with a raw material with a density of around 0.940 kg/m3 and the final product has a density of around 0.930 kg/m3!! This is considerably less than other PEX process, and results in a very flexible tubing. How is it possible that a material with this low density still exceeds the ASTM requirements for PEX? The reason is that inventors of this process has succeeded to align most molecular chains AROUND the tubing circumference! Traditional extrusion processes does not provide any orientation of molecules, but their orientation are at random. By having the molecules aligned around the tubing they are ready to absorb the stress caused by inside pressure. So in spite of lower density this tubing can actually resist a higher inside pressure than traditional PEX tubing! At the same time, since few molecules are stretched along the tubing, the flexibility is even better than what is explained by the density alone! Welcome to test the pressure resistance. Just hook up our tubing in series with a competitor's tube and increase the pressure until one of them bursts. It will not be the LK Pex Tubing.

Another major difference is the homogeneity. Traditional PEX-a processes have raw materials with high density and high molecular weight making the polymer flow characteristics quite poor. The material is mainly pushed through the extruders and raw material particles are just melted together. The flow is very little stirred during the extrusion. Not so in the LK PEX-a process. The material is thoroughly worked, the original raw material particles are thoroughly blended, and even stretched out to orient the molecules around the tubing. The result is excellent homogeneity, antioxidants well disbursed, and better overall properties. Check homogeneity by holding tubing samples towards a bright light. Turn slowly and look. You will notice the difference!

Property comparisons

Property	LK PEX-a pipe	Traditional PEX-a pipe
Flexibility	Considerable more flexible than any other PEX tubing meeting ASTM	Somewhat better flexibility than Radiation and Silane crosslinked tubing.
Strength	Withstands somewhat higher inside pressures than other PEX Tubing	Meets ASTM
Homogeneity	Excellent	Not very good. Worse than Radiation and Silane
Thermal Memory	Excellent	Good. Better than Radiation & Silane.
Repairability	Excellent	Excellent
Kinking resistance	Excellent	Fair. Better than Radiation and Silane
Barrier property	25 times less than DIN 4726 (measured)	Meeting DIN 4726
Thermostability	Excellent	Better than ASTM requirements
Memory effect of being coiled	Little. Easy to bend in any direction.	Fair. Better than Radiation and Silane.
Minimum bending radius	Narrower than any other PEX tubing	Fair. Better than Radiation and Silane
Kinking resistance	Excellent	Fair. Better than Radiation and Silane
Process uniqueness	There is just one manufacturer	Several manufacturers - not unique
Commercial dependence	None	Uponor dominates