History of colored HDPE Materials

We would like to give a short overview to the experiences of colored HDPE materials for exposed use.

Main applications of exposed colored HDPE goods

Application	Color	Production Method	Requested UV-Stability
Bottle Boxes	All	Injection Moulding	5 years
Food Package	All	Blow Mouling	1 year
Gas Pipes	Yellow	Extrusion	1 year*
Drinking Water pipes	Blue	Extrusion	1 year*

*The specification requirements for uv-stability of these pipes are limited to 1 year storage period only, as these products will finally be installed underground.

Major application for colored HDPE pipes in the mid 80's

Black HDPE pipes are produced since 1950 and due to natural carbon black ingredient having natural uv-stability, extra uv-stabilization is not required.
Yellow HDPE pipes for gas transports and blue HDPE pipes for potable water are produced approximately since 1975. Raw material suppliers developed yellow and blue resins for very low uv-stability according to the temporary requirements for the storage period of these pipes only.
Experiences of non pressure HDPE resins, used for other applications as bottles boxes or food packages are for determined exposure. In addition the different specific polymer weight for injection moulding and blow moulding productions need other stabilization ingredients.
No experiences for extruded colored HDPE pipes were available.

Development of long life durable colored HDPE for pipe application

In the mid 80´s, PESTEC started the development by research of polyethylen technology in combination with necessary additives for an optimized HDPE raw material to achieve following features :

- very good extrusion property
- uv-stability (color stability)
- very little factor of brittleness
- very small aging due to heat

Various formulations have been produced and tested during a period of 4 years.

Test methods

Different tests, all based on a time lapse method, are suitable. Most established tests are XENO test and WOM test.
Very important for PESTEC was to use a test with a natural uv-ray spectrum to get realistic test results, comparable with environmental atmosphere.
At the beginning, we used 10.000 hours test corresponding to 10 years real exposure followed by 20.000 hours test corresponding to 20 years.

Test results

Test results show perfect properties according to our specified requirements.
For details please see our technical information TI 110-3 UV-Test.