

Experimental: Measured Properties and the effect of process condition

Elmendorf tear strength

- ❑ Crystalline orientation
- ❑ Lamellar stack oriented (MD or TD)
- ❑ Process conditions:

FLH, BUR/DDR ↑

Dart Drop impact strength

- ❑ Random lamellar orientation
- ❑ The balance of mechanical properties (MD and TD)
- ❑ Process conditions:

BUR/DDR ↑

	TUR	BUR	FLH	Tear strength		Modulus (TD)	Modulus (MD)	DART impact
				MD	TD			
LLDPE9	22	2.1	17.2	16.09708	28.1903	255.871	232.064	296
LLDPE8	21.19	2.1	8.8	13.798	23.9777	223.044	175.158	326
LLDPE7	16.92	2.5	8	15.9258	21.6533	204.656	165.069	741
LLDPE6	16.92	2.5	16	18.0691	24.0513	239.17	215.252	336
LLDPE5	15	3	12	17.3177	24.2189	258.598	234.233	480
LLDPE10	30	1.5	10	8.90881	29.6031	278.47	227.171	174
LDPE13	64	1.5	6	7.33874	8.17011	326.943	221.524	15.8
LDPE11	52.5	1.6	7	7.216068	8.85887	326.421	194.169	6.75
LDPE5	30.5	1.5	6	28.2555	21.6426	346.549	222.438	22.33
LDPE7	42	1.29	5	12.33533	9.47929	362.178	224.144	13.9
LDPE3	20	1.92	9	4.912959	8.12065	326.112	283.546	49.5
LDPE0	30.5	1.7	7.5	8.747312	10.8021	354.466	217.09	38.5
HDPE10n	107.5	0.82	6.5	0.553896	7.911	1519.55	1185.58	0
HDPE9n	107.5	0.88	6.5	0.237934	12.151	1371.52	1113.04	0
HDPE8	107.5	0.9	7	0.33439	9.2617	1279.22	933.193	0
HDPE7n	96.5	1.08	6	0.290912	16.139	1537.25	1047.87	0
HDPE6n	85.5	1	6	0.44128	16	1799.54	1112.71	0
HDPE5	64	0.88	5.5	0.1589	13.0679	1090.19	1096.34	0
HDPE4n	64	1.25	6	0.26157	29.6037	1498.78	1229.61	0
HDPE2n	42	1.15	6	0.454687	38.2522	1461.45	1107.93	1.34
HDPE2	42	1.05	5.5	0.231541	24.3336	1468.16	1009.26	3.75
HDPE1n	30.5	1.35	6	0.431996	17.8165	1363.37	1015.31	3.71

Experimental:

Structural parameters and the Study of the major effects of process conditions by design of experiment:



• Dependent Parameters

- Crystallinity
- Crystal Length(Lc)
- Lamellar Thickness
- Crystal Size(110) → BUR
- Crystal Size(200) → BUR
- Roughness
- Orientation factors:
 - fM_a → TUR
 - fT_a → BUR
 - fM_b
 - fT_b → TUR, BUR
 - fM_amorph → TUR
 - fT_amorph → TUR

The total of 22 test run include
4 LLDPE, 8 LDPE, 10 HDPE films

Independent variables: TUR, BUR, FLH

$$fT_b = 0.756 - 0.5993 \cdot x - 0.0025 \cdot y + 0.1076 \cdot x \cdot x + 0.002 \cdot x \cdot y + 5.4406 \cdot 10^{-6} \cdot y \cdot y$$

