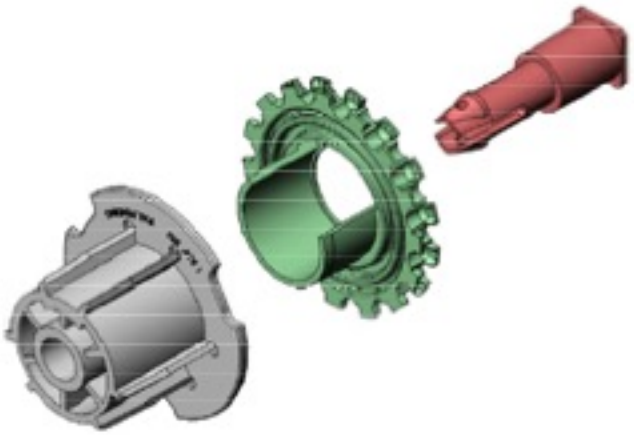
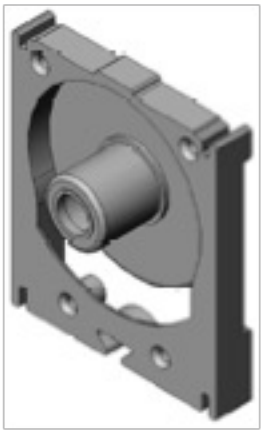
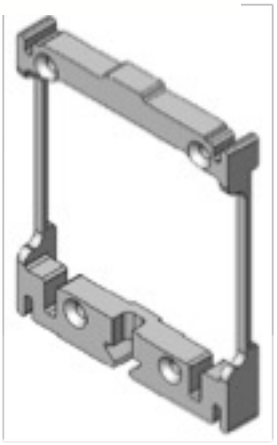
Platinum Series Clutch Specifications – Components with PA6 Glass Fiber



PROPERTIES & AVERAGE VALUES OF INJECTION MOLDED SPECIMENS			
PERMANENCE	**English**	**SI Metric**	**ASTM TEST**
Primary Additive	20 %	20 %	
Specific Gravity	1.31	1.31	D 792
Molding Shrinkage			
1/8 in (3.2 mm) section	0.0020 - 0.0040 in/in	0.20 - 0.40 %	D 955
MECHANICAL			
Impact Strength, Izod			
notched 1/8 in (3.2 mm) section	1.5 ft-lbs/in	80 J/m	D 256
unnotched 1/8 in (3.2 mm) section	10.0 ft-lbs/in	534 J/m	D 4812
Tensile Strength	15000 psi	103 MPa	D 638
Tensile Elongation	1.0 - 3.0 %	1.0 - 3.0 %	D 638
Tensile Modulus	0.85 x 10^6 psi	5861 MPa	D 638
Flexural Strength	25000 psi	172 MPa	D 790
Flexural Modulus	0.75 x 10^6 psi	5171 MPa	D 790
ELECTRICAL			
Volume Resistivity	< 1E3 ohm.cm	< 1E3 ohm.cm	D 257
Surface Resistivity	< 1E6 ohm/sq	< 1E6 ohm/sq	D 257 ESD S11.11
Surface Resistance	< 1E5 ohm	< 1E5 ohm	ESD S11.11
Static Decay			
MIL-PRF-81705D, 5kV to 50 V, 12% RH	< 2.00 s	< 2.00 s	FTMS101C 4046.1
GENERAL PROCESSING FOR INJECTION MOLDING			
Injection Pressure	10000 - 15000 psi	69 - 103 MPa	
Melt Temperature	470 - 535 °F	243 - 279 °C	
Mold Temperature	130 - 200 °F	54 - 93 °C	
Drying	2 hrs @ 180 °F	2 hrs @ 82 °C	
Moisture Content	0.20 %	0.20 %	
Dew Point	0 °F	-18 °C	





POM
Acetal (POM)

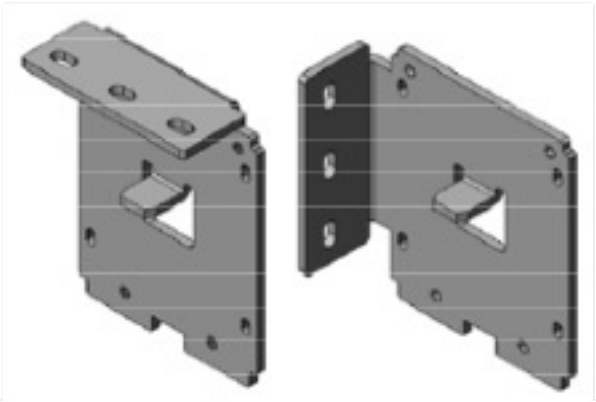
PROPERTIES & AVERAGE VALUES OF INJECTION MOLDED SPECIMENS

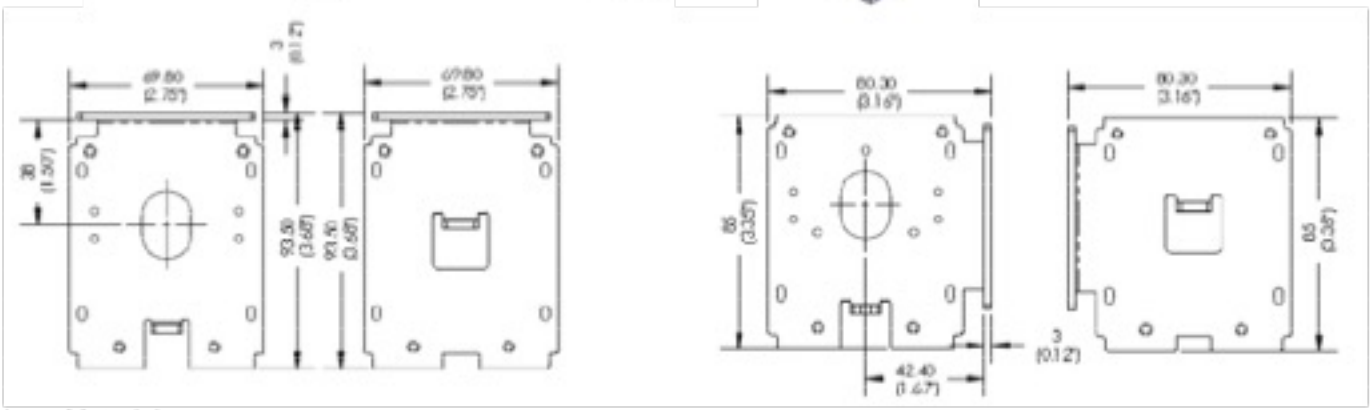
PERMANENCE	**English**	**SI Metric**	**ASTM TEST**
Specific Gravity	1.36	1.36	D 792
Molding Shrinkage			
1/8 in (3.2 mm) section	0.0170 - 0.0250 in/in	1.70 - 2.50 %	D 955
MECHANICAL			
Impact Strength, Izod			
notched 1/8 in (3.2 mm) section	1.0 ft-lbs/in	53 J/m	D 256
unnotched 1/8 in (3.2 mm) section	10.0 ft-lbs/in	534 J/m	D 4812
Tensile Strength	6000 psi	41 MPa	D 638
Tensile Elongation	7.0 - 10.0 %	7.0 - 10.0 %	D 638
Tensile Modulus	0.25 x 10^6 psi	1724 MPa	D 638
Flexural Strength	9000 psi	62 MPa	D 790
Flexural Modulus	0.30 x 10^6 psi	2068 MPa	D 790
ELECTRICAL			
Volume Resistivity	< 1E4 ohm.cm	< 1E4 ohm.cm	D 257
Surface Resistivity	< 1E7 ohm/sq	< 1E7 ohm/sq	D 257 ESD S11.11
Surface Resistance	< 1E6 ohm	< 1E6 ohm	ESD S11.11
Static Decay			
MIL-PRF-81705D, 5kV to 50 V, 12% RH	< 2.00 s	< 2.00 s	FTMS101C 4046.1

GENERAL PROCESSING FOR INJECTION MOLDING

	English	**SI Metric**
Injection Pressure	10000 - 15000 psi	69 - 103 MPa
Melt Temperature	360 - 425 °F	182 - 218 °C
Mold Temperature	175 - 225 °F	79 - 107 °C
Drying	2 hrs @ 250 °F	2 hrs @ 121 °C
Moisture Content	0.15 %	0.15 %
Dew Point	-25 °F	-32 °C

Platinum Series Clutch Specifications – Installation Brackets





1. Material:
   Cold Rolled Steel Bracket ASTM A1008
2. Specification:
   ASTM A1008

3. Physical Properties	Metric	English
Density	7.872 g/cc	0.2844 lb/in³

4. Mechanical Properties	Metric	English
Tensile Strength, Ultimate	303 - 358 MPa	43900 - 51900 psi
Tensile Strength, Yield	180 - 240 MPa	26100 - 34800 psi
Elongation at Break	42.0 - 48.0 %	42.0 - 48.0 %
Modulus of Elasticity	200 GPa	29000 ksi
Bulk Modulus	140 GPa	20300 ksi
Poissons Ratio	0.290	0.290
Machinability	55.0 %	55.0 %
Shear Modulus	80.0 GPa	11600 ksi

5. Material Components Properties	Metric	English
Carbon, C	<= 0.100 %	<= 0.100 %
Iron, Fe	99.31 - 99.7 %	99.31 - 99.7 %
Manganese, Mn	0.300 - 0.500 %	0.300 - 0.500 %
Phosphorous, P	<= 0.0400 %	<= 0.0400 %
Sulfur, S	<= 0.0500 %	<= 0.0500 %

6. Surface Finishes:
   These brackets are Zinc-Plated.

Platinum Series Clutch Specifications – Spring Components

Stainless Steel Spring

1. Material: Music wire
2. Specification: ASTMA 228-02 CHEM ONLY
3. Chemical Properties:
   - C: 0.81%
   - CR: 0%
   - MN: 0.51%
   - NI : 0%
   - P : 0.011%
   - S : 0.006%
   - SI: 0.21&
4. Tensile:
5. Rockwell : RC 41
6. Heat treating: Stress relieve at 232°C Min.

TESTING AND QUALITY CONTROL

- ✓ ZMC is involved in developing systems to ensure our products are designed and produced to meet and exceed our customer requirements.
- ✓ ZMC's quality control tests will determine the durability and longevity of our clutches to offer you the best quality in the market at affordable prices.

A. PULL APART TEST

a) A piece of plastic is taken from the clutch and placed between two holders.
b) The holders will pull apart the plastic and determine the force needed to break it.
c) The results are recorded on every step of the test for further evaluation

B. IMPACT TEST

a) A high force over a short time is applied to the clutch components to determine how much pressure they can stand

C. SHEER TEST

a) Determines how much load the clutch components can stand

D. DUROMETER

a) This hardness test measures the depth of the indentation in the material by a given force.

E. CLUTCH PERFORMANCE AND LOAD TEST

a) Load test is the process of creating demand on a device and measuring its response. The performance testing covers a broad range of engineering evaluations where our products are specified on their final measurable performance characteristics.
b) The clutch performance is tested with 0 weight and the reading of the pull force required to raise and lower the blind is obtained.
c) Five pounds are added and the evaluating results are recorded.
d) The test will be performed adding 5 pounds then 1 pound at a time until it reaches the maximum weight stand by the clutch.

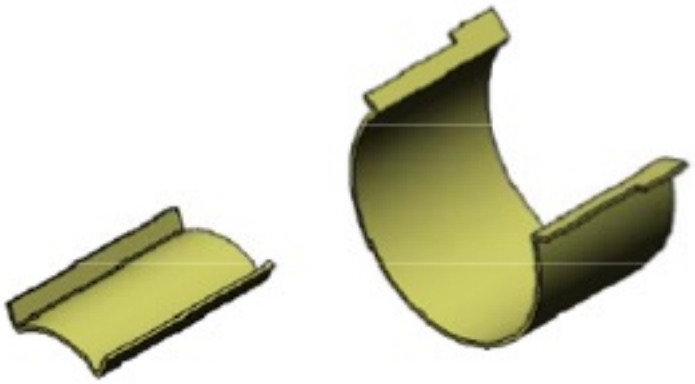
F. CLUTCH ENDURANCE TEST

a) This test determines the performance of the clutch during its lifetime
b) How much wear and fatigue is incurred over its lifetime
c) The test is carried out for over 1 week of continuing cycling and it equals to 13 years of use
d) The same clutches will go back to the "Clutch Performance and Load Test". Our records indicate that our clutches will still have the same performance and strength.

G. ONGOING TEST

a) Testing for noise and smooth performance of the clutches with different types of ball chains.

Platinum Series Clutch Specifications – Spring Shim



1. COMPOSITION

Grade		C	Mn	Si	p	S	Cr	Mo	Ni	N
316	Min	-	-	-	0	-	16.0	2.00	10.0	-
	Max	0.08	2.0	0.75	0.045	0.03	18.0	3.00	14.0	0.10

2. MECHANICAL PROPERTIES

Grade	Tensile Str (MPa)min	Yield Str 0.2% Proof (MPa)min	Elong(% in 50mm) min	Hardness	
				Rockwell B (HR B) max	Brinell(HB) max
316	515	205	40	95	217

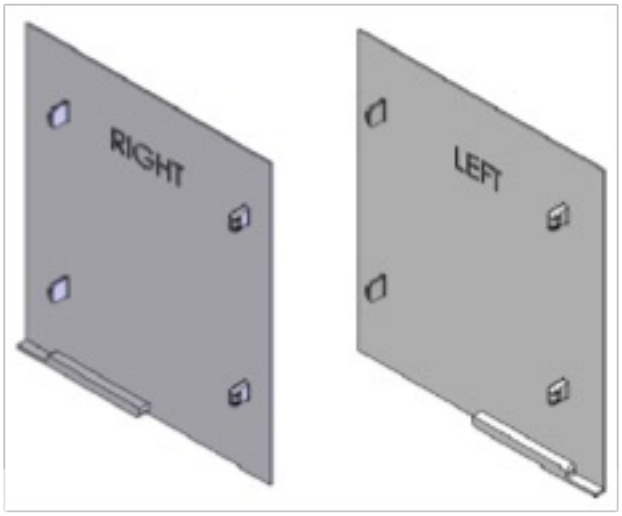
3. PHYSICAL PROPERTIES

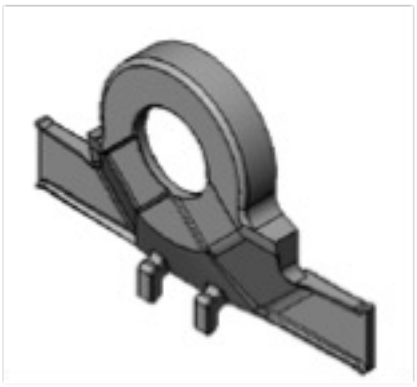
Grade	Density (kg/m³)	Elastic Modulus (GPa)	Mean Co-eff of Thermal Expansion (µm/m/°C)			Thermal Conductivity (W/m.k)		Specific Heat 0-100°C(J/kg.k)	Elec Resistive(nΩ.m)
			0-100 °C	0-315 °C	0-538 °C	At 100 °C	At 500 °C		
316	800	193	15.9	16.2	17.5	16.3	21.5	500	740

4. CHEMICAL PROPERTIES

- Fe, <0.03%
- C, 16-18.5%
- Cr, 10-14%
- Ni, 2-3%
- Mo, <2%
- , Mn, <1%
- Si, <0.045%
- p<0.03%
- s

Platinum Series Clutch Specifications – ABS Components





ABS, Acrylonitrile-Butadiene-Styrene
ABS is a "polymericed alloy" of the tree materials acrylonitrile, butadiene and styrene. The material is located under the group styrene plastic. Styrene plastics are in volume one of the most used plastics.

Properties	**English**	**SI**
Specific Gravity	1.04 to 1.11	1.03 to 1.11 *g/cm³*
Mold Shrinkage, Flow	0.00050 to 0.014 *in/in*	0.00050 to 0.014 *cm/cm*
Melt Mass Flow Rate	0.20 to 30 *g/10 min*	0.20 to 30 *g/10 min*
Drying Temperature	176 to 195°*F*	79.7 to 90.7°*C*
Drying Time	2.0 to 3.6 *hr*	2.0 to 3.6 *hr*
Suggested Max Moisture	0.0100 to 0.15%	0.0100 to 0.15%
Suggested Max Regrind	5 to 20%)	5 to 20%
Injection Pressure	11700 to 15400 *psi*	80.9 to 106 *MPa*
Rear Temperature	338 to 478°*F*	170 to 248°*C*
Middle Temperature	398 to 466°*F*	203 to 241°*C*
Front Temperature	379 to 491°*F*	193 to 255°*C*
Nozzle Temperature	371 to 501°*F*	188 to 260°*C*
Processing (Melt) Temp	434 to 475°*F*	224 to 246°*C*
Mold Temperature	121 to 168°*F*	49.2 to 75.4°*C*

Application
ABS is used for auto body parts, suitcases, toys etc. Extruded profiles, tubes and bolts can be made from ABS when the requirements are high impact resistance and a nice surface.