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Clean Room Molding

By: Eric Robinson

Visiting a cleanroom molding facility can be a very interesting experience and can greatly improve your understanding of cleanroom capabilities. Cleanrooms come in many different sizes, classes and capabilities. Cleanrooms are outfitted in everything from built-in, permanent, hard wall structures to mobile, hooded and free-standing

units, often with soft walls of static dissipative, non-outgassing air curtains. Most of them function in similar manners and accomplish, to varying degrees, the same end result. That is very clean, reduced particulate, static free parts, which are suitable for the OEM's product needs. Most cleanrooms control and carefully regulate airflow, airborne particles, static charges, microbes, humidity, temperature, and other elements. Through the proper use of [HEPA](#) (high-efficiency particulate air) or ULPA (ultra low penetration air) filtration, stringent cleaning methods, ultra-clean de-ionized air, antistatic surfaces and antistatic containment, strict clothing requirements, and other measures, cleanroom environments are kept free of contaminants and part quality is significantly improved.



Hooded, Mobile Class 100,000 Cleanroom at Henry Plastic Molding



Class 100,000 Cleanroom in Operation at Henry Plastic Molding

Cleanrooms are categorized in classifications that indicate how strictly regulated they are and the amount of particles allowed per cubic meter of airspace. These classes are described in [ISO 14644](#) regulations. Generally, the higher the Class or ISO number, the higher the amount of particles are allowed. For example: Class 10 (ISO 4) cleanrooms are

stricter than Class 100 (ISO 5) cleanrooms. Cleanrooms are rated by class numbers of Class 100,000, Class 10,000, Class 1,000, Class 100 and Class 10. The following tables will provide a basic understanding of cleanroom guidelines and standards. Also remember, Class and ISO Class are two different things. Class 1 (American Measurement) = ISO Class 3:

| ISO Class | .1 um | .2 um | .3 um | .5 um | 1 um | 5 um |
|-----------|---------|--------|--------|-------|------|------|
| 4 | 10 | 2 | | | | |
| 5 | 100 | 24 | 10 | 4 | | |
| 6 | 1,000 | 237 | 102 | 35 | 8 | |
| 7 | 10,000 | 2,370 | 1,020 | 352 | 83 | |
| 8 | 100,000 | 23,700 | 10,200 | 3,520 | 832 | 29 |

| ISO Class | American Measurement | Metric System | Air Changes |
|-----------|----------------------|---------------|---|
| 1 | N/A | N/A | N/A |
| 2 | N/A | N/A | N/A |
| 3 | 1 | M1.5 | Requires 60 - 100 feet per min. 540 to 600 + air changes per hour (Unidirectional) 9' Ceiling |
| 4 | 10 | M2.5 | Requires 60 - 100 feet per min. 540 to 600 air changes per hour (Unidirectional) 9' Ceiling |
| 5 | 100 | M3.5 | Requires 40 -100 feet per min. (400 to 480 air changes per hour (Unidirectional) 9' Ceiling |
| 6 | 1,000 | M4.5 | Requires 70 - 160 air changes per hour (Nonunidirectional) 9' Ceiling |
| 7 | 10,000 | M5.5 | Requires 30 - 70 air changes per hour (Nonunidirectional) 9' Ceiling |
| 8 | 100,000 | M6.5 | Requires 10 - 20 air changes per hour (Nonunidirectional) 9' Ceiling |

At Henry Plastic molding we currently provide cleanroom molding for Baxter HealthCare, Life Technologies, XXXX, XXXX and XXXX.

Feel free to call us and take a tour of Henry Plastic Molding. We would be happy to show you a cleanroom in operation and discuss the cleanroom molding requirements of your parts.

| Texture Number | Min. Draft Required | Texture Depth Inches |
|----------------|---------------------|----------------------|
| 11000 | 1.5 | 0.0004 |
| 11010 | 2 | 0.001 |
| 11020 | 3 | 0.0015 |
| 11030 | 3.5 | 0.002 |
| 11040 | 5 | 0.003 |
| 11050 | 7 | 0.0045 |
| 11060 | 5 | 0.003 |
| 11070 | 5 | 0.003 |
| 11080 | 3.5 | 0.002 |
| 11090 | 6 | 0.0035 |
| 11100 | 9.5 | 0.006 |
| 11110 | 4.5 | 0.0025 |
| 11120 | 3.5 | 0.002 |
| 11130 | 4.5 | 0.0025 |
| 11140 | 4.5 | 0.0025 |
| 11150 | 4.5 | 0.00275 |
| 11160 | 6.5 | 0.004 |
| 11200 | 5 | 0.003 |
| 11205 | 4.5 | 0.0025 |
| 11210 | 6 | 0.0035 |
| 11215 | 7 | 0.0045 |
| 11220 | 8 | 0.005 |
| 11225 | 7 | 0.0045 |
| 11230 | 4.5 | 0.0025 |
| 11235 | 6.5 | 0.004 |
| 11435 | 15.5 | 0.01 |

TEXTURE DEPTH AND SIDEWALL DRAFT CONSIDERATIONS:

To assure clean ejection of your part with no scuffing, use a simple rule for determining draft:

1.5 - 2 degrees of draft per .001" in texture depth

This rule is for sidewalls of the tool that the part will shrink away from. Areas in the tool that the part will shrink toward will require more draft. Lifters, slides, cams, and other tooling components should have their texturing draft requirements evaluated based on their action as they move away from the part. Shut-off conditions on textured sidewalls may also be affected by the texture depth and tool draft relationship. Texture depth can be reduced in specific areas and / or the texture pattern can be 'softened' on surfaces where there are ejection concerns. Part design, part size, molding materials, texture construction, and other molding factors have a significant impact on ejection issues. Standard tool materials such as P-20, H-13, S-7, 01, A1, A2, A6, 420 stainless steel, beryllium copper, kirksite, forged, wrought and cast aluminum have all been textured successfully.

Equivalent textures are available and often provide excellent comparison to the actual Mold-Tech textures, while saving significant cost and mold build time. Use of an equivalent texture should be determined and decided by the customer, not the mold maker.

Henry Plastic Molding has prepared this table based on Mold-Tech guidelines. Refer to Mold-Tech at www.mold-tech.com or call the Mold-Tech support number at 630-235-8948 for more information. Engineers at HPMI are also available if needed.