

TECHNICAL PAPER TD220302 **HINGED DOORS FOR "CLEANROOM" APPLICATIONS.**

Occasionally, you may be asked for doors "to suit cleanroom applications", but as there are many different levels of cleanroom environment, there are also many different door options.

There are generally two Standards which may be quoted, B.S.5295:Pt1:1989, or U.S. Federal Standard 209D. They both have different Classification Levels, but there are approximate equivalents:-

BS 5295: Pt.1 Classification	Approx. old Classification	Approx. Federal Std.US209D
C		1
D		10
E	1	100
F	1	100
G		1000
H		1000
J	2	10000
K	3	100000
L	4	
M		

NB: The lower the letter or number, the higher the required cleanroom specification.

There are also four 'Containment Levels', which may be quoted in lieu of the BS or US Standard. In these instances, "Containment Level 1" is the lowest specification and "Containment Level 4" is the highest.

'Cleanrooms' tend to use pressure differentials between areas, typically 15pa, but sometimes as much as 25pa to avoid contamination.

Normally positive pressure is used in cleaner areas, such that the airflow is always out, to prevent particles from 'dirtier' areas being drawn into the cleanest areas.

The exceptions to this would be areas subject to dangerous pathogens, where positive pressure may allow a leakage to contaminate other areas. Containment Levels 3 and 4 are therefore negative pressure areas, using inward airflow.

Omega doorsets can be used in all cleanroom locations, provided the correct items are specified, and provided additional care is taken during the initial specification stages, and also in the installation of the doorsets.

Generally, the following specifications will apply for "Omega" Cleanroom Doors :-

Door Leaf

Top capping channel - All joints filled flush.

Vertical edge seams - Both vertical seams filled flush.

Bottom edge.- Bottom reinforcing channel fully sealed inside leaf.

Hardware. - All hardware bedded on mastic during fitting.

"Adaptabase"* - This should be sealed to the door leaf on site, after final adjustment to suit floor level.

This provides a fully-flush door leaf, with all surface penetrations sealed to prevent contamination of door core.

Frames

Either:-

1) - Std. "knock-down" frame. - Installed as normal, but interlocking top corner seams are to be mastic sealed by installers, on completion.
Frames are to be fully mastic-sealed both sides, to head, jambs and at threshold.
Frame grommets to be mastic-sealed into frame.

or:-

2) - Welded frames. - Installed as normal.
Frames are to be fully mastic-sealed both sides, to head, jambs and at threshold.
Frame grommets to be mastic-sealed into frame.

Both the above will ensure that the doorset is fully-sealed to the primary structure, and also that the void within the frame is sealed to prevent contamination*.

* On Containment Level 3 or 4 applications, frame voids would be fumigated by removal of one or more frame grommets, as required, if contamination is suspected.

HARDWARE

There are no 'standard' hardware packages for cleanroom applications, as all hardware tends to be specified to suit individual site requirements.

The general rules for Cleanrooms are as follows:-

All hardware is bedded on mastic during installation to prevent contamination of door core or frame void, caused by surface penetrations.

Door closers are normally positioned on the 'dirty' side - particularly important on 'laminar flow' cleanroom areas where surface protrusions are to be avoided wherever possible.

This may affect the selection of appropriate closers, dependent on the pressure differential on either side of the door.

If the door closer is positioned on the 'push' side of a door opening into a negative pressure area, the closer is only developing 70% of its standard power due to the closer geometry ('parallel arm'), and the door is under pressure, trying to keep it open.

A heavy-duty closer should then be specified in lieu of standard duty.

Containment Level 4 must be accessed via an airlock arrangement, therefore doorsets into these areas are usually interlocked such that one door cannot be opened until the other is closed.

The specification should therefore include electromagnetic locks or conventional locks with electric strikes, with appropriate inter locking devices.
Wiring between the doorsets would normally be carried out by the site electricians.

WINDOWS IN DOORS

There are many options, but the minimum requirement concerns "the elimination of ledges and unnecessary horizontal surfaces".

All of our standard vision panels use 45° beveled frames and therefore will all comply with this minimum requirement.

Cut-outs in the door leaf are **fully** sealed to avoid contamination of the core. Window frames are welded and sealed on the 'clean' side, and screw-fixed on the 'dirty' side, to facilitate re-glazing in the event of breakage. Screws are normally stainless steel, shallow head.

Special, flush-glazed vision panels can be provided for 'laminar flow' cleanroom applications.

We have recently fire-tested our semi-flush, double-glazed window system and also our fully-flush, triple-glazed window system, and both of these options can also be offered in any of our standard window configurations, for periods up to 4 hours.

Whilst the above information covers the general requirements for doors in "cleanroom" areas, there are also "controlled areas", which are required to be cleaner than outside environments, but are below the "cleanroom" classification.

These areas may only require standard doorsets complete with seals and thresholds, to prevent unnecessary dust within the zone, but in other instances they may need seam-filled leaves, sealed frames and sealed hardware.

It is therefore essential to confirm the exact requirements for the location, to ensure the end-user obtains the level of control that he requests, without paying for specifications he does not require.

Please note.

This document is issued for general information only and is not intended as a substitute for information contained in the relevant British Standards.

As Standards are under constant re-appraisal, it is essential that the full document be consulted.

*Design Right: Patent Granted

Omega Technical Department