Approved for Publication
26/02/2009

SAA
Scottish Assessors Association

Revaluation 2010

Industrial Committee

Practice Note 5
Valuation of subjects containing Clean Rooms

1.0 Introduction

1.1 This Practice Note applies to the valuation of subjects that contain areas of environmentally controlled space popularly referred to as “Clean Rooms”.

2.0 Basis of Valuation

2.1 The basis of valuation is the comparative principle as it applies to industrial properties having regard to the costs associated with the provision of additional features necessary to create such subjects.

3.0 Economic Background

3.1 Clean rooms are typically found in the semi-conductor, electronics, biotechnology and pharmaceutical industries, although they may also be encountered in other fields where sensitivity to environmental contamination is an issue. The semiconductor industry is widely recognised as being prone to cyclical demand. The timescales involved in setting up a new production facility have frequently led to supply/demand imbalance, periods of significant overproduction or undersupply and resultant violent price swings. The general trend since the turn of the century has, however, been one of falling demand and over supply of microchips and associated products.

3.2 From being at the forefront of the electronics industry in the 1980’s and 1990’s, Scotland now finds itself struggling to compete in terms of production costs in an increasingly globalised marketplace. There has been a noticeable recent trend towards suspension of intended development or whole or partial closure of existing facilities.

3.3 Electronics manufacturers are not however the only users of clean room facilities and the pharmaceutical and biotechnology industries appear to remain more buoyant.

4.0 Clean Room Definition

4.1 Clean rooms are areas within properties where higher than normal environmental standards are maintained. A clean room may therefore be defined as an area with environmental control of particulate contamination (such as dust, airborne microbes, aerosol particles and chemical vapours), temperature and humidity, constructed in such a way as to minimise the

introduction, generation and retention of particles inside the room.

4.2 In terms of structure and internal finish, clean rooms can vary significantly depending on purpose and design. Indeed it is these variations that drive the various classifications set out later in this report. It is noted, however, that particularly in some less sophisticated industries the term Clean Room can be applied somewhat loosely to cover accommodation that amounts to little more than an air-conditioned room. For the sake of clarity, accommodation should only be considered suitable for valuation under the terms of this Practice Note if, in addition to the presence of environmental control, the accommodation is at the very least characterised by the presence of specialist or specifically adapted floor, wall and ceiling finishes.

5.0 Explanation of Terms

5.1 The following definitions will assist in understanding features commonly associated with clean rooms and their method of operation.

5.1.1 Laminar flow

This is the preferred method of air changing for higher specification clean rooms. Air flow can be either horizontal or vertical. In full laminar flow clean rooms, air enters the room through a batch of filters that comprise the whole of one wall or ceiling and leaves by corresponding ducts in the opposite wall or floor. It follows that for effective laminar flow to take place, there must be minimal interruption by pillars, protruding light fittings, inset windows, furniture etc. Vertical laminar flow is likely to be found in the most sophisticated clean rooms and is clearly superior as lateral contamination is minimised, air being admitted through ceiling filters and extracted through perforated floor tiles.

5.1.2 Laminar flow clean room

A clean room in which laminar air flow characteristics predominate throughout the entire air space. The direction of flow may be either horizontal or vertical.

5.1.3 Conventional or turbulent flow

The air enters the room through a bank of filters positioned such that ducting after final filtration is minimal and leaves the room through outlets remote from the inlets.

5.1.4 Conventional or turbulent flow clean room

This is a clean room in which the air conditioning method does not comply with laminar flow theory.

5.1.5 Positive Air Pressure

Maintained to ensure that if there are any leaks (through door openings etc.) air leaks out of the chamber instead of unfiltered air coming in.

5.1.6 ULPA and HEPA filters

Abbreviations for Ultra-Low Penetration Air and High Efficiency Particulate Air filters that are the very high specification filters necessary to achieve the environmental standards of the clean rooms that they serve.

5.1.7 Air Lock

An enclosed area at the entrance or exit of a clean room forming a break between the ambient environment outside and the controlled environment inside the clean room. Often provides gowning and/or shoe change facilities.

5.1.8 Air shower

An enclosed area at the entrance of a clean room with air jets which remove loose particulate matter from personnel prior to entering the clean room.

5.1.9 Clean work station, laminar flow bench or cabinet

These terms describe working enclosures that have their own filtered air or gas supply. These areas may have environmental standards much higher than the clean rooms in which they are located. Such facilities may in themselves be not rateable being self-contained items of plant <400m³.

6.0 Clean Room Performance

6.1 General

6.1.1 The term Clean Room is used to describe a wide range of accommodation varying from areas with simple air conditioning to the most sophisticated forms as can be found in wafer-fabrication plants.

6.1.2 Clean rooms are classified according to the number and size of particles permitted per volume of air. This is now done according to ISO 14644-1 which is based on volumes of air expressed in metric terms. ISO 14644-1 is an international standard adopted by the European Union in 1999 and the USA in 2001. This method of classification was intended to supersede USA Federal Standard 209E (where the classification is determined by measuring the number of particles > 0.5 microns in one cubic foot of room air). Although this latter method of classification was officially cancelled in 2001, it continues to be the most widely used and most easily understood classification of clean rooms.

6.1.3 This Practice Note will use the US Fed standard 209E basis of classification in the descriptions that follow. Clean rooms are thus described as Class 1, Class 10 etc - a Class 10 clean room for example having not more than 10 particles exceeding 0.5 microns in one cubic foot of air. The new ISO 14644-1 classifications are however also provided for assistance.

6.1.4 It cannot be emphasised too strongly, however, that neither US Fed Standard 209E nor ISO 14644-1 classifications alone provide a reliable guide to valuation treatment. The air-handling/ filtration plant in such

facilities is generally non-rateable. The above classifications will also reflect a number of other issues that are not attributable to the physical characteristics of the building. Nevertheless, such information can be an indicator of the structural standard of the facility as there is usually a correlation between the plant and the structure – the best air-handling being found in the best structures.

6.1.5 It is not thought possible to operate a clean room better than Class 100 with human presence and any that do almost certainly require robot technology. It is unlikely that the rateable element of such superior facilities will be better, for reasons of environmental standards alone, than the specified Type 1 facility.

6.1.6 Clean room specifications are continually advancing and surveyors are advised to enquire of the service engineer/facilities manager at any property for the technical details of systems encountered.

6.2 Critical criteria

6.2.1 The standard of cleanliness achieved in any clean room depends on a number of factors that include.

1. The structural quality of the clean area and, in particular, of internal wall, floor and ceiling finishes.

2. The specification of the air filtration plant and equipment.

3. The control of access/egress to the area and personnel dressing disciplines.

4. The extent to which furnishings, fittings, equipment and materials stored within the area contaminate the environment or interfere with air flow.

5. The extent to which people and materials move within the area.

6.2.2 There is no single most important factor. All of these interact and in order to achieve the highest standards of cleanliness, strict attention requires to be paid in all of these areas. Obviously in terms of valuation for rating, however, it is not appropriate to take into account all of these factors.

6.2.3 It is not uncommon to find two clean rooms of identical natures, perhaps across a corridor from one another in the same property, operating at different cleanliness specifications. This may, for example, be due to different access disciplines on account of process requirements. The environmental standard alone is therefore not a safe guide to value, which should always be based on the (rateable) structural standard of the facility. In this example, the clean rooms should have the same annual value.

7.0 Clean Room Classifications

7.1 Clean Rooms can take many structural forms and in order to simplify matters for valuation purposes this report recognises three principal types.

7.1.1 Type 1

Feature	Details
Structure	Probably quite large and in a purpose-built building. Clean room typically with a peripheral viewing corridor, dust free wall, ceiling and floor linings with welded/sealed joints. Laminar flow rooms will be normal.
Services	AC will be by vertical or horizontal laminar flow. Clean rooms likely to operate under positive air pressure with sprinkler systems and high intensity lighting systems. There may be special water and gas services.
Discipline	Strictest of regimes with operatives fully gowned and gloved and an air showering access procedure.
Typical air conditioning specification	Clean room classifications 100 and 1,000. ISO 14644-1 equivalent classes 5-6.

7.1.2 Type 2

Features	Details
Structure	Typically installed in a standard industrial style building but with specialised partitions having dust free finishes, sealed suspended ceilings and welded vinyl floor coverings with upstands.
Services	Positive pressure with entry through a simple air lock. Conventional air flow or basic horizontal laminar flow system. Flush fitting lighting system.
Discipline	Probably less strictly controlled than Type 1 but may still require full body cover.
Typical air conditioning specification	Clean room classifications 1,000 and 10,000. ISO 14644-1 equivalent classes 6-7.

7.1.3 Type 3

Features	Details
Structure	Almost certainly erected within existing space but may well apply to corridor areas of superior establishments. More typically formed by an area partitioned off from normal production space or created from offices. Clean rooms will have dust free linings, suspended ceilings with sealed joints and surface mounted light fittings, welded vinyl floors.
Services	Simple ducted AC systems or banks of free-standing AC units.
Discipline	Direct access from non-specified production or office space. Lab coat requirement only.
Typical air conditioning specification	Clean room classifications 10,000 and 100,000. ISO 14644-1 equivalent classes 7-8.

8.0 Rateability of Clean Rooms

8.1 Dependent upon its nature, a clean room structure may be rateable either as part of the building or as an item of plant or machinery. Where a clean room structure is held to be an item of plant, the following comments are provided to assist in determining if it is rateable.

8.2 Most clean rooms will be assembled on site using either basic materials or prefabricated parts and as such will take on such an impression of permanence that they can readily be regarded as being plant "in the nature of a building or structure".

8.3 A clean room exceeding 400 m^3 will be rateable (depending on construction) in terms of Class 4, Table 4 (chambers) and a clean room of smaller capacity will still be rateable provided it is not “readily capable of being moved from one site and re erected in its original state on another without the substantial demolition of any surrounding structure".

8.4 The valuer should be quite convinced that the clean room should be regarded as an item of plant and can be removed and re erected before conceding rateability. Clean work-stations and laminar flow benches or cabinets installed within general clean room areas may be appropriate items to concede.

9.0 Rateability of Service Plant

9.1 The approach to the treatment of air-handling plant in clean rooms is governed by the terms of the Valuation for Rating (Plant and Machinery) (Scotland) Regulations 2000.

9.2 Class 2 of the Schedule of Prescribed Classes of Plant and Machinery describes as rateable service items including plant used for heating, cooling and ventilating but specifically excludes

"*any such plant or machinery which is in or on the lands and heritages and is used or intended to be used in connection with services mainly or exclusively as part of manufacturing operations or trade processes*".

9.3 Note that the term *Air-Conditioning* is not referred to in the Regulations but the services which air-conditioning plant provides such as heating, cooling and ventilating are specifically mentioned.

9.4 Careful consideration must therefore be given before removing any service plant from value that it is claimed was installed only as a process requirement. It is suggested that where the main or exclusive use of an item of service plant cannot be identified as being used as part of manufacturing operations or trade processes, then the item should be regarded as rateable under Class 2.

9.5 In the case of multi-purpose service plant, the functions of the plant should be individually considered. For example, in the case of an air-conditioning system which provides amongst other things, heating, the use of the heating needs to be identified and unless the heating is used mainly as part of manufacturing operations or trade processes, then an element in respect of heating should be retained in value.

9.6 An element should generally be retained in value in respect of comfort heating throughout clean-room areas.

10.0 Valuation

10.1 From an examination of the available evidence, the following percentages are to be applied to the local basic rate and represent the rateable element only.

10.2

Clean room type	Addition to Basic Rate
Type 1	+100%
Type 2	+70%
Type 3	+50%

10.3 In no case should the final rate applied be allowed to fall below that for production offices of similar structural specification valued from the local comparative scheme.

10.4 The additions stated include lighting. Less common services such as sprinklers etc should be added as found.

11.0 Age and Obsolescence

11.1 Allowances in respect of age and obsolescence should be selected from the following table. Where conversion and upgrading of existing accommodation has taken place to create clean rooms, the allowances should be moderated at the valuer's discretion.

11.2

Year	Allowance	Year	Allowance	Year	Allowance
2010	0.00%	1986	19.00%	1962	43.00%
2009	0.50%	1985	20.00%	1961	44.00%
2008	1.00%	1984	21.00%	1960	45.00%
2007	1.50%	1983	22.00%	1959	46.00%
2006	2.00%	1982	23.00%	1958	47.00%
2005	2.50%	1981	24.00%	1957	48.00%
2004	3.00%	1980	25.00%	1956	49.00%
2003	3.50%	1979	26.00%	1955	50.00%
2002	4.00%	1978	27.00%	1954	50.00%
2001	4.50%	1977	28.00%	1953	50.00%
2000	5.00%	1976	29.00%	1952	50.00%
1999	6.00%	1975	30.00%	1951	50.00%
1998	7.00%	1974	31.00%	1950	50.00%
1997	8.00%	1973	32.00%	1949	50.00%
1996	9.00%	1972	33.00%	1948	50.00%
1995	10.00%	1971	34.00%	1947	50.00%
1994	11.00%	1970	35.00%	1946	50.00%
1993	12.00%	1969	36.00%	1945	50.00%
1992	13.00%	1968	37.00%	1944	50.00%
1991	14.00%	1967	38.00%	1943	50.00%
1990	15.00%	1966	39.00%	1942	50.00%
1989	16.00%	1965	40.00%	1941	50.00%
1988	17.00%	1964	41.00%	1940	50.00%
1987	18.00%	1963	42.00%	1939	50.00%