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Humidity Control

ART-SORB®

ART-SORB® is a high performance humidity controller for the preservation of works of art. It is used to create appropriate micro-environments for artefacts in showcases or frames by buffering the changes in RH, i.e. by maintaining a constant RH. Especially when paintings, works on paper or on parchment are travelling, it is highly recommended to equip the frames or crates with ART-SORB®.
ART-SORB® is very efficient across the complete RH range and has a superior moisture buffering capacity over regular density silica gel.
ART-SORB® comes in three forms: as loose beads, as sheets and as cassettes. Bead and cassette types work well in drawers or virtually anywhere in a display case. When it comes to frames the sheet type is most convenient. The sheets can be cut to fit frames of any size.

Characteristics

High Moisture Capacity: Equilibrium Moisture Content (EMC) is the actual amount of water contained by the silica gel when its vapor pressure is at equilibrium with a given relative humidity (RH). A high EMC indicates a large capability to buffer changes in RH. ART-SORB® has uniquely high adsorption/desorption capability througout the entire range of RH (see figure 1).
High M-Value: The M-Value represents the amount of water in grams that is gained or lost by one kilogram of gel when the RH changes by 1%. A high M-Value means a greater capacity to buffer RH changes. ART-SORB® like other silica gels, has a high M-Value below 40% RH; above this level, however, ART-SORB® far outperforms its competitors, actually increasing its M-Value (see figure 1).

Minimal Hysteresis Problems: Hysteresis is the phenomenon whereby a silica gel's EMC/RH adsorption curve lies below its desorption curve (which drastically restricts a silica gel's buffering ability). ART-SORB® has a high slope of adsorption/desorption, or M-Value, throughout the RH range, so that it is not significantly affected by hysteresis. Immune to Temperature Changes: Many moisture sensitive materials are affected by temperature, causing the M-Value and response time to vary adversely to temperature changes. ART-SORB®'s EMC/RH curve is totally independent of and immune to changes in temperature.

Economical: ART-SORB®'s extraordinary high M-Values all along the RH range means it has a large moisture reservoir with which to buffer changes in RH. Therefore less ART-SORB® is needed to obtain the same effectiveness in comparison with other buffering agents. On a dry weight for weight basis, almost seven times as much regular density silica gel would be necessary to match the effectiveness of a quantity of ART-SORB® between 40-70% RH.

Ease of handling: ART-SORB® is inert, non-poisonous and safe to handle without special precautions.
Infinite Lifespan: ART-SORB® can be reconditioned an infinite number of times.

Conditioning of ART-SORB®

ART-SORB® can be easily conditioned at a desired relative humidity by placing it in a controlled environment and allowing it to come to equilibrium for one or two days. A humidity-controlled chamber or storeroom is suitable for this purpose. The RH of the conditioned ART-SORB® should be checked with a hygrometer.

Methods to improve efficiency of silica gel in microclimate

Although silica gel responds to changes in RH, it only responds at the air/gel interface. Therefore, if the air is relatively static there will be a long time-lag before the moisture generated from the silica gel becomes evenly distributed in the showcase, and only the air in the immediate area will be properly conditioned by the gel. The gel must therefore be spread as thouroughly and evenly as possible (to maximize the air/gel inter face). The recommended method of maximizing surface area distribution of silica gel is by placing it in porous plastic tubes or flat trays (deep trays minimize surface area relative to the total quantity of gel in use). Thus, the nature and the size of the showcase will determine the best size of silica gel to use. A small fan can also be installed in the showcase for purposes of circulation, but care should be taken since this can be damaging to certain works of art.

ART-SORB® types

Beads

Grain size: 1,5 - 4 mm / particle
Supplied: 1 kg and 8 kg cans, conditioned by 50%
Can be placed in a drawer or virtually anywhere in a display case.
Requires about 0,5 - 1 kg / 1 m^3 volume of air in display case.

Sheet

Size: 50 x 50 cm x 1,8 mm
Weight: 200 gr. / sheet (400 gr. of gel / m^2)

Best placement is in a frame or in a showcase. The sheets themselves can be cut to appropriate size.
Requires about 5 - 10 sheets / 1 m^3 volume of air.
Made by impregnating ART-SORB® fine particles into a non-woven, polyethylene/polypropylene fiber sheet.

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Cassette

Size: 330 x 110 x 20 mm
Weight: 450 gr. / Cassette

The cassette type works best inside a showcase. It is easy to handle and can be replaced easily.

Figure 1: EMC/RH and M-Value of respective Silica Gels

% RF	Reg. Density		Inter. Density 59		ART-SORB®	
	EMC	M	EMC	M	EMC	M
0	0	7	0	2	0	6,5
10	7	7	2	1	6,5	5
20	14	6,5	3	1	11,5	4,5
30	20,5	4,5	4	1	16	6
40	25	3,5	5	1,5	22	4
50	28	2	6,5	1,5	26	9
60	30,5	1,5	8	3	35	19
70	32	1	11	6	54	13
80	33	1	17	15,5	67	7
90	34	1	32,5	61	74	6
100	35		93,5		80	

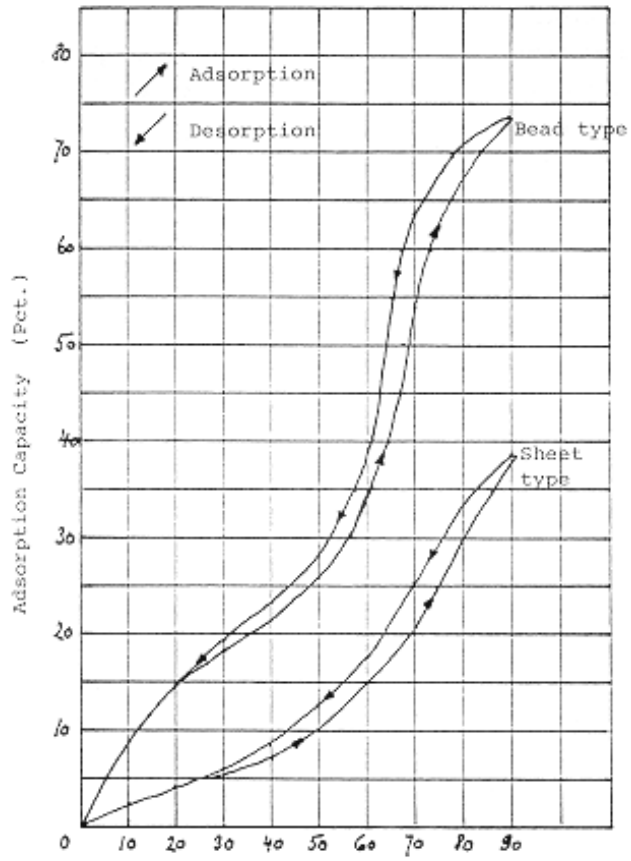

Figure 2: ART-SORB® Adsorption Curve / Desorption Curve (at 25°C

Relative Humidity (%)

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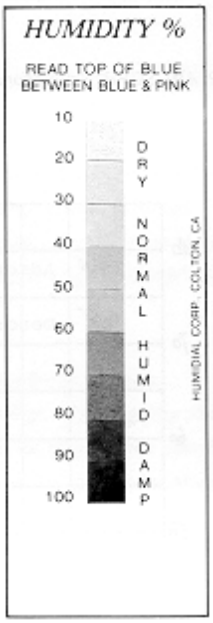
Humidity Indicator

The reversible humidity indicator strips show the relative humidity in a closed showcase or a room. The strip is divided into nine sections. Each section corresponds to a 10% increase in relative humidity. The colour changes from blue to pink as the humidity increases. The humidity indicators are soluble in water and should not be placed in direct contact with water, steam or metal. Keep the strips in a closed container until they are used.



Size

Packets of 5 or 10 strips

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