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WASHINGTON ENERGY EXTENSION SERVICE

TECHNOTE

MOISTURE PROBLEMS AND MULTIPLE GLAZING **TN1003**

By examining a range of internal and external conditions it is possible to compare condensation potential on single, double and triple glazing. The lower range of normal living temperatures is about 50° (night setback). Most people find 60% humidity to be near the upper limit of the comfort range. Since these two values approximate the limits of acceptability, the performance of single, double, and triple glazing under these conditions should reveal much about their comparative abilities to prevent moisture problems from occuring.

For a wide range of indoor temperatures and humidities, the dew point can be determined from the following chart:

DEW POINT TEMPERATURE OF INTERIOR SURFACES AT VARIOUS TEMPERATURES AND HUMIDITIES

	Relative Humidity						
Air Temp(F)	80%	70%	60%	50%	40%	30%	20%
80	73	69	64	59	53	44	35
70	63	59	55	50	44	36	27
60	53	49	46	40	35	27	19
50	43	40	**36**	30	26	18	10
40	33	30	27	22	17	10	2
30	23	21	18	13	9	1	-7

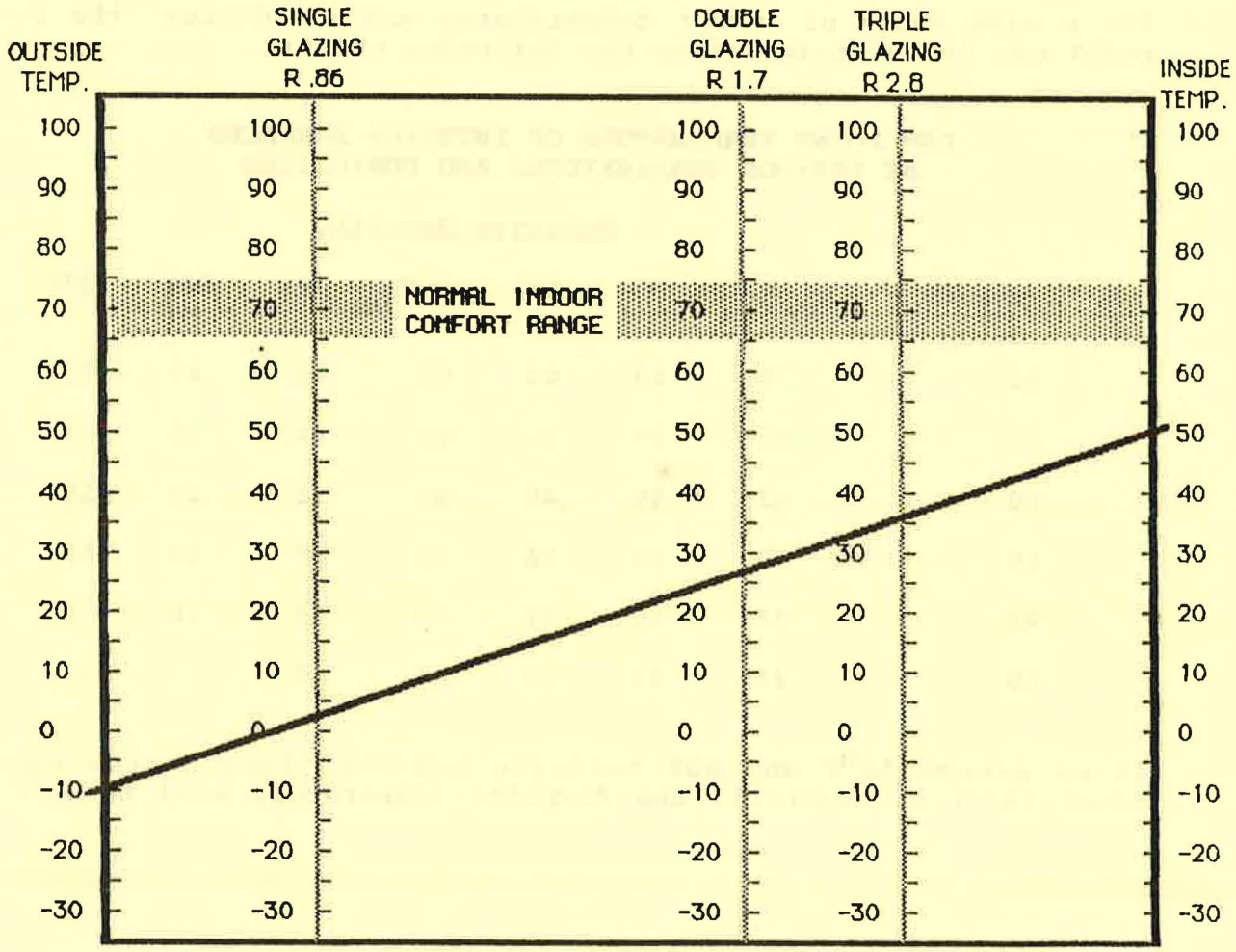
If we assume 50°F and 60% relative humidity (our approximate lower limit of comfort), the dewpoint temperature will be 36°F.

914 East Jefferson, #300
Seattle, Wa. 98122
(206) 296-5640

W. 808 Spokane Falls Blvd., #627
Spokane, Wa. 99201
(509) 624-4180

The following nomogram allows comparison of window performance over a range of temperatures and glazings. Using an indoor temperature of 50°F and the dew point of 36°F (as calculated from the preceding table), the temperature at which condensation will occur can be plotted. If a straight edge is placed on the inside temperature scale (right hand side), and a line is drawn through the 36°F position on the triple glazing scale, an outdoor temperature of -8°F is shown where the straight edge intersects the outdoor temperature scale. This is the outdoor temperature at which condensation will occur under the given conditions of 50°F indoor temperature and 60% indoor relative humidity.

NOMOGRAM FOR CALCULATING THE INTERIOR SURFACE TEMPERATURE OF WINDOWS AT VARIOUS INDOOR AND OUTDOOR TEMPERATURES



Repeating the procedure for double glazing and single glazing yields outdoor temperatures of +13°F and 34°F respectively. Obviously, triple glazing provides much better protection from condensation.

The case just examined was selected because it represents rather extreme indoor living conditions. If triple glazing is evaluated with a more typical indoor temperature of 70°F and a relative humidity of 40%, the result is even more dramatic. Under these conditions condensation will not occur until the outdoor temperature drops below -30°F. Under the same conditions, double glazing results in condensation at around +5°F while single glazing comes in at around +38°F.

These figures suggest that triple glazed windows would almost never exhibit significant condensation problems in moderate or even severe climates. Condensation will only occur when humidity or temperature conditions are abnormal.

Written by Mike Nelson

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