



Weather Resistance Testing for Control Contractor Surface-Mount Speakers

Understanding Mil Spec 810 and IEC529 Environmental Tests

JBL Professional Control Contractor models 23, 25, 25AV, 28, 29AV-1, 30 and SB210 loudspeakers are designed in part for use in outdoor settings and they have passed the internationally recognized IEC529 and MilSpec810 testing for outdoor capability. The IEC529 and MilSpec810 tests are designed to simulate approximate climatic conditions and provide an indication of the degrees of weather resistance.

At JBL Professional, developing weather resistant enclosures is an ongoing process. While Control Contractor products are designed to meet and exceed IEC529 and MilSpec810 test specifications, we are continually engaged in long-term research to ensure we develop loudspeaker systems with the best weather resistance possible.

I. Understanding Mil Spec 810 and IEC529 IP Ratings

The IP Code ratings (International Protection) are based on the international standard IEC529 (corresponding to the CEE ratings in Europe) and use two characters to describe the degree of protection a cabinet offers. The first number indicates protection against a solid object. The second number indicates protection against damage from water penetration.

By contrast, Mil Spec 810 provides a specific set of humidity, solar radiation, temperature extremes and aqueous salt atmosphere exposure test(s), for which the product either passes or fails.

Together, they provide a broad indication of weather resistance capability.

Mil Spec 810

Specific Mil Spec 810 tests include:

Salt Spray -- This tests resistance to the effects of an "aqueous salt atmosphere". It also gives a general indication of resistance to rusting. It consists of 48 hours continuous spray consisting of 5% salt solution.

Humidity -- This is to indicate resistance to a warm humid atmosphere. 48 hours of cycling. Starts at 100% humidity @ 27 degrees C; goes to 95% @ 35 degrees and goes back to 100% at 27 degrees C.

Solar Radiation -- To determine the effects of being out in the sun, such as yellowing or chalking. 48 hours of very intense UV (1120W/sq m). These 48 hours are supposed to simulate about 1 year of being out in the sun.

Low Temperature -- According to the MilSpec document, this simulates acceptability in a mild climate such as "coastal Europe and southeast Australia". This cycles from -6 degrees C to -19 degrees C (21F to -2F) for 48 hours.

High Temperature -- According to the MilSpec document, this simulates acceptability in a Hot climate such as "North Africa, the Middle East, Pakistan, and India, southwestern US and northern Mexico". This cycles from 32 C to 49C (90F to 120F) for 48 hours.

IEC 529 (“IP” Ratings)

The first character of the 2-character IP Code describes the degree of protection a cabinet offers against a solid object penetrating the cabinet. The second character describes the level of protection against incursion of water.

When one of these two factors is rated and the other is not, a lower case "x" is utilized as a placeholder to indicate that the other factor is not rated. For example, IP-x4 means that the product is rated on the IP scale for water protection but not for solid foreign object. The "x" does not mean that the product is not capable of protection -- a "0" would be used to indicate "not protected" -- but simply that the factor has not been rated on the IP scale for that product.

First Character – Protection Against Solid Foreign Object (IP-1x through IP6x, where the first character relates to solid foreign object and the second character, listed as “x”, is undefined)

First Numeral	Degrees of Protection Against Solid Foreign Objects Entering the Enclosure
0	Not Protected
1	Protected against solid foreign objects larger than 50 mm (2 in) in diameter.
2	Protected against solid foreign objects larger than 12.5 mm (.5 in) in diameter.
3	Protected against solid foreign objects larger than 2.5 mm (.1 in) in diameter.
4	Protected against solid foreign objects larger than 1 mm (.04 in) in diameter.
5	Dust Protected; ingress of dust not totally prevented. Penetrated dust does not interfere with the satisfactory operation of unit.
6	Dust-Tight; no ingress of dust.

Second Character – Protection Against Water (IP-x1 through IPx8, where the first character, listed as “x”, is undefined, and the second character relates to protection against damage from water).

Second Numeral	Degrees of Protection Against Water (tests implemented using fresh water)
0	Not Protected
1	Protected against vertically falling water drops; drops have no harmful effects.
2	Protected against vertically falling water drops when enclosure is tilted up at a 15° angle; drops have no harmful effects.
3	Protected against water sprayed at up to a 60° angle; water has no harmful effects.
4	Protected against splashing water from any direction; water has no harmful effects.
5	Protected against water jets from any direction; water has no harmful effects.
6	Protected against powerful water jets from any direction; water has no harmful effects.
7	Protected against temporary immersion in water; ingress of water in quantities causing harmful effects shall not be possible given standardized pressure and time conditions.
8	Protected against the effects of immersion in water; ingress of water in quantities causing harmful effects shall not be possible under conditions mutually agreed upon by the user and manufacturer.

II. Criteria for Passing the Tests

While both MilSpec 810 and IEC529 specify exact testing that must be performed after which the speaker must “function properly”, neither standard specifies what constitutes proper functioning, leaving that determination up to the manufacturer. Whereas some loudspeaker manufacturers may deem their loudspeakers as having passed the tests if their loudspeaker simply makes sound afterward, JBL Professional uses a very stringent method for determining proper function: All JBL Professional loudspeakers MUST be able to reproduce their stated frequency responses and maintain their full power ratings following testing.

Approval Process – Following the testing, the loudspeaker is “rub and buzz” tested for any signs of sonic damage or warping. The cabinet is opened, inspected for any visible signs of damage and then closed. Following this inspection the loudspeaker is then subjected to a full 2 hours of pink noise at full power to ensure there has not been any damage that weakened the loudspeaker such that it wouldn't handle its full rated power. Finally, the loudspeaker is again re-tested for frequency response, rub and buzz.

III. Control Contractor Product Ratings

MilSpec 810

All Control Contractor models pass MilSpec 810.

IEC529 (“IP”)

Protection Against Solid Foreign Object -- Control Contractor models 23, 25 and 28 are classified as IP-3x with regard to foreign object incursion because they are protected against solid foreign objects larger than 2.5 mm (.01 in). Control Contractor models 29AV-1, 30 and SB-210 are listed as IP-5x for foreign objects incursion and are considered dust-protected.

Protection Against Water – Control Contractor models 23, 25 and 28 and 29AV-1 have an IP water protection rating of IP-x4. Control Contractor models 30 and SB-210 carry an IP water protection rating of IP-x5.

Combining the Solid Foreign Object and Water Ratings -- Control Contractor models 23, 25 and 28 have an IP code rating of IP-34. Control 29AV-1 has an IP code rating of IP-54. With regards to water incursion, these rating indicate that these models are “splash proof” and can be utilized in settings where they may be subjected to occasional rain or water splashing onto the unit. Control Contractor models 30 and SB-210 carry an IP code rating of IP-55 indicating that they are “jet proof”. They can be placed in settings where medium jets of water may occasionally hit the cabinet such as from a water sprinkler.

Upgrading the IP Rating – Optional accessories are available for some models that increase the IP rating of a model. They are described in the “Optional Upgrade Accessories” section, below and ratings are listed in the “Model Ratings” chart at the end of this document.

Product Protection Via Placement – For any of the ratings, it is best for longest lifespan to place Control Contractor products in locations where they will be minimally subjected to unintended incursion of water and foreign objects.

IV. Control Contractor Weather Resistance Features

Standard Features

Tweeter – The tweeter surface is protected by a coating of pure titanium and is a **highly weather resistant**.

Woofer Cone – The Control 23 and 28 use polypropylene cones, the Control 25 & 25AV use a polypropylene-coated paper, the Control 29AV-1 uses a Kevlar® cone, the Control 30 uses a fiberglass/Kevlar® composite cone and the SB210 uses an Aluminum/Ceramic Composite cone. **All are highly weather resistant.**

Butyl Rubber Woofer Surround -- The surround is made of pure butyl rubber which is a **weatherproof material**.

WeatherEdge™ – The edge of the woofer basket on these models is covered with an extension of the rubber surround, called “WeatherEdge™” or is rear-loaded to minimize exposure to the elements.

Cabinet – Control Contractor cabinets are made from high impact polystyrene and have excellent outdoor capabilities.

Grille – For Control 23, 25 & 28, grilles are punched first, then zinc plated, and powder-coated last, in that order. This leaves a continuous protective layer of both plating and powder-coat throughout the holes. Some companies may rely solely on paint or powdercoat, which is inadequate. They may punch and paint pre-coated metal, leaving the inside of the grille holes unplated and protected only by the coating. Control 29AV-1, 30 and SB-210 feature thermoset composite coated grilles with foam behind the grille to minimize incursion of water. Control 30 grille is backed with WeatherMax™ multi-layer foam, which prevents the direct incursion of water. Control 25AV comes with a stainless steel grille and WeatherMax multi-layer foam backing.

Optional Upgrade Accessories

A number of accessories are available to upgrade the weather resistance of Control Contractor loudspeakers. Adding MTC-PC2 Panel Cover and WMG Grille increases the IP rating of any IP-34 or IP-54 speaker up to IP-55.

MTC-PC2 Panel Cover – The MTC-PC2 is a simple-to-use weatherproof panel cover to protect the input terminals of Control Contractor and Control Series loudspeakers. The MTC-PC2 installs over the existing input cup, provides a watertight gland fitting entrance (when used with round jacketed cable) to seal and protect this section of the loudspeaker against incursion of water. (*Control 25AV, 29AV, and 30 already come with MTC-PC2.*)

MTC-xxSSG Stainless Steel Grille – Stainless steel grilles are available as a direct retrofit for models Control 23, 25, and 28. (*Control 25AV already comes with an SSG stainless steel grille.*) These grilles are paintable and available in either a silver or a black finish. For best performance, MTC-xxSSG grilles should be used in conjunction with the MTC-PC2 weatherproof panel cover. (*Note: The “xx” in the part number indicates the grille size. For example, MTC-23SSG is sized for Control 23.*)

MTC-xxWMG WeatherMax™ Grille – Optional WeatherMax™ grilles are available for models Control 23, 25, 25AV and 28 that do not feature a WeatherMax grille pre-attached. WeatherMax™ multi-layer foam prevents the direct water incursion from the grille and protects the system from dust.

V) Model Ratings

	IEC529 Rating	Grille	MTC-PC2 Panel Cover	Optional Accessories
Control 23, 23T, 23-WH and 23T-WH	IP-34	Zinc-plated, powdercoat	Optional	<ul style="list-style-type: none"> • MTC-23SSG stainless steel grille Improved IP-34 capability • MTC-23WMG WeatherMax™ grille IP-54 rating without MTC-PC2 IP-55 rating when combined with MTC-PC2 • MTC-PC2 Panel Cover
Control 25, 25T, 25-WH and 25T-WH	IP-34	Zinc-plated, powdercoat	Optional	<ul style="list-style-type: none"> • MTC-25SSG stainless steel grille Improved IP-34 capability • MTC-25WMG WeatherMax™ grille IP-54 rating without MTC-PC2 IP-55 rating when combined with MTC-PC2 • MTC-PC2 Panel Cover
Control 25AV and 25AV-WH	IP-35	Stainless Steel	Included	<ul style="list-style-type: none"> • MTC-25WMG WeatherMax™ grille IP-55 rating (speaker comes with MTC-PC2)
Control 28, 28T-60, 28-WH and 28T-60-WH	IP-34	Zinc-plated, powdercoat	Optional	<ul style="list-style-type: none"> • MTC-28SSG stainless steel grille Improved IP-34 capability • MTC-28WMG WeatherMax™ grille IP-54 rating without MTC-PC2 IP-55 rating when combined with MTC-PC2 • MTC-PC2 Panel Cover
C29AV-1 and C29AV-1-WH	IP-54	Thermoset composite grille, foam backing	Included	
Control 30 and 30-WH	IP-55	Thermoset composite grille, WeatherMax™ backing	Included	
Control SB-210	IP-55	Thermoset composite grille, WeatherMax™ backing	Included	