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**StressXpress®**  
**HSP60 ELISA Kit**

Catalog# SKT-110-96 (96-Well Kit)

Catalog# SKT-110-480 (5 x 96-Well Kit)

Colorimetric detection of HSP60

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## GENERAL INFORMATION

### Materials Supplied

Catalog Number	Item	96 wells Quantity/ Size
SKC-110A	Anti-Hsp60 Immunoassay Plate	1 Plate
SKC-110B	5X Hsp60 Extraction Reagent	1 vial/10mL
SKC-110C	Recombinant Hsp60 Standard	2 vials
SKC-110D	Standard and Sample Diluent	1 vial/50mL
SKC-110E	10X Wash Buffer Concentrate	1vial/100mL
SKC-110F	Anti-Hsp60 Biotinylated Antibody Concentrate	1 vial/150µL
SKC-110G	Anti-Hsp60 Biotinylated Antibody Diluent	1 vial/13mL
SKC-110H	Streptavidin: HRP Concentrate	1 vial/150µL
SKC-110I	Streptavidin: HRP Diluent	1 vial/13mL
SKC-110J	TMB Substrate	1 vial/13mL
SKC-110K	Stop Solution	1 vial/13mL

If any of the items listed above are damaged or missing, please contact our Customer Service department at (250) 294-9065. We cannot accept any returns without prior authorization.



**WARNING: Not for human or animal disease diagnosis or therapeutic drug use.**

## Precautions

**Please read these instructions carefully before beginning this assay.**

The reagents in this kit have been tested and formulated to work exclusively with StressMarq Biosciences Inc.'s StressXpress® ELISA Kits. This kit may not perform as described if any reagent or procedure is replaced or modified.

**For research use only. Not for human or diagnostic use.**

## If You Have Problems

### **Technical Service Contact Information**

**Phone:** 250-294-9065

**Fax:** 250-294-9025

**E-Mail:** techsupport@stressmarq.com

**Hours:** M-F 9:00 AM to 5:00 PM PST

In order for our staff to assist you quickly and efficiently, please be ready to supply the lot number of the kit (found on the outside of the box).

## Storage and Stability

All reagents are stable as supplied at 4°C. Unused wells should be resealed with desiccant in the foil pouch provided, and stored at 4°C until the kits expiry date.

## Materials Needed But Not Supplied

- Ultra pure water
- Additional reagents and materials for cell lysate and tissue extract preparation, including protease inhibitors
- Precision pipettors, with disposable plastic tips
- Polypropylene or polyethylene tubes to prepare samples – do not use polystyrene, polycarbonate or glass tubes
- A container to prepare 1X Wash Buffer
- A wash bottle or an automated 96-well plate washer

- Disposable reagent reservoirs
- A standard microtiter plate reader for measuring absorbance at 450 nm
- Adhesive plate sealers

## Assay Precautions

- All ELISA reagents must be at room temperature (20-25°C) before use.
- Vigorous plate washing is essential.
- Use new disposable pipette tips for each transfer to avoid cross-contamination.
- Use a new adhesive plate cover for each incubation step.
- Minimize lag time between wash steps to ensure the plate does not become completely dry during the assay.
- Avoid microbial contamination of reagents and equipment. Automated plate washers can easily become contaminated thereby causing assay variability.
- Take care not to contaminate the TMB Substrate. Do not expose TMB Substrate solution to glass, foil, or metal. If the solution is blue before use, DO NOT USE IT.
- Individual components may contain preservatives. Wear gloves while performing the assay. Please follow proper disposal procedures.

# INTRODUCTION

## Background

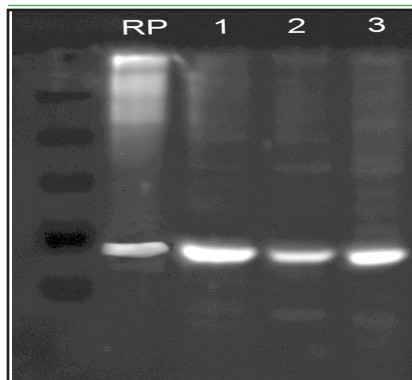
In both prokaryotic and eukaryotic cells, the misfolding and aggregation of proteins during biogenesis and under conditions of cellular stress are prevented by molecular chaperones. Members of the HSP60 family of heat shock proteins are some of the best characterized chaperones. Hsp60, also known as Cpn60 or GroEL, is an abundant protein synthesized constitutively in the cell that is induced to a higher concentration after brief cell shock. It is present in many species and exhibits a remarkable sequence homology among various counterparts in bacteria, plants, and mammals with more than half of the residues identical between bacterial and mammalian Hsp60 (1-3). Whereas mammalian Hsp60 is localized within the mitochondria, plant Hsp60, or otherwise known as Rubisco-binding protein, is located in plant chloroplasts.

It has been indicated that these proteins carry out a very important biological function due to the fact that Hsp60 is present in so many different species. The common characteristics of the Hsp60s from the divergent species are i) high abundance, ii) induction with environmental stress such as heat shock, iii) homo-oligomeric structures of either 7 or 14 subunits which reversibly dissociate in the presence of  $Mg^{2+}$  and ATP, iv) ATPase activity and v) a role in folding and assembly of oligomeric protein structures (4). These similarities are supported by recent studies where the single-ring human mitochondrial homolog, Hsp60 with its co-chaperonin, Hsp10 were expressed in a *E. coli* strain, engineered so that the *groE* operon is under strict regulatory control. This study has demonstrated that expression of Hsp60-Hsp10 was able to carry out all essential *in vivo* functions of GroEL and its co-chaperonin, GroES (5). Another important function of Hsp60 and Hsp10 is their protective functions against infection and cellular stress. Hsp60 has however been linked to a number of autoimmune diseases, as well as Alzheimer's, coronary artery diseases, MS, and diabetes (6-9).

## About This Assay

StressMarq Biosciences Inc.'s StressXpress® ELISA Kit is for the detection of Hsp60 in cell lysates, tissue extracts, and serum samples. Each kit contains sufficient components to quantitate the Hsp60 concentration in up to 40 samples, tested in duplicate.

## Western Blot Validation of Detection Antibody



**Figure 1: Western blot analysis of Hsp60.**

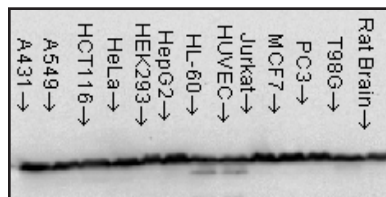
Lane 1- Recombinant Human Hsp60

Lane 2- Human

Lane 3- Dog

Lane 4- Mouse

## Western Blot Validation of Capture Antibody



**Figure 2: Multi-blot format of Hsp60 using a cell lysate from 12 human cancer cell lines.**

## ASSAY OVERVIEW

1. Prepare Standard and samples in Standard and Sample Diluent.
2. Add 100  $\mu\text{L}$  of Standard or sample to appropriate wells.
3. Cover plate with Plate Sealer and incubate at room temperature (22 - 25  $^{\circ}\text{C}$ ) for 1 hour.
4. Wash plate four times with 1X Wash Buffer.

*Note: Gently squeeze the long sides of plate frame before washing to ensure all strips remain securely in the frame. Empty contents. Use a squirt bottle to vigorously fill each well completely with 1X wash buffer, then empty plate contents. Repeat procedure for a total of four washes. Blot plate onto paper towels or other absorbent material.*

5. Add 100  $\mu\text{L}$  of Biotinylated Antibody Working Solution to each well.
6. Cover plate with Plate Sealer and incubate at room temperature for 1 hour.
7. Wash plate four times with 1X Wash Buffer.
8. Add 100  $\mu\text{L}$  of Streptavidin-HRP Working Solution to each well.
9. Cover plate with Plate Sealer and incubate at room temperature for 30 minutes.
10. Wash plate four times with 1X Wash Buffer.
11. Add 100  $\mu\text{L}$  of TMB Substrate to each well.
12. Develop the plate in the dark at room temperature for 30 minutes.
13. Stop reaction by adding 100  $\mu\text{L}$  of Stop Solution to each well.
14. Measure absorbance on a plate reader at 450 nm.



## Sample Preparation

### Cell Lysate Preparation

1. Prepare and treat cells as desired.
2. For adherent cells, remove media and rinse cells with ice-cold PBS. Harvest cells with trypsin-EDTA or by using a cell scraper. Centrifuge at 500 x g for 5 minutes. For suspension cells, harvest by centrifugation at 500 x g for 5 minutes.
3. Wash cells by re-suspending the cell pellet in ice-cold PBS. Pellet cells by centrifugation at 500 x g for 5 minutes. Repeat wash for a total of three (3) washes with ice-cold PBS.
4. Use a pipette to carefully remove and discard the supernatant, leaving the cell pellet as dry as possible. The cell pellet may be frozen at -70°C and lysed at a later time, if desired.
5. Calculate the amount of 1X Extraction Reagent required. For every  $1 \times 10^6$  to  $1 \times 10^7$  cells, use 1 mL of 1X Extraction Reagent.
6. Prepare 1X Extraction Reagent by diluting 1 part 5X Extraction Reagent with 4 parts ice-cold ultra pure water. For example, if 5 mL of 1X Extraction Buffer is required, dilute 1 mL of 5X Extraction Reagent with 4 mL of ultra pure water.

*Note: Use of alternative extraction buffers may contain components which could interfere and compromise the performance of the assay, producing inaccurate results. For best results, use the 1X Extraction Reagent included in this kit.*

7. Add protease inhibitors to the 1X Extraction Reagent. Examples of an appropriate protease inhibitor cocktail includes 0.1 mM PMSF, 1 µg/mL leupeptin, 1 µg/mL aprotinin, and 1 µg/mL pepstatin. Alternatively, a commercially available protease cocktail, obtainable from a variety of scientific reagent vendors, may also be used.
8. Add appropriate amount of ice-cold 1X Extraction Reagent including protease inhibitors to the cell pellet.

*Note: If excess buffer is used for the number of cells lysed, the protein concentration will be low.*

9. Pipet up and down to break up the cell pellet until the cell suspension is homogeneous and no clumps are visible.
10. Incubate on ice for 30 minutes with occasional mixing or sonification.

*Note: To increase protein yields and decrease sample viscosity, aspirate the cell pellet 5-10 times through a 21 ½ gauge needle or sonicate the cell pellet for 30 seconds with 50% pulse during the incubation.*

11. Transfer the mixture to a fresh micro centrifuge tube and centrifuge at ~21,000 x g for 10 minutes at 4°C.
12. Transfer the supernatant (cell lysate) to a fresh tube for analysis. Avoid disturbing the cell pellet. Discard the cell pellet once the supernatant is harvested. The cell lysate is now ready for analysis in the assay.
13. Alternatively, store the cell lysate in single-use aliquots at -70°C. It is recommended that a protein determination assay be performed and the extracts aliquoted into convenient amounts prior to storing at -70°C to avoid multiple freeze-thaw cycles.

## **Tissue Extract Preparation**

1. Harvest tissue to be analyzed. Tissues may be flash frozen, stored at -70°C and prepared at a later time, if desired.
2. Calculate the amount of 1X Extraction Reagent required. For each 0.5 cm<sup>3</sup> piece of tissue, use 1 mL of 1X Extraction Reagent.
3. Prepare 1X Extraction Reagent by diluting 1 part 5X Extraction Reagent with 4 parts ice-cold ultra pure water. For example, if 5 mL of 1X Extraction Buffer is required, dilute 1 mL of 5X Extraction Reagent with 4 mL of ultra pure water.

*Note: Use of alternative extraction buffers may contain components which could interfere and compromise the performance of the assay, producing inaccurate results. For best results, use the 1X Extraction Reagent included in this kit.*

4. Add protease inhibitors to the 1X Extraction Reagent. Examples of an appropriate protease inhibitor cocktail includes 0.1 mM PMSE, 1 µg/mL leupeptin, 1 µg/mL aprotinin, and 1 µg/mL pepstatin. Alternatively, a commercially available protease cocktail, obtainable from a variety of scientific reagent vendors, may also be used.
5. Place the tissue in a mortar and add sufficient volume of liquid nitrogen to cover

the tissue.

6. Allow the liquid nitrogen to evaporate. The tissue should be thoroughly frozen.
7. Grind the frozen tissue to a powder with a pestle.
8. Add appropriate amount of ice-cold 1X Extraction Reagent including protease inhibitors to the processed tissue.
9. Continue to homogenize the tissue with the pestle until the tissue suspension is homogeneous.
10. Transfer the extract to a fresh micro centrifuge tube and centrifuge at  $\sim 21,000 \times g$  for 10 minutes at  $4^{\circ}\text{C}$ .
11. Transfer the supernatant (tissue extract) to a fresh tube for analysis. Avoid disturbing the cell pellet. Discard the cell pellet once the supernatant is harvested. The tissue extract is now ready for analysis in the assay.
12. Alternatively, store the tissue extract in single-use aliquots at  $-70^{\circ}\text{C}$ . It is recommended that a protein determination assay be performed and the extracts aliquoted into convenient amounts prior to storing at  $-70^{\circ}\text{C}$  to avoid multiple freeze-thaw cycles.

## Serum Collection

1. Collect whole blood using established methods.
2. Allow samples to clot at room temperature for 30 minutes.
3. Centrifuge at  $2400 \times g$  for 10 minutes, taking precautions to avoid hemolysis.
4. Transfer the serum to a fresh tube. The serum collected is now ready for analysis in the assay.
5. Alternatively, store serum samples in single-use aliquots at  $< -20^{\circ}\text{C}$ . Avoid multiple freeze-thaw cycles.
6. For use of serum with this kit see information under **Sample Dilution** on page 12.

## Sample Handling

- All blood components and biological materials should be handled as potentially hazardous. Follow universal precautions when handling and disposing of infectious agents.
- 100  $\mu\text{L}$  of diluted sample is required per well.
- Samples must be assayed in duplicate each time the assay is performed.
- Samples should be frozen if not analyzed shortly after harvest. For long-term storage, aliquot and freeze samples. Avoid repeated freeze-thaw cycles when storing samples.
- If particulate is present in samples, centrifuge prior to analysis.
- If the integrity of the sample is of concern, make a note on the Plate Template and interpret results with caution.

## Sample Dilution

- Samples must first be diluted prior to testing.
- Prepare at least 250  $\mu\text{L}$  of sample in Standard and Sample Diluent. Mix samples well prior to analysis.
- Suggested starting dilutions for samples:
  - o For **cell and tissue lysates**, prepare a 200  $\mu\text{g}/\text{mL}$  total protein concentration dilution in Standard and Sample Diluent.
  - o When **measuring Hsp60 in serum samples**, use a 1:2 dilution in 50mM Acetic Acid (pH 4.67) and assay total 100  $\mu\text{L}$  sample volume directly i.e. add 50  $\mu\text{L}$  of 50 mM Acetic Acid to all standard and sample wells followed by 50  $\mu\text{L}$  of appropriately diluted standards or samples to each well. Run each standard, sample, or blank in duplicate. Follow with the remaining procedure. Expect lower OD values, however, serum matrix effects are removed.

*Note: If values for samples are not within the range of the standard curve, optimal sample dilutions need to be determined.*

## Other Reagent Handling/ Preparation

### Standard Preparation

1. Reconstitute standard vial with 500  $\mu\text{L}$  of Standard and Sample Diluent for a concentration of 450 ng/mL. Mix well.
2. Label seven (7) tubes, one for each additional standard curve point: 225 ng/mL, 113 ng/mL, 56 ng/mL, 28 ng/mL, 14 ng/mL, 7 ng/mL, and 0 ng/mL.
3. Pipet 125  $\mu\text{L}$  of Standard and Sample Diluent into each tube.
4. Serial dilute the 450 ng/mL standard 1:1 with Standard and Sample Diluent. Perform dilution by mixing 125  $\mu\text{L}$  of the previous standard with 125  $\mu\text{L}$  of Standard and Sample Diluent. Continue until reach the standard value of 7 ng/mL.
5. Use Standard and Sample Diluent only as the zero standard value.

### 1X Wash Buffer Preparation

- Prepare 1X Wash buffer by diluting 10X Wash Buffer in ultra pure water. For example, if preparing 1 L of 1X Wash Buffer, dilute 100 mL of 10X Wash Buffer into 900 mL of ultra pure water. Mix well. Store reconstituted 1X Wash Buffer at 2-8°C for up to one (1) month. Do not use 1X Wash Buffer if it becomes visibly contaminated during storage.

### Biotinylated Antibody Working Solution Preparation

- Determine the amount of Biotinylated Antibody Working Solution required. For every strip-well used (8-wells), prepare 1 mL of Biotinylated Antibody Working Solution.
- Prepare Biotinylated Antibody Working Solution by diluting Biotinylated Antibody Concentrate 1:100 with Biotinylated Antibody Diluent. For example, if 12 mL of Biotinylated Antibody Working Solution is required (one whole plate), dilute 120  $\mu\text{L}$  of Biotinylated Antibody Concentrate in 12 mL Biotinylated Antibody Diluent. Mix well prior to use.

## Streptavidin-HRP Working Solution Preparation

- Determine the amount of Streptavidin-HRP Working Solution required. For every strip-well used (8-wells), prepare 1 mL of Streptavidin-HRP Working Solution.
- Prepare Streptavidin-HRP Working Solution by diluting Streptavidin-HRP Concentrate 1:100 with Streptavidin-HRP Diluent. For example, if 12 mL of Streptavidin-HRP Working Solution is required (one whole plate), dilute 120  $\mu$ L of Streptavidin-HRP Concentrate in 12 mL Streptavidin-HRP Diluent. Mix well prior to use.

## Performing the Assay

### Sample Incubation

- Determine the number of strips required. Leave these strips in the plate frame. Place unused strips in the foil pouch with desiccant and seal tightly. Store unused strips at 2-8°C. After completing assay, keep the plate frame for additional assays.
  - Use a Plate Template to record the locations of the standards and unknown samples within the wells.
1. Add 100  $\mu\text{L}$  of appropriately diluted standards or samples to each well. Run each standard, sample, or blank in duplicate. For serum samples (as detailed on page 12):
    - Add 50  $\mu\text{L}$  of 50mM Acetic Acid, pH 4.67 to all standard and sample wells.
    - Add 50  $\mu\text{L}$  of appropriately diluted standards or samples to each well. Run each standard, sample or blank in duplicate.
  2. Carefully cover wells with a new adhesive plate cover. Incubate for one (1) hour at room temperature.
  3. Carefully remove adhesive plate cover, discard plate contents and wash FOUR times with 1X Wash Buffer as described in the Plate Washing section.

### Plate Washing

1. Gently squeeze the long sides of plate frame before washing to ensure all strips remain securely in the frame.
2. Empty plate contents. Use a squirt wash bottle to vigorously fill each well completely with 1X Wash Buffer, then empty plate contents. Repeat procedure three additional times for a total of FOUR washes. Blot plate onto paper towels or other absorbent material.

*Note: For automated washing, aspirate plate contents from all wells and flood wells with 1X Wash Buffer. Repeat procedure three additional times for a total of FOUR washes. Additional*

washes may be necessary. Blot plate onto paper towels or other absorbent material.

Take care to avoid microbial contamination of equipment. Automated plate washers can easily become contaminated thereby causing assay variability.

### **Biotinylated Antibody Incubation**

- Prepare only the required amount of Biotinylated Antibody Working Solution for the number of strips being used.
1. Add 100  $\mu\text{L}$  of Biotinylated Antibody Working Solution to each well containing standard, sample or blank. Mix well by gently tapping the plate several times.
  2. Carefully attach a new adhesive plate cover. Incubate plate for one (1) hour at room temperature, 20-25°C.
  3. Carefully remove the adhesive plate cover, discard plate contents and wash FOUR times with 1X Wash Buffer as described in the Plate Washing section.

### **Streptavidin-HRP Incubation**

- Prepare only the required amount of Streptavidin-HRP Working Solution for the number of strips being used.
1. Add 100  $\mu\text{L}$  of Streptavidin-HRP Working Solution to each well containing standard, sample or blank.
  2. Carefully attach a new adhesive plate cover. Incubate plate for 30 minutes at room temperature, 20-25°C.
  3. Carefully remove the adhesive plate cover, discard plate contents and wash FOUR times with 1X Wash Buffer as described in the Plate Washing section.

### **TMB Substrate Incubation and Reaction Stop**

- Only remove the required amount of TMB Substrate and Stop Solution for the number of strips being used.
- Do NOT use a glass pipette to measure the TMB Substrate solution. Do NOT cover the plate with aluminum foil or metalized mylar. Do NOT return leftover



TMB Substrate to bottle. Do NOT contaminate the unused TMB Substrate. If the solution is blue before use, DO NOT USE IT!

1. Add 100  $\mu$ L of TMB Substrate into each well.
2. Allow the enzymatic color reaction to develop at room temperature (20-25°C) in the dark for 30 minutes. Do NOT cover plate with a plate sealer. The substrate reaction yields a blue solution.
3. After 30 minutes, stop the reaction by adding 100  $\mu$ L of Stop Solution to each well. Tap plate gently to mix. The solution in the wells should change from blue to yellow.

### **Absorbance Measurement**

*Note: Evaluate the plate within 30 minutes of stopping the reaction.*

1. Wipe underside of wells with a lint-free tissue.
2. Measure the absorbance on an ELISA plate reader set at 450 nm.

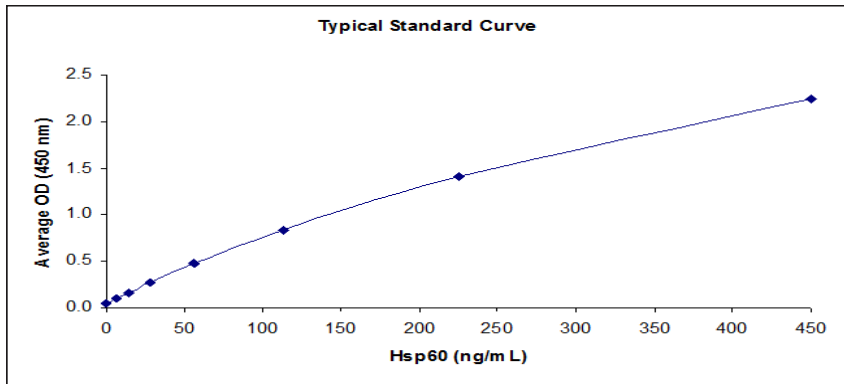
*Note: Refer to Page 12 for directions on serum sample analysis.*

Many plate readers come with data reduction software that plot data automatically. Alternatively a spreadsheet program can be used.

### Calculations

- Duplicate absorbance values should be within 10% of each other. Care should be taken when interpreting data with differences in absorbance values greater than 10%.
1. Prepare a standard curve to determine the amount of Hsp60 in an unknown sample. Plot the average absorbance obtained for each standard concentration on the vertical (Y) axis versus the corresponding Hsp60 concentration on the horizontal (X) axis using graph paper or curve-fitting software.
  2. Calculate the Hsp60 concentration in unknown samples using the prepared standard curve. Determine the amount of Hsp60 in each unknown sample by noting the Hsp60 concentration (X axis) that correlates with the absorbance value (Y axis) obtained for the unknown sample.
  3. Multiply the Hsp60 concentration obtained by the dilution factor to determine the amount of Hsp60 in the undiluted sample.

## Performance Characteristics



**Figure 2. Typical standard curve**

*Note: This typical standard curve was generated using the Hsp60 ELISA Kit Protocol. This standard curve is for demonstration only. A standard curve must be generated for each assay.*

### Assay Range: 7-450 ng/mL

- Suggested standard curve points are 450 ng/mL, 225 ng/mL, 113 ng/mL, 56 ng/mL, 28 ng/mL, 14 ng/mL, 7 ng/mL, and 0 ng/mL.

### Assay Specificity and Species Reactivity

- This assay is specific for Hsp60.
- The Hsp60 ELISA has been validated for the detection of human Hsp60.

### Sensitivity

- The calculated sensitivity of the Hsp60 ELISA is 1.37 ng/mL.

### Assay Limitations

- This assay has been validated for use with cell lysates, tissue extracts, and serum. Other sample types or matrices (e.g. urine, cerebrospinal fluid, cell culture supernatant, etc.) may contain interfering factors that can compromise the performance of the assay or produce inaccurate results.

- Some samples may contain higher levels of interfering factors that can produce abnormal results.
- If values for samples are not within the range of the standard curve, optimal sample dilutions need to be determined.
- The use of assay reagents not provided in this kit can compromise the performance of this assay.
- Do not mix components with reagents from other kits with different lot numbers.

### References

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## Warranty and Limitation of Remedy

StressMarq Biosciences Inc. makes **no warranty or guarantee** of any kind, whether written or oral, expressed or implied, including without limitation, any warranty of fitness for a particular purpose, suitability and merchantability, which extends beyond the description of the chemicals hereof. StressMarq **warrants only** to the original customer that the material will meet our specifications at the time of delivery. StressMarq will carry out its delivery obligations with due care and skill. Thus, in no event will StressMarq have **any obligation or liability**, whether in tort (including negligence) or in contract, for any direct, indirect, incidental or consequential damages, even if StressMarq is informed about their possible existence. This limitation of liability does not apply in the case of intentional acts or negligence of StressMarq, its directors or its employees.

Buyer's **exclusive remedy** and StressMarq's sole liability hereunder shall be limited to a refund of the purchase price, or at StressMarq's option, the replacement, at no cost to Buyer, of all material that does not meet our specifications.

Said refund or replacement is conditioned on Buyer giving written notice to StressMarq within thirty (30) days after arrival of the material at its destination. Failure of Buyer to give said notice within thirty (30) days shall constitute a waiver by Buyer of all claims hereunder with respect to said material.

**For further details, please refer to our Warranty and Refund Policy located on our website and in our catalog.**

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## NOTES

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