



# MORSTILLE® 18C DSTDP

## ANTIOXIDANT

### COMPOSITION

Morstille® 18C DSTDP is a thioester synergist that is particularly effective as a long-term heat aging stabilizer when used in conjunction with primary antioxidants. Morstille® 18C DSTDP is highly effective in polypropylene, ABS, and high density polyethylene. Morstille® 18C DSTDP is a nonvolatile stabilizer and offers low oral and dermal toxicity.

<b>PROPERTIES</b>	<b>TYPICAL VALUES</b>
Empirical Formula	C42H82O4S
Molecular Weight	682
Appearance	white pastilles
Acid Number	<1
Assay (%)	99
Molten Color (APHA)	20
Freezing Point (°C)	65
Physiological Behavior	Refer to safety data sheet
Packaging	20 kg (44 lb) PE bag

### RECOMMENDATIONS FOR APPLICATION

1. Morstille® 18C DSTDP is especially recommended to protect polypropylene from oxidation in high temperature applications.
2. Morstille® 18C DSTDP is very effective in high density polyethylene and other polymers.
3. For applications requiring superior heat stability, a combination of a hindered phenolic antioxidant and Morstille® 18C DSTDP should be used. It has been found that a combination of three parts of Morstille® 18C DSTDP to one part of hindered phenolic antioxidant often provides optimum performance. Typical use levels are 0.15% of Morstille® 18C DSTDP and 0.05% of phenolic antioxidant. It is recommended that specific end use formulations be optimized with regard to thioester synergist ratio and use level.

### FDA STATUS

Morstille® 18C DSTDP is one of a number of antioxidants listed in Section 181.24 of the Food Additives Regulations as having a “prior sanction” for use in the manufacture of food-packaging material. When so used, such substances are not considered “food additives” within the meaning of that term as used in the law. The only limitation on use is that prescribed for all similar antioxidants; namely, that such migration as may occur shall not result in the addition of more than 50 parts per million of the antioxidant to food.

Morstille® 18C DSTDP is also authorized for use in adhesives in section 175.105 of the Food Additives Regulations and as a component of resinous or polymeric coatings in Section 175.300 of the same regulations.

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# TECHNICAL DATA

## INTRODUCTION

The mechanism of oxidative polymer degradation is a radical chain process. The degradation process is initiated by the formation of a polymer free radical. This radical can be formed by the homolytic rupture of a chemical bond in the polymer. The initiation can be catalyzed by a variety of factors, such as ultraviolet radiation, ionizing radiation, heat and mechanical processing. Once the polymer radical has formed, it can react with oxygen to form a variety of oxygenated radical species. Initially, many of these species can propagate the decomposition process by yielding a radical which decomposes and by doing so can either cause oxidative chain scission or cross-linking.

The function of antioxidants is to inhibit the formation of the radical species. Hindered phenolic antioxidants are usually considered as chain terminators. Thioester synergists are believed to function in a variety of ways -- as hydroperoxide or peroxide decomposers and as a means of regenerating the primary antioxidant.

The term "synergist" is applied to Morstille® 18C DSTDP because when it is used in combination with a hindered phenolic antioxidant, the stability is much greater than the sum of the individual components

## THERMAL STABILITY

Morstille® 18C DSTDP has been processed at temperatures as high as 600°F without excessive color formation or loss of stabilizer. Morstille® 18C DSTDP is thermally stable and little decomposition occurs after heating at 550°F for extended periods of time.

The resistance of Morstille® 18C DSTDP to discoloration and volatilization is important as temperatures in this range are being encountered in modern plastic processing.

## CHEMICAL PROPERTIES

Morstille® 18C DSTDP is a relatively inert plastic additive and does not react with most commonly used plastic additives.

## VOLATILITY

Morstille® 18C DSTDP is a relatively nonvolatile stabilizer. At elevated processing temperatures, losses via volatilization will be relatively low for Morstille® 18C DSTDP.

ADDITIVE	WEIGHT LOSS @ 200°C
Morstille® 18C DSTDP	<1 %
2,6-ditertiarybutyl p-cresol	50 %

## COMPATIBILITY

Compatibility of plastic additives implies good solubility, non-migration to the surface and permanence under conditions of use.

Generally hindered phenolic antioxidants are quite compatible in polypropylene at their normal use levels, e.g., 0.02 to 0.3%. Thioesters differ in this respect with Morstille® 18C DSTDP approaching the limits of compatibility at levels above 0.4%.

The test specimens were stored at room temperature and examined for exudation. The first signs of exudation were recorded and are listed in the following table:

<u>Compatibility of MORSTILLE® 18C DSTDP in Polypropylene</u>	
ADDITIVE LEVEL (%)*	DAYS TO EXUDATION
0.4	30
0.6	20
0.8	12
1.2	10
1.4	2

*\*All samples contained 0.1% of a hindered phenolic antioxidant and 1% carbon black.*

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