



REPORT
INTERTEK-ETL SEMKO Division
1717 Arlingate Lane COLUMBUS, OHIO 43228

ORDER NO.: 3178523

Page 1 of 2

DATE: June 30th, 2009

Revised : July 9, 2009

REPORT NO. 3178523COL-001R

RENDERED TO:

A.S.Trust & Holdings
44-129 Mikiola Drive
Keneohe, HI 96744

STANDARD AND TEST USED: ANSI/UL 2182 "Refrigerants", Section 5 "Fractionation Analysis" and an evaluation of the Blend's Ozone Depletion Potential (ODP) and Global Warming Potential (GWP) over 100 years.

AUTHORIZATION: The test was authorized by Mr. Richard Mariya.

SPECIMEN DESCRIPTION: The tests were performed on refrigerant blend with the following nominal liquid composition (mass%): R-170/R-290/R-600a/R-600 (3.1/54.8/6.0/36.1) ($\pm 0.3/\pm 2.0/\pm 0.6/\pm 2$).

INTRODUCTION: The purpose of this evaluation is to first investigate the flammability properties of each component of this refrigerant blend to determine a Worse Case of Formulation for Flammability (WCF). This formulation was then be used to run computer simulations in accordance with section 5 of ANSI/UL 2182 to determine the Worse Case of Fractionation for Flammability (WCFF). Finally, the Global Warming Potential (GWP) over 100 years and Ozone depletion Potential (ODP) were evaluated based on mass% of components of the blend and literature search including the EPA website and several published industry papers.

CONCLUSION: This report describes the results of A.S. Trust & Holdings refrigerant blend R-170/R-290/R-600a/R-600 (3.1/54.8/6.0/36.1) ($\pm 0.3/\pm 2.0/\pm 0.6/\pm 2$), in accordance with section 5 of ANSI/UL 2182. The test evaluations were conducted at Intertek Testing Services located in Columbus, OH between 6/15/09 and 6/29/09. Components of this blend were ranked for flammability based on the evaluation their thermodynamic properties of Heat of combustion, Flash Point, Auto-ignition Temperature, and LEL. LEL was selected as the dominating property for determining higher flammability. Based on the combination of these thermodynamic properties, R-600a was determined to be the most flammable and therefore maximized in the WCF and R-170 least flammable and therefore minimized in the WCF. Property data for each component is listed in Table 1 of this report. Results from WFC Fractionation Simulation Data are reported in Table 2 of this report. Results for Composition including Nominal Formulation, Worse Case of Formulation for Flammability (WCF), and Worse Case of Fractionation for Flammability (WCFF) are reported in Table 3 of this report. Finally, the GWP over 100 years for this blend in its nominal composition was estimated to be negligible or essentially Zero, and the Ozone Depletion Potential (ODP) of the blend is Zero, due to the absence of any halogenated compounds.

Subject:

This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to permit copying or distribution of this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.