

# **Car Company Quality: A Vehicle Test Fit Study of 1,907 Car Company Service Parts**

**Study Dates: March 1999 – March 2002**

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Prepared By



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# Car Company Quality Vehicle Test Fit Study

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# Results

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## **1,907 Car Company Parts Tested—50% Fail CAPA Standards**

During the period between March 1999 and March 2002, CAPA conducted fit tests of 1,907 car company service parts. One-half (50%) of these car company brand service parts failed to meet CAPA standards for fit and appearance. The results varied among the major car makers: The highest failure rate was present in General Motors parts (65%) and Honda parts had one of the lowest (27%). This report details those findings.

A key component of CAPA's Quality Certification Program is the vehicle test fit process. For each vehicle test fit, CAPA takes precise measurements of the car company service part, originally installed car company part, and CAPA part(s).<sup>1</sup> Detailed records are made of these measurements, as well as their fit and appearance quality. The purpose of the vehicle test fit effort was not to evaluate the quality of car company service parts, but to ensure that parts in the CAPA certification program are equivalent to or better than the car company service parts being used by collision repairers.

Over time, the number of vehicle test fits performed continued to grow, as did the amount of data recorded from those test fits. In analyzing this data, cumulative problems with car company service parts purchased in the open market began to emerge.

This report contains an overall analysis of the quality of 1,907 car company service parts in systematic fit and appearance examinations. The purpose of this report is to provide the industry with a view of the quality of car company brand service parts. There is currently no independent quality certification for these car company parts.

Visit the CAPA website at [www.CAPAcertified.org](http://www.CAPAcertified.org) for additional information on the test fit results of the car company parts in this study.

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<sup>1</sup> In this report, "CAPA parts" refers to aftermarket parts in the CAPA program that are either CAPA certified, or in the process of becoming CAPA certified.

# Background

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Reverse engineering is the scientific method of methodically dissecting and measuring a product in order to duplicate or enhance it. In manufacturing, reverse engineering is a commonly accepted and often used practice. Car companies frequently use reverse engineering to obtain information on another company's product in order to create a competing product. While reverse engineering often leads to improvement and innovation, it is frequently used to provide consumers with competing products at lower prices.

As is common across all aftermarket industries, the parts that CAPA certifies are reverse engineered from car company service parts purchased directly from the open market. Initially, the CAPA program mandated that the manufacturers producing competitive parts duplicate the car company service parts. After production had begun, the CAPA part had to demonstrate repeatable fit on its checking fixture. In theory, the resulting part would be comparable in fit to the car company service version of the part, which was presumed to be good.

In reality, while the CAPA parts matched their car company service counterparts, at times they were not fitting the vehicles for which they were intended. The reason: significant inconsistencies in the car company service parts. Reverse engineering duplicates everything, including defects that may not appear until the part is mounted on a vehicle. A defect in a car company service part that was copied in a CAPA part is referred to as a "follow-through" defect. (See Chart 5.)

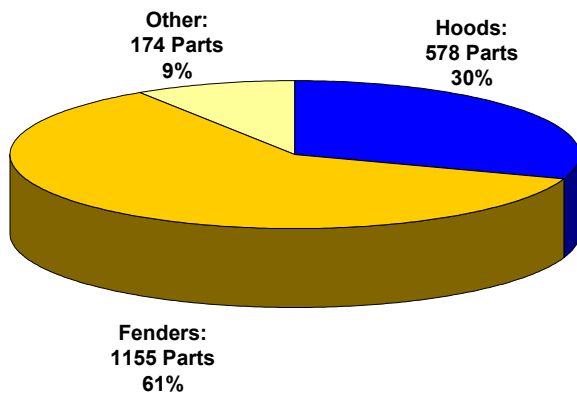
The Vehicle Test Fit (VTF) portion of the CAPA certification program was implemented over three years ago (March 1999) in an effort to compensate for the variability in the fit of car company service parts. Since that time, all applicable parts could not become CAPA certified until they had passed the VTF portion of the certification process. In addition, parts entering the program prior to March 1999 were also required to comply.

CAPA includes car company service parts in its vehicle test fit process to help ensure that the parts in its program display comparable or better fit and quality than the car company service parts. If a car company service part properly fits the vehicle, then the CAPA part must meet or exceed the fit of that part. If a car company service part that properly fits the vehicle cannot be located, then the car company original part is used or the competitive part will not be considered for certification.

# Background (continued)

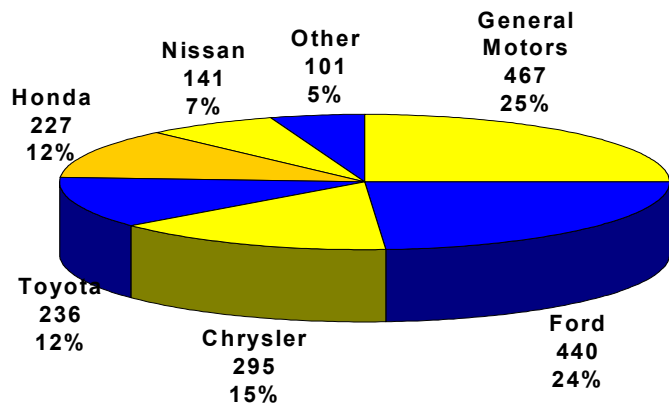
The population of the car company service parts included in this report was completely dependent on the population of CAPA parts, i.e. a car company service part was test fit only if it was the counterpart of a CAPA part that was being tested. The car company service parts were purchased directly from car company dealerships from March 1999 to March 2002. The part types included fenders, hoods, tailgates, and bumper covers. This information may also be viewed at [www.CAPAcertified.org](http://www.CAPAcertified.org).

**CHART 1**  
**CAR COMPANY PART TYPES**  
**INCLUDED IN STUDY**  
**(1,907 PARTS)**



“Other” includes part types such as tailgates and bumper covers.

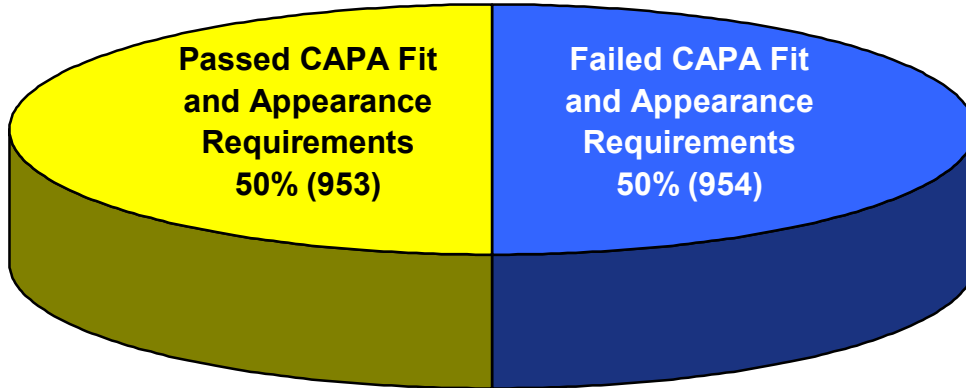
**CHART 2**  
**CAR COMPANY MANUFACTURERS**  
**INCLUDED IN STUDY**  
**(1,907 PARTS)**



“Other” car company manufacturers include BMW, Isuzu, Mazda, Mercedes, Mitsubishi, Suzuki, and Volkswagen.

# Overall Car Company Quality

**CHART 3  
OVERALL RESULTS  
CAR COMPANY SERVICE PART QUALITY STUDY  
(1,907 PARTS)**



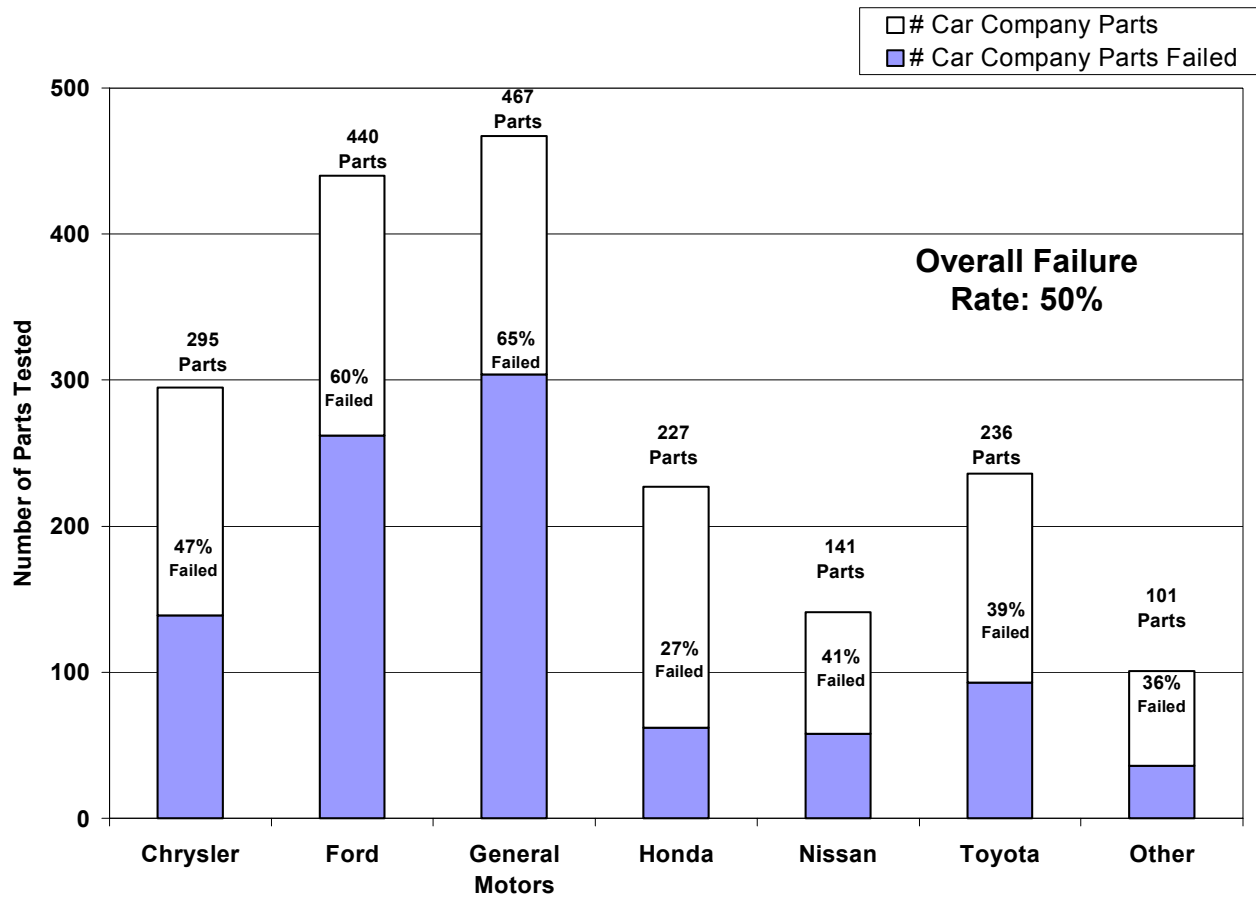
<u>Overall Summary</u>	<u># of Parts</u>	<u>% of Total</u>
Fail	954	50%
Pass	953	50%
Total Car Company Parts Evaluated	1,907	

<u>Failure Types</u>	<u># of Parts</u>	<u>% of Failures</u>
Total Parts Failed*	954	
Fit	511	54%
Appearance	673	71%

\*Parts can fail both Fit and Appearance.

# Car Company Failure Rates

**CHART 4**  
**CAR COMPANY FAILURE RATES**  
**BY MANUFACTURER**  
**(1,907 PARTS)**



“Other” car company manufacturers include BMW, Isuzu, Mazda, Mercedes, Mitsubishi, Suzuki, and Volkswagen.

# How Variability in Car Company Service Parts Could Affect CAPA Parts

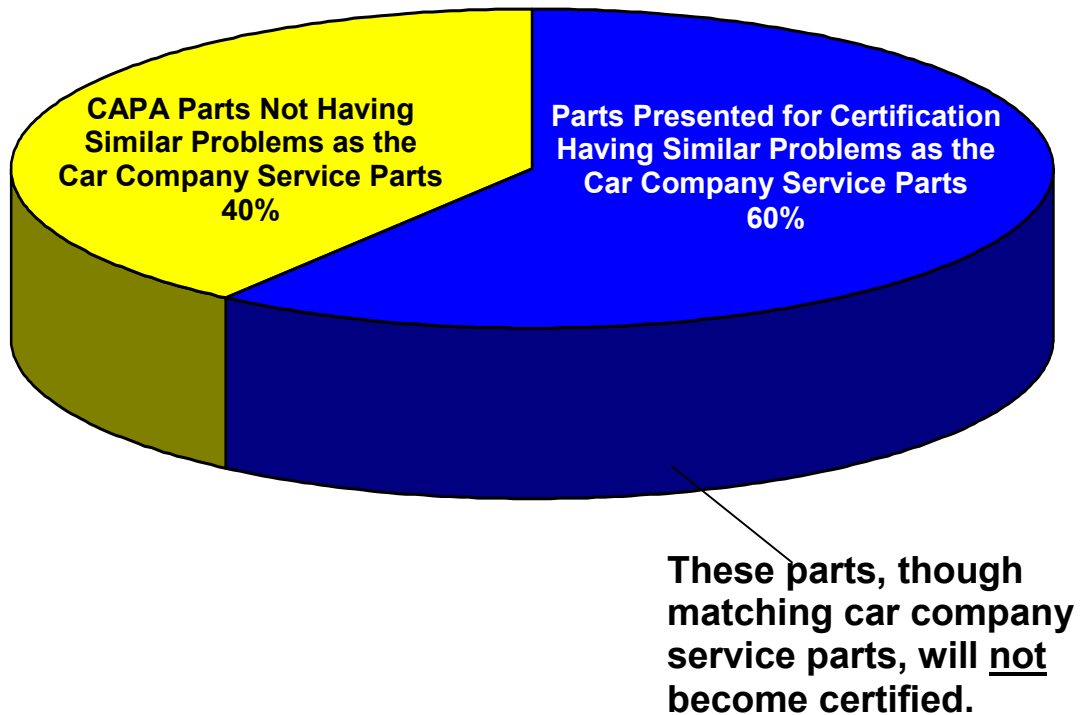
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When a CAPA manufacturer develops a new part using car company service parts that have fit problems, it is probable that the competitive part will exhibit a similar problem. This is why the CAPA program mandates the Vehicle Test Fit.

If the part presented for certification does have a fit problem, the manufacturer must correct it prior to certification. While these parts technically match the car company parts, because they don't fit, they cannot become certified.

**CHART 5**  
**FIT DEFECTS IN CAR COMPANY SERVICE PARTS THAT ARE OBSERVED IN PARTS APPLYING FOR CAPA CERTIFICATION**



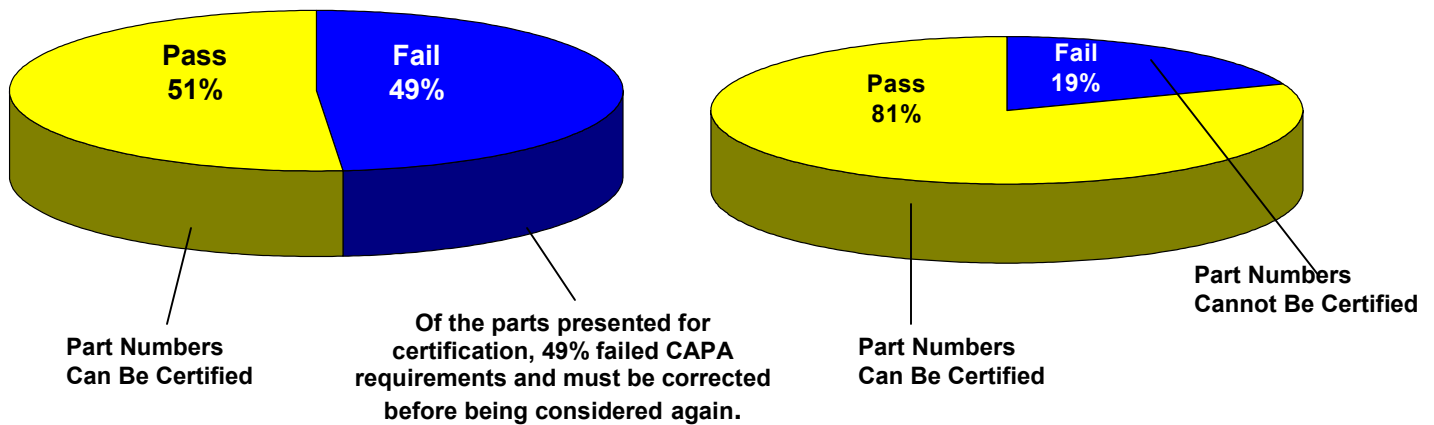
# CAPA vs. Car Company Test Results

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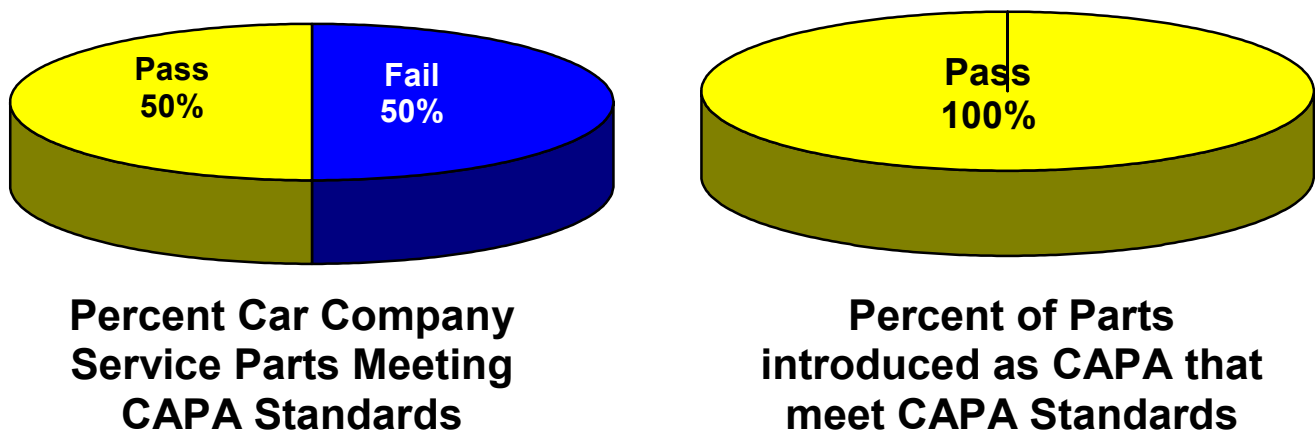
Of the 49% of parts that failed on the first test, 62% were resubmitted. Of those, 81% passed. Overall 76% of CAPA parts presented became certified.

**CHART 6**  
**VEHICLE TEST FIT RESULTS**  
**PRELIMINARY AND SUBSEQUENT RETESTS**



When compared to car company parts in the market, 100% of CAPA parts meet standards and only 50% of the car company parts meet the standards (Chart 7).

**CHART 7**  
**CAPA CERTIFIED PARTS ARE EQUIVALENT TO OR BETTER THAN THEIR**  
**CAR COMPANY SERVICE COUNTERPARTS.**



# Conclusion

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The data presented in this report was collected from the vehicle test fits required by CAPA over a three-year period. The purpose of the vehicle test fit is not to evaluate the quality of car company service parts, but to ensure that parts in the CAPA certification program were similar to or better than the car company service parts being used by collision repairers.

Analysis of the car company service part test fit data reveals that half the parts purchased from the market during the time of this study did not meet CAPA's quality standards.

The parts in the CAPA program are reverse engineered from the car company service parts available on the market. If the quality of the car company service parts is variable and the parts display fit defects, it is probable that similar defects will be reverse engineered into the CAPA part unless a vehicle test fit is performed. This is why the CAPA program mandates the Vehicle Test Fit. If a part does have a fit problem, the manufacturer must correct it prior to certification.

This systematic approach to part quality ensures that a defect in a CAPA part is detected prior to certification. Currently, CAPA is the only organization regularly checking the quality of both car company and independently produced parts.

During the timeframe of this study, 49% of the new CAPA part numbers submitted for certification failed the vehicle test fit on their first attempt. Fifty percent of the car company service parts failed. The car company service parts remain available in the market with the noted defects. The independent parts failing will not be available on the market as CAPA certified until they have been fixed and fully comply with certification standards. For this reason, CAPA certified parts are equivalent to or better than the car company service counterparts.

**CAPA will continue in its efforts to ensure the quality of automotive parts that it certifies. CAPA encourages competition in the marketplace to ultimately reduce the cost of crash repair without compromising quality.**

# Methodology

## Fit

For each test fit, the VTF Technician mounted each part, both car company service and CAPA, and adjusted it on the vehicle to get the best fit possible. However, the technician did not modify a part to achieve an acceptable fit, which would be the probable course of action if the part were being used in a collision repair situation. The technician's goal was to determine whether or not the part had shortcomings that would make it undesirable in a collision repair situation.

The fit assessment included the following:

<b>VTF Fit Evaluation Points</b>	<b>Evaluation Point Description</b>	<b>Associated Problems</b>
Overall Fit to Adjacent Parts	Part shape, contour, length, style lines, etc. compatible to adjacent parts.	Non-complimentary, incorrect size, shape, position
Gap	The horizontal distance between two measurement points.	Inconsistent Tight Wide
Flush	The vertical distance between two measurement points.	High Low
Attachment Points	All brackets, fasteners, flanges, hinges, holes, striker-related components.	Incorrect position Incorrect size Incorrect construction

# Methodology (continued)

## Appearance

In addition to being evaluated for fit, both the car company service and CAPA parts were evaluated for appearance quality.

<b>TABLE 2: APPEARANCE CRITERIA</b>	
<b>Criteria</b>	<b>Description</b>
Adhesive	Missing, lack of bond, or adhesive causing distortion to the Class "A" surface (pull down).
Burrs	Sharp teeth-like protrusions at the edge of the part.
Chips	Small areas where the EDP coat is missing; usually due to damage, i.e. factory, warehouse & shipping handling.
Corner Radius	Rounded corners that do not match the car company service parts; corners lacking material creating a hole; sharp corners resulting from excess material or poor grinding operations. Opposite corners having differently shaped radii.
Dents or Bumps	Depression or protrusions on the Class "A" surface that can be seen or felt with the back of the fingernail.
Dirt or Foreign Matter	Small particles in the EDP coat Class "A" surface that can be felt with the back of the fingernail.
Excess Material	Extra material on the part that is not seen on the car company service parts which may affect the part fit to the vehicle. Seen as "flash" on plastic parts or in cowl areas, fender folds at door lines, mounting flanges, and hood corners.
Grind Marks	Cuts in the Class "A" surface that are present after EDP which can be felt with the back of the fingernail.
Metal Fold Lines	Visible fold line on the Class "A" surface caused by crimp operation on hoods.
Non-Uniform Coating Coverage	Inconsistencies in the EDP coating such as blisters, missing or thin EDP, or drip marks due to hanging that can be felt with the back of the fingernail.
Non-Uniform Trimming	Trimming inconsistencies on the Class "A" surface typically seen on plastic parts due to manual trim operations. Also can be seen on metal parts at mounting flange areas where trimming is inconsistent.
Orange Peel	Rippled or wavy EDP coating on the Class "A" surface that can be felt with the back of the fingernail.
Pits	Small porous holes in the EDP coat on the Class "A" surface.
Rinse Residue	Visually detected streaking marks or discoloration left after the EDP process.

## Methodology (continued)

<b>TABLE 2: APPEARANCE CRITERIA</b>	
<b>Criteria</b>	<b>Description</b>
Rolled Edges	Upward bulge typically seen along the crimped edge of the part or where metal is formed into a bodyline. Observed at hood edges, fender-to-door line, fender cowl area, and top fender-to-hood edge.
Rough Surfaces	Inconsistencies on the Class "A" surface that can be seen or felt with the back of the fingernail; typical of poor EDP; surface feels gritty; can be a poorly reworked areas on part.
Scratches or Gouges	Marks on the Class "A" surface that can be felt with the back of the fingernail. Most often caused by damage due to handling or debris in the stamping process.
Tool Marks	Markings left from the tool when it draws or shapes the material into the part.
Underside Metal Folds	Edges and corners not crimped in the same manner as the car company service parts. This applies to Class "B" and "C" surfaces on the part or the underside of parts.
Waviness/ Distortion/ Ripples	Visible variations on the Class "A" surface and formed edges such as bodylines, folds, or bends. Includes edge roughness, edge contour, edge consistency, and edge radius.
Weld Burns or Missing Welds	Welds that burn through or distort the Class "A" surface. Also welds that are missing.
Wet Mar	Smear EDP coat due to packaging prior to coat being fully dry or cured.
	Note: Class A surface areas are those that can be seen from an upright position when the part is installed on the vehicle and all mating components, such as hoods, doors, and trunk lids, are in the closed position.

# Glossary

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<b>Appearance</b>	The outward, or external aspect of the part. In order to assess the appearance of a part, the Vehicle Test Fit Technician visually inspects the part according to a specific set of requirements outlined in CAPA's Quality Standards Manual.
<b>Checking Fixture</b>	A device used to verify the dimensional integrity of a product, such as a fender or a hood. The checking fixture enables the manufacturer to ensure that the part has all the critical mounting holes, gap measurements, and flush measurements so that the part will fit the vehicle.
<b>Fit</b>	The proper size, shape, and dimensions. In order to assess the fit of a part, the Vehicle Test Fit Technician mounts the part on an undamaged vehicle.
<b>Car Company Original Part</b>	A part installed at the car company assembly plant.
<b>Car Company Service Part</b>	An aftermarket crash part produced by, or for, a car company.