LM Procure to Pay
Quick Reference Guide
For Suppliers

Quality Rating Formula
This quick reference guide explains the Quality Rating formula being used by the Lockheed Martin P2P system. This rating formula is used for all business units and for all suppliers.

The supplier overall rating rolls up to a Lockheed Martin Corporate level but is still available at the Supplier, Company, Plant, Purchasing Organization, Program Code, and Material Number levels.

This guide walks through the formula and explains what the formula takes into account and why.
The former Lockheed Martin Quality Rating formula, which included a three-factor calculation, is shown above. The new five-factor formula included in this guide, also pictured above, was effectively released September 30, 2013 and was developed in coordination with all Lockheed Martin businesses.
The Quality Rating scale (shown above) has also been updated. To receive a rating of excellent, a score of 100% must be maintained. The excellent score previously included a percentage of 98-100%.

The approved and conditional ranges have been extended and the unsatisfactory range now includes a percentage of <80% versus the previous rating of <90%.
The basis for modifying the Lockheed Martin quality rating formula was to accommodate additional key factors not addressed by the original three-factor quality rating formula. The revised five-factor quality rating formula was designed to address the following additional key factors.

- Need for a Quality Rating that represents Performance
- Need for a weighted rating that highlights:
  - Disruptions to our Factories
  - Lack of Responsiveness in addressing Root Cause and Corrective Action Requests
  - Impacts to the Lockheed Martin reputation/brand associated with customer escapes
- Enhances our ability to drive supply chain improvement more effectively with available resources
- Need for a common quality rating approach across Lockheed Martin

This guide walks through the calculations included for each of the five factors (P1 – P5).
**Quality Rating – P1**

\[ P1 = \text{MIN}[30, 100 \times \frac{\sum (r \times A_r \times L_r)}{\sum \text{Qty Pieces}}] \]

- The maximum amount of points deducted from the P1 section of the rating is 30.
- The “r” in the formula shall be equal the number of rejected pieces.
- The “Ar” in the formula shall be equal to \(1 - \frac{\text{#Months since Reject}}{n}\) (where \(n = 12\)).
- The “Lr” in the formula is equal to 1.0 for all physical defect locations, except for those that represent documentation, which are equal to 0.25.
- The “Qty Pieces” part of the formula is equal to the total number of supplier receipt “pieces” for the past 12 months and represents the denominator in the formula.

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>The P1 section of the Lockheed Martin Quality Rating formula includes all supplier-responsible defects quantities (numerator) and total quantity of posted receipt pieces within a 12-month period (denominator).</td>
</tr>
</tbody>
</table>
| 2.   | The first part (P1) represents all supplier-responsible defects found on-site at the supplier facility through Lockheed Martin factory installation to Customer Delivery as outlined below:  
  - Supplier Discovered Defect  
  - First Article Acceptance Defect  
  - Source Acceptance Defect  
  - Receiving Defect  
  - Receiving Inspection Defect  
  - Manufacturing Floor Defect  
  - Mfg Floor Defect After Installation / Delivery  
  - Documentation Defect  
  - Audit/Survey Finding |
## Quality Rating – P1

\[
P1 = \text{MIN} \left[ 30, 100 \times \frac{\sum (r \ast Ar \ast Lr)}{\sum \text{Qty Pieces}} \right]
\]

- The maximum amount of points deducted from the P1 section of the rating is 30.
- The “r” in the formula shall be equal to the number of rejected pieces.
- The “Ar” in the formula shall be equal to 1 - #Months_since_Reject / n (where n is 12).
- The “Lr” in the formula is equal to 1.0 for all physical defect locations, except for those that represent documentation, which are equal to 0.25.
- The “Qty Pieces” part of the formula is equal to the total number of supplier receipt “pieces” for the past 12 months and represents the denominator in the formula.

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.</td>
<td>The maximum amount of points deducted from the P1 section of the rating is 30. The P1 section of the formula is comprised of the following components.</td>
</tr>
<tr>
<td>4.</td>
<td>The &quot;r&quot; in the formula is comprised of all supplier-responsible defect record pieces. F2 Quality Notifications (QNotes) represent Lockheed Martin defect records and supplier-responsible reject quantities associated within each can reflect one or more pieces. While the latter quantity is totaled and utilized for the &quot;r&quot; value, the aging factor is first considered by defect record. The associated supplier-responsible reject quantities are then totaled to calculate the &quot;r&quot; value.</td>
</tr>
</tbody>
</table>
| 5.   | The “Ar” in the formula represents the aging factor for individual supplier-responsible defect records. The “Ar” in the formula is equal to 1 - #Months_since_Reject / n (where n is 12). To determine the aging factor, the completion date of each unique defect record is compared relative to today's date. 

Example - For a defect record that is three months old, the months since reject factor equals 0.25. In this example, To complete the "Ar" value for this one defect record, subtract .25 from 1, which equals .75.

Note: Age in months is determined by counting the absolute value of days divided by 30.
# Quality Rating – P1

![Quality Rating Formula](image)

- The maximum amount of points deducted from the P1 section of the rating is 30
- The "r" in the formula shall be equal the number of rejected pieces
- The "Ar" in the formula shall be equal to 1 - #Months_since_Reject / n (where n is 12)
- The "Lr" in the formula is equal to 1.0 for all physical defect locations, except for those that represent documentation, which are equal to 0.25
- The "Qty Pieces" part of the formula is equal to the total number of supplier receipt “pieces” for the past 12 months and represents the denominator in the formula

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.</td>
<td>The “Lr” in the formula is equal to 1.0 for all physical defect locations, except for those that represent documentation, which are equal to 0.25.</td>
</tr>
<tr>
<td>7.</td>
<td>The “Qty Pieces” part of the formula is equal to the total number of supplier receipt “pieces” for the past 12 months and represents the denominator in the formula.</td>
</tr>
<tr>
<td>8.</td>
<td>Example – r was found to equal seven (one defect record containing seven rejected pieces). Ar was found to equal .75 as the defect record was three months old. Lr was found to equal 1.0 (defect found at receiving). The quantity pieces was found to equal 60 (two receipts containing 60 total pieces for the past 12 months).</td>
</tr>
</tbody>
</table>

\[ P1 = MIN[30, 100 \times \frac{\sum (r \times Ar \times Lr)}{\sum Qty\ Pieces}] \]

Using the example numbers, the P1 section of the formula equates to 8.75
Quality Rating – P2

\[ P2 = \text{MIN} \left( 40, 5 \times \sum (N \times \text{Ar}) \right) \]

- The maximum amount of points that can be deducted from the P2 section of the rating is 40.
- The “5” in the formula represents the points per month for line disruption (limited by unique material number) and capped at 40 total points.
- The “N” in the formula is equal to the unique count of supplier-responsible defect records with location codes of manufacturing floor reject.
- The “Ar” in the formula is equal to 1 - #Months_since_Reject / n (where n is 12).

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.</td>
<td>The P2 section of the Lockheed Martin Quality Rating formula includes all supplier-responsible manufacturing floor defect quantities for the past 12 months.</td>
</tr>
<tr>
<td>10.</td>
<td>The maximum amount of points deducted from the P2 section of the rating is 40. The P2 section of the formula is comprised of the following components.</td>
</tr>
</tbody>
</table>
### Quality Rating – P2

\[ P2 = \text{MIN} \left( 40, 5 \times \sum (N \times Ar) \right) \]

- The maximum amount of points that can be deducted from the P2 section of the rating is 40.
- The “5” in the formula represents the points per month for line disruption (limited by unique material number) and capped at 40 total points.
- The “N” in the formula is equal to the unique count of supplier-responsible defect records with location codes of manufacturing floor reject.
- The “Ar” in the formula is equal to \( 1 - \frac{\#\text{Months} \_ \text{since} \_ \text{Reject}}{n} \) (where \( n \) is 12).

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.</td>
<td>The “5” in the formula represents the points per month for line disruption (limited by unique material number) and capped at 40 total points.</td>
</tr>
<tr>
<td>12.</td>
<td>The “N” in the formula is equal to the unique count of supplier-responsible defect records (limited by unique material number) with location codes of manufacturing floor reject.</td>
</tr>
<tr>
<td>13.</td>
<td>The “Ar” in the formula represents the aging factor for individual supplier-responsible defect records. The “Ar” in the formula is equal to ( 1 - \frac{#\text{Months} _ \text{since} _ \text{Reject}}{n} ) (where ( n ) is 12). To determine the aging factor, the completion date of each unique defect record is compared relative to today's date.</td>
</tr>
</tbody>
</table>
# Quality Rating – P2

\[ P2 = \text{MIN}(40, 5 \times \sum(N \times Ar)) \]

- The maximum amount of points that can be deducted from the P2 section of the rating is 40.
- The “5” in the formula represents the points per month for line disruption (limited by unique material number) and capped at 40 total points.
- The “N” in the formula is equal to the unique count of supplier-responsible defect records with location codes of manufacturing floor reject.
- The “Ar” in the formula is equal to 1 - Months_since_Reject / \( n \) (where \( n \) is 12).

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.</td>
<td>Example – In this example, two defect records were found in the past 12 months for a unique material number.</td>
</tr>
<tr>
<td></td>
<td>The first manufacturing floor defect was found six months ago. ( N ) equals 1 and ( Ar ) equals 0.5, the result of which is then multiplied by five. This first defect equals 2.5. ( 5 \times 0.5 \times 1 = 2.5 )</td>
</tr>
<tr>
<td></td>
<td>The second manufacturing floor defect was found this month. ( N ) equals 1 and ( Ar ) equals 1, the result of which is then multiplied by five. This second defect equals 5. ( 5 \times 1 \times 1 = 5 )</td>
</tr>
<tr>
<td></td>
<td>[ P2 = \text{MIN}(40, 2.5 + 5) ]</td>
</tr>
<tr>
<td></td>
<td>[ P2 = 7.5 ]</td>
</tr>
<tr>
<td></td>
<td>Both results are added to equal the total P2 formula. In this example, the P2 section of the formula equates to 7.5</td>
</tr>
</tbody>
</table>
15. The P3 section of the Lockheed Martin Quality Rating formula includes all Supplier Corrective Action Response (SCAR) records that have reached or exceeded Issued status within the past 12 months. Customer Escape SCARs are excluded from the P3 formula.

16. The maximum amount of points deducted from the P3 section of the rating is 10. The P3 section of the formula is comprised of the following components.

17. The “2” in the formula represents the points per SCAR record issued within the past 12 months and capped at 10 points.

18. The “S” in the formula is equal to the number of SCAR records issued each month.
### Quality Rating – P3

**P3 = MIN (10, 2 * Σ (S * Ar))**

- The maximum amount of points that can be deducted from the P3 section of the rating is 10
- The “2” in the formula represents the points per SCAR record issued within the past 12 months and capped at 10 points
- The “S” in the formula is equal to the number of SCAR records issued each month
- The “Ar” in the formula is equal to 1 - #Months_since_Reject / n (where n is 12)
- Customer Escape SCARs are excluded from the P3 formula

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>19.</td>
<td>The “Ar” in the formula represents the aging factor for individual supplier-responsible defect records. The “Ar” in the formula is equal to 1 - #Months_since_Reject / n (where n is 12). To determine the aging factor, the issued date of the SCAR record is compared relative to today’s date. Example – In this example, one SCAR record was found in the past 12 months. The SCAR record was found four months ago. In this example, S equals 1(number of SCAR records issued) and Ar equals .67, the result of which is then multiplied by two, which equates to 1.34. <em><em>( P3 = MIN(10,2</em>\sum 1</em>.67) )**</td>
</tr>
</tbody>
</table>

In this example, the P3 section of the formula equates to 1.34
### Quality Rating – P4

**P4 = 20, if any SCAR response is late or no response was provided**

- Includes only supplier corrective action response (SCAR) records that are open and overdue, or closed with no response.
- The maximum amount of points that can be deducted from the P4 section of the rating is 20.
- The 20-point penalty is removed when the last overdue SCAR is closed or extended.
- Customer Escape SCARs are excluded from the P4 formula.

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>20.</td>
<td>The P4 section of the Lockheed Martin Quality Rating formula includes only Supplier Corrective Action Response (SCAR) records that are open and overdue, or closed with no response. Customer Escape SCARs are excluded from the P4 formula.</td>
</tr>
<tr>
<td>21.</td>
<td>The maximum amount of points deducted from the P4 section of the rating is 20. The 20-point penalty is removed when the last overdue SCAR is closed or extended.</td>
</tr>
</tbody>
</table>
Quality Rating – P4

P4 = 20, if any SCAR response is late or no response was provided

- Includes only supplier corrective action response (SCAR) records that are open and overdue, or closed with no response.
- The maximum amount of points that can be deducted from the P4 section of the rating is 20
- The 20-point penalty is removed when the last overdue SCAR is closed or extended
- Customer Escape SCARs are excluded from the P4 formula

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
</table>
| 22.  | Example – In this example, two SCAR records were found in the past 12 months for a unique material number.  
The first SCAR record was found seven months ago, and was closed with no response being received from the supplier (SCAR Closed with No Response status). Although the SCAR was marked as closed, the 20-point P4 penalty still applies because a response was not received.  

P4 = 20, if any SCAR response is late.

The second SCAR record was found one month ago, and remains open and overdue. The required due date on this SCAR exceeds today’s date by seven days. Although this SCAR also contributes to the P4 formula for this unique material number, the maximum P4 penalty remains at 20 points.

If the SCAR in the first example is closed today with an acceptable supplier response, the P4 penalty would remain at 20 points. This is due to the SCAR in the second example still being open and overdue. However, if the SCAR in the second example is also closed, then the P4 20-point penalty would be removed. In this example, the P4 section of the formula equates to 20. |
Step 23. The P5 section of the Lockheed Martin Quality Rating formula takes into account all supplier corrective action response (SCAR) records that have reached or exceeded Issued status within the past 12 months. Regardless of whether SCARs in this calculation are open or closed, the P5 penalty will continue to apply until the specified SCAR due date has passed.

Only Customer Escape SCARs are included within the P5 formula.

Step 24. The maximum amount of points deducted from the P5 section of the rating is 100.

Step 25. The “N” in the formula is equal to the unique count of SCAR records with a location code of customer escape with each occurrence equaling 25 points.
# Quality Rating – P5

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>26.</td>
<td>Example – In this example, two Customer Escape SCAR records were found in the past 12 months.</td>
</tr>
</tbody>
</table>

The first SCAR record was found 10 months ago, and was closed with an acceptable response received from the supplier. Although the SCAR was marked as closed, the 25-point P5 penalty still applies because the SCAR required due date has not yet been reached.

The second SCAR record was found three months ago, and remains open. The required due date on this SCAR exceeds today’s date by 30 days. This SCAR also contributes to the P5 formula for this unique material number because the SCAR required due date has not yet been reached.

Because the maximum P5 penalty has not yet been met, both example SCARs above are included to equal the “N” in the P5 calculation.

\[
P5 = MIN(100, 25 \times 2)
\]

In this example, the P5 section of the formula equates to 50.

- Includes only supplier corrective action response (SCAR) records that have reached or exceeded issued status within the past 12 months
- The P5 penalty will continue to apply until the specified SCAR due date has passed, regardless of open or closed status
- The maximum amount of points that can be deducted from the P5 section of the rating is 100 with each occurrence equaling 25 points
- Only Customer Escape SCARs are included within the P5 formula
27. Given all P1-P5 examples included within this document, the above image depicts a quality rating summary of all P values combined.

The above image depicts all P1 through P5 example values included within this document to obtain a total quality rating value. Each value within the P1 through P5 sections of the quality rating formula is added, totaled, and then subtracted from 100 to obtain the total quality rating calculation.

The examples included herein could either represent the quality rating of a unique supplier-material number or may represent the total quality rating of a unique supplier based on the total number of purchase order receipts, supplier-responsible defect records, and SCAR records found for the past 12 months.

28. The total quality rating in this example equals 12.41. This supplier would receive an Unsatisfactory score due to the total quality rating equaling less than 80.

Note: The quality rating minimum score is 0.