
















# Automotive Maintenance and Light Repair, 1<sup>ST</sup> Edition







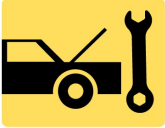


## Chapter 22 Gaskets & Sealants









### Opening Your Class

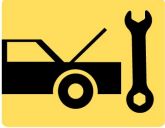
KEY ELEMENT	EXAMPLES
Introduce Content	This course or class covers <b>Automotive Maintenance and Light Repair</b> . It correlates material to task lists specified by ASE and NATEF.
Motivate Learners	Explain how the knowledge of how something works translates into the ability to use that knowledge to figure why the engine does not work correctly and how this saves diagnosis time, which translates into more money.
State the learning objectives for the chapter or course you are about to cover and explain this is what they should be able to do as a result of attending this session or class.	Explain the chapter learning objectives to the students. <ul style="list-style-type: none"><li>— Prepare for ASE Engine Repair (A1) certification test content area “C” (Engine Block Diagnosis and Repair).</li><li>— Describe the various types of gaskets.</li><li>— Explain why the surface finish is important for head gaskets.</li><li>— List the types of sealers and their applications.</li><li>— Explain use and precautions associated with cover gaskets.</li></ul>
Establish the Mood or Climate	Provide a <i>WELCOME</i> , Avoid put downs and bad jokes.
Complete Essentials	Restrooms, breaks, registration, tests, etc.
Clarify and Establish Knowledge Base	Do a round robin of the class by going around the room and having each student give their backgrounds, years of experience, family, hobbies, career goals, or anything they want to share.

ICONS	Ch22 Gaskets & Sealants
         	<p><b>1. SLIDE 1 CH22 Gaskets &amp; Sealants</b></p> <p><b>2. SLIDES 2-3 EXPLAIN OBJECTIVES</b></p> <p><b>Check for ADDITIONAL VIDEOS &amp; ANIMATIONS @ <a href="http://www.jameshalderman.com/">http://www.jameshalderman.com/</a> WEB SITE REGULARLY UPDATED</b></p> <p><b>4. SLIDES 4-6 EXPLAIN Introduction</b></p> <p><b>7. SLIDE 7 EXPLAIN Figure 22-1 Gaskets are used in many locations in engine</b></p> <p><b>ANIMATION: GASKETS &amp; SEALING AREAS</b>  <b><a href="http://www.myautomotivelab.com">WWW.MYAUTOMOTIVELAB.COM</a></b>  <small><a href="http://media.pearsoncmg.com/ph/chet/chet_myautomotivelab_2/animations/a1_animation/chapter32_fig_32_1/index.htm">HTTP://MEDIA.PEARSONCMG.COM/PH/CHET/CHET_MYAUTOMOTIVELAB_2/ANIMATIONS/A1_ANIMATION/CHAPTER32_FIG_32_1/INDEX.HTM</a></small></p> <p><b>DISCUSSION: REFER TO FIGURE 22–1 AND HAVE STUDENTS TALK ABOUT ALL THE DIFFERENT TYPES OF GASKETS THAT ARE USED TO SEAL DIFFERENT ENGINE PARTS</b></p> <p><b>DEMONSTRATION: SHOW DIFFERENT TYPES OF GASKETS THAT ARE USED TO SEAL THE ENGINE. STRESS DIFFERENCES BETWEEN GASKETS THAT ARE USED FOR EXTREME HEAT &amp; PRESSURE AND THOSE USED FOR LOW PRESSURE &amp; LOW HEAT</b></p> <p><b>8. SLIDE 8 EXPLAIN Head Gaskets</b></p> <p><b>9. SLIDE 9 EXPLAIN Figure 22-2 Gaskets help prevent leaks between two surfaces.</b></p> <p><b>10. SLIDES 10-15 EXPLAIN Head Gaskets</b></p> <p><b>16. SLIDE 16 EXPLAIN Figure 22-3 typical perforated steel core head gasket with a graphite or composite facing material.</b></p> <p><b>17. SLIDE 17 EXPLAIN Figure 22-4 solid steel core head gasket with a nonstick coating, which allows some movement between the block and the head, and is especially important on engines that use cast-iron blocks with aluminum cylinder heads.</b></p> <p><b>DEMONSTRATION: SHOW EXAMPLES OF PERFORATED STEEL CORE AND MULTILAYERED STEEL GASKETS. DISCUSS MATERIALS USED IN EACH TYPE OF GASKET AND HOW THEIR DESIGN ENHANCES THEIR FUNCTION.</b></p>

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	<p>18. SLIDE 18 EXPLAIN Head Gaskets</p> <p>19. SLIDE 19 EXPLAIN Figure 22-5 armor ring can be made from steel or copper.</p> <p>20. SLIDES 20-22 EXPLAIN Head Gaskets</p> <p>23. SLIDE 23 EXPLAIN Figure 22-6 Multilayer steel (MLS) gaskets are used on many newer all-aluminum engines as well as on engines that use a cast block with aluminum cylinder heads. This type of gasket allows the aluminum to expand without losing the sealing ability of the gasket.</p>
	<p><b>DISCUSSION: ASK THE STUDENTS TO TALK ABOUT WHY DIFFERENT TYPES OF GASKET SEALERS ARE NEEDED AND WHERE AND WHEN THEY SHOULD BE USED.</b></p>
	<p>24. SLIDES 24-26 EXPLAIN Head Gaskets</p> <p>27. SLIDES 27-32 EXPLAIN Cover Gasket Materials</p> <p>33. SLIDE 33 EXPLAIN Figure 22-7 Left to right: Cork-rubber, paper, composite and synthetic rubber (elastomer) gaskets.</p> <p>34. SLIDE 34 EXPLAIN Cover Gasket Materials</p> <p>35. SLIDE 35 EXPLAIN Figure 22-8 Rubber-coated steel gaskets have replaced many oil pan gaskets that once had separate side rail gaskets and end seals.</p> <p>36. SLIDE 36 EXPLAIN Cover Gasket Materials</p>
	<p><b>DEMONSTRATION: SHOW DIFFERENCE BETWEEN FORMED IN PLACE GASKETS &amp; NON-FORMED GASKETS WHEN USED TO SEAL BETWEEN ENGINE PARTS</b></p>
	<p><b>DEMONSTRATION: SHOW DIFFERENT TYPES OF GASKETS &amp; MATERIALS EACH GASKET USES TO PERFORM ITS SEALING JOB. (EG: CORK GASKETS, FIBER GASKETS, SYNTHETIC GASKETS, RUBBER-COATED METAL GASKETS, FORMED IN PLACE GASKETS, &amp; PLASTIC/RUBBER GASKETS)</b></p>
	<p>37. SLIDE 37 EXPLAIN Figure 22-9 Formed in place gaskets often use silicone rubber and are applied at the factory using a robot. Check gasket manufacturers for the correct gasket replacement.</p>

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	<p>38. SLIDE 38 EXPLAIN Cover Gasket Materials</p> <p>39. SLIDE 39 EXPLAIN Figure 22-10 typical intake manifold gasket showing the metal washer at each fastener location which keeps the gasket from being compressed too much.</p> <p><b>DEMONSTRATION: SHOW THE DIFFERENCE BETWEEN FORMED IN PLACE GASKETS AND NON-FORMED GASKETS WHEN USED TO SEAL BETWEEN ENGINE PARTS</b></p>
	<p>40. SLIDES 40-41 EXPLAIN Gasket Failures</p> <p>42. SLIDE 42 EXPLAIN Figure 22-11 This intake manifold gasket was damaged due to fretting. Newer designs allow for more movement between the intake manifold and the cylinder head.</p>
	<p><b>DEMONSTRATION: SHOW EXAMPLES OF DIFFERENT HEAD GASKET FAILURES. SHOW THEM DIFFERENT PLACES THAT CAN FAIL ON GASKETS AND WHY THEY FAIL. DISCUSS WHAT CAUSES GASKET TO FAIL IN EACH AREA OF HEAD GASKET.</b></p>
	<p><b>DEMONSTRATION: SHOW INTAKE MANIFOLD GASKET FAILURES CAUSED BY THE DIFFERENT EXPANSION RATES OF CAST IRON &amp; ALUMINUM &amp; MOVEMENT OF PARTS WHEN HEATED &amp; COOLED.</b></p>
	<p><b>DISCUSSION: ASK THE STUDENTS TO DISCUSS WHY GASKETS SHOULD NEVER BE REUSED WHEN ASSEMBLING ENGINE PARTS.</b></p>
	<p>43. SLIDES 43-44 EXPLAIN Oil Seals</p> <p>45. SLIDE 45 EXPLAIN Figure 22-12 A rear main seal has to be designed to seal oil from leaking around the crankshaft under all temperature conditions.</p>
	<p><b>HANDS-ON TASK: WITH AN ASSORTMENT OF SEALS, HAVE STUDENTS DETERMINE WHICH SIDE OF THE SEAL FACES THE ENGINE.</b></p>
	<p>46. SLIDE 46 EXPLAIN Oil Seals</p>
	<p><b>DISCUSSION: ASK THE STUDENTS TO TALK ABOUT WHAT A BOLT TORQUE SEQUENCE IS AND WHY IT IS NECESSARY</b></p>

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	<p>47. SLIDES 47-49 EXPLAIN Assembly Sealants</p> <p>50. SLIDE 50 EXPLAIN Figure 22-13 Room-temperature vulcanization (RTV) is designed to be a gasket substitute on non-machined surfaces. Be sure to follow the instructions as printed on the tube for best results.</p> <p>51. SLIDE 51 EXPLAIN Assembly Sealants</p>
	<p><b>DEMONSTRATION: SHOW STUDENTS WHERE RTV GASKET SEALERS ARE APPLIED ON ENGINE PARTS. SHOW WHERE ANAEROBIC GASKET SEALERS ARE APPLIED TO CERTAIN ENGINE PARTS AND SURFACES</b></p>
	<p>52. SLIDE 52 EXPLAIN Figure 22-14 Anaerobic sealer is used to seal machined surfaces. Always follow the instructions on the tube for best results.</p> <p>53. SLIDE 53 EXPLAIN Figure 22-15 strength of the thread locker depends on whether the fastener is to be removed by hand (blue). High-strength thread locker (red) can only be removed if heated</p>
 	<p><b>DEMONSTRATION: SHOW STUDENTS HOW TO USE (BLUE) THREAD LOCKING SEALER AND WHERE TO USE (RED) THREAD LOCKING SEALER. DEMONSTRATE DIFFERENCES IN USAGE BY TRYING TO LOOSEN EACH PART ON WHICH BLUE &amp; RED THREAD LOCKER WERE USED. <u>DISCUSS RESULTS.</u></b></p>
	<p>54. SLIDES 54-57 EXPLAIN Assembly Sealants</p> <p>58. SLIDE 58 EXPLAIN Figure 22-16 Applying antiseize compound to the threads of a bolt helps prevent the threads from galling or rusting.</p> <p>59. SLIDE 59 EXPLAIN Chart 22-1 Summary chart showing where sealants are used and their common trade names</p>
 	<p><b>DEMONSTRATION: SHOW DIFFERENCE BETWEEN BLIND TAPPED THREADED HOLE &amp; TAPPED THREADED HOLE THAT GOES INTO AN OPEN CHAMBER LIKE BLOCK COOLANT PASSAGE</b></p> <p><b>DISCUSSION: ASK STUDENTS TO DISCUSS WHY SEALERS ARE USED ON BOLTS THAT ARE THREADED INTO COOLANT PASSAGES BUT NOT ON BLIND BOLT HOLES.</b></p>

<b>ICONS</b>	<b>Ch22 Gaskets &amp; Sealants</b>
	<p><b>SEARCH INTERNET: HAVE STUDENTS USE INTERNET TO RESEARCH AN ENGINE GASKET COMPANY OF THEIR CHOICE. COLLECT ALL THE INFORMATION AVAILABLE ON HOW GASKETS ARE MADE, WHAT MATERIALS ARE USED, AND THE PURPOSES FOR EACH GASKET. REPORT OUT THE FINDINGS AT THE NEXT CLASS.</b></p>