



# System Review

## Instruction guide for initial pre-audit and annual system review

The System Review is a potent and cost-effective tool that guides you step-by-step through all necessary points that must be checked during the initial pre-audit, and then annually. It is most effective when used on a mobile device (tablet or smartphone) via the CALMS application.

*Note: Always ask the customer for permission before taking pictures.*

Follow Review steps: Notes   System details   Efficiency   Reliability   Potential Savings

1. Begin the compressed air system review with an introductory meeting, then proceed to the compressor room. Record any issues with the compressed air system, and photograph the entire installation before continuing with the distribution and demand-side inspection (this may also be part of a waste-leak audit).
2. **Notes:** Discuss with the customer any identified issues with the compressed air system. Utilize predefined and user (expert only) – predefined questions.
3. **System details:** Fill out the System Details page and note the equipment in the compressor room: - record compressor data, take pictures of name-plates and panels - document dryer data, take pictures of nameplates and HMI - gather receiver data and photograph receivers with a pressure gauge. Also, photograph the compressor room and PI&D schematics or sketch them in Setup -> schematics.
4. **Efficiency:** Complete the System Efficiency page.
5. **Reliability:** Fill in the System Reliability page.
6. **Potential savings:** Correct if necessary auto-suggested savings and estimate %savings. Generate a System Review report.
7. Optional: Conduct a waste audit: - carry out a leak survey using a selected ultrasound detector - identify artificial demands - spot inappropriate uses - add significant compressed air users with data.

*Note: All data and fields must be fulfilled otherwise system review is incomplete.*

## 1 Content

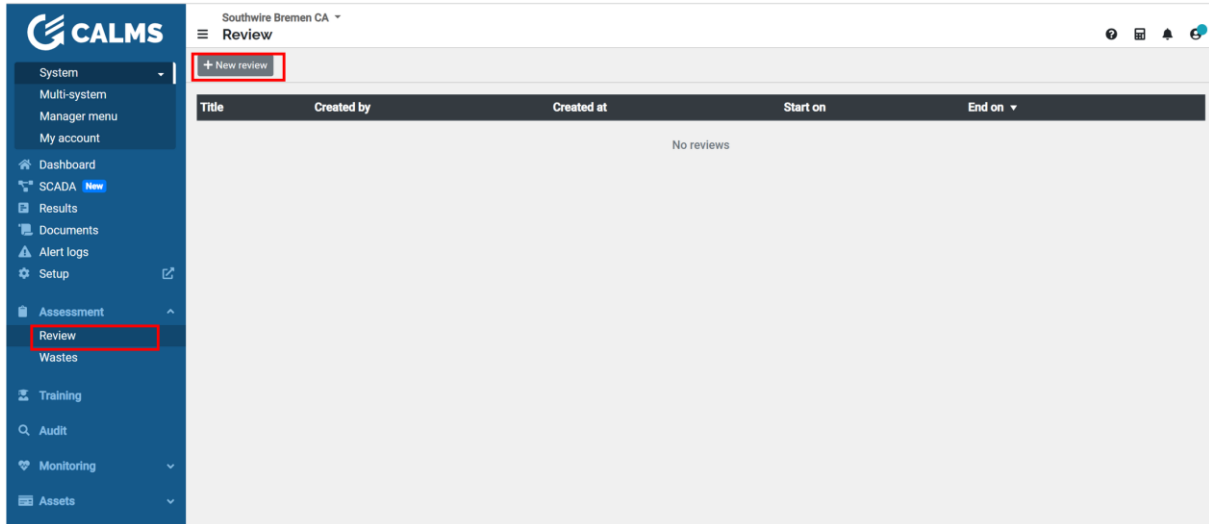
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## 2 Open new or existing system

Create new system (only for CALMS partners) under Manager menu select Create new system.

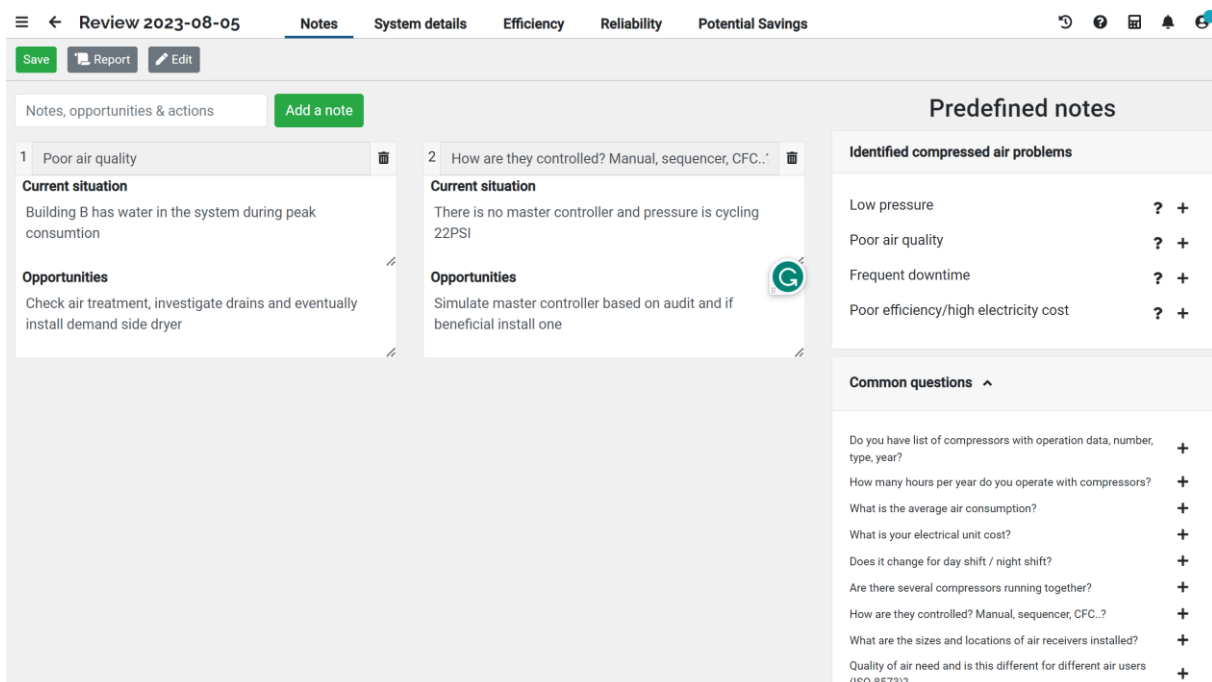
In case system is already created select the **system** under System menu.

- **Open Review under Assessment**
- **+ New review** (we recommend to set end on date with duration of 1 year)



## 3 Notes

Start with Notes menu, select with + predefined questions, problems or write own. Purpose of notes is to get list of opportunities, record information about the system. Take and link pictures, sort notes and return to notes whenever needed during system review.



## 4 System details

1. Collect system data,
2. With link check major **system setup** and create **PI&D schematics**, draw PI&D under **Setup/Equipment** menu with as many data and pictures of equipment as possible (based on linked pictures you can enter data later). Return back to System review.
3. Enter the **compressor data** (if PI&D is completed all the data will copy to this page), use loaded/unloaded hours to estimate operation to estimate annual consumption.
4. Record **Compressed air cost** from customer books, with help of CALMS calculator or CALMS TCO tool.
5. Under **Estimation** use Auto or enter manual data for annual consumption to estimate system efficiency and compare to the best in class based on system data.

Review 2023-08-05
Notes
System details
Efficiency
Reliability
Potential Savings

Save
Report
Edit

**System data**

Annual operating hours	<input type="text" value="8760"/>	h	Max operating pressure	<input type="text" value="0"/>	psi
Electricity cost	<input type="text" value="0.08"/>	\$/kWh	Pressure setpoint	<input type="text" value="0"/>	psi
CO2 emission	<input type="text" value="0.22"/>	kg/kWh ?	Min operating pressure	<input type="text" value="0"/>	psi
			Dryer type	<input type="text" value="No dryer"/>	
			Compressed air system type	<input checked="" type="radio"/> Oil flooded <input type="radio"/> Oil free	

Check system setup, PI&D diagram and target KPIs [Open](#)

**Compressor data**

Tag	Name - model	OEM	Control type	Year of manufacture	Nominal power	Reporting period			Utilisation rate average output	Annual energy consumption	
						Running hours	Loaded hours	Unloaded hours			
C.01		<input type="text" value=""/>	Fixed speed	<input type="text" value=""/>	<input type="text" value=""/>	<input type="text" value=""/>	<input type="text" value=""/>	<input type="text" value=""/>	0	0 %	0 kWh
		Required field.		Required field.	Required field.	Required field.	Required field.	Required field.			

[ADD COMPRESSOR](#) Total: 0 kWh

**Compressed air cost**  \$ /US gal [Fill from total cost of ownership](#)

**Estimation**

Auto
Manual

Annual energy consumption:	0 kWh	Average power:	0 kW
Annual air consumption:	0 US gal	Average flow:	0 cfm

Specific power:	Best in class system - based on specific power		
Electrical cost for compressed air per year:	\$0.00	\$0.00	\$0.00
Total compressed air cost per year:	\$0.00	\$0.00	\$0.00
Annual environmental footprint CO2:	0.1	1	1

## 5 Efficiency

1. Collect data for overall efficiency score with highlighting the answers

*Note: All questions must be answered*

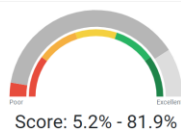
2. Press **Edit answers** button to start replying with selecting (click on the most appropriate answer), when all is selected press **Lock answer&save** button to save.

3. For each question you can use 3 icons: **Edit comment** for detail explanation, remarks, **Add images** to take some photos related to and **Marks as not applicable** in case this point is not relevant or applicable for this system

Review 2023-08-05    Notes    System details    **Efficiency**    Reliability    Potential Savings

Scan    Report    Edit

Overall efficiency score



Score: 5.2% - 81.9%

**LOCK ANSWERS & SAVE**    Missing answers to some questions. [Show missing](#)

Supply side score: 15.6% - 65.6%							
Heat recovery	<input type="checkbox"/>	<input type="checkbox"/>	None	HRC on 25% of compressors	HRC on 50% of compressors	HRC on 75% of compressors	HRC for complete system
System capacitance - storage (m3 or cf) as a percentage of normal operating flow (m3/min or cfm)	<input type="checkbox"/>	<input type="checkbox"/>	Less than 20%	20-40%	40-60%	60-80%	More than 80%
Compressor control method	<input type="checkbox"/>	<input type="checkbox"/>	Bypassing or Online / Offline - high cycling 5x min	Modulation or Online / Offline - high cycling 2x min	Online / Offline - high cycling 1x min	Online / Offline - low cycling less than 1x min	Variable speed drive
System control method	<input type="checkbox"/>	<input type="checkbox"/>	Local only		Simple sequencer		Master controller
Flow controller	<input type="checkbox"/>	<input type="checkbox"/>	No flow controller		Flow controller		Flow controller with remote monitoring
Dryer type	<input type="checkbox"/>	<input type="checkbox"/>	No dryer	Heatless desiccant	Heated desiccant	Refrigerated	Heat of compression
Pressure drop across air treatment	<input type="checkbox"/>	<input type="checkbox"/>	More than 0.7 bar (10 psi)	0.5 bar (8 psi)	0.4 bar (6 psi)	0.3 bar (4 psi)	Less than 0.2 bar (3 psi)
Condensate management	<input type="checkbox"/>	<input type="checkbox"/>	Hand valves / cracked or opened		Timed drains	No-loss drains not checked	No-loss drains regularly checked

Distribution side score: 0.0% - 60.0%							
Excessive pressure in distribution line or working pressure above minimum required (valid for instrument air 6-10 bar / 85-145 psi)	<input type="checkbox"/>	<input type="checkbox"/>	+ 2 bar (20 psi)	+ 1.5 to 2 bar (15 to 20 psi)	+ 1 to 1.5 bar (10 to 15 psi)	+ 0.5 to 1 bar (7 to 10 psi)	+ 0.5 bar (7 psi)
Main pipeline size / flow speed	<input type="checkbox"/>	<input type="checkbox"/>	More than 20 m/s (65 f/s)	18 m/s (60 f/s)	15 m/s (50 f/s)	12 m/s (40 f/s)	Less than 10 m/s (32 f/s)
Pipeline ring	<input type="checkbox"/>	<input type="checkbox"/>	No			Yes	
Piping material	<input type="checkbox"/>	<input type="checkbox"/>	Corroded steel	Carbon steel	Non metallic	Aluminium	Stainless steel
Pressure drop in distribution piping	<input type="checkbox"/>	<input type="checkbox"/>	More than 0.7 bar (10 psi)	0.5 bar (8 psi)	0.4 bar (6 psi)	0.3 bar (4 psi)	Less than 0.2 bar (3 psi)

Demand side score: 0.0% - 100.0%							
Leak management program	<input type="checkbox"/>	<input type="checkbox"/>	Not maintained	Occasional	Spot maintenance	Routine maintenance	Sustainable program
Leak rate %: (Leak flow / Avg. flow)	<input type="checkbox"/>	<input type="checkbox"/>	More than 40%	35%	30%	20%	Less than 10%
Inappropriate use awareness / management	<input type="checkbox"/>	<input type="checkbox"/>	None evident		Occasional		Sustainable program
Artificial demand awareness / management	<input type="checkbox"/>	<input type="checkbox"/>	None evident		Occasional		Sustainable program
Compressed air usage training for end-users	<input type="checkbox"/>	<input type="checkbox"/>	Never		Occasional		Regular

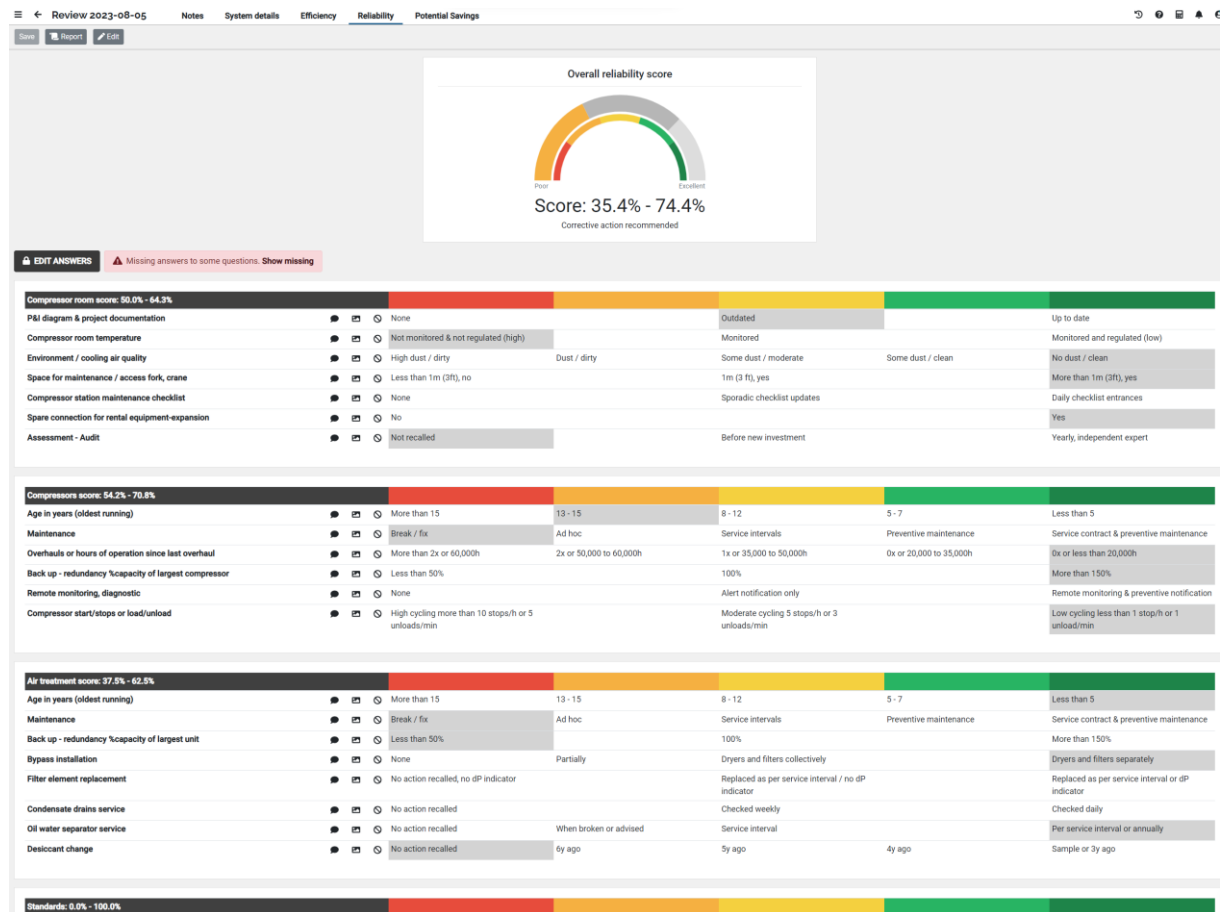
## 6 Reliability

1. Collect data for overall reliability score with highlighting the answers

*Note: All questions must be answered*

2. Press **Edit answers** button to start replying with selecting (click on the most appropriate answer), when all is selected press **Lock answer&save** button to save.

3. For each question you can use 3 icons: **Edit comment** for detail explanation, remarks, **Add images** to take some photos related to and **Marks as not applicable** in case this point is not relevant or applicable for this system



The screenshot displays the 'Reliability' section of the CALMS interface. At the top, there is a navigation bar with 'Review 2023-08-05' and tabs for 'Notes', 'System details', 'Efficiency', 'Reliability', and 'Potential Savings'. Below the navigation, there are buttons for 'Save', 'Report', and 'Edit'. The main content area features a large gauge chart titled 'Overall reliability score' showing a score of 35.4% - 74.4% with a 'Corrective action recommended' label. Below the gauge, there is a section for 'EDIT ANSWERS' with a warning icon and the text 'Missing answers to some questions. Show missing'. The interface is divided into three main sections: 'Compressor room score: 50.0% - 64.3%', 'Compressors score: 64.2% - 70.6%', and 'Air treatment score: 37.5% - 62.5%'. Each section contains a table of assessment questions with multiple-choice options and a color-coded progress bar. The 'Compressor room score' section includes questions like 'P&I diagram & project documentation', 'Compressor room temperature', 'Environment / cooling air quality', 'Space for maintenance / access fork, crane', 'Compressor station maintenance checklist', 'Spare connection for rental equipment-expansion', and 'Assessment - Audit'. The 'Compressors score' section includes 'Age in years (oldest running)', 'Maintenance', 'Overhauls or hours of operation since last overhaul', 'Back up - redundancy %capacity of largest compressor', 'Remote monitoring, diagnostic', and 'Compressor start/stops or load/unload'. The 'Air treatment score' section includes 'Age in years (oldest running)', 'Maintenance', 'Back up - redundancy %capacity of largest unit', 'Bypass installation', 'Filter element replacement', 'Condensate drains service', 'Oil water separator service', and 'Desiccant change'. At the bottom, there is a 'Standards: 0.0% - 100.0%' section with a corresponding progress bar.

## 7 Potential savings

1. Check all actions, estimated compressed air cost and correct selection of **Potential actions Yes/No** and correct estimated **potential savings %**.
2. Create **Report** with using of existing template and you can always modify report with additional sections, comments, pictures...to deliver best representation on system review

