



# XIR<sup>®</sup>

## HEAT REFLECTING LAMINATED GLASS

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## MACHINERY GLAZING SOLUTIONS





# THE EVOLUTION OF XIR<sup>®</sup> GLASS

## Customer-guided development.

Having developed XIR<sup>®</sup> Glass to the highest possible standards, Dean's Autoglass introduced the product to market in 2000, highlighting its heat reflection properties whilst allowing high visibility as the product's key benefit - perfect for open cut mining projects with 24 hour operation.

We rapidly found that safety is the primary concern to all operators. XIR<sup>®</sup>

Glass has an extra layer of Polyvinyl Butyral (PVB) and PET in the laminate, making it more resistant to impact / intrusion and, importantly, to incidental breakages which can quickly escalate to large cracks due to the vibration of the equipment.

The mining sector specifies XIR<sup>®</sup> Glass for its intrusion resistance, heat reflection, visual clarity and sound attenuation - all contributing to operator safety, comfort and minimised equipment downtime.



Designed for use in heavy industry, XIR<sup>®</sup> is the ultimate safety glass for installations where there is an elevated risk of glass breakage and cabin intrusion. XIR<sup>®</sup> Glass provides a safer and more comfortable work environment leading to greater productivity.

### Increased Impact Resistance

1

- Safer working environment
- Higher productivity

### Increased Resistance to Incidental Damage

2

- Less replacement cost
- Less machine downtime
- Higher productivity

### High Light Transmittance

3

- Good visibility, day and night
- No internal reflection

### Solar Control

4

- Less heat load in cabin
- Most equipment run two air-conditioners - machinery may still operate on one air-conditioner

### Sound Attenuation

5

- More comfortable work environment
- Less operator fatigue

### Dean's Autoglass - Exceptional Service

6

- Having initiated and completed the R&D for this product, Dean's Autoglass is in the best position to be able to recommend, specify and install XIR<sup>®</sup> **on-site**, minimising your downtime.

Tests show XIR<sup>®</sup> Glass is superior in strength and durability when compared with other laminated glass products in the market. Safety is enhanced by a reduction in operator fatigue due to the reduction in solar heat gain and noise attenuation properties. ([Click here to go to Performance Data Comparisons](#))

# SAFETY FIRST. ALWAYS. WITH XIR®

## Testing to ensure operator safety.

With the added combination of PET and PVB interlayers, incidental breakage (chips and cracks) are reduced, minimising machine downtime for glass replacement and improving machine and worker productivity.

More importantly, we carry out extensive laboratory testing to minimise the risk of foreign object intrusion through the glass. Operator safety is our priority as much as it is yours.

## WHY THE INDUSTRY CHOOSES XIR®



**7.52mm Clear Laminate\***



**7.52mm XIR®\***

*The result of a 2.25kg hardened steel ball dropped from a height of 3m in controlled testing.*

## Impact Testing

We applied our standard automotive impact test which comprises a 2.25kg hardened steel ball being dropped from a tower on to a 300mm square of laminated glass. Samples were from a well-known competitor versus corresponding samples of XIR® Laminated Glass.

### The summary

The 8.3mm competitor sample failed at 4 metres, with the steel ball smashing through - endangering the machine operator.

The XIR®75 7.5mm sample passed 4 drops of the steel ball from a height of 9 metres (the maximum height of the drop tower). We estimate failure at 12-15 metres and are working on a new test method to verify this in a controlled in environment.

## See the Tests and the Results



### PLAY VIDEO

Impact Test 7.52mm XIR®



### PLAY VIDEO

Impact Test 10.38mm Clear Laminate (competitor sample)



### PLAY VIDEO

Impact Test 11.52mm XIR®



COMPETITOR LAMINATED GLASS

6.38mm - 3m drop - FAIL



XIR® LAMINATED GLASS

7.5mm - 5m drop - PASS



COMPETITOR LAMINATED GLASS

10.38 - 3m drop - FAIL



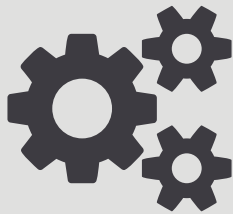
XIR® LAMINATED GLASS

XIR® 11.15mm - 9m drop - PASS



# Turn DOWN the TEMPERATURE

**XIR®** HEAT REFLECTING LAMINATED GLASS



## Spectrally Selective Film

XIR® is a spectrally selective film composed of multiple metal and metal oxide layers. The film is encased between two layers of Polyvinyl Butyral (PVB) and glass to make XIR® Heat Reflecting Laminated Glass.



## Block 99.5% UV Radiation

XIR® **blocks out 99.5%** of Ultra Violet radiation and **93%** of Infra-Red heat, while **transmitting 75% of visible light**.



## Reduce Interior Temperature

XIR® reduces the interior temperature without impairing visibility.

XIR® glass is transparent and has low reflectivity meaning you are never forced to sacrifice clarity and light transmission - **day or night**.

## Performance Characteristics



**PLAY VIDEO**

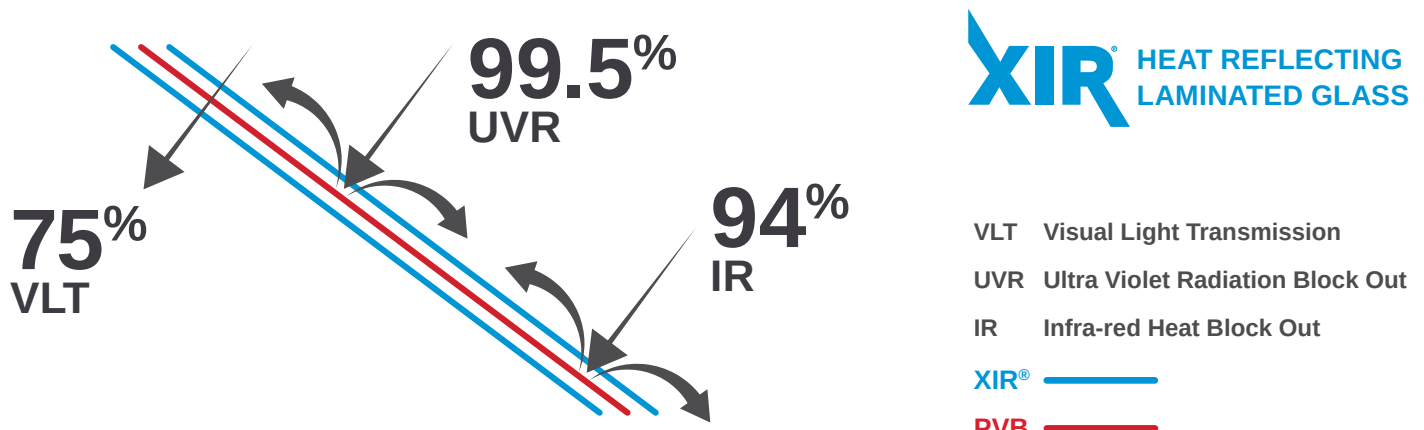
Thermal Test Clear Lami vs XIR® 7mm

PRODUCT	Visible Properties (%)			Solar Properties (%)		Solar Heat Gain Coeff.	U-Value (W/m²K)	Shading Coeff.
	Trans	Ext. Refl.	Int. Refl.	Direct Trans.	Ext. Refl.			
<b>7.52</b> CLEAR XIR® LAMINATE	74	8	7	43	24	0.53	5.69	0.61
<b>11.52</b> CLEAR XIR® LAMINATE (H1032)	72	8	8	39	21	0.52	5.45	0.6

## Performance Data

GLASS TYPE FOR COMPARISON	Visible Light Transmittance (Tvis)	Visible Reflectance Exterior %	Total Solar Transmittance (Tsol)	Solar Reflectance Exterior %	Reflective Heat Gain Btu's / Hr / Ft²	Ultra Violet Blockage %
Clear Glass	90	9	81	8	220	30
US Standard Auto Green Tint	81	8	56	6	171	55
US Spectrally Absorbing Green	74	7	44	5	150	70
<b>XIR® 70</b>	70	9	46	22	117	>99
<b>XIR® 75</b>	75	11	52	23	135	>99

NOTE: XIR® Laminated Glass is two plies of 2.1mm clear glass with XIR-PVB interlayer. Source: Southwall Technologies USA 07/31/98





# EASY ON THE EARS

Noise attenuation for  
operator comfort.

The acoustic properties of the noise dampening Polyvinyl Butyrol Resin (PVB) plus heat reflective Poly Ethylene Terephthalate interlayer **diminishes the transmission of high frequency noise by 8 decibels and low frequency noise by around 5 decibels.**

The operator benefits from improved acoustic comfort and increased hearing safety levels.

Safety in risk areas  
is enhanced by the  
strength of XIR® as  
well as reducing  
operator fatigue.



## Sound Control at a Glance

Laminated glass with XIR® interlayer reduces more low frequency sound than standard laminate with PVB interlayer.

### SOUND TRANSMISSION LOSS (TL), dB

Frequency (Hertz)	100	125	160	200	250
STANDARD LAMINATE WITH PVB INTERLAYER	25	26	28	27	29
STANDARD LAMINATE WITH XIR® INTERLAYER	29	29	30	27	28

## Before & After Reglaze - A Case Study (1)

A study carried out by a local accredited acoustics specialist measured noise levels before and after reglazing ROC L8 drill rigs with XIR®75 7.5mm Heat Reflecting Laminated Glass.

The report states:

**Table 1 - RESULTS OF NOISE MEASUREMENTS, dB L<sub>Aeq</sub>**

	Operation					
	A/C Only		Engine Operating		Engine Operating on High (2000 rpm)	
	High	Medium	Low (1200 rpm)	High (2000 rpm)	With A/C	With Compressor
BEFORE	-	-	72	81	-	-
AFTER GLAZING WITH XIR®	70	66	70	78	79	79

“With regards to the [client] specification for the ROC L8 drill rigs, the requirements are as follows:

- Air-conditioning noise levels be no more than 65 dB(A); and
- Engine noise be no more than 80 dB(A).

Comparing *Table 1* with the above, it is noted that the engine noise complies with the specification, whilst the noise from the air-conditioning exceeds by 5 dB when on high speed and is marginal when on medium speed.

With regards to the air-conditioning noise, this may not be considered an issue since it is not at a level that will cause hearing damage (as defined in the *Mines Safety and Inspection Regulations 1995*) and will not significantly contribute to the in-cab noise levels when the engines are running.

We trust the above information is acceptable and if you have any queries, please do not hesitate to contact me.

Regards,

Tony George  
Lloyd George Acoustics”

## This Machine Didn't Pass the Max 82dB Test - A Case Study (2)

Noise and vibration measurements of EPIROC ROC L8(30) Drill Rig were undertaken on-site under typical operating conditions with the rig stationary (1500 rpm) and drilling into hard rock on a flat section of quarry. Drilling conditions were: 0.4 metres per minute drill speed, 40 bar rotational pressure, 18 bar air pressure and 70 bar feed pressure.

Measuring equipment had been laboratory calibrated and was field calibrated before and after the measurement session.

### Summary of results:

In-cab noise levels were 76 dB (A) with the air-conditioning off and 78 dB(A) with air-conditioning on full.

External noise levels ranged from 86 to 93 dB(A). The calculated sound power level for the vehicle was 119 dB(A).

For vibration, the r.m.s. acceleration in the longitudinal (z) direction was  $a_{wz}$  0.105 m/s<sup>2</sup>. In the transverse (x and y) directions measured in the r.m.s. values were  $a_{wx}$  0.054 m/s<sup>2</sup> and  $a_{wy}$  0.047 m/s<sup>2</sup> respectively. The 8 hour equivalent vibration exposure level was determined to be  $A(8)$  0.11 m/s<sup>2</sup>. Note, that in addition to complying with the client's specification requirements of  $A(8) < 1.15$  m/s<sup>2</sup> (the EU daily exposure limit), the measured vibration level also meets the more stringent EU daily exposure action value, which is  $A(8) \leq 0.50$  m/s<sup>2</sup>.

### The data:

#### Machine and testing details

Make: EPIROC      Model: ROC L8(30)      Serial Number: AVO 08A1120  
 Tested/measured by: Lloyd George Acoustics. Michael Cake  
 Equipment Used: Bruel & Kjaer 2260 (sn 2311736) / Svan 948 (sn 9862) with SV39A seat accelerometer

#### Internal noise levels, dB(A)

Specified Noise Level Limit	82 dB(A), 12 hours	
	Machine Operating Condition	
Position	Stationary High Idle (No A/C)	Stationary High Idle (A/C on Full)
Operator's Ear	76	78
Notes:	Tested whilst drilling into hard rock at 0.4m/min at 1500 rpm. Measured at operator's ear.	

#### Whole Body Vibration Levels, m/s<sup>2</sup>

Specified Vibration Limit	$A(8) < 1.15$ m/s <sup>2</sup>			
	Directional Vibration (r.m.s.)			
Position	x	y	z	$A(8)$
Operator's Seat	0.054	0.047	0.105	0.11
Notes:	Tested whilst drilling into hard rock at 0.4m/min at 1500 rpm. Measured at operator's seated position.			

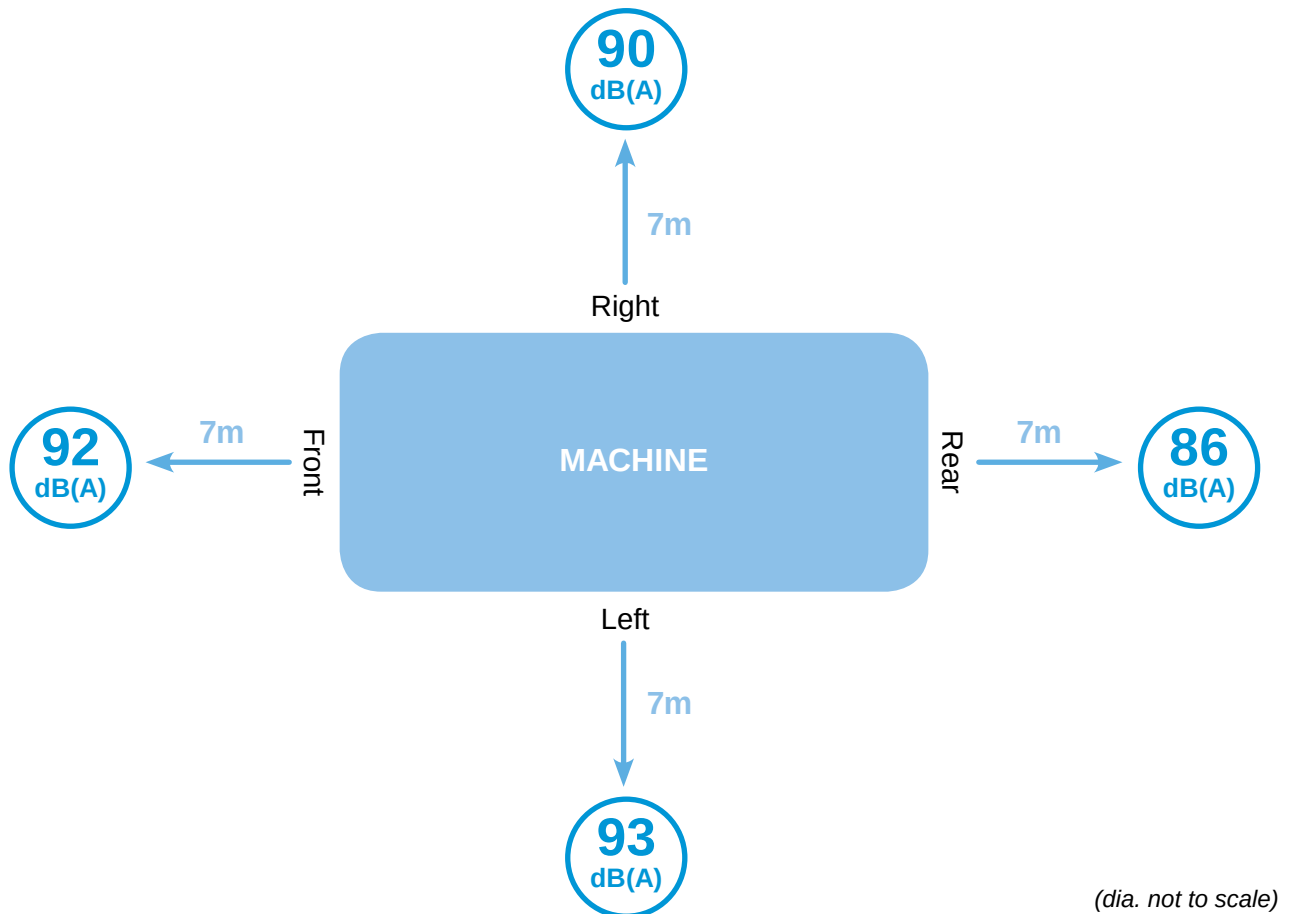


## A Case Study (2) continued.

The data continued:

### External Noise Levels at Stationary High Idle, dB(A)

Measurement Distance	7m
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Calculated Sound Power Level (SWL)	119 dB(A)
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	Position	Frequency (Hertz)						
		63	125	250	500	1k	2k	4k
Octave Band Sound Pressure Level (dB(A))	Front	77	76	73	82	87	87	84
	Right	72	70	72	80	85	85	79
	Rear	65	62	70	78	81	82	77
	Left	75	75	73	83	87	88	85
Notes:		Tested whilst drilling into hard rock at 0.4m/min at 1500 rpm.						



# XIR® HEAT REFLECTING LAMINATED GLASS

## Certifications for Land Vehicles

See the following for:

- AS/NZS 2080:2006  
Safety Glazing for Land Vehicles
- AS 2080:2019  
Safety Glazing for Land Vehicles

## Right to Display PAS-Mark (Certification Solutions International Pty Ltd)

Certificate of Conformance enabling XIR® Glass to display the PAS-Mark logo for Safety Glazing for Land Vehicles and for Safety Glazing Materials in Buildings.





## PRODUCT COMPLIANCE SCHEDULE

# PT Bintang Mas Glassolutions

### Address:

Jl. Yos Sudarso KM 1, 5 Bedali Lawang, Malang Jawa Timur 65215, Indonesia.

This schedule identifies the Certified Product(s) on which the PAS-Mark and CSI Licence Number may be used.

## AS/NZS 2080:2006 Safety glazing for land vehicles

Product Description	Flat heat-treated toughened safety glass with or without obscuration bands for use as side and/or rear windows, excluding windscreens.
Type	Heat treated, toughened safety glass – Type “T”
Nominal Glass Thickness	4mm to 12mm Float glass
Maximum Glass Size	Max Furnace dimensions: 3mm: 1250 mm (W) x 3000 mm (L) 4-12mm: 2440 mm (W) x 5100 mm (L)
Glass Colours	Plain Clear Float, Bronze, Green and Grey.

*This schedule supersedes any previously issued schedule.*

CSI Licence Number:  
Certification Issue Date:  
Certification Expiry Date:  
CSI Certificate Number:

**7271**  
18 November 2021  
22 October 2022  
CSI Lic No. 7271 - 2021 – 11 – S3-R1

Certification Review Date: 15 November 2021  
Next Annual Review Date: 24 October 2022  
CSI Database ID Number: 1000126

  
Azma Khan  
Managing Director



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## PRODUCT COMPLIANCE SCHEDULE

# PT Bintang Mas Glassolutions

**Address:**

Jl. Yos Sudarso KM 1, 5 Bedali Lawang, Malang Jawa Timur 65215, Indonesia.

This schedule identifies the Certified Product(s) on which the PAS-Mark and ID. Number may be used.

### AS 2080:2019 Safety glazing for land vehicles

<b>Product Description</b>	Flat or curved PVB laminated safety glass. Clear or tinted, with or without obscuration bands.
<b>Type of Laminated Safety Glass</b>	WHP Windscreen HP High Performance Laminate
<b>Nominal Glass Thickness</b>	6mm to 12mm
<b>Maximum Glass Size</b>	2440mm (W) x 3660mm (L)
<b>Interlayer Thickness</b>	0.76mm or 1.52mm (PVB). 0.80 mm TriLam XIR film, 0.76 mm to 3.04 mm Sentryglas Plus / SGP
<b>PVB brand</b>	Decent, Trosifol, Eastman TriLam, Kuraray SGP
<b>Glass Colours</b>	Clear, Green, Grey, Bronze.

*This schedule supersedes any previously issued schedule.*

**CSI Licence Number:** 7271  
**Certification Issue Date:** 18 November 2021  
**Certification Expiry Date:** 22 October 2022  
**CSI Certificate Number:** CSI Lic No. 7271 - 2021 - 11 - S6-R1

**Certification Review Date:** 15 November 2021  
**Next Annual Review Date:** 24 October 2022  
**CSI Database ID Number:** 1000126

  
 Azma Khan  
 Managing Director



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*This Certificate of Conformance has been issued to confirm that.*

## PT Bintang Mas Glassolutions

**Address:**

Jl. Yos Sudarso KM 1, 5 Bedali Lawang, Malang Jawa Timur 65215, Indonesia.

The Licensee agrees to comply with the Product Assessment Scheme – Rules and Requirements, Terms and Conditions and is entitled to use the PAS-Mark as shown above, on products manufactured under the PAS-Mark Scheme a program assessed by Certification Solutions International Pty Ltd to ensure the manufacturing process has the capability to consistently produce products in compliance with:

### AS 2080:2019 Safety glazing for land vehicles

<b>CSI Licence Number:</b>	<b>7271</b>	<b>Certification Review Date:</b>	15 November 2021
<b>Certification Issue Date:</b>	18 November 2021	<b>Next Annual Review Date:</b>	24 October 2022
<b>Certification Expiry Date:</b>	22 October 2022	<b>CSI Database ID Number:</b>	1000126
<b>CSI Certificate Number:</b>	CSI Lic No. 7271 - 2021 - 11 - C2-R1		

*This certificate shall be read in conjunction with the accompanying Product Compliance Schedule. Subject to the client complying with the Product Assessment Scheme, Rules & Requirements, this certificate shall be renewed annually.*

  
 Azma Khan  
 Managing Director



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## ⚙️ Important facts about windscreens

- It is illegal in all states of Australia to apply film to a windscreen and to tint a windscreen below the shade band.
- An automotive windscreen must transmit at least 75% of visible light. A high level of Visible Light Transmission is essential in maintaining a clear, unobstructed view for the driver or vehicle operator and passengers.
- **XIR® Heat Reflecting Laminated Glass is the only autoglass that will maintain unimpeded visibility and block out heat.**
- Glass radiates 70% of the heat generated in the passenger compartment of a vehicle - 30% of this is through the front windscreen.
- In a Standard Green Laminated Windscreen the PVB will cut out approximately 99% of Ultra Violet light Radiation. **The distinct advantage of XIR® is that it will also halve the heat entering the vehicle through the glass.**

## ⚙️ Technical terms

### Infra-Red Radiation (IR)

Infra-red is the portion of the solar spectrum that is responsible for the heat we feel directly from the sun. Infra-red causes heat to build up in vehicles. Interior fixtures, such as the dashboard and upholstery, retain the heat generated by IR. Over time, this can cause fading and cracking, reducing the life span of interior surfaces.

### Ultra Violet Radiation (UV)

Ultra Violet radiation is the part of the solar spectrum that is responsible for the fading of interior surfaces such as fabric, carpet and paints. UV can also cause serious skin damage. The intensity of UV is affected by numerous factors, primarily the season and time of day.

### Visible Light (VLT)

Visible Light is the portion of the solar spectrum that is visible to the human eye. Visible Light also generates some heat.

### Solar Spectrum

The light and radiation generated by the sun. Made up of Ultra Violet, Infra-red and Visible Light.

## ⚙️ Product characteristics

XIR® Heat Reflecting Laminated Glass incorporates XIR® Spectrally Selective film encased in two layers of PVB. XIR® is an 'intelligent film' that can differentiate between the three types of radiation that make up the solar spectrum. XIR® Heat Reflecting Laminated Glass is the ONLY autoglass that can halve the heat entering a vehicle cabin through glass.

- UV radiation block-out **99.5%**
- Infra-red heat block out **94%**
- Visible light transmittance **75%**
- Composition **Sputter coated, multiple metal and metal oxide layers**
- Width **Up to 2 metres**
- Test Compliance **ANSI Z26.1 - AS-1. ECE Reg. #43**





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